to adversely affect the manatee, wood stork, Everglade snail kite, Cape Sable seaside sparrow, red-cockaded woodpecker, American crocodile, or eastern indigo snake. With respect to the eastern indigo snake, public pedestrian or non-motorized use of ORV trails and human occupation in the backcountry could alter eastern indigo snake behavior, but not to an extent that those effects would be measurable or result in death or injury of an individual. Effects that are not measurable are considered insignificant and discountable in the context of the Act. The development of an educational plan under the GMP/EIS is consistent with the standardized protection measures developed by the FWS' South Florida Field Office to minimize potential adverse effects to the eastern indigo snake resulting from land development projects as explained in the 1999 Multi-Species Recovery Plan (Service 1999). The most recent iteration of the Service's standardized protection measures for the eastern indigo snake is published on Service's website (http://www.fws.gov/verobeach/ReptilesPDFs/EasternIndigoSnakeConservationGuidelines.pdf) These measures include the creation and distribution of educational materials regarding eastern indigo snake identification, biology and habitat requirements. Based on this information, the NPS has determined the implementation of the PA is not likely to adversely affect the above-listed species. The Service concurs and will not consider these species further in this document.

The Service listed the Florida bonneted bat (*Eumops floridanus*) as an endangered species during the final stages of development of this Hunting Management Plan. The Service is developing guidelines for consultations regarding this species. The Florida bonneted bat does occur on BICY, however, current locations for the bonneted bat are unknown. Historic records indicate bonneted bats were at least foraging near the Deep Lake Unit of BICY. Due to the limited range of acoustic sampling methods, this information does not mean the bonneted bat is absent in other areas of BICY.

After reviewing location information and potential activities that may take place during implementation of the Hunting Management Plan, the NPS believes "the Florida bonneted bat could be impacted by flushing and short-term displacement; however, their daytime roosting locations in tree cavities and nocturnal feeding behavior would limit their exposure to hunters. Additionally, since no construction or other permanent ground disturbing activities are associated with this project, impacts to the Florida bonneted bat would be negligible." The NPS stated, in a teleconference on January 22, 2014, that it plans on implementing protection measures for either manmade or natural roost sites that they currently implement for RCWs (*e.g.*, buffer zones around known roost sites). Hunters are required to vacate BICY between 10 pm and 5 am, the times where bonneted bats would be most active. Hunters camping overnight in BICY will not be hunting between 10 pm and 5 am, thereby minimizing the potential for bat/hunter interactions. Those types of activities would also have to comply with guidance provided in the GMP. In addition, the NPS plans on incorporating educational materials and efforts to further minimize the potential for hunters to interact with bonneted bats. Based on these conservation measures and other information presented, the NPS has determined the implementation of the Hunting Management Plan is not likely to adversely affect the Florida bonneted bat. The Service concurs.

The remainder of this analysis is focused on the Florida panther, as that is the species most likely to be affected by the introduction of public hunting in the Addition. Public hunting is part of the baseline condition for the original BICY boundaries, so this analysis will focus on the Addition.

For the purposes of this consultation, the Service used the status of the Florida panther as described in the 2008 Recovery Plan (Service 2008) and updated in the August 13, 2012, Biological Opinion for the Off Road Vehicle (ORV) Trail Heads and U.S. Highway 41 Turn Lanes Project, Service Consultation Code 2012-I-0139. The final report for 2013 for the Florida panther has not been received, therefore, the 2012 data are the most recent available. The Service's goal for Florida panther conservation in south Florida is to locate, preserve, and restore lands containing sufficient area and appropriate land cover types to ensure the long-term survival of a population of 80 to 100 individuals (adults and subadults) south of the Caloosahatchee River. As of July 2012, 49 known radio-collared panthers (alive or status unknown) were documented within a 25-mile radius of the ORV Trailheads project from 6,664 telemetry observations. It is not known if all of these animals are currently alive. With the panther population in south Florida at or near carrying capacity, any territory vacated through death or removal of an individual from the wild, is likely to be filled by a dispersing subadult panther in a relatively short period of time. In 2010, Rancher's Supply (a consultant to the FWC) found evidence of 91 adult and juvenile panthers during their annual count of both radio-collared and uncollared panthers in south Florida south of the Caloosahatchee River (FWC 2011). In 2011, the same survey detected 90 panthers for the area surveyed (Rancher's Supply 2012). The area surveyed included BICY. For the purposes of the survey, only resident adults and juveniles accompanying their mother are included; kittens in a den and dispersing subadults are not included in the counts. The Rancher's Supply methodology leads to a conservative estimate of population numbers as it includes only adults and juveniles and does not capture dispersing subadults and kittens.

