Supplemental Information for the Florida Black Bear

Biological Status Review Report

The following pages contain peer reviews received from selected peer reviewers, comments received during the public comment period, and the draft report that was reviewed before the final report was completed

March 31, 2011

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Peer review #1 from Dr. Madan Oli

From: Oli,Madan Kumar
To: Imperiled
Cc: Oli,Madan Kumar
Subject: RE: Deadline reminder for peer reviews of BSR reports
Date: Sunday, January 16, 2011 1:59:44 PM
Hi,
Here are my comments on the Florida Black Bear BSR report:

This is an excellent document, with a clear and concise summary of biological information, population status and trends, and threat assessment. My only comments concern the Quantitative Analyses section, where it is concluded that the probability of extinction in the next 100 years is zero, based on analyses reported in Root and Barnes (2001). One might argue that this conclusion is not well supported by available data (or even flawed) for the following reasons:
1. Root and Barnes (2006) used cub survival rate of 0.65; this value is much greater than the recent estimates of cub survival in Ocala National Forest (Garisson et al. 2007, Hostetler et al. 2009).
2. To my knowledge, rigorous estimates of the survival of subadult females are currently not available, and no justification for the values used is provided.
3. Root and Barnes (2006) did not consider factors such as environmental and demographic stochasticities, catastrophes, as well as parametric uncertainties. It is well know that environmental and demographic stochasticities, and catastrophes can increase probability of extinction substantially even in increasing populations.
4. The authors report a point estimate for the probability of extinction or of population declines; however, no measure of precision (e.g., standard error or confidence intervals) are provided. Thus, one cannot determine the precision of the reported probabilities of extinction or related parameters.
I recommend that these issues be presented as caveat to the aforementioned conclusion. A minor point, but please the following sentence: “The model was found to be most sensitive to changes in adult survival” to “The population growth rate was found to be most sensitive to changes in adult survival”. Finally, I note that more detailed information on sensitivity and elasticity of population growth rate to matrix entry and lower-level demographic parameters are presented in Hostetler et al. (2009; supplementary material).

Sincerely,

Madan

From: Oli,Madan Kumar [mailto:olim@ufl.edu]
Sent: Saturday, March 12, 2011 4:55 PM
To: McCown, Walter
Subject: RE: Black Bear BSR

Walt, I am glad to know that some of my comments were helpful. I do agree with your conclusion regarding listing.

Cheers,

Madan

Peer review #2 from Dr. Dave Garshelis

From: Garshelis, Dave L (DNR)
To: Imperiled
Subject: RE: FL Black Bear Draft BSR Report
Date: Thursday, January 06, 2011 12:19:07 PM

Thank you for the opportunity to review Florida's Biological Status Review for the Florida black bear. I found the document to be very thorough and thoughtful. I think the group did an extraordinary job of pulling together all of the relevant data and interpreting it. The data themselves are reasonably strong. I see no major holes in the information insofar as judging the criteria for listing. I am in total agreement with the conclusion that this subspecies should no longer be listed as threatened, despite some continuing conservation concerns (e.g., high level of population fragmentation).

In order to meet the threshold for being threatened, the IUCN redlist criteria require at least one of the following: (A) that the population has been declining, (B) that the geographic range is very small, (C) that population size is <10,000 and still declining, (D) that population size is <1,000, or (E) that population projections indicate an extinction probability of at least 10% in 100 years. It is apparent from the data that the population has been increasing for at least 3 decades, and this increase is expected to continue, given the conservation attention that has been paid to this species (e.g. attempts to reduce human-bear conflicts and road kills). It is also clear that the geographic range and population size do not meet the criteria for threatened. I did not examine the PVA model, but it is reasonable, given the description of the current situation, that extinction risk would be very low (of course impossible to project for 100 years). I am thus satisfied that none of the criteria are met and that the species should not be listed as threatened.

Normally, in downgrading a species on the IUCN redlist, one must wait 5 years for the proposed new listing to take effect, to ensure that the projected favorable trends continue. However, since the former listing did not use these same rigorous criteria, and periodic evaluations have not been done, I think that application of the 5-year lag in downlisting would be unwarranted. Also, the IUCN redlist has a category for "Near Threatened", which would normally include species like this, which are downlisted but still "conservation dependent". Again, since the state does not have a category for this, that is not relevant here.

I am glad to see that black bears in Florida (and surrounding areas where this subspecies occurs) are doing better than I had thought.

Sincerely,

Dave Garshelis, PhD
Minnesota DNR
Co-chair IUCN Bear Specialist Group

Peer review #3 from Frank van Manen

From: T van Manen, Frank
To: Imperiled
Cc: McCown, Walter
Date: Monday, January 17, 2011 8:29:15 PM
Attachments: Review of FWC Black Bear Biological Status Review - Jan 2011.docx

Attached please find my comments on the Biological Status Review of black bears in Florida.

Please feel free to contact me if you have any questions regarding my review.

Sincerely,

Frank T. van Manen
U.S. Geological Survey
Univ. of Tennessee
274 Ellington PSB
Knoxville, TN 37996

Review of FWC's Biological Status Review for the Florida black bear (*Ursus americanus floridanus*)

The Biological Status Review (BSR) document provides a review of the status of the Florida black bear in Florida, currently listed as threatened by the state of Florida. First, I commend the Florida Fish and Wildlife Conservation Commission (FWC) for using the established process developed by the IUCN for their listing of species under the IUCN Red List criteria. This process is based on international standards, provides consistency for application to many different species, and provides transparency for the listing process.

