



May 25, 2018

Larry Williams
State Supervisor
South Florida Ecological Services
U.S. Fish & Wildlife Service
1339 20th Street
Vero Beach, Florida 32960-3559

RE: Review of the Endangered Status of the Florida Key Deer

Dear Mr. Williams,

The undersigned organizations, **Key Deer Protection Alliance**, **Last Stand**, **Center for Biological Diversity**, **Sierra Club**, and **Sierra Club Florida**, write to express their concern and to provide their comments regarding the review of the status of the Florida Key deer by the U.S. Fish & Wildlife Service (Service).

As reported in a February 6, 2018 article in *The Miami Herald*, it appears the Service is engaging in a review of the species' status under the Endangered Species Act (ESA), without public notice.¹ It is unclear to the undersigned organizations whether the Service is engaging in a 5-year review of the species status (last conducted more than five years ago in 2010), a species status assessment (SSA), or otherwise engaging in a review based upon a petition or other data available to the Service.

The relative secrecy of this review process stands in stark contrast to the manner in which the Service conducted its five-year review of the species in 2010, other species' status assessments, which are listed on the Service's website, as well as numerous other five-year reviews in recent years. For example, the Florida panther was noticed in the federal register for public comment as recently as June 2017.² If the Service is performing a 5-year review, ESA regulations require notice to be published in the Federal Register. *See* 50 C.F.R. §424.21. We are aware of no such notice appearing in the Federal Register.

¹ Jenny Staletovich, "Feds quietly reconsider protected status for endangered Florida Key deer," (February 6, 2018), <http://www.miamiherald.com/news/local/environment/story.html>.
² *See* U.S. Fish and Wildlife Service, Endangered and Threatened Wildlife and Plants 5-Year Status Review of 23 Southeastern Species, 82 Fed. Reg. 29916 (June 30, 2017).

Endangered species protection is at the core of the undersigned organizations' missions. For the **Key Deer Protection Alliance (KDPA)**, the protection of the Key deer is its very namesake. KDPA was established nearly three decades ago to save the Key deer from extinction through education and habitat protection. The mission of the **Center for Biological Diversity** is to secure a future for all species, great and small, hovering on the brink of extinction. The Center's southeast office is particularly concerned about Florida's coastal species which face threats from historic to ongoing habitat destruction and sea-level rise. **Last Stand** has been committed to protecting the quality of life with particular emphasis on the natural environment of the Florida Keys for over thirty years, and has worked diligently for the protection of the Key deer. **The Sierra Club** is the nation's oldest grassroots organization. Sierra Club has long advocated for protections for Florida species under the Endangered Species Act, including litigation to ensure the FWS meets its obligations. Sierra Club's affiliate in Florida, **Sierra Club Florida**, has 38,000 members throughout the state. It has conducted public education and advocacy campaigns to protect Florida's endangered species and their habitat since 1970.

It is deeply concerning that members of the public, as well as leading conservation organizations who have made substantial contributions toward the protection of this species, were not notified of this review process. To the extent the Service is reviewing the status of the Key deer, it should publish a notice in the Federal Register, *see* 50 C.F.R. §424.21, to ensure it receives *all* best available information on the status of and threats to the species and engages in an open and transparent process, complete with a peer review.

In the meantime, we write to provide the agency with our comments and the best available science relevant to the ongoing threats to Florida Key deer survival. The information in this letter will assist the Service in its review of this imperiled species. As demonstrated by this letter, the scientific evidence supports continuing to list the species as endangered. The New World Screwworm killed 135 deer since 2016, more than 200 deer may have been killed by Hurricane Irma, vehicular collisions and habitat loss continue to threaten the population, and sea-level rise presents a host of new challenges for the continued survival of this species in the wild. These enduring threats and others continue to warrant listing of the Florida Key deer as endangered. Moreover, as surveys conducted in the wake of Hurricane Irma show continued severe population losses associated with long-term impairment of habitat conditions, any assertion that the species is at present resilient to hurricanes of comparable strength is based on conjecture. The Service must wait until the population actually shows evidence of bouncing back rather than assuming that it will.

I. The Six Criteria for the Reclassification of the Florida Key Deer from Endangered to Threatened Have Not Been Met.

The Multi-Species Recovery Plan identifies six criteria for the reclassification of Key deer from endangered to threatened: (1) Further loss, fragmentation, or degradation of suitable, occupied habitat in the Lower Keys has been prevented; (2) Native and non-native nuisance species have been reduced by 80 percent; (3) All suitable, occupied habitat on priority acquisition lists for the Lower Keys is protected either through land acquisition or cooperative agreements; (4) Key deer habitat is managed, restored, or rehabilitated on protected lands; (5) Stable populations of Key deer are distributed throughout its historic range; and (6) Two additional stable populations have been established along the periphery of the historic range of the Key deer. These populations will be considered demographically stable when they exhibit a stable age structure and

have a ratio of increase equal to or greater than 0.0 as a 7-year running average for 14 years.³ These criteria have not been met, therefore reclassification is not supported.

A. Criteria #1: Further loss, fragmentation, or degradation of suitable, occupied habitat in the Lower Keys has not been prevented.

The Florida Keys are home to over 30 species of threatened and endangered species and encompass one of the most biodiverse ecosystems in the United States.⁴ The resources of the region prompted the Florida legislature to designate it as an Area of Critical State Concern in 1979.⁵ This designation is intended to protect environmental or natural resources of regional or statewide importance.⁶ Yet habitat destruction due to development remains a constant threat. In 2012, the Florida Department of Economic Opportunity and local governments identified 8,758 vacant parcels in Monroe County.⁷ Since the last 5-Year Review, the Service has identified 8,205 at-risk parcels intersecting 6,746 acres of habitats that may be used by the Key deer.⁸ There is also an additional 3,510 acres of at-risk lands outside Monroe County's parcel layer not subject to the Rate of Growth ordinance.⁹ The greatest number of at-risk parcels (4,925 parcels or 60%) are on Big Pine and No Name Keys,¹⁰ where the largest percentage of the Key deer population occurs.¹¹ In 2006, the Service issued an incidental take permit/habitat conservation plan (ITP/HCP) to Monroe County, Florida Department of Transportation, and Florida Department of Community Affairs for adverse effects to listed species from development on Big Pine and No Name Keys.¹² The ITP/HCP authorizes take of more than four (4) Key deer per year and 168 acres of Key deer habitat over a 20-year period.¹³

Although a Rate of Growth Ordinance (ROGO) remains in place and the Monroe County Tier System was implemented in 2006 to protect environmentally sensitive lands from development,¹⁴ the region remains under constant development pressure. The current ROGO allows for the construction of 197 new units every year¹⁵ and this month Governor Scott proposed 1,300 new building allocations.¹⁶ The County's population has risen by nearly 6,000 people from April 1, 2010 to July 1, 2016 according to U.S. Census data.¹⁷ This population growth and development puts the Key deer and many other listed species at risk, as a significant percentage of Key deer habitat remains unprotected,

³ United States Fish & Wildlife Service, Multi-Species Recovery Plan for South Florida, Key Deer, 4-3-4-24 (1999).

⁴ Monroe County, Monroe County Year 2030 Comprehensive Plan, 1, April 13, 2016, at <https://www.monroecounty-fl.gov/DocumentCenter/Home/View/4606>.

⁵ *Id.*

⁶ *Id.*

⁷ Hurricane Evacuation Clearance Time Memorandum of Understanding By and Between the Florida Department of Economic Opportunity and the County of Monroe, City of Key West, Islamorada, Village of Islands, City of Layton, City of Key Colony Beach, City of Marathon, and Florida Division of Emergency Management, 3, August 2, 2012, at <https://www.monroecounty-fl.gov/DocumentCenter/Home/View/4484>.

⁸ United States Fish & Wildlife Service, Key Deer Assessment Guide, July 29, 2013, at https://www.fws.gov/verobeach/ConservationinKeysPDFs/20130729_updated%20Key%20Deer%20Assessment%20Guide.pdf.

⁹ *Id.*

¹⁰ *Id.*

¹¹ *Id.*; U.S. Fish & Wildlife Service, Key Deer (*Odocoileus virginianus clavium*), 5-Year Review: Summary and Evaluation, 8, Aug. 2010.

¹² Key Deer Assessment Guide, *supra* note 8.

¹³ *Id.*

¹⁴ See Monroe County, Florida, "Tier System," at <https://www.monroecounty-fl.gov/192/Tier-System>.

¹⁵ Monroe County Year 2030 Comprehensive Plan, 3, *supra* note 4.

¹⁶ Key West Citizen, "Scott surprises County with ROGO's," (May 3, 2018) at www.keysnews.com/article/story/scott-surprises-county-with-rogos/

¹⁷ United States Census Bureau, Quick Facts, Monroe County, Florida, at <https://www.census.gov/quickfacts/fact/table/monroecountyflorida#viewtop>

particularly in higher elevation sites where habitats such as tropical hardwood hammocks occur.¹⁸ Karim and Main (2009) determined that total remaining hammock habitat throughout the Keys encompassed 3,712 hectares (ha) with 1,750ha remaining in the Lower Keys (among 102 patches).¹⁹ Of these 1,750ha, 27% remained unprotected.²⁰ Illegal clearing also appears to be on the rise. In 2017, at least 17 properties were cleared illegally in the Lower Keys following Hurricane Irma.²¹ A report prepared by Zwick and Carr (2006) found that by 2060 all vacant land in the Keys is projected to be consumed by development, including lands not necessarily accessible by automobile.²²

B. Criteria #2: The removal of native and non-native nuisance species remains ongoing.

The removal of exotic and invasive species remains an ongoing task for property managers. The Monroe County Land Steward manages all of the County's conservation lands, including mitigation properties for the HCP/ITP that is in place on Big Pine and No Name Keys.²³ It appears that as recently as 2016, the Land Steward, with assistance from the County's contracted crew of exotic plant technicians and other contractors, has conducted numerous invasive exotic plant removal projects, site cleanups, and native plantings on the mitigation lands.²⁴ Larger-scale work was performed on parcels within Sands, Eden Pines, Palm Villa, and Bahia Shores subdivisions.²⁵ While these efforts are commendable, two hundred (200) properties have up to ten percent (10%) aerial coverage of exotic and invasive species.²⁶ Fifty-nine (59) mitigation parcels have invasive infestation levels greater than ten percent (10%) aerial coverage.²⁷ Seven (7) of these parcels were acquired in 2016, and it appears they have not yet been restored.²⁸ The greatest concentration of invasive exotics occurring on Monroe County mitigation lands on Big Pine Key is in the Sands subdivision.²⁹ The County continues to make progress on the eradication of exotics in Sands, and additional invasive and exotic removal projects are planned for the future.³⁰ These projects, however, are subject to available funding.³¹ The Monroe County Land Steward continues to monitor and treat exotic and invasive species on mitigation lands.³² The control of invasive and exotic species on Refuge lands appears to remain ongoing and a federal court recently overturned the Service's ability to regulate the interstate transport of injurious species under the Lacey Act, which would have otherwise helped keep invasive species at bay.³³

C. Criteria #3: All suitable, occupied habitat on priority acquisition lists for the Lower Keys is protected either through land acquisition or

¹⁸ Karim, A. & Main, M. 2009. Habitat fragmentation and conservation strategies for a rare forest habitat in the Florida Keys archipelago, *Urban Ecosystems* 12(3): 359-370.

¹⁹ *Id.*

²⁰ *Id.*

²¹ Theresa Hava, "Illegal clearing figures double in Key Largo," *Keysnews.com* (Nov. 8, 2017), at <https://keysnews.com/article/story/illegal-clearing-figures-double-in-key-largo/>.