As stated earlier, the environmental baseline for this Hunting Management Plan is represented by Alternative 2. Hunting occurs in the original BICY but is prohibited in the Addition. The PA would maintain hunting in the original BICY, and expand hunting opportunities to the Addition. According to the schedule presented in the Hunting Management Plan (NPS 2013), hunting would occur on a maximum of 165 days per year for all included seasons. This analysis is focused on those hunting opportunities that may introduce an additional variable potentially affecting the Florida panther population in BICY. Future changes to the hunting seasons, bag limits, and other elements would be evaluated under the adaptive management strategy framework established through the Hunting Management Plan (NPS 2013).

The PA calls for the development of a "clear decision-making and communications framework between the NPS and FWC, in consultation with the [Service], to manage hunting in the entire Preserve. Wildlife Management Area regulations would be reviewed at least annually through the decision-making framework established in the NPS/FWC Cooperative Partnership Agreement" (NPS 2013). Furthermore, "decisions regarding modifications to the Hunting Management Plan, hunting regulations, law enforcement needs, threatened and endangered species, nonnative/exotic species, research and monitoring, and public access would be made by the NPS and FWC, in consultation with the [Service], through the adaptive management process"

(NPS 2013). The adaptive management process includes a feedback loop for validation of assumptions and facilitation of science-based decisions regarding changes to the hunting program in BICY. More specific information about the components incorporated into an adaptive management framework may be viewed in the description of the PA in the Hunting Management Plan (NPS 2013).

The PA includes a provision for population monitoring of major game species (*i.e.,* deer and hog), as well as the Florida panther population. These data will be used under the science-based adaptive management framework in conjunction with traditional and innovative hunting management tools *(e.g.,* quotas, season dates, bag limits, season limits) to provide for a sustainable prey base for the Florida panther. The adaptive management framework identifies the use of a 5-year average for both deer survey and hunter check-in data to determine if changes are needed to the hunting program to ensure the level of deer harvest does not result in a reduction of available prey for the Florida panther.

In performing the analysis of the development and implementation of the PA, the Service considered the introduction of public hunting in the Addition as the potential introduction of a competing predator for the Florida panther. Public hunting has never occurred on the Addition and hunting of any kind has been prohibited in the Addition for more than 20 years. The Big Cypress National Preserve Harvest and Pressure Summary for 2010 to 2011 (FWC 2011) reported hunter effort in the form of man days per deer harvested from the 2006-2007 season to the 2010-2011 season. For all forms of hunting, including archery, muzzle-loading, and general gun, the lowest level of effort required to harvest a buck was 36 hunter days. The greatest level of effort was 93 hunter days. The means of harvest for these levels of effort figures were muzzle-loading and archery, respectively. For the purpose of this analysis, the FWC provided an analysis of hunter pressure and deer harvest for BICY from 1980 to 2012 (Figure 1). This figure, while showing some trends between hunter pressure and harvest, does not show a significant relationship. It is likely hydrology and rainfall may play a role in this relationship that may clarify the relationship of hunter-days to harvest success; however, those data are not available at this time (Fletcher and McCarthy 2011).