In my review, I focused on the quality and interpretation of the scientific information and analyses used in this BSR. I appreciate the concise nature of the DSR report but this may compromise interpretation of the scientific data in some instances. It seems this document should provide sufficient information from the supporting studies and scientific information that it can be interpreted on its own. Consequently, many of my comments relate to further clarification and providing more details of the scientific data that were used in the status review. I realize this may deviate from the intentions of the IUCN format. However, given that much of the supporting literature for the review criteria are FWC or contractor reports, rather than peer-reviewed articles (I found no peer-reviewed papers associated with geographic range [criterion B], population size and trend [criterion C], population very small or restricted [criterion D], and quantitative analysis [population viability; criterion E]), this additional information is important.

My comments follow the major sections of the BSR and focus on the criteria in the table with the biological status review information.

Taxonomic Classification

Biological background information on taxonomic classification is correct, with appropriate detail.

(1) Life History

Biological background information on life history of the species is succinct and accurate, and sufficient for this status review.

(2) Geographic Range and Distribution

a. I suggest including a map in this section to show the distribution and extent of subpopulations in Florida and their respective population estimates. Although this information can be obtained from other documents, the area and distribution of the subpopulations is a core issue of black bear management in Florida, thus providing an important backdrop for this document.

b. The area of black bear range is used as one of the status assessment criteria, so providing some information on how the estimates of primary and secondary range were derived and how they were defined would be important. The FWC (2010) reference contains some of this information but the essentials should be provided in the BSR. A minor point: other area measurements in the document were in km^2 but these were in mi^2.

c. There are several different terms used to describe bear range, which tends to be confusing. In the BSR table, the ambiguous IUCN terms 'extent of occurrence' and 'area of occupancy' are used but they are never defined. One can infer that these terms refer to range that is inhabited by bears and range within which reproduction occurs (page 2 of BSR), respectively. However, the supporting documentation often uses the terms primary and secondary range. Consistent use of the terms and clear definitions, especially for terms used in the status review table, would help interpretation.

(3) Population Status and Trend

a. It may be beneficial to briefly explain why the black bear is currently not listed as Threatened by the state of Florida in Baker and Columbia counties and Apalachicola National Forest. This information would provide important historical context for the current BSR.

b. The IUCN criteria place substantial weight on population size. Obtaining reliable estimates of black bear population size for an entire state is challenging. However, with the DNA studies, FWC has better estimates than most states. The DNA mark-recapture studies on 6 of the FL subpopulations provide a solid basis for the BSR. Therefore, your statement "The exact population size of the Florida black bear is unknown due to the bear's reclusive behavior and occupancy of remote, forested areas (Maehr and Wooding 1992)" somewhat devalues the quality of the data you actually have; I suggest you use a statement like this instead to indicate the challenges of obtaining reliable population data on black bears so the reader knows to interpret the precision of the overall estimate within that context.

c. Population abundance for almost all subpopulations was estimated using mark-recapture techniques based on DNA sampling; there is a large body of literature that supports this approach and results should be considered reliable (see Luikart et al. [2010] for a recent overview). However, the population estimation process and accuracy and precision of the estimates should be discussed briefly. I realize these details are provided in Simek et al. (2005) and other references but this information is directly applied in the assessment so some basic information is desirable.

-Based on the Simek et al. (2005) document, I note abundance estimates for the different subpopulations were based on Jolly-Seber estimates of the study areas, which were then converted to bear densities based on the sampled area, which, in turn, were extrapolated to obtain population abundance for the area of primary range associated with each subpopulation. The assumption of equal habitat quality for these extrapolations is clearly stated and may be reasonable if the study areas were representative the larger region. An accurate estimate of the sampling area also is an important assumption; using the average summer home range radius as a buffer beyond the edge of the sampling grid is not unreasonable,

however, methods based on spatially-explicit capture-recapture techniques (e.g., Efford 2004, Efford et al. 2004) would provide a more accurate estimate.
-Simek et al. (2005) presented population estimates on both open and closed models but only the open model (Jolly-Seber) estimates were used for the BSR. Given the 3 consecutive years of DNA data (2001-2003), a robust design approach would provide improved population and apparent survival estimates and also allow estimation of temporary emigration or immigration (Pollock 1981, 1982). The closed estimates vary substantially by year so a robust design may provide important insights into this variability. See Clark et al. (2010) for a recent application.
- Given the population estimate for the state and the estimate of primary black bear range (25,000 km^2), average bear density in the state is approximately 0.1 bear/km^2; this density is low compared with almost any unhunted population in eastern North America. I suspect use of the Jolly-Seber model may be one potential source of bias because capture heterogeneity cannot be incorporated into the model. With capture heterogeneity present in most bear studies, a robust design approach would better address this issue.
-Although I have identified several different techniques that could improve the accuracy and precision of the population estimates, I point out these very likely would *not* change the findings of the status review based on the IUCN criteria, particularly if the estimates are indeed biased low. However, these issues should be addressed.

d. You present the statewide estimate as 2,212-3,433 based on adding the lower and upper estimates of 95% confidence intervals, respectively, of the extrapolated estimates of the subpopulations (i.e., Table 8 in Simek et al. [2005]) plus the estimates for Chassahowitzka and Glades/Highlands). These details should be provided in the BSR. The level of information presented in the Draft Black Bear Management Plan (FWC 2010; i.e., pages 6 and 7) would also be appropriate for this BSR. More importantly, considering the state estimate is composed of 8 separate subpopulation estimates, of which at least 6 have associated standard errors, I suggest you add the point estimates, rather than the lower and upper limits of the 95% confidence intervals, and use the delta method of Powell (2007) to calculate the standard error of the summed estimate. After all, the point estimates best reflect the central tendency of the data. The standard error of the point estimates could then be used to calculate a confidence interval for