²² Zwick, P. & Carr, M. 2006. Florida 2060, A Population Distribution Scenario for the State of Florida. Available at <http://www.1000friendsofflorida.org/connecting-people/florida2060/>

²³ Monroe County, Florida, Monroe County 11th Annual Key Deer HCP Monitoring Report, 6 (Jan. 1, 2016-Dec. 31, 2016).

²⁴ *Id.*

²⁵ *Id.*

²⁶ *Id.* at 4.

²⁷ *Id.* at 28.

²⁸ *Id.* at 9.

²⁹ *Id.* at 15.

³⁰ *Id.*

³¹ *Id.*

³² *Id.*

³³ *U.S. Ass'n of Reptile Keepers, Inc. v. Zinke*, 852 F.3d 1131 (D.C. Cir. 2017).

cooperative agreements.

In the Service's 2010 Five-Year Review, the agency stated, "although roughly 71 percent of potential deer habitat has been acquired for conservation purposes, a sizeable portion (29%) remains at risk to development."³⁴ The Service further remarked, "[a] growing concern is the reduced purchasing power of acquisition funds available for the State's Florida Forever Program and the amounts available for allocation in the Keys."³⁵ Since the Service expressed these concerns, the Florida legislature has slashed funding for the Florida Forever program. Between 1990 and 2008 the state spent on average \$275 million annually on Florida Forever and its predecessor program (Preservation 2000).³⁶ Funding was cut by 94% between 2008 and 2015³⁷, and the program received zero funding in the 2017 legislative session.³⁸ Just this year the Legislature dedicated \$101 million to Florida Forever³⁹, but it is unclear what, if any, money will be available to fund acquisition efforts in the Florida Keys under the Florida Forever program in the near future. All the while, the cost of land continues to rise.

D. Criteria #4: Key deer habitat is not managed, restored, or rehabilitated on protected lands.

The Service recognized in its last 5-Year Review for the species that "[h]abitat maintenance and restoration of conservation lands are critical components for long-term viability of Key deer. However, the ability to manage ecosystem processes effectively may be partially limited by available resources (e.g. funding, staffing) and other constraints (e.g., land ownership patterns, knowledge of best management practices)."⁴⁰ Since then, the National Key Deer Refuge has experienced significant changes. "During the beginning of 2015, refuge staff was dramatically reduced by scheduled staff transitions and the introduction of replacement staff was gradual throughout the year."⁴¹ Staff turnover likely contributed to likely underreported Key deer mortalities in 2015.⁴² Also, the Refuge system's only Key deer biologist recently left the National Key Deer Refuge.

E. Criteria #5: Stable populations of Key deer are not distributed throughout its historic range.

Stable populations depend in large part on the availability of fresh water. The availability of fresh water is a primary determinant of Key deer distribution.⁴³ But fresh water is not plentiful on the Florida Keys. Various activities and events have diminished, and continue to diminish, the amount of fresh water that is available to deer and other species.

As the Service observed in 2010:

³⁴ 5-Year Review: Summary and Evaluation, 5-6, *supra* note 11.

³⁵ *Id.* at 6.

³⁶ Anderson, 2018. *More Money for Florida Forever, but environmentalists still suing*, Herald-Tribune, Mar. 18, 2018.

³⁷ Dixon, 2015. Florida Forever funding cut 94% since 2008. Tc Palm. June 15, 2015. Accessed at <http://www.tcpalm.com/news/florida-forever-funding-cut-94-since-2008-ep-1137241031-332549492.html>.

³⁸ <http://www.miamiherald.com/news/local/environment/article148862139.html>.

³⁹ Anderson, 2018, *supra* note 36.

⁴⁰ 5-Year Review: Summary and Evaluation, 6, *supra* note 11.

⁴¹ HCP Monitoring Report, 5, *supra* note 23.

⁴² *Id.* at 5-6.

⁴³ Habitat Conservation Plan for the Florida Key Deer (*Odocoileus virginianus clavium*) and other Protected Species on Big Pine Key and No Name Key, Monroe County, Florida, April 2006 Revision, *available at*

<https://www.fws.gov/uploadedFiles/Big%20Pine%20Key%20HCP%20Final%20Version%204-12-06.pdf>.

Freshwater resources, naturally limited in the Keys, have been eliminated or degraded due to development. Additionally, roads, subdivisions, and other developments have disrupted the natural ebb and flow of sloughs and other surface and groundwater systems. The distribution and persistence of freshwater strongly influences the distribution of Key deer. The occurrence of perennial water holes is important to each subpopulation because they provide freshwater during the dry season, allowing for year-round residency. Loss of water holes has a widespread, long-term, detrimental impact to deer, particularly outside the core.⁴⁴

Big Pine Key is underlain by two subterranean freshwater lenses.⁴⁵ In both lenses, freshwater floats on top of the underlying saltwater.⁴⁶ Changes occur seasonally due to tidal influences and rainfall-dependent freshwater recharge.⁴⁷ Development, including dredge and fill activities and road building, has altered the natural hydrology of many islands within the refuge.⁴⁸ Over the past several decades, extensive canals were dug to create waterfront property. In addition, more than 60 miles of ditches on Big Pine Key were dug in the 1960s to drain freshwater wetlands for mosquito control.⁴⁹ These practices have accelerated the natural discharge of freshwater lenses, decreasing the size of the lens by 20 percent, and “have likely had a substantial impact on the natural hydrology and flow patterns across the island landscape.”⁵⁰

Unsurprisingly, permanent sources of freshwater occur only in a few places, which include pinelands. “Key deer preferentially utilize [pinelands] for the permanent freshwater sources that are critical to survival of the species.”⁵¹

As the 2006 HCP explains:

Throughout the Keys, freshwater wetlands are restricted to areas landward of the seasonal high tide line and in the Lower Keys are found in areas underlain by freshwater lenses. The persistence of freshwater ecosystems is limited primarily by freshwater availability, tidal influence, and human activities, including direct and indirect effects of development such as draw-down and contamination. During the dry season, freshwater lenses of Big Pine Key can diminish by as much as 50 percent. Freshwater wetlands are located in the northern and central portions of Big Pine Key but are present in one parcel on No Name Key and represent 689.4 and 3.4 acres, respectively.

This habitat type is dominated by sawgrass (*Cladium jamaicense*) and spikerush (*Eleocharis* spp.). Forested freshwater systems in the Keys are generally pinelands with a sawgrass understory. Freshwater wetlands are typically found in isolated, seasonally flooded depressions with elevations of +3.0 feet National Geodetic Vertical Datum (NGVD) or less and may be found in conjunction with pinelands. Freshwater wetlands provide critical habitat for several listed species, in particular the Key deer and Lower Keys marsh rabbit (*Sylvilagus palustris*

⁴⁴ 5-Year Review, 5 (internal citations omitted), *supra* note 11.

⁴⁵ U.S. Department of the Interior, Fish and Wildlife Service, Southeast Region, Lower Florida Keys National Wildlife Refuges, Comprehensive Conservation Plan, 20 (Oct. 2009).

⁴⁶ *Id.*

⁴⁷ *Id.*

⁴⁸ *Id.* at 84.

⁴⁹ *Id.* at 20.

⁵⁰ *Id.*

⁵¹ Habitat Conservation Plan for the Florida Key Deer, *supra* note 43.

hefneri). These habitats and surface waters represent the only dry season source of freshwater for wildlife and play an important role in attenuating nutrients and other contaminants in surface water runoff.⁵²

Hurricanes can cause significant damage to pinelands and the freshwater wetlands that occur there. Pine rocklands cannot tolerate saltwater, and flooding events from hurricanes and sea-level rise pose the greatest risk to pinelands. Flooding can occur due to storm surges, and this form of saltwater intrusion killed many pines following hurricanes Georges (1998) and Wilma (2005).

Since Hurricane Irma, the area has received significantly less rainfall than in previous years. With the exception of October 2017, which experienced higher than average rainfall, rainfall amounts between September 2017 and March 2018 were 69% less than the climate normal period between 1980-2010.⁵³ Consequently, as discussed in greater detail in section III, there appear to be fewer palatable freshwater sources on Big Pine and No Name Keys. This lack of rainfall is not uncommon following hurricanes in the Keys. There was a drought after Hurricane Wilma, which led to the prolonged mortality of pine trees. It is estimated that the area lost about 30% of all pine trees in the years following Wilma.⁵⁴

In 2009, the Refuge identified the need for predictive models and long-term monitoring data on water quality and quantity of surface freshwater solution holes and underground freshwater lenses as well as the condition and extent of tidal habitats to detect changes from sea-level rise due to climate change.⁵⁵ The results from these studies would be used to design and implement projects to restore hydrologic conditions to maintain freshwater wetlands, improve water flows and tidal connections, and ameliorate impacts associated with hurricane storm surges.⁵⁶ It is not clear whether any monitoring and restoration activities have been performed on the Refuge since the Comprehensive Conservation Plan (CCP) was finalized. The Refuge has not reported the results of any salinity testing since October 24, 2017 (which was an above-average month for rainfall). The need for consistent salinity monitoring and these longer-term projects is even more critical given the impacts of Hurricane Irma and the long-term effects of an increasing rise in sea level.

F. Criteria #6: It is unclear whether two additional stable populations have been established along the periphery of the historic range of the Key deer.

The status of Key deer populations on Sugarloaf and Cudjoe Keys (as well as backcountry islands) remains unclear. Citing earlier research, the Service remarked as recently as last year that Key deer “have decreased to near extirpation on more distant islands such as Cudjoe and Sugarloaf Keys.”⁵⁷ The CCP for the Lower Florida Keys Refuges notes that more than 30 deer were translocated to suitable habitat on Cudjoe and Sugarloaf Keys in recent years.⁵⁸ The CCP emphasizes the importance of monitoring these populations stating, “the fate of these herds must be monitored over time to assess the efficacy of translocation as an effective management strategy to ensure the long-term

⁵² *Id.*

⁵³ See attached climate data from the National Climatic Data Center.

⁵⁴ See NPR, Science Friday, September 15, 2017, Remarks by Danielle Ogurcak, at <https://www.sciencefriday.com/segments/how-hurricane-irma-could-affect-floridas-endangered-species/>.

⁵⁵ Comprehensive Conservation Plan, 84, *supra* note 45.

⁵⁶ *Id.*

⁵⁷ United States Fish & Wildlife Service, Biological Opinion for Section 10(a)(1)(A) Permit Application for specific research/recovery activities under the Southeast Region blanket permit TE 697819-4, 4 (Jan. 12, 2017)(internal citations omitted).

⁵⁸ Comprehensive Conservation Plan, 32, *supra* note 45.

viability of the species. Deer on backcountry islands also need to be monitored. To date, detailed demographic studies have only been conducted at the core population on Big Pine and No Name Keys.”⁵⁹ We are not aware of any population monitoring in these areas since the CCP identified the need for population monitoring in 2009. Compounding the absence of any population counts is the lack of signage in the area. Between January 1, 2016 and April 16, 2017 there were thirteen (13) Key deer mortalities along US 1 off of Big Pine Key.⁶⁰

II. The Current Species Status Indicates an Endangered Listing is Still Appropriate.

In addition to the six criteria not being met under the Recovery Plan, new information about Key deer biology, population trends, distribution, abundance, demographics, genetics, and conservation status has been made available since the Service’s last Five-year Review in 2010. This new information continues to support a determination that the species remains endangered.