Ackerman et al. (1982) predicted the deer kill rate for a resident male cougar was one deer every 8 to 11 days. Resident female kill rates were predicted to be one deer every 14 to 17 days. A female with three, 13-month old kittens had a predicted kill rate of one deer every 3.3 days. Janis and Clark (2002) determined a predation success rate of one kill per 5.24 days for female panthers and one kill per 7.7 days for male panthers, with an average of one kill per animal per 6.45 days for the general panther population. Other literature (Anderson and Lindzey 2003, Cooley et al. 2008, Murphy et al. 2011) shows similar predation success rates of one deer-sized prey per panther approximately every 6.7 to 7.6 days or on average one deer-sized prey per week (Ruth and Murphy 2010). These studies provide guidance regarding the energy needs of Florida panthers.

Land (1991) noted deer survival rates averaged 81.3 percent over a 4-year period between 1987 and 1991 in the Bear Island Unit of BICY. In this study, Land also found bobcats predated more deer than panthers. Bobcats alone, and bobcats and panthers together also killed more deer than were harvested by hunters. Land found the Bear Island population to be stable with female deer

replacing themselves before death. Land concluded hunting in Bear Island did not appear to have adverse impacts on the deer population as a whole. It should be noted an antlerless season existed at the time of this report. Antlerless harvest is now prohibited throughout BICY in areas that are open to hunting.

The NPS states that under the PA "adverse impacts to the Florida panther would be very similar to those of Alternative 1, with the exception of the impacts on the panther prey base." To investigate the interactions of predators and their prey, the Service reviewed literature related specifically to deer and large predators including mountain lions (*Puma concolor*), wolves (*Canis lupus*), and coyotes (*Canis latrans*). We found one particular reference, Ballard et al. (2001), which reviewed studies of deer population and predator relationships conducted throughout North America including mule deer and black-tailed deer (*Odocoileus hemionus*), as well as white-tailed deer. They found widely differing relationships between predators and their prey, mainly based on the relationship of the deer population to carrying capacity. While these studies were not performed in the same type of habitat present in BICY, we do believe they represent the best scientific and commercial data available.

Bleich and Taylor (1998) observed deer mortality for individually monitored deer in the Western Great Basin of California. For females, the primary cause of mortality was predation, comprising 83 percent of mortality. Human induced mortality and malnutrition comprised 4.8 and 12.2 percent, respectively. For the 11 male deer where cause of death was determinable, 36.4 percent were predated and 63.6 percent of mortalities were attributed to hunter harvest. The authors speculated mountain lion predation may regulate deer populations in ecosystems where severe drought or winters occur unpredictably. Drought and unusual weather conditions occur in South Florida in an unpredictable fashion, similar to the conditions of this study.

Compensatory mortality is a theory that states a total population's mortality remains unchanged at low to intermediate exploitation rates because natural mortality decreases in compensation for reduced density. Conversely, additive mortality represents an increase in mortality due to exploitation that results in an increase in total mortality (Allen et al. 1998). Bartmann et al. (1992) reviewed compensatory mortality in the Piceance Basin of Colorado and determined coyote predation was compensatory to starvation mortality in deer populations that were at carrying capacity. Coyote predation was not compensatory to starvation when deer populations were not at carrying capacity. In BICY, it is unlikely the deer population is at carrying capacity. Therefore, it is unlikely, if the same relationship exists, that panther-caused mortality is compensatory to starvation in our system.

Mackie et al. (1998) summarized research in Montana on mule and white-tailed deer. They found hunting to be the largest source of female deer mortality, with natural mortality representing 0 to 25 percent of mortalities observed. They did not believe hunter harvest or other sources of mortality were compensatory in this population. In BICY, NPS and the FWC are proposing to allow harvest of antlered individuals only; therefore, hunter harvest effects will be focused on the male portion of the population. White-tailed deer are polygynous, so one buck services several does, making loss of male deer less important to the population as a whole.