A. Population abundance, densities, and demographics support an endangered listing.

Population estimates published between 2000-2005 range from 600-800 total Key deer, with 60-75% of the population occurring on Big Pine and No Name Keys.⁶¹ In 2006, the total Key deer population was estimated at about 650.⁶² From 2006-2010, the Service indicated that no significant changes were observed in the population levels.⁶³

Based on data collected between 2013 and the first quarter of 2014, Villanova et. al. (2017), determined that the Key deer population had continued to increase from their historic population size of around 25 individuals to an estimated census size of approximately 1,000 individuals with a “heavily skewed female-biased adult sex ratio.”⁶⁴ Villanova, et. al. (2017) stated, however, that management must continue to monitor the census size of the population to evaluate the population stability of the species⁶⁵ and recognized the need for future studies to obtain “more accurate estimates of fetal sex ratio and methods to reduce female mortality.”⁶⁶ Villanova, et. al. (2017) expected that the population would persist into the next 50 years “under continued management practices.”⁶⁷

⁵⁹ *Id.*

⁶⁰ See attached maps.

⁶¹ Institute of Renewable Natural Resources. Texas A&M. 2016. Florida Key Deer Screwworm Final Report (Phase I). Unpublished report to National Key Deer Refuge, South Florida Ecological Service Field Office (citing Lopez, R.R. 2001. Population ecology of Florida Key deer. Dissertation, Texas A&M University, College Station, Texas, USA; Lopez, R.R., N.J. Silvy, B.L. Pierce, P.A. Frank, M.T. Wilson, and K.M. Burke. 2004. Population density of the endangered Florida Key deer. *Journal of Wildlife Management* 68:570-575; Roberts, C.W. 2005. Estimating density of Florida Key deer. M.S. thesis, Texas A&M University. Texas A&M University, available at <http://hdl.handle.net/1969.1/3812>).

⁶² U.S. Fish & Wildlife Service, Biological Opinion for the Department of Homeland Security’s Federal Emergency Management Agency’s Administration of the National Flood Insurance Program in Participating Communities in Monroe County, Florida, 34 (April 30, 2010).

⁶³ *Id.*

⁶⁴ Villanova, L., Hughes, P.T., Hoffman, E.A., 2017. Combining genetic structure and demographic analyses to estimate persistence in endangered Key deer (*Odocoileus virginianus clavium*), *Conservation Genetics* 18:1061-1076.

⁶⁵ *Id.*

⁶⁶ *Id.*

⁶⁷ *Id.*

Further, although the study was published in 2017, initial sampling occurred from April 2013 through May 2013 and a second session occurred from July 2013 until March 2014.⁶⁸ Since Villanova, et. al. (2017) collected their data, however, the Key deer population has been severely impacted by disease and Hurricane Irma. Thus, that study does not take into account the series of recent events that have significantly impacted the Key deer population.

The Population Has Declined Due to a New World Screwworm Outbreak

In 2016, 135 deer died as a result of an outbreak of the New World Screwworm.⁶⁹ This represents approximately 15% of the Key deer population at the time.⁷⁰ Following the Screwworm outbreak, researchers with the Institute of Renewable Natural Resources at Texas A&M University estimated the population to be approximately 844 deer throughout the species' range.⁷¹

Monroe County's 11th Annual Monitoring Report on the Habitat Conservation Plan for the Key Deer and Other Protected Species further documents the impacts of the Screwworm on the Key deer population and supports a much lower total population count than that reported by Villanova et. al (2017). The report finds that the total mortality count (all known mortalities from all causes) on Big Pine and No Name Keys in 2016 was 277.⁷² This is a significant increase from the yearly mortality counts reported from 2010-2014. During that time there was a yearly average of 162 Key deer mortalities in Big Pine and No Name Keys.⁷³ (Data from 2015 should not be considered in comparing previous years as it appears there were possible reporting errors, such that the number of deer deaths were likely underreported).⁷⁴ The report explains:

This total is the highest recorded, and was due to the number of deaths attributed to the outbreak of New World screwworm, *Cochliomya hominivorax*. Of the 130 recorded deaths from screwworm in 2016, 126 (97%) occurred within the core islands of Big Pine and No Name Keys. There were 151 non-screwworm-related deaths in the core, of which 109 (72%) were caused by deer-vehicle collisions (DVC). Additional human involved anthropogenic deer mortalities such as poaching, drowning, and entanglement accounted for 10 additional deaths (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.⁷⁵

The monitoring report concludes that “estimates place the reduction of the herd for 2016 at around 15%.”⁷⁶

The Species Has Experienced Further Population Declines Due to Hurricane Irma

⁶⁸ *Id.*

⁶⁹ <https://wfsc.tamu.edu/texas-am-institute-helping-find-key-to-preserving-endangered-florida-deer/>.

⁷⁰ Florida Key Deer Screwworm Final Report, *supra* note 61.

⁷¹ *Id.*

⁷² Monroe County, Florida, Monroe County 11th Annual Key Deer HCP Monitoring Report, 4 (Jan. 1, 2016-Dec. 31, 2016).

⁷³ *Id.* at 5. Data from 2015 should not be considered in comparing previous years as it appears there were possible reporting errors, such that the number of deer deaths were likely underreported.

⁷⁴ *Id.* at 5-6.

⁷⁵ *Id.* 4-5.

⁷⁶ *Id.* at 5.

Following the Screwworm outbreak in 2016, Hurricane Irma made landfall on Big Pine Key and No Name Key in September 2017. While the Service determined in the early months following the storm that 21 deer perished,⁷⁷ preliminary research shows that the Key deer may have not fared as well as the Fish & Wildlife Service previously indicated. A survey conducted on Big Pine and No Name Keys after Hurricane Irma yielded the lowest average deer count (43) of all surveys conducted from 2010-2017.⁷⁸ This is a dramatic decrease from the average deer count of ninety-seven (97) between January and August of 2017.⁷⁹

Research by Parker et. al. with the Institute of Renewable Natural Resources at Texas A&M University (2017) also finds that there may have been a significant decline in the population following Hurricane Irma. “Road survey data suggests on average a decrease in the Key deer population by -22.99% post-storm. Average deer observed also was compared between fall 2016 and fall 2017 and estimated to range between -14 to -24% decrease in the average Key deer observed.” The researchers explain:

In calculating the percent population changes 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, mean, and upper monthly estimates. Estimated percent population changes ranged from -1.32% to -49.47%, with the average being approximately 22.99%. Assuming the upper confidence interval population estimates pre-storm, these percent population changes ranged as high as -37.94% to -67.59%.⁸⁰

Parker et. al. (2017) recommended that “a second population estimate be obtained in December/January to overcome some of the biases previously mentioned.”⁸¹ Specifically, the team recommended the following actions:

- 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. Alternatively, use of unmanned drones also can serve to obtain a separate population estimate and compare/validate some of the potential biases mentioned here.
- 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 recovery of freshwater holes.⁸²

Notably, in a letter dated May 7, 2018, Daniel Clark, the Refuge Manager for the Florida Keys National Wildlife Refuges Complex stated that based on 59 surveys conducted since Hurricane Irma, the population on Big Pine Key and No Name Key is now estimated to be only 573 individuals combined. (*See attached*). The letter also indicated that additional surveys would be conducted in May.

⁷⁷ News Release, “Key Deer Population Makes it Through Another Major Incident,” U.S. Fish & Wildlife Service, October 19, 2017, *available at*, <https://www.fws.gov/nwrs/threecolumn.aspx?id=2147607912>.

⁷⁸ <https://www.fws.gov/uploadedFiles/FWS%20HCP%20Report%202017.pdf>.

⁷⁹ *Id.*

⁸⁰ I. D. Parker, M. Grassi, R. R. Lopez, N. J. Silvy. 2017. Florida Key Deer Hurricane Irma Report. Texas A&M Natural Resources Institute. College Station, Texas. 9 pages.

⁸¹ *Id.*

⁸² *Id.*

The Service should not draw any conclusions about the resilience of the populations on Big Pine Key and No Name Key to hurricanes of a severity comparable to Irma until it has actually *observed* a resilient response. At present, it appears that the survey data shows only a serious population decline, and that further study is necessary to document and interpret the long-term response to this event.

Moreover, the Service must consider that events like Hurricane Irma are expected to increase due to climate change, and that similarly devastating hurricanes are thus more likely in the future than they have been historically.⁸³

The Population Remains Threatened By Sea-Level Rise

In addition to the impacts the Screwworm and Hurricane Irma have had on the population since Villanova et. al. (2017) collected their data, overall population figures must also be considered over the longer term as the species faces one of the most significant threats over the next 50-100 years -- sea level rise. Recent research by Reece et. al. (2013) and Benscoter et. al. (2013) has shown that the Key deer is highly vulnerable to the impacts of sea-level rise and likely has low adaptive capacity.⁸⁴ As explained in greater detail in section III, the studies concluded that the species should be a high priority in federal and state conservation efforts.⁸⁵

Summary

Disease and a Category 4 hurricane have significantly impacted the Key deer population and point to a much smaller current population than that which the Service has recently suggested. Sea-level rise will be an ever-increasing threat, particularly over the next 50-100 years as discussed in greater detail below. These threats underscore the importance of continued and, in some instances, increased management actions to protect this highly vulnerable species. Moreover, the impacts of these threats demonstrate that recent predictions of persistence may need to be reevaluated, as the population may be less resilient to the cumulative effect of these threats than posited based on prior data.

B. The Species Is Genetically Unique.

Key deer have been found to be genetically unique relative to mainland white-tailed deer, and have numerous physical and behavioral characteristics, which distinguish them from their mainland sister taxon. Anthropogenic influences have also impacted the natural history of the Key deer.⁸⁶

⁸³ See, e.g., Balaguru, K., Judi, D.R. & Leung, L.R. Future hurricane storm surge risk for the U.S. gulf and Florida coasts based on projections of thermodynamic potential intensity, *Climatic Change* (2016) 138: 99. <https://doi.org/10.1007/s10584-016-1728-8> (“[O]ur results indicate a median increase in storm surge ranging between 25 and 47 %, with changes in hurricane intensity increasing future storm surge by about 10 % relative to the increase that may result from sea level rise alone...”).

⁸⁴ See Reece, J.S., Noss, R.F., Oetting, J. Hocter, T., and Volk, M. 2013. A Vulnerability Assessment of 300 Species in Florida: Threats from Sea Level Rise, Land Use, and Climate Change. *PLoS ONE* 8(11): e80656. doi: 10.1371/journal.pone.0080658; Benscoter A.M., Reece, J.S., Noss, R.F., Brandt, L.A., Mazzotti, F.J., et. al. 2013. Threatened and Endangered Subspecies with Vulnerable Ecological Traits Also Have High Susceptibility to Sea Level Rise and Habitat Fragmentation. *PLoS ONE* 8(8): e70647. doi:10.1371/journal.pone.0070647.

⁸⁵ See *id.*

⁸⁶ Villanova, et. al., *supra* note 64.

Additional research since the Service's last Five-Year Review continues to support these findings. Villanova et. al. (2017) examined the genetic structure and demographics of the Key deer and found that Key deer are genetically isolated from mainland white-tailed deer and that there is a lack of genetic substructure between islands on which they occur.⁸⁷ The researchers further found that there is enough diversity to uniquely identify individual deer and determined that female survival and fetal sex ratio were the main drivers of species persistence.⁸⁸

Comparing Key deer to mainland populations of white-tailed deer, Villanova et. al. (2017) found that there was high haplotype diversity among and within mainland populations, while genetic diversity was greatly reduced in the Keys.⁸⁹ Key deer all contained a single mtDNA haplotype, with nuclear markers that supported a single panmictic population between Big Pine Key and No Name Key.⁹⁰ The study also identified a reduced level of allelic richness relative to mainland deer, supporting the lack of gene flow between Key deer and mainland deer.⁹¹

C. The Range of the Key Deer Has Contracted Significantly and Has Decreased the Overall Viability of the Species.

The historical range of Key deer likely extended from Key Vaca to Key West.⁹² Due to habitat loss caused by development and other factors⁹³ the species' range has contracted and the current distribution is from Johnson Keys to Sugarloaf Keys.⁹⁴ Areas such as Marathon and Key West no longer support deer.⁹⁵ The entire current range of the Florida Key deer occurs on 11 island complexes.⁹⁶ Each of these 11 complexes contain a subpopulation and these subpopulations are divided into three geographic categories: 1) core sub-populations on the mainline Keys, (2) non-core subpopulations on mainline Keys, and (3) non-core subpopulations on outer Keys.⁹⁷ The subpopulations on Big Pine Key and No Name Key constitute the core of the Key deer metapopulation.⁹⁸ The largest concentration of Key deer (about 75 % of the entire population) is found on Big Pine Key.⁹⁹

Although population numbers have increased significantly from historical lows (25 individuals) the Service explained in 2017 that the contraction in the species' range "has decreased the overall viability of the Key deer population by increasing the probability that a stochastic event, such as a hurricane or disease epidemic, may have catastrophic impacts to the core population on and around Big Pine Key."¹⁰⁰ Moreover, on Big Pine and No Name Keys, residential and commercial construction, with the associated creation of canals, fencing, and clearing, has damaged essential components of deer habitat, including vegetation and freshwater resources.¹⁰¹ The deer that occur within this core subpopulation are located in "small, isolated and fragmented habitats within a very

⁸⁷ *Id.*

⁸⁸ *Id.*

⁸⁹ *Id.*

⁹⁰ *Id.*

⁹¹ *Id.*

⁹² Biological Opinion for Section 10(a)(1)(A) Permit Application, 3 *supra* note 57.

⁹³ 5-Year Review: Summary and Evaluation, 4-6, *supra* note 11.

⁹⁴ Biological Opinion for Section 10(a)(1)(A) Permit Application, 3 *supra* note 57.

⁹⁵ *Id.*

⁹⁶ 5-Year Review: Summary and Evaluation, 8, *supra* note 11.

⁹⁷ *Id.*

⁹⁸ *Id.*

⁹⁹ Key Deer Assessment Guide, *supra* note 8.

¹⁰⁰ Biological Opinion for Section 10(a)(1)(A) Permit Application, 4 *supra* note 57.

¹⁰¹ *Id.*

restricted range. Even though large parcels of land are in public ownership and protected, Key deer utilize private property and require additional areas to maintain a viable population.”¹⁰² It is unclear, at least in the short term, where these additional areas will become available, particularly as development continues to occur in the area and land conservation programs including Florida Forever have been cut drastically by the Florida Legislature as previously discussed.

D. Habitat and Ecosystem Conditions Have Deteriorated.

Key deer prefer upland habitats including pine rocklands and tropical hardwood hammocks.¹⁰³ Big Pine Key and No Name Key contain the largest areas of pine rockland habitat in the Florida Keys.¹⁰⁴ Silvy & Lopez (2012) estimated 1,988 acres of these habitats occur on Big Pine Key and 517 acres on No Name Key.¹⁰⁵ Climate change and sea-level rise are altering and reducing Florida Key deer habitat across the species’ range.¹⁰⁶ A 1-2 foot rise in sea level, which could occur by mid-century, will result in a significant loss of habitat for the core metapopulation on Big Pine and No Name Keys.¹⁰⁷ In addition to the loss of these upland cover types, the number of watering holes will also likely decrease.¹⁰⁸ These impacts are discussed in detail below.

III. The Key Deer Warrants Continued Protections As An Endangered Species Under the ESA’s Five-Factor Analysis.

Over the last eight years since the 2010 5-Year Status review, threats to the Florida Key deer have mounted considerably. Under the ESA, a review of each listed species’ status at least once every five years is required. The possible outcomes of the five-year review are no change, changing in status between endangered and threatened, or delisting.

In determining the appropriate listing status, the following factors must be considered: (1) the present or threatened destruction, modification, or curtailment of its habitat or range; (2) overutilization of commercial, recreational, scientific, or educational purposes; (3) disease or predation; (4) the inadequacy of existing regulatory mechanisms; and (5) other natural or manmade factors affecting its survival.¹⁰⁹ The Service must analyze these threats synergistically and cumulatively, though threat of endangerment due to any one listing factor necessitates listing. Here, in every applicable category, the Florida Key deer faces intense threats to its continued survival and recovery. Therefore, the Key deer warrants continued listed as endangered.

A. The present or threatened destruction, modification, or curtailment of its habitat or range necessitates an endangered listing.

Development Continues to Threaten the Species

¹⁰² *Id.*

¹⁰³ Silvy, N.J. & R.R. Lopez, Sea-level Rise Impacts to Florida Key Deer, Sea-level Rise Adaptation in the Florida Keys: Conserving Terrestrial and Intertidal Natural Areas and Native Species (August 2012).

¹⁰⁴ Harley, G.L. et al., Elevation promotes long-term survival of *Pinus elliotti* var. *densa*, a foundation species of the endangered pine rockland ecosystem in the Florida Keys, 29 *Endangered Species Research* 117 (2015).

¹⁰⁵ Silvy, N.J. & R.R. Lopez, *supra* note 103.

¹⁰⁶ *Id.*

¹⁰⁷ *Id.*

¹⁰⁸ *Id.*

¹⁰⁹ 16 U.S.C. § 1533(a)(1).

Habitat destruction due to development continues to occur. Since the Service's 2010 five-year review, the size of the human population in Monroe County has actually increased by approximately 6,000 between 2010 and 2016 according to U.S. Census data.¹¹⁰ This is an increase of +8.1% since 2010. This is a marked change from the -4.1% population decrease between 2000 and 2005 that the Service cited in its 2010 five-year review.

The Level of Service (LOS) for Big Pine Key has also declined since 2013, indicating a greater number of vehicles on area roads. Monroe County routinely monitors the LOS on U.S. 1 for concurrency management purposes pursuant to Chapter 163, Florida Statutes and Monroe County Land Development Regulations.¹¹¹ "If the overall LOS for U.S. 1 falls below the LOS C Standard, then no additional land development will be allowed in the Florida Keys."¹¹² Between 2013 and 2017 the LOS for Big Pine Key has dropped from a "B" to a "C" standard of service.¹¹³ The 2015 report finds:

Segments with reserve speeds of less than or equal to 3 mph should be given particular attention when approving development applications. The Saddlebunch Keys (MM 10.5 to MM 16.5) in the Lower Keys, Big Pine Key (MM 29.5 to MM 33.0), 7-Mile Bridge (MM 40.0 to MM 47.0) and a 12 mile segment on the upper keys (5 segments) starting from Lower Matecumbe Key (MM 73.0) to Plantation Key (MM 91.5) are within the 'area of concern'; 2 of the 5 segments have no reserve volumes. The 7-Mile Bridge segment could be discarded from the concern list, since delays are mainly due to the temporary maintenance activity.

As the number of Keys residents and visitors continues to grow and place even greater demands on the ecosystem, the State has slashed funding for land acquisition under the Florida Forever program since the Service's last five-year review. There was a 94% decline in funding between 2008 and 2015¹¹⁴ and the program received zero funding in the 2017 legislative session.¹¹⁵

B. Overutilization for commercial, recreational, scientific, or educational purposes can result in unintentional take of the species.

Capturing and radio-collaring can result in unintentional take. In January 2017, the Service issued a biological opinion for the use of a blanket permit by Service personnel to conduct and oversee trapping and collaring activities as part of monitoring activities and population surveys in the Lower Florida Keys.¹¹⁶ The Biological Opinion anticipated incidental take of up to sixty adult, yearling, or juvenile Key deer annually in the form of capture and harassment.¹¹⁷ The Service permitted incidental take up to three Key deer in the form of injury or mortality.¹¹⁸

C. Disease Has Significantly Impacted the Species.

1. New World Screwworm

¹¹⁰ <https://www.census.gov/quickfacts/fact/table/monroecountyflorida#viewtop>.

¹¹¹ URS Corporation, 2015 U.S. 1 Arterial Travel Time and Delay Study, Monroe County, Florida, September 2015.

¹¹² *Id.* at 1.

¹¹³ *Id.*

¹¹⁴ Dixon, 2015, *supra* note 37.

¹¹⁵ <http://www.miamiherald.com/news/local/environment/article148862139.html>.

¹¹⁶ Biological Opinion for Section 10(a)(1)(A) Permit Application, *supra* note 57.

¹¹⁷ *Id.*

¹¹⁸ *Id.*

In 2016, the Florida Keys experienced a screwworm outbreak, which killed at least 135 deer, including 83 that were euthanized to reduce the risk of further infection.¹¹⁹ The screwworm has spread across more than 20 islands.¹²⁰ As Dr. Roel Lopez at Texas A&M University remarked last year, “[t]his was a significant blow to a species of which is uniquely located in that area and has an estimated population of just 875.”¹²¹ The loss of 135 deer represents approximately 15% of the entire population.

2. Mycobacterium avium paratuberculosis (MAP)

The Florida Key deer is also threatened by the transmission of MAP.¹²² MAP was first reported in the Key deer in 1996 on Big Pine, Key.¹²³ By 2008, eight additional MAP-positive Key deer were identified on Big Pine Key and Newfound Harbor Keys.¹²⁴ Field studies conducted from 2009 through 2011 by SCWDS found 10% of fecal pellet samples collected throughout the Key deer’s range were positive.¹²⁵ The researchers identified three MAP-positive Key deer, all of which were on Little Palm Island.¹²⁶ In addition, it is likely that following Hurricane Irma, deer have migrated from Long Beach Road (where these infections occurred) into Big Pine Key. It is not known at this time whether the disease has spread to the Big Pine Key population.

3. Disease and a Contracting Population

As the Service observed in its last five-year review of the Key deer, the density of deer on Big Pine Key and No Name Key coupled with increased habitualization and overabundance in urban areas may increase the risk of infectious disease and parasite transmission.¹²⁷ As recently as last year, the Service expressed concern in a Biological Opinion for a screwworm monitoring program that while Key deer have become more abundant on Big Pine Key and adjacent islands, the population has contracted, thereby increasing the probability that a stochastic event “may have catastrophic impacts to the core population on and around Big Pine Key.”¹²⁸ Such events could reduce numbers to the extent that road mortalities could adversely affect the population.¹²⁹ In view of the screwworm outbreak, the unknown status of MAP-deer post Hurricane Irma, and continued illegal feeding, the Service needs to closely examine the impacts these diseases have had (and may continue to have) on a contracted population.

D. Existing state regulatory mechanisms remain inadequate to protect the species.

State management of Florida Key deer would not be an appropriate or adequate substitute for the current federal protections provided under the ESA. The Florida Fish and Wildlife Conservation Commission (FWC) currently defers to the federal agency on Key deer

¹¹⁹ <https://wfsc.tamu.edu/texas-am-institute-helping-find-key-to-preserving-endangered-florida-deer/>.

¹²⁰ *Id.*

¹²¹ *Id.*

¹²² Murray HL, Yabsley MJ, Keel MK, Manning EJ, Wilmers TJ, Corn JL, Persistence of *Mycobacterium avium* subspecies paratuberculosis in endangered Key deer and Key deer habitat, *J Wild Dis.* 2014. 50(2):349-53.

¹²³ *Id.*

¹²⁴ *Id.*

¹²⁵ *Id.*; Southeastern Cooperative Wildlife Disease Study Annual Report, Annual Report, July 1, 2012-June 30, 2013, College of Veterinary Medicine, The University of Georgia, available at, <https://www.fws.gov/uploadedFiles/SCWDS%202013%20Annual%20Report.pdf>.