Both Hamlin and Mackie (1989) and Mackie et al. (1998) noted there is a potential for predation to influence deer populations, particularly in areas where there may be multiple predators. Hamlin and Mackie (1989) indicated that predation combined with other sources of mortality, including hunting, could influence low density deer populations and potentially keep them from increasing. This observation indicates introduction of hunter harvest should be undertaken in a precautionary manner to observe the potential effects on the deer populations in BICY, particularly the Addition. The adaptive management framework and communication structure will allow NPS and the FWC, in consultation with the Service, to monitor and respond to this type of scenario should it arise.

In a study conducted on Vancouver Island, British Columbia, Hatter (1988) noted wolf predation was the primary limiting factor in fawn recruitment in that population of black-tailed deer. Atkinson and Janz (1994) noted reduced wolf densities yielded increased fawn survival during the first 3 months of life, likely resulting in an increase in fawn recruitment. The increase in fawn survival was reversed when wolf control efforts ceased. In these studies, the predator appeared to be controlling fawn recruitment into the population. BICY is not a closed system as Vancouver Island is, making a similar type of study problematic. However, the potential exists that the panther population does have a significant effect on the deer population in BICY.

Nelson and Mech (1986*a*) observed wolf predation was responsible for twice the mortality attributed to hunting in white-tailed deer in Minnesota. Of 85 deer mortalities, 44 were attributed to wolf predation, 22 to hunting, 12 to probable wolf predation, and 7 to miscellaneous causes. Their study also indicated wolf predation was limiting yearling deer recruitment into the population in this area.

In a study in Montana, Dusek et al. (1992) determined mortality rates for 154 adult, female radio-collared deer in three different habitat types. Hunting was the largest source of mortality in all areas. Their study concluded hunting regulations in that area had little effect on natural mortality rates and was, therefore, additive to other forms of mortality. This study focused on female deer and the relationship of hunting to natural mortality levels. Antlerless deer harvest is not permitted in BICY. Therefore, hunter harvest, while being an additive source of mortality for bucks, will not be an additive source of mortality for does in BICY.

During a predator removal experiment in Texas, Beasome (1974) noted fawn mortality was 61 to 74 percent higher in areas without predator removal. Deer densities in the treatment areas increased from 15.6 to 19.6 deer per kilometer squared (km^2) while those in the untreated area declined from 8.0 to 7.8 deer per km^2. This study also indicated predator densities had an effect on recruitment of deer into the breeding population. In this case, the removal of a large predator from the study area resulted in an increase in the prey population.

Using these and other case studies of predator/prey relationships, Ballard et al. (2001) concluded the deer population's relationship to carrying capacity was critical to the impacts of predation. Where deer populations appeared limited by predation, such populations were below forage carrying capacity. Conversely, deer populations at or near carrying capacity did not respond to predator removal experiments, indicating the effects of predation were compensatory in nature.

Other factors also influence fitness and fawn survival. Kunkel and Mech (1994) noted fawns from white-tailed does greater than 4 years of age in Minnesota were heavier and had better survival rates than fawns from younger does. A buck only harvest strategy ensures older does are retained in the population. If this dynamic also occurs in BICY, an unhunted or buck only harvest would allow does to reach a more advanced age with a potential for greater fawn survival.

Collectively, these studies appear to support the idea that panther population in south Florida, and in particular in BICY, may be driving the deer population - rather than the availability of deer as prey driving the panther population. Since the deer population in BICY occurs at low densities, most likely related to resource availability and hydrology, and predator mortality is additive in deer populations at low densities, panther predation could be having an effect on recruitment of fawns or yearlings into the population. Most of the published literature indicated hunter harvest did not appear to have an effect on fawn or yearling recruitment (Ballard 2008). This may be due to the fact panthers, and other large predators, are more efficient at finding and killing prey than humans. Assuming hunter harvest is not affecting recruitment of fawns or yearlings into the breeding population, then the proposed introduction of hunting into the Addition should not have a measurable effect on the deer population in this management unit. The adaptive management approach included in the PA will allow NPS to assess this assumption and validate it, by requiring continued monitoring of deer populations, hunter harvest, and panthers. These data will be incorporated into the feedback loop for assessing the effects of implementation of the PA on panther and deer populations in BICY.

The adaptive management process requires an action to be taken so data can be collected on the effects of the action and input into a feedback loop to assess if changes to the action are necessary to achieve the stated goals. For the Addition, 5 years of consistently collected deer survey data and hunter harvest data do not exist. Three years of consistently collected deer survey data do exist, so the 5 years of data desired should be reached in two additional seasons. Since the 5-year average cannot be used for the first two seasons, the NPS and FWC, in consultation with the Service, will be reviewing data at least annually to determine whether changes in quotas, bag limits, or seasons should be implemented.

Predator cycles follow prey cycles with a lag (Laundre et al. 2007). Laundre et al. (2007) noted a puma population in southern Idaho and northwestern Utah increased during an increase in mule deer abundance and declined four years after mule deer abundance declined. Therefore, annual review of deer data will allow the NPS and FWC, in consultation with the Service, to identify any change in prey population cycles before that change results in a change in the predator population. This frequency of review of the data should ensure potential adverse effects to the panther prey base are identified and addressed before those effects could result in measurable effects on the Florida panther.

The NPS and FWC have committed to following the protocols established in the Hunting Management Plan to ensure hunters harvest a reasonable number of bucks while the deer population is sustainable and the panther population is not affected. There will be no increase in the quotas for the Addition until sufficient data exist and analyses of those data support such a

change. As currently planned, this would not occur until a 5-year average for hunter check-in data can be established and additional access points or sustainable ORV trails were available in the Addition (NPS 2013).

Because the relationship between panthers, hunters, and prey will be complex and difficult to predict, two elements must be in place to ensure adverse effects to panthers do not occur. The first element is an initial hunting program that is conservative and prevents adverse effects to panthers. The PA provides that through limiting hunting quota permits to 30 per season, in the Addition, for the initial years of implementation of the Hunting Management Plan. The second element includes trigger points and feedback loops sufficient to conserve the panther population. The PA provides that through its inclusion of annual data reviews and the types and levels of change or unforeseen events that could result in changes to seasons or quota permits for the Addition.

CONCLUSION

The goal of the adaptive management framework is to ensure hunting activities do not alter the existing predator/prey relationship in BICY and, therefore, do not have a measurable effect on the Florida panther. As actions that result in harm or harassment of panthers would be measurable, and the analysis indicates these types of effects are not likely to occur, we anticipate harm or harassment of panthers would not occur with implementation of the PA. As stated earlier, the potential harassment effects of ORV use have been addressed in prior, formal consultations and, as such, are not included in this consultation. Based on this information, the NPS has determined effects to the Florida panther population would be expected to be minimized with the PA and result in long-term, negligible to minor, adverse, regional effects to the Florida panther (NPS 2013). As the NPS stated in the Hunting Management Plan, this level of effects equates to a determination that implementation of the PA "may affect, but is not likely to adversely affect" the Florida panther. Based on this information, the Service concurs.

This consultation applies to the development of the Hunting Management Plan and implementation of the PA. Any additional proposals or modifications to the adaptive management framework may require additional consultation in accordance with section 7 of the Act.

The Service supports selection of Alternative 3, of the PA, due to its inclusion of an adaptive management strategy in making decisions regarding hunting activities within BICY. We believe the PA offers the best use of science in decision-making and creates a cooperative atmosphere between NPS, the FWC, and the Service. Adaptive management focuses on learning and adapting, through partnerships of managers, scientists, and other stakeholders who learn together how to create and maintain sustainable resource systems (Williams et al., 2009). The adaptive management strategy and decision-making framework will ensure the best science is used to formulate decisions regarding hunting in BICY and the needs of threatened or endangered species like the Florida panther are adequately considered in those decisions.