¹²⁶ *Id.*

¹²⁷ 5-Year Review: Summary and Evaluation, 16, *supra* note 11.

¹²⁸ Biological Opinion for Section 10(a)(1)(A) Permit Application, 4 *supra* note 57.

¹²⁹ *Id.*

regulatory decision-making.¹³⁰ While this deference depends on the subspecies being listed under the ESA, a delisting would drop the Florida Key deer into a regulatory void. Specifically, while Florida Key deer are currently included on the State’s Endangered and Threatened Species List, Key deer are only included on that state list by virtue of their existing federal status – in the event that Service delists the Key deer, the state would need to undertake a biological status review and develop a management plan.¹³¹

As a general matter, due to the inherent nature of FWC, the Service should approach any potential down-listing or delisting of terrestrial species in Florida with an added layer of scrutiny. FWC has a unique history, as it was formed by consolidating one state agency originally created by the Constitution (the Game and Fresh Water Fish Commission), and another originally created by statute (the Marine Fisheries Commission).¹³² The legislature can enact legislation in aid of FWC’s constitutional authority, but much of FWC’s authority—including much of its authority over terrestrial wildlife—comes directly from the Constitution, and therefore creates far less transparency and accountability for the agency.¹³³

This problematic regulatory scheme is further compounded by an apparent policy trend in recent years for FWC to develop management plans (such as in the case of the Florida black bear) that the agency contends are “non-regulatory” documents. For example, in the case of the Florida black bear, the management plan does not require FWC or any other agency to avoid, minimize, and mitigate impacts to bear habitat from land development (such as an applicant for an ITP under section 10 of the ESA would need to demonstrate). Instead, the Commission will provide “technical assistance” to landowners and “comments” to permitting agencies in order to minimize and avoid potential negative human-bear interactions or impacts of land modifications on the conservation and management of black bears. And even those comments and recommendations will be based on the goals and objectives of the management plan, which on its face is a non-regulatory, non-binding guidance document.¹³⁴ Moreover, as the Commission emphasizes in its management plan for the Florida black bear, Florida “statutes make clear that FWC’s comments are not binding on the regulatory agencies.”¹³⁵ And even then, FWC’s

¹³⁰ Rule 68A-27.007, Fla. Admin. Code states, “activities that result in take or incidental take of Federally-designated Endangered or Threatened Species do not require a permit from the Commission when authorized by the U.S. Fish & Wildlife Service or the National Oceanic and Atmospheric Administration’s National Marine Fisheries Service...”

¹³¹ Rule 68A-27.0012, F.A.C.

¹³² *Caribbean Conservation Corp. v. Florida Fish & Wildlife Conservation Comm’n*, 838 So. 2d 492, 494-95 (Fla. 2003).

¹³³ See, Fla. Const. art. IV § 9 (“The legislature may enact laws in aid of the commission, not inconsistent with this section”); *Caribbean Conservation Corp.*, 838 So. 2d at 501-02 (Fla. 2003) (explaining that the Constitution’s language differentiates between FWC’s powers over “wild animal and fresh water aquatic life” and its powers over “marine life,” with the latter being more limited and more statutorily - derived); *Airboat Ass’n of Florida, Inc.*, 498 So. 2d at 630 (holding that a rule governing the hunting of terrestrial animals was not subject to APA scrutiny); *Wakulla Commercial Fishermen’s Ass’n v. Florida Fish & Wildlife Conservation Comm’n*, 951 So. 2d 8, 9 (Fla. Dist. Ct. App. 2007) (explaining that FWC rules promulgated under constitutional authority “come before the court with a strong presumption of validity and must be upheld if they are rationally or reasonably related to a legitimate state interest.”); *Airboat Ass’n of Florida, Inc. v. Florida Game & Fresh Water Fish Comm’n*, 498 So. 2d 629, 630 (Fla. Dist. Ct. App. 1986) (holding that a rule on hunting wild animals was “tantamount to a legislative act,” and thus the court lacked jurisdiction to review the rule under the APA). While FWC currently chooses to abide by the APA for its rulemaking processes, it is not necessarily required to follow these processes and could change its policy at any time. See FWC, About the Rulemaking Process, <http://myfwc.com/about/rules-regulations> (last visited May 7, 2018).

¹³⁴ Florida Fish and Wildlife Conservation Commission. 2012. Florida Black Bear (*Ursus americanus floridanus*) Management Plan. p. 126, Tallahassee, FL: FWC, myfwc.com/media/2612908/bear-management-plan.pdf.

¹³⁵ *Id.*

actual track record of commenting on projects is that it at most comments on half of the more than 1,000 annual requests it receives.¹³⁶ Thus, it is quite possible that if the Service were to de-list the Key deer, there would be no regulatory mechanisms in place at the state level, and the species would be “protected” through the use of a non-regulatory management plan. This would certainly put the species in significant peril and risk of extinction -- the very outcome the ESA is designed to guard against. Accordingly, state listed species’ regulations are grossly inadequate to provide any real protection for the Florida Key deer, and this listing factor should be evaluated in favor of a continued “endangered’ listing.

E. Other natural or manmade factors affect the survival of the species.

1. Vehicle Collisions remain a leading cause of death.

Deer-vehicle collisions (DVC) remain the leading cause of death for the Florida Key deer.¹³⁷ Below are the yearly DVC mortalities since the Service’s last 5-Year status review.¹³⁸

Year	DVC
2010	103
2011	131
2012	151
2013	109
2014	121
2015	75*
2016	109

The 2015 total contained reporting errors and the number of deer deaths was likely underreported.¹³⁹ The Service’s annual Habitat Conservation Plan Summary report indicates there were 96 DVC mortalities on Big Pine Key and No Name Key in 2017.¹⁴⁰ The Refuge website, however, states, “so far in 2017, 97 Key deer have been hit by cars (updated 9 Nov 2017).”¹⁴¹ It is therefore unclear how many DVC mortalities occurred in 2017. Several DVCs also continue to occur within the Refuge.¹⁴² Data on the number of DVC mortalities in 2018 does not appear to be publicly available.

In addition, as of 2016 a cooperative agreement between Monroe County and state law enforcement officials to augment and improve the response to calls regarding deer injury

¹³⁶ Wiley, N. 2015. Letter to Jennifer Hecker. Oct. 1, 2015.

¹³⁷ Biological Opinion for Section 10(a)(1)(A) Permit Application, *supra* note 57.

¹³⁸ Key Deer HCP Monitoring Report, 5 *supra* note 23.

¹³⁹ *Id.*

¹⁴⁰ <https://www.fws.gov/uploadedFiles/FWS%20HCP%20Report%202017.pdf>.

¹⁴¹ https://www.fws.gov/refuge/National_Key_Deer_Refuge/wildlife_and_habitat/key_deer_main.html#10.

¹⁴² See attached maps.

and mortality was still being developed and not fully implemented.¹⁴³ It remains unclear what roles FWC, the Service, and local law enforcement have in responding to calls regarding deer killed or injured on area roads and what protocols are in place to account for DVCs. The lack of a coordinated response and rigorous recordkeeping practices could lead to additional underreporting of DVC. In any given year, 5%-15% of the population is lost due to motor vehicle collisions.¹⁴⁴

2. Hurricane Irma likely killed far more deer than the Fish & Wildlife Service previously estimated and the lack of fresh water continues to threaten the species.

As the Service previously explained in its last 5-year review of the species, catastrophic events such as hurricanes pose a threat to Key deer.¹⁴⁵ “Given the reduction in the deer’s historic range, the threat and impact of tropical storms and hurricanes is now greater than when the species’ distribution was more widespread.”¹⁴⁶ Hurricanes can alter the landscape, damage flora, and cause numerous waterholes to become saline for many months.¹⁴⁷ “Unnatural pooling of seawater due to roads and other developments results in hypersalinity, compounding the loss of flora, and such hurricane effects likely interact with sea-level rise.”¹⁴⁸

On September 10, 2017, Hurricane Irma made landfall in the Florida Keys with Category Four force winds. In addition to causing extensive property damage throughout the Keys, the storm impacted vegetation and water resources for the Florida Key deer.¹⁴⁹ Following the storm refuge staff positively confirmed 21 hurricane-related Key deer deaths.¹⁵⁰

A report by Parker et al. (2017), however, found that the average percent population change pre- and post-storm on Big Pine and No Name Keys was 23%.¹⁵¹ This amounts to a potential loss of more than 200 deer following Hurricane Irma, as the entire population on Big Pine and No Name is estimated to be between 825 and 1,017 deer.¹⁵² Due to certain statistical biases identified by the authors, they recommended that a second study be performed in December/January 2018.¹⁵³ As discussed above, a May 2018 letter from Refuge Manager Daniel Clark indicated that surveys conducted to date indicated a population of only 573 individuals on Big Pine and No Name Keys.

Since Hurricane Irma, there have also been fewer natural water sources for Key deer. Recently, the organization Save Our Key Deer measured available water sources on No Name and parts of Big Pine Key.¹⁵⁴ The group found that such sources on No Name Key were limited to a few depressions and solution holes in the pine rocklands.¹⁵⁵ Comparing this recent data to photography from March 2013, several depressions that once held water are presently dry.¹⁵⁶ Locations such as Long Beach Road on Big Pine Key also

¹⁴³ Key Deer HCP Monitoring Report, 5-6, *supra* note 23.

¹⁴⁴ https://www.fws.gov/refuge/National_Key_Deer_Refuge/wildlife_and_habitat/key_deer_main.html

¹⁴⁵ 5-Year Review: Summary and Evaluation, 21, *supra* note 11.

¹⁴⁶ *Id.*

¹⁴⁷ *Id.*

¹⁴⁸ *Id.*

¹⁴⁹ News Release, “Key Deer Population Makes it Through Another Major Incident,” U.S. Fish & Wildlife Service, October 19, 2017, *available at*, <https://www.fws.gov/nwrs/threecolumn.aspx?id=2147607912>.

¹⁵⁰ *Id.*

¹⁵¹ Parker, et. al., *supra* note 80.

¹⁵² *Id.*

¹⁵³ *Id.*

¹⁵⁴ See <https://saveourkeydeer.org/1-28-18-drinking-water-survey-update/>.