This letter fulfills the requirements of section 7 of the Act and further action is not required. If modifications are made to the project, if additional information involving potential effects to listed species becomes available, or if a new species is listed, reinitiation of consultation may be necessary.

We look forward to working with you to protect BICY for its conservation and historic value. If you have any questions, please contact Jane Tutton at 772-469-4235,

cc: electronic only
NPS/DSC, Denver, Colorado (Tracy Atkins)
NPS/RO, Atlanta, Georgia (Tim Pinion)
FWC, Tallahassee, Florida (Nick Wiley)
FWC, Gainesville, Florida (Don Coyner)

LITERATURE CITED

Ackerman, B.B, F.G. Lindzey, and T.P. Hemker. 1982. Predictive Energetics Model for Cougars. *In* Cats of the World: Biology, Conservation, and Management. Eds. S.D. Miller and D.D. Everett. Texas A & I University. Kingsville, Texas.

Allen, M.S., L.E. Miranda, and R.E. Brock. 1998. Implications of compensatory and additive mortality to the management of selected sportfish populations. Lakes & Reservoirs: Research and Management 1998 3:67-79.

Anderson, C. R., and F. G. Lindzey 2003. Estimating cougar predation rates from GPS location clusters. Journal of Wildlife Management 67:307-316.

Atkinson, K. T., and D. W. Janz. 1994. Effect of wolf control on black-tailed deer in the Nimpkish Valley on Vancouver Island. Ministry of Environment, Lands and Parks. Wildlife Bulletin Number B-73. Nanaimo, British Columbia, Canada.

Ballard, W. B., D. Lutz, T. W. Keegan, L., H. Carpenter, and J. C. deVos, Jr. 2001. Deer-predator relationships: a review of 66 recent North American studies with emphasis on mule and black-tailed deer. Wildlife Society Bulletin 29

Ballard, W.B. 2008. Deer-predator relationships. Department of Range, Wildlife, and Fisheries Management, Texas Tech University, Lubbock Texas .

Bartmann, R. M., G. C. White, and L. H. Carpenter. 1992. Compensatory mortality in a Colorado mule deer population. Wildlife Monographs 121.

Beasom, S. L. 1974. Relationships between predator removal and white-tailed deer net productivity. Journal of Wildlife Management 38:854-859.

Bleich, V. C., and T. J. Taylor. 1998. Survivorship and cause-specific mortality in five populations of mule deer. Great Basin Naturalist 58:265-272.

Cooley, H. S., H. S. Robinson, R. B. Wielgus, and C. S. Lambert. 2008. Cougar prey selection in Northeast Washington. Journal of Wildlife Management 72:99-106.

Dusek, G. L., A. K. Wood, and S. T. Stewart. 1992. Spatial and temporal patterns of mortality among female white-tailed deer. Journal of Wildlife Management 56:645-650.

Fletcher, R., and K. McCarthy. 2011. Historical data analysis related to recreational ORV use and panthers within Big Cypress National Preserve. IFAS/University of Florida Final Report submitted to U. S. Department of Interior, National Park Service. 53pp.

Florida Fish and Wildlife Conservation Commission. 2010. Annual report on the research and management of Florida panthers: 2009-2010. Fish and Wildlife Research Institute and Division of Habitat and Species Conservation. Naples, Florida.

Florida Fish and Wildlife Conservation Commission. 2011. Big Cypress National Preserve: Harvest and Pressure Summary. 2010-2011. Tallahassee, Florida.

Hamlin, K. L., and R. J. Mackie. 1989. Mule deer in the Missouri River Breaks, Montana: a study of population dynamics in a fluctuating environment. Montana Fish, Wildlife, and Parks, Wildlife Division. Federal Aid to Wildlife Restoration Final Report, Project W-120-R-7-18, Program Number 1, Study BG-1.0, Job Numbers 2 and 3, Helena, Montana.