¹⁵⁵ *Id.*

¹⁵⁶ *Id.*

presently have no natural sources of freshwater for wildlife.¹⁵⁷ It appears this information was provided to the Service on January 28, 2018.¹⁵⁸ Information was also provided to the Service on January 24, 2018 indicating that of almost all of the sites tested, salinity levels exceeded palatable limits for wildlife.¹⁵⁹

The Service has long recognized the importance of waterholes for Key deer. “The principle factor influencing the movement of Key deer is the location and availability of freshwater...but suitable water is available on only 13 of the 26 islands during the dry season.”¹⁶⁰ As the agency explained in its last 5-year review, the loss of these waterholes is being further compounded by the impacts of sea-level rise:

The pine rockland community in the Keys has already undergone a reduction due to sea-level rise. The distribution, abundance, and availability of limited freshwater wetlands in the lower Keys are essential components of Key deer habitat, profoundly affecting their distribution and ability to persist. The presence of certain waterholes is important to subpopulations of Key deer because they provide fresh water during the dry season. Loss of the waterholes due to sea-level rise could have widespread, long-term, detrimental impacts to the deer, particularly outside the core.¹⁶¹

In light of the Parker et. al. (2017) report and evidence of fewer watering holes for Key deer to utilize on Big Pine and No Name Keys, it is far too premature for the Service to conclude that “Hurricane Irma had little impact on Key Deer population.”¹⁶² The damage caused by the Screwworm, Hurricane Irma, and vehicle collisions over the past two years should give the Service serious pause going forward. In 2017, the Service prepared a biological opinion on the use of Southeast Region blanket permit for Service personnel to conduct and oversee trapping and collaring activities as part of monitoring activities and population surveys relating to the screwworm outbreak.¹⁶³ In that biological opinion the Service recognized the vulnerability of the population if it were to experience disease, a hurricane, and road mortalities. The Service explained at the time:

Despite the apparent increase in population levels of Key deer, there has been a contraction of the range of Key deer from 1970 to 1999. Key deer have become increasingly abundant on Big Pine Key and adjacent islands, but have decreased to near extirpation on more distant islands such as Cudjoe and Sugarloaf keys. This contraction in the range has decreased the overall viability of the population by increasing the probability that a stochastic event, such as a hurricane or disease epidemic, may have catastrophic impacts to the core population on and around Big Pine Key. Catastrophic events could reduce Key deer numbers to the extent that road mortalities could adversely affect the population.¹⁶⁴

Since that biological opinion, the Service has determined that the screwworm has killed at least 135 individuals, recent research suggests that impacts from Hurricane Irma may have been much more significant than the Service previously determined, and vehicle collisions continue to claim the lives of more than 100 deer every year. Accordingly, the

¹⁵⁷ *Id.*

¹⁵⁸ *Id.*

¹⁵⁹ See <https://saveourkeydeer.org/urgent-update/>.

¹⁶⁰ Key Deer Assessment Guide, *supra* note 8.

¹⁶¹ 5-Year Review: Summary and Evaluation, 22, *supra* note 11.

¹⁶² <https://www.fws.gov/southeast/news/2017/10/new-survey-shows-hurricane-irma-had-little-impact-on-key-deer-population/>.

¹⁶³ Biological Opinion for Section 10(a)(1)(A) Permit Application, *supra* note 57.

¹⁶⁴ *Id.*

Service needs to carefully consider the effects disease, Hurricane Irma, and increasing vehicle mortalities have had on this already-vulnerable population. Further, the species' long-term viability is further threatened by the effects of climate change and sea-level rise as explained below and the Service must consider these impacts individually *and cumulatively* before making a final determination regarding the status of the species.

3. Climate Change and Sea-Level Rise Threaten the Species.
 - a. *Anthropogenic Climate Change Threatens the Survival and Recovery of the Florida Key Deer.*

Sea-level rise due to anthropogenic greenhouse gas pollution poses a serious and growing threat to the continued survival and recovery of the Florida Key deer. Sea level rise is projected to inundate the vast majority of Florida Key deer habitat within this century, and has already resulted in the loss and degradation of the Key deer's pineland habitat. The harms from sea level rise are being exacerbated by related climate change threats from increasing hurricane intensity and storm surge, increasing tidal flooding, and more frequent extreme weather events, which will destroy and degrade Florida Key deer habitat and increase stress on this small, isolated population. Due to the threats from sea-level rise, climate change, and human land-use, a recent vulnerability assessment for Florida species ranked the Key deer as one of the six most vulnerable and a top priority for conservation.¹⁶⁵

- b. *Sea-level rise is a serious and growing threat to the Florida Key deer and its habitat.*
 - 1) The Florida Key deer's habitat is particularly vulnerable to inundation from sea-level rise.

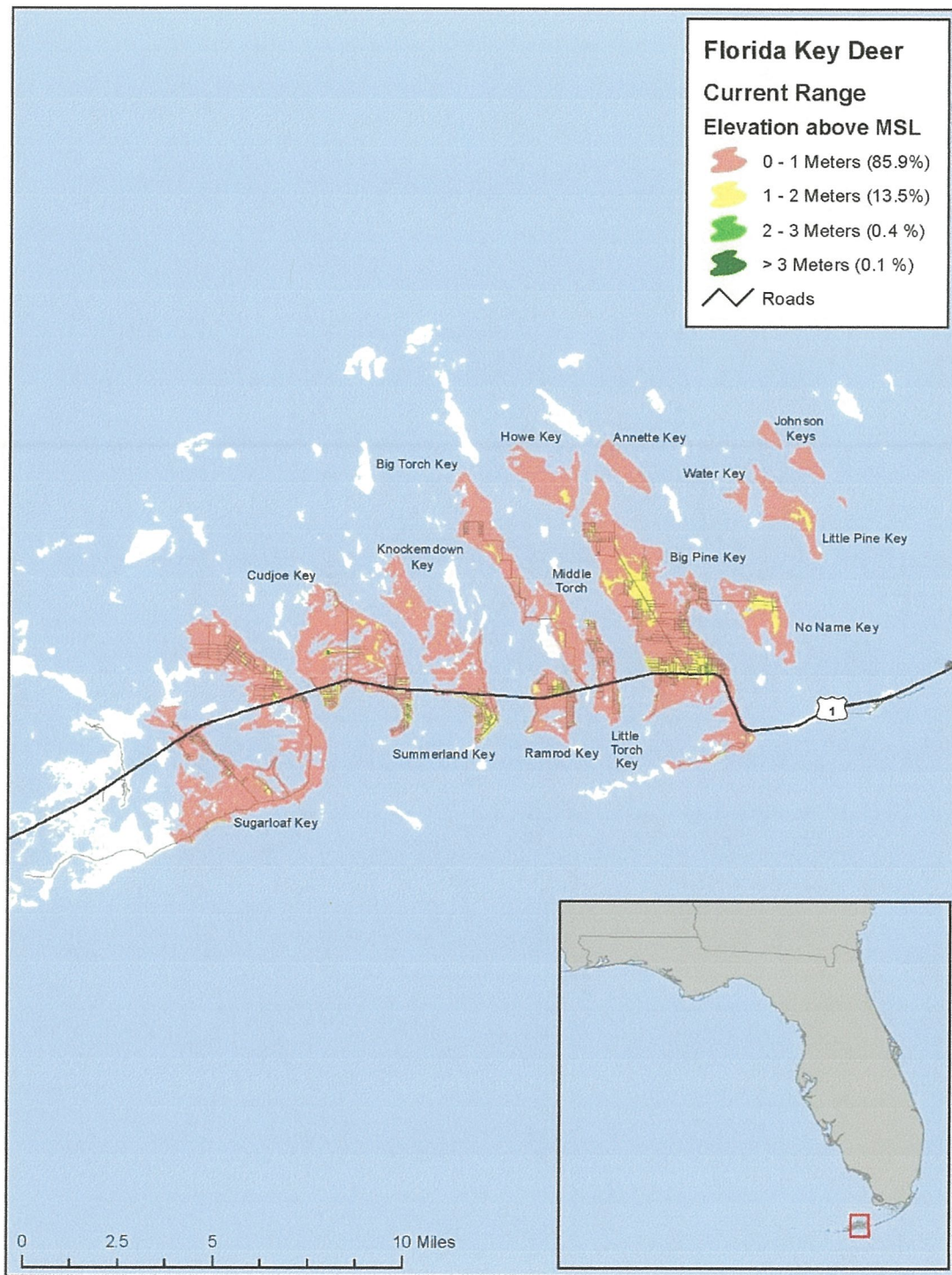
The Key deer's preferred habitat in salt-intolerant slash pinelands and hardwood hammocks¹⁶⁶ in the Lower Florida Keys is particularly vulnerable to loss and degradation from sea-level rise and increasing storm surge because of its low elevation, flat topography, extensive coastline, and porous limestone geology.¹⁶⁷ As illustrated in the figure below, GIS analysis shows that 86% of the land area of the Keys occupied by the Key deer is less than three feet (1 meter) above sea level.¹⁶⁸

¹⁶⁵ Reece, J.S. et al., *supra* note 84; Reece, J.S. & R.F. Noss, Prioritizing species by conservation value and vulnerability: a new index applied to species threatened by sea-level rise and other risks in Florida, 34 *Natural Areas Journal* 31 (2014).

¹⁶⁶ Lopez, R.R. et al., Habitat-use patterns of Florida Key deer: implications of urban development, 68 *Journal of Wildlife Management* 900 (2004).

¹⁶⁷ Weiss, J.L. et al., 2011. Implications of recent sea-level rise science for low-elevation areas in coastal cities of the coterminous U.S.A., 105 *Climatic Change* 635; Strauss, B.H., et al., 2012. Tidally adjusted estimates of topographic vulnerability to sea-level rise and flooding for the contiguous United States, 7 *Environmental Research Letters* 014033; Melillo, Jerry M., Terese (T.C.) Richmond, and Gary W. Yohe, Eds, *Climate Change Impacts in the United States: The Third National Climate Assessment*, U.S. Global Change Research Program, 841 pp (2014); Parkinson, R.W. et al., *Managing the Anthropocene marine transgression to the year 2100 and beyond in the State of Florida U.S.A.*, 128 *Climatic Change* 85 (2015).

¹⁶⁸ Center for Biological Diversity, *Deadly Waters: How Rising Seas Threaten 233 Endangered Species* (December 2013).

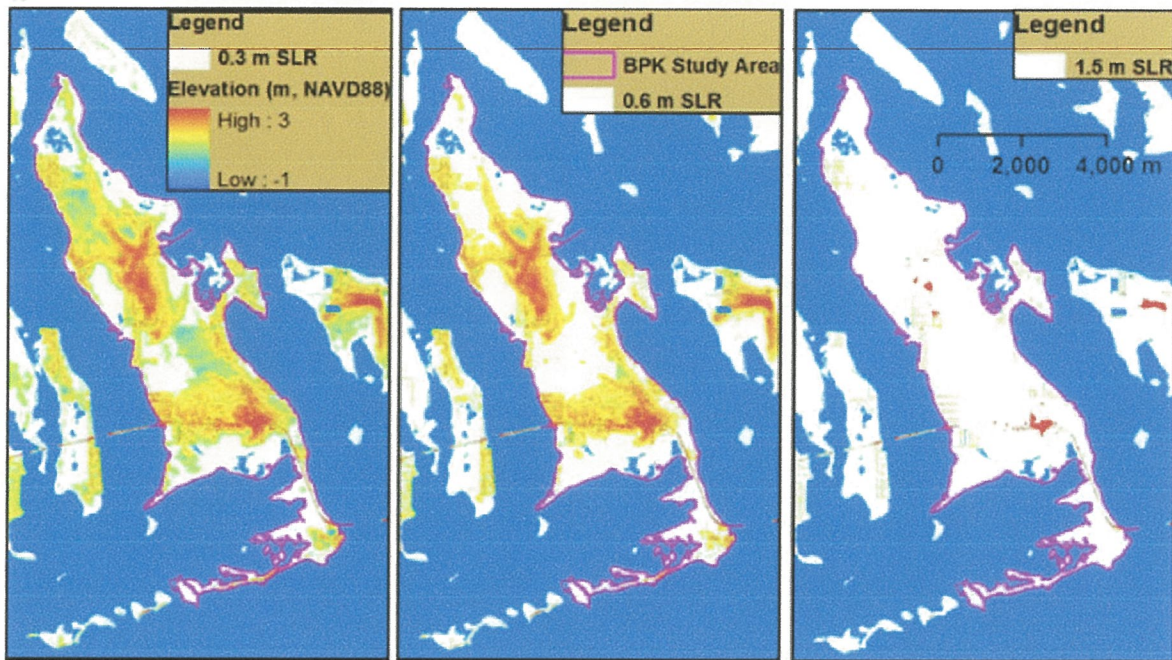


Scientific studies project that most of the Florida Keys will be inundated or drastically altered with just two feet of sea-level rise, which could occur by mid-century.¹⁶⁹ Modeling by Zhang et al. (2011) projected that 76% of Lower Florida Keys land area will

¹⁶⁹ Benschoter, A.M. et al., 2013. Threatened and Endangered Subspecies with Vulnerable Ecological Traits Also Have High Susceptibility to Sea Level Rise and Habitat Fragmentation, 8 PLoS ONE e70647.

be inundated at 2 feet (0.6 meters) of sea-level rise, while 97% of the land area would be inundated at 5 feet (1.5 meters) sea-level rise.¹⁷⁰ On Big Pine Key, more than half of the land area would be inundated at 2 feet sea-level rise, with most land area underwater at 5 feet of sea-level rise, as illustrated in the figure below. Similarly, modeling for Big Pine Key by Silvy and Lopez (2012) projected the loss of 20% of land area with 1 foot sea-level rise, 62% loss with 2 feet sea-level rise, and 84% with 3 feet sea-level rise; and for No Name Key, 32% land area loss with 1 foot sea-level rise, 56% loss with 2 feet sea-level rise, and 76% with 3 feet sea-level rise.¹⁷¹ Modeling of Key deer habitat in Sugarloaf Key projected that 0.2 m sea-level rise would result in the loss of most of the upland and transitional habitat in the central portion of Sugarloaf Key, while 0.5 m SLR would leave only remnant upland habitat in the southeast portion of the Key.¹⁷²

Inundation maps for Big Pine Key at 0.3, 0.6, and 1.5 meters of sea level rise, with inundated areas shown in white. Source: Zhang et al. (2011): Figure 3.



- 2) Sea-level rise in the Florida Keys is occurring faster than the global average.

Global average sea level rose by seven to eight inches since 1900, and sea-level rise is accelerating in pace.¹⁷³ A rapid acceleration in the rate of sea-level rise along the U.S. Atlantic Coast since 2000 has been attributed to the weakening of the entire Gulf Stream system.¹⁷⁴ Consistent with this acceleration, coastal areas of South Florida have

¹⁷⁰ Zhang, K. et al., 2011. Assessment of sea level rise impacts on human population and real property in the Florida Keys, 107 *Climatic Change* 129.

¹⁷¹ Silvy, N.J. & R.R. Lopez 2012, *supra* note 103.

¹⁷² Ross, M.S. et al., 2009. Disturbance and the rising tide: the challenge of biodiversity management on low-island ecosystems, 7 *Frontiers in Ecology and Environment* 471.

¹⁷³ USGCRP [U.S. Global Change Research Program], *Climate Science Special Report: Fourth National Climate Assessment, Volume I* [Wuebbles, D.J. et al. (eds.)], U.S. Global Change Research Program, Washington, DC (2017), <https://science2017.globalchange.gov/> at 339.

¹⁷⁴ Southeast Florida Climate Change Compact Sea Level Rise Work Group, *Unified Sea Level Rise Projection for Southeast Florida, A Document Prepared for the Southeast Florida Regional Climate Change*

experienced rates of sea-level rise that are higher than the global average. For example, off Virginia Key, the average rate of regional sea level rise since 2006 was 9 ± 4 mm per year, which is much higher than the global average rate between 1993 and 2012 of 3.2 ± 0.4 mm per year based on satellite data and 2.8 ± 0.4 mm per year based on in-situ data.¹⁷⁵

- 3) Two feet of sea-level rise in the Florida Keys could occur by mid-century, and up to 8 feet is possible by the end of the century.

Regional sea-level rise projections for south Florida indicate that two feet of sea-level rise could occur by mid-century, and three to four feet or more is likely by the end of the century. The Southeast Florida Regional Climate Change Compact (Compact) provides science-based guidance on the sea-level rise projections that managers should use for different time horizons for South Florida.¹⁷⁶ According to the Compact, in the short term, by 2030, sea level is projected to rise 6 to 10 inches above 1992 mean sea level; in the medium term, by 2060, sea level is projected to rise 14 to 34 inches above 1992 mean sea level; and in the long term, by 2100, sea-level is projected to rise 31 to 81 inches above 1992 mean sea level.¹⁷⁷

The 2017 Fourth National Climate Assessment estimated that *global* sea level is very likely to rise by 0.3–0.6 feet by 2030, 0.5–1.2 feet by 2050, and 1.0–4.3 feet by 2100, relative to the year 2000, with sea-level rise of 8.2 feet possible at the end of the century due to ice sheet melting.¹⁷⁸ Sea-level rise will be much more extreme if greenhouse gas emissions continue unabated. By the end of the century, global mean sea level is projected to increase by 0.8 to 2.6 feet under a lower emissions RCP 2.6 scenario, compared with 1.6 to 6 feet under a high emissions RCP 8.5 scenario,¹⁷⁹ which global emissions are currently tracking. The best available science makes clear that the impacts of sea-level rise will be long-lived: we lock in an estimated eight feet of sea level rise over the long term for every degree Celsius of warming.¹⁸⁰ Under all emissions scenarios, sea levels will continue to rise for many centuries.¹⁸¹

- 4) The Key deer's habitat has already been reduced by sea-level rise.

The Key deer's pine rockland habitat has already been reduced by sea-level rise. Ross et al. (1994) documented large-scale reductions in slash pine forest on Sugarloaf Key attributed to salinization of ground and soil water due to sea-level rise. Pine forests declined from 88 hectares before 1935 to 30 hectares by 1991, with vegetation changing to more salt-tolerant species.¹⁸² Similarly, a study of slash pine rocklands on Big Pine Key and No Name Key by Harley et al. (2015) found that pines had been lost at lower elevations and the oldest and largest diameter pine trees were found at higher elevations

Compact Steering Committee, 35 pp (2015); Park, J. and W. Sweet, Accelerated sea level rise and Florida Current transport, 11 *Ocean Science* 607 (2015).

¹⁷⁵ Wdowinski, S. et al, 2016. Increasing flooding hazard in coastal communities due to rising sea level: Case study of Miami Beach, Florida, 126 *Ocean & Coastal Management* 1.

¹⁷⁶ Southeast Florida Climate Change Compact Sea Level Rise Work Group, Unified Sea Level Rise Projection for Southeast Florida, *supra* note 174.

¹⁷⁷ *Id.* at 4.

¹⁷⁸ USGCRP, Climate Science Special Report, at 25-26, 333, 343 *supra* note 173.

¹⁷⁹ *Id.* at 344.

¹⁸⁰ Levermann, A. et al., The multimillennial sea level commitment of global warming, 110 *PNAS* 13745 (2013).

¹⁸¹ USGCRP, Climate Science Special Report, at 345-346 *supra* note 173.

¹⁸² Ross, M.S. et al., Sea-level rise and the reduction in pine forests in the Florida Keys, 4 *Ecological Applications* 144 (1994).

which act as a refuge during storm surge events.¹⁸³ Sea-level rise also appears to be decreasing the frequency and influence of fire in Florida Keys pine rockland ecosystems, which is detrimental to health and persistence of this important Key deer habitat.¹⁸⁴

5) Key deer watering holes will be lost with sea-level rise.

Sea-level rise threatens freshwater availability for Key deer by making drinking water holes too salty. Modeling by Silvy and Lopez (2012) of 126 water holes on Big Pine Key projected the loss of 20 water holes (16%) with just 0.5 feet SLR; 74 total water holes lost (59%) with 1 foot SLR; and 83 total water holes lost (66%) with 1.5 feet SLR. Of the 16 water holes on No Name Key, Silvy and Lopez (2012) projected the loss of 7 water holes (44%) with just a half-foot SLR and all 16 water holes lost (100%) with 1 foot SLR.¹⁸⁵

c. *The increasing intensity of hurricanes and storm surge threatens Key deer habitat and watering holes.*

Increasingly intense Atlantic hurricanes and storm surge due to climate change is exacerbating the loss and degradation of Key deer habitat. The frequency of high-severity Atlantic hurricanes is increasing,¹⁸⁶ which results in more severe hurricane-generated surge events and wave heights.¹⁸⁷ Large storm surge events of Hurricane Katrina magnitude have already doubled in response to warming during the 20th century.¹⁸⁸ A recent study projected a twofold to sevenfold increase in the frequency of Atlantic hurricane surge events for each 1°C in temperature rise.¹⁸⁹ A separate study projected that, under the RCP 4.5 emissions scenario, which the world is exceeding, storm surge is projected to increase by 25 to 47 percent along the U.S. Gulf and Florida coasts due to the combined effects of sea level rise and growing hurricane intensity.¹⁹⁰ As sea levels rise, storm surge rides on a higher sea surface, which pushes water further inland and creates more flooding of coastal habitats.¹⁹¹

Intensifying storm surge threatens to kill slash pines by making soil and groundwater too salty. For example, Hurricane Wilma's storm surge caused high tree mortality in pine forests of upper Sugarloaf Key.¹⁹² Larger storm surge has also made watering holes unusable for Key deer for weeks or months following hurricanes. Lopez et al. (2003) found that, following Hurricane Georges, 27% (4 out of 15) of monitored water holes

¹⁸³ Harley, G.L. et al., Elevation promotes long-term survival of *Pinus elliotti* var. *densa*, a foundation species of the endangered pine rockland ecosystem in the Florida Keys, 29 *Endangered Species Research* 117 (2015).

¹⁸⁴ Ross, M.S. et al., 2009, *supra* note 172.

¹⁸⁵ Silvy, N.J. & R.R. Lopez, *supra* note 103.

¹⁸⁶ Elsner, J.B. et al., The increasing intensity of the strongest tropical cyclones, 455 *Nature* 92 (2008); Bender, M.A. et al., Modeled impact of anthropogenic warming on the frequency of intense Atlantic hurricanes, 327 *Science* 454 (2010); Kishtawal, C.M. et al., Tropical cyclone intensification trends during satellite era (1986–2010), 39 *Geophysical Research Letters* L10810 (2012).

¹⁸⁷ Grinsted, A. et al., Homogeneous record of Atlantic hurricane surge threat since 1923, 109 *PNAS* 19601 (2012); Komar, P.D. & J.C. Allan, Increasing hurricane-generated wave heights along the U.S. east coast and their climate controls, 24 *Journal of Coastal Research* 479 (2008).

¹⁸⁸ Grinsted, A. et al., Projected hurricane surge threat from rising temperatures, 110 *PNAS* 5369 (2013).

¹⁸⁹ *Id.*

¹⁹⁰ Balaguru, K. et al., Future hurricane storm surge risk for the U.S. gulf and Florida coasts based on projections of thermodynamic potential intensity, 138 *Climatic Change* 99 (2016).

¹⁹¹ Tebaldi, C. et al., Modelling sea level rise impacts on storm surges along US coasts, 7 *Environmental Research Letters* 014032 (2012).