Hatter, I. W. 1988. Effects of wolf predation on recruitment of black-tailed deer on northeastern Vancouver Island. Wildlife Branch, Ministry of Environment. Wildlife Report Number R-23. Victoria, British Columbia, Canada.

Janis, M.W., and J.D. Clark. 2002. Responses of Florida Panthers to Recreational Deer and Hog Hunting. *The Journal of Wildlife Management* 66(3): 839-848

Kunkel, K. E., and L. D. Mech. 1994. Wolf and bear predation on white-tailed deer fawns in northeastern Minnesota. Canadian Journal of Zoology 72:1557-1565.

Land, D.E. 1991. Big Cypress Deer/Panther Relationships: Deer Mortality Final Report. Tallahassee, Florida.

Land, E.D. 1994. Response of the wild Florida panther population to removals for captive breeding. Final Report, Study Number 7571. Florida Game and Fresh Water Fish Commission; Tallahassee, Florida.

Laundre, J.W., L. Hernandez, and S.G. Clark. 2007. Numerical and demographic responses of pumas to changes in prey abundance: testing current predictions. Journal of Wildlife Management 71(2):345-355.

Mackie, R. J., D. F. Pac, K. L. Hamlin, and G. L. Dusek. 1998. Ecology and management of mule deer and white-tailed deer in Montana. Montana Fish, Wildlife and Parks, Wildlife Division. Federal Aid to Wildlife Restoration Report, Project W-120-R, Helena, Montana.

Murphy, K. M., M. S. Nadeau, and T. K. Ruth. 2011. Cougar—prey relationships. Pages 41-69 *in* J. A. Jenks, editor. Managing cougars in North America. Jack H. Berryman Institute, Utah State University, Logan, Utah, USA. 200pp.

National Park Service. 1991. General Management Plan and Final Environmental Impact Statement: Big Cypress National Preserve, Florida. Volume 1. Ochopee, Florida: Big Cypress National Preserve.

National Park Service. 2001. Final Recreational Off-road Vehicle Management Plan and Supplemental Environmental Impact Statement. Big Cypress National Preserve. Ochopee, Florida.

National Park Service. 2006. 2006 *Management Policies*. Washington, D.C.

National Park Service. 2010. The Big Cypress National Preserve – Addition Draft GMP/Wilderness Study/Off-Road Vehicle Management Plan/ Environmental Impact Statement.

National Park Service. 2013. Big Cypress National Preserve Second Revised Draft Hunting Management Plan/Environmental Assessment. Denver, Colorado.

Nelson, M. E., and L. D. Mech. 1986. Mortality of white-tailed deer in northeastern Minnesota. Journal of Wildlife Management 50:691-698.

Rancher's Supply, Inc. 2011. Florida Panther Annual Count 2010, Synoptic Survey of Florida Panthers 2010. 144 pp.

Ruth, T. K., and K. Murphy. 2010. Cougar—prey relationships. Pages 138-162 in M. Hornocker and S. Negri, editors. Cougar: ecology and conservation. University of Chicago Press, Chicago, Illinois, USA. 306pp.

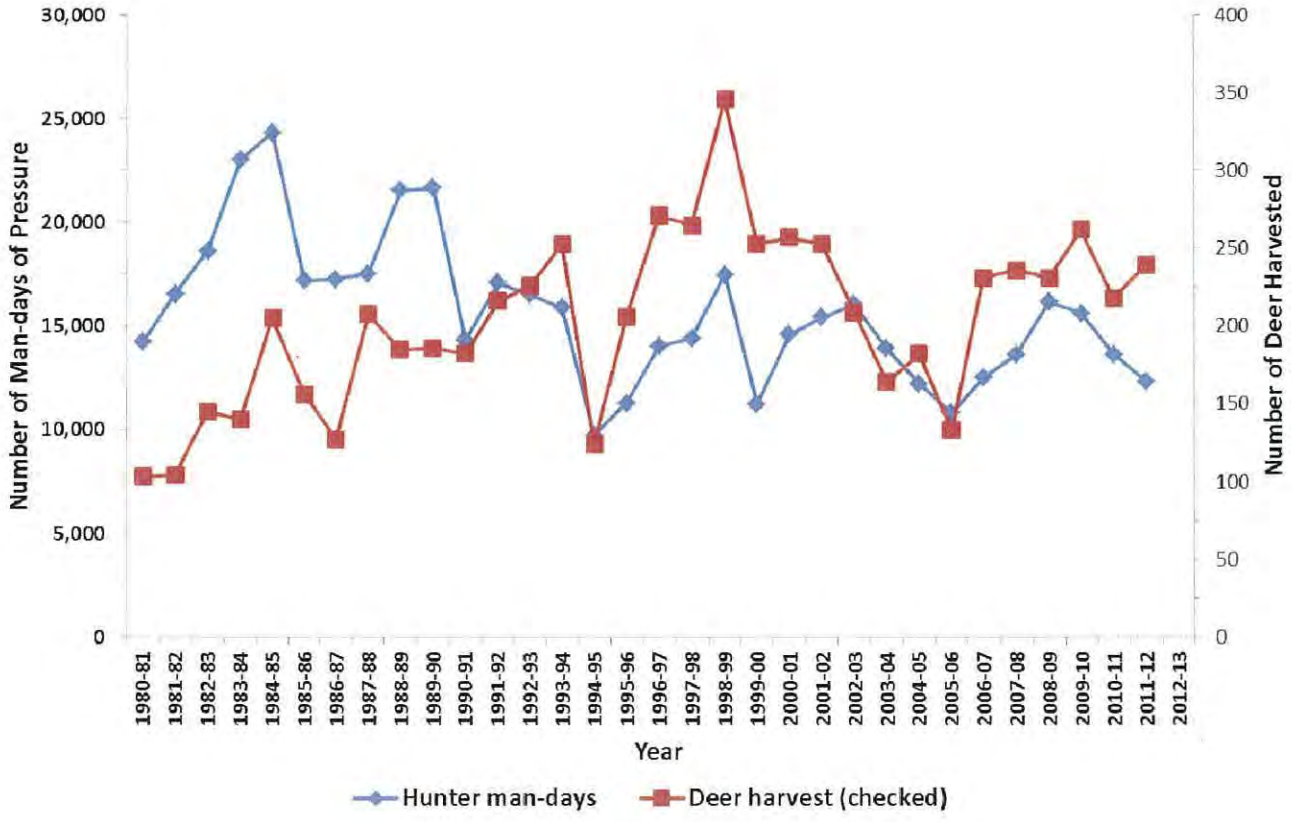
U.S. Fish and Wildlife Service. 1999. The Eastern Indigo Snake *in* South Florida Multi-species recovery plan. http://www.fws.gov/verobeach/MSRPPDFs/EasternIndigoSnake.pdf

U.S. Fish and Wildlife Service. 2006. Deer Hunting in the United States: Demographics and Trends. Addendum to the 2006 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation. Report 2006-10.

U.S. Fish and Wildlife Service. 2008. Florida panther recovery plan: final. Prepared by the Florida Panther Recovery Team and the South Florida Ecological Services Office. U.S. Fish and Wildlife Service; Atlanta, Georgia.

Williams, B. K., R. C. Szaro, and C. D. Shapiro. 2009. "Adaptive Management: The U.S. Department of the Interior Technical Guide." Adaptive Management Working Group, U.S. Department of the Interior, Washington, DC.

Figure 1. Hunter pressure and deer harvest from Big Cypress Wildlife Management Area (Big Cypress National Preserve), 1980-2012.



As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

NPS 176/112493