¹⁹² Ross, M.S. et al., *supra* note 184.

were unsuitable for deer, in some cases for weeks or months.¹⁹³ Following Hurricane Wilma, salinity in many Big Pine Key sinkholes that normally held fresh water remained brackish eight months later.¹⁹⁴

d. *Increasing nuisance flooding threatens Key deer habitat.*

The Service must also consider the impacts on Key deer habitat from increasing tidal or “nuisance” flooding due to sea-level rise. Nuisance flooding, also called “sunny day flooding,” occurs when high tide conditions are exacerbated by sea-level rise. Nuisance flooding has increased substantially on the East, Gulf and West coasts by 300 to 925 percent since the 1960s, primarily due to sea-level rise.¹⁹⁵ For example, according to a detailed flooding analysis for Miami Beach between 1998 and 2013, flooding frequency significantly increased after 2006, with a 33 percent increase in rain-induced flooding and a more than 400 percent increase in tide-induced flooding.¹⁹⁶ Scientific studies project that nuisance flooding will become much more frequent and severe in the next few decades.¹⁹⁷ For example, an analysis by Dahl et al. (2017) projected that tidal flooding in Virginia Key off South Florida will increase significantly in the near-term, from 5.1 flood events per year during 2001-2015 to 46 flood events per year by 2030 and 206 events per year by 2045.¹⁹⁸

e. *Mass human migration spurred by sea-level rise threatens the Key deer.*

The Service must evaluate the synergistic effects of human development, projected human population growth, and mass human migration spurred by sea-level rise on the Florida Key deer and its habitat. Inland inundation, even under lower scenarios of sea-level rise, is projected to create mass human population migration and social crisis, which would have significant direct and indirect effects on Florida Key deer and its habitat. A nation-wide study estimated that approximately 3.7 million Americans live within three feet of high tide, putting them at extreme risk of flooding from sea-level rise in the next few decades, with coastal residents in Florida ranking among the most vulnerable.¹⁹⁹ Another study forecast that 4.2 million Americans would be at risk of flooding from 3 feet of sea level rise, while 13.1 million people would be at risk from 6 feet of sea-level rise, driving mass human migration and societal disruption.²⁰⁰ With six feet of sea -level rise, Florida is projected to account for nearly half of the total U.S. population at risk from displacement by sea-level rise. In Monroe County, 55% of the human population is considered at risk from 0.9 meters (3 feet) of sea level rise, and 85% of the population is at risk with 1.8 meters (6 feet) of sea level rise.²⁰¹

¹⁹³ Lopez, R.R. et al., 2003. Hurricane impacts on Key Deer in the Florida Keys, 67 *Journal of Wildlife Management* 280.

¹⁹⁴ Ross, M.S. et al., 2009, *supra* note 184.

¹⁹⁵ NOAA, Sea Level Rise and Nuisance Flood Frequency Changes around the United States, NOAA Technical Report NOS CO-OPS 073 (2014); Sweet, W.V. & J. Park, From the extreme to the mean: Acceleration and tipping points of coastal inundation from sea level rise, 2 *Earth's Future* 579 (2014); NOAA [National Oceanic and Atmospheric Administration], What is nuisance flooding (2016), <http://oceanservice.noaa.gov/facts/nuisance-flooding.html>.

¹⁹⁶ Wdowski, S. et al, *supra* note 175.

¹⁹⁷ Moftakhari, H.R. et al., 2015. Increased nuisance flooding along the coasts of the United States due to sea level rise: Past and future, 42 *Geophysical Research Letters* 9846.

¹⁹⁸ Dahl, K.A. et al., 2017. Sea level rise drives increased tidal flooding frequency at tide gauges along the U.S. East and Gulf Coasts: Projections for 2030 and 2045, 12 *PLoS ONE* 2: e0170949.

¹⁹⁹ Strauss, B.H. et al., 2012. Tidally adjusted estimates of topographic vulnerability to sea level rise and flooding for the contiguous United States, 7 *Environmental Research Letters* 014033.

²⁰⁰ Hauer, M.E. et al., 2016. Millions projected to be at risk from sea-level rise in the continental United States, 6 *Nature Climate Change* 691.

²⁰¹ *Id.* at Supplemental Information Table 2S.

- f. *The increasing frequency of extreme weather events heightens stress on small, isolated Key deer populations.*

Climate models project continued warming in all seasons across the southeast U.S., an increase in the rate of warming, and an increased frequency, intensity, and duration of extreme heat events.²⁰² The frequency of extreme weather events is also projected to increase, putting more stress on the Key deer and its habitat.

As further evidence of growing stress from climate change, a recent analysis found that climate-related local extinctions are already widespread and have occurred in hundreds of species, including almost half of the 976 species surveyed, across climatic zones, clades, and habitats.²⁰³ A separate study estimated that nearly half (47 percent) of terrestrial non-volant threatened mammals (out of 873 species) and nearly one-quarter (23.4 percent) of threatened birds (out of 1,272 species) may have already been negatively impacted by climate change in at least part of their distribution.²⁰⁴ The study concluded that “populations of large numbers of threatened species are likely to be already affected by climate change, and that conservation managers, planners and policy makers must take this into account in efforts to safeguard the future of biodiversity.” A recent meta-analysis concluded that climate change is already impacting 82 percent of key ecological processes that form the foundation of healthy ecosystems and which humans depend on for basic needs.²⁰⁵ Genes are changing, species' physiology and physical features such as body size are changing, species are rapidly moving to keep track of suitable climate space, and entire ecosystems are under stress.

4. Anthropogenic Causes and Intentional Take

The number of Key deer deaths attributed to various human-involved (anthropogenic) causes has remained fairly constant since the Service's last Five-Year Review in 2010. Causes other than motor vehicles include poaching, entanglement, and dogs. The number of deaths attributed to these anthropogenic causes has ranged from 2-11 deer between 2010-2017.²⁰⁶ On average more than four deer have been killed every year as a result of anthropogenic causes (excluding vehicles) from 2014-2017.²⁰⁷

In 2015 a man was charged with shooting and killing a Key deer,²⁰⁸ and in 2017 two men were sentenced in connection with an incident involving the capture of three Key deer on Big Pine Key. The deer were captured and forced inside a vehicle and were later discovered following a traffic stop by a Monroe County Sheriff's deputy. The adult male

²⁰² Carter, L.M. et al., 2014. Ch. 17: Southeast and the Caribbean. *Climate Change Impacts in the United States: The Third National Climate Assessment*, J. M. Melillo, Terese (T.C.) Richmond, and G. W. Yohe, Eds., U.S. Global Change Research Program, 396-417.

²⁰³ Wiens, John J. 2016. Climate-related local extinctions are already widespread among plant and animal species, 14 PLoS Biology e2001104.

²⁰⁴ Pacifici, Michela et al., 2017. Species' traits influenced their response to recent climate change, 7 Nature Climate Change 205.

²⁰⁵ Scheffers, Brett R. et al. 2016. The broad footprint of climate change from genes to biomes to people, 354 Science 719.

²⁰⁶ <https://www.fws.gov/uploadedFiles/FWS%20HCP%20Report%202017.pdf>.

²⁰⁷ *Id.*

²⁰⁸ Kevin Wadlow, “Man charged with killing protected Key deer that was eating his plants,” Miami Herald, June 15, 2015, at <http://www.miamiherald.com/news/local/community/florida-keys/article24508282.html>.

deer was later euthanized because of injuries it sustained in confinement.²⁰⁹ Key deer mortality from anthropogenic causes and intentional take remains a threat to the species.

V. A Listing of “Threatened” May Not Provide the Same Level of Protections for the Florida Key Deer as Currently Provided.

The ESA defines an “endangered species” as “any species which is in danger of extinction throughout all or a significant portion of its range.”²¹⁰ It defines a “threatened species” as, “any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.”²¹¹ Service policy and case law establish that the “significant portion of its range” provision of the ESA provides an independent basis for listing a species.²¹²

One key difference in the level of protections afforded to endangered and threatened species under the ESA is that while the Act expressly prohibits the “taking” of endangered species, it does not expressly prohibit the taking of threatened species. For threatened species, section 4(d) of the Act directs the Secretary of the Interior to promulgate rules “to provide for the conservation” of threatened species. Although the Service’s longstanding “blanket” 4(d) rule extends the ESA’s protections to threatened species, 50 C.F.R. § 17.31(a), the Service may issue a species-specific special “4(d) rule” to reduce the level of protection.²¹³ Thus, a decision to reclassify a species status from endangered to threatened does not necessarily mean a species will always enjoy the same protections afforded under the Act. Moreover, it appears that the Service will soon be proposing a rulemaking to make the blanket 4(d) rule inapplicable to species listed as threatened in the future. That change would potentially leave a newly listed (or newly down-listed) threatened species without any protection unless and until the Service enacts a special 4(d) rule for it.

Any potential down-listing of the Florida Key deer from endangered to threatened status could have significant implications for how the species is currently protected. The Key deer is currently protected (in part) through the implementation of certain reasonable and prudent alternatives set forth in a biological opinion on the Federal Emergency Management Agency’s (FEMA) administration of its flood insurance program in the region.²¹⁴ It is also protected under an incidental take permit and habitat conservation plan that limits the number of deer (more than 4) that may be taken on Big Pine and No Name Keys as a result of development over twenty years.²¹⁵ These regulatory documents were the subject of years of study and stakeholder involvement. Down-listing the Florida Key deer could result in not only far fewer protections for the species (e.g. increased take) through the use of a special 4(d) rule, but it would almost certainly complicate and jeopardize a complex regulatory mechanism that has been in place for more than a decade (the 2006 HCP) and in the case of the 2010 Amended FEMA biological opinion, follows eighteen years of federal court litigation and a settlement agreement.²¹⁶ The Service must

²⁰⁹ <https://www.fws.gov/southeast/news/2017/11/defendants-sentenced-for-illegal-take-of-endangered-key-deer/>.

²¹⁰ 16 U.S.C. § 1532(6).

²¹¹ *Id.* § 1532(20).

²¹² See e.g., *Defenders of Wildlife v. Salazar*, 729 F.Supp.2d 1207 (D. Mont. 2010); *Wildearth Guardians v. Salazar*, 2010 U.S. Dist. LEXIS 105253 (D. Ariz. Sept. 30, 2010).

²¹³ 16 U.S.C. § 1533(d).

²¹⁴ Habitat Conservation Plan for Florida Key Deer, *supra* note 43.

²¹⁵ United States Fish and Wildlife Service. 2010. Amended Biological Opinion on the Federal Emergency Management Agency’s National Flood Insurance Program’s actions in the Florida Keys. Atlanta, Georgia.

²¹⁶ See *Florida Key v. Stickney*, 864 F. Supp. 1222 (S.D. Fla. 1994); *Florida Key Deer v. Brown*, 364 F. Supp. 2d 1345 (S.D. Fla. 2005); *Florida Key Deer v. Paulison*, 522 F.3d 1133 (11th Cir. 2008).

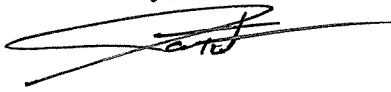
consider the dependence of the species on the protections provided by this complex framework.

VI. Conclusion

We hope you will carefully consider our comments and the supporting research we have provided. It is evident, based on the best available information,²¹⁷ that the Florida Key deer should continue to be listed as endangered under the ESA.

We would also like an opportunity to discuss this matter with you and the members of your staff participating in the status assessment and/or 5-year review. We have provided our contact information below. Thank you and we look forward to hearing from you soon.

Sincerely,



Jason Totoiu
Executive Director
Everglades Law Center, Inc.
331 West Central Ave. Suite 213
Winter Haven, FL 33880
863-298-8000
Jason@evergladeslaw.org

Alicia Putney
President
Key Deer Protection Alliance
P.O. Box 430224
Big Pine Key, FL 33043
305-872-8888
keydeerputney@att.net

Karimah Schoenhut
Staff Attorney
Sierra Club
Environmental Law Program
50 F St NW, Eighth Floor
Washington, DC 20001
202-548-4584
karimah.schoenhut@sierraclub.org

Jaclyn Lopez, Florida Director
Center for Biological Diversity
P.O. Box 2155
St. Petersburg, FL 33731
727-490-9190
jlopez@biologicaldiversity.org

Frank Jackalone
Florida Chapter Director
Sierra Club
2990 Central Avenue
St. Petersburg, FL 33712
727-824-8813
frank.jackalone@sierraclub.org

Mark Songer, President
Last Stand
PO Box 146
Key West, FL 33041-0146
305-394-3807
mark_songer@comcast.net

²¹⁷ 16 U.S.C. §1533(b)(1)(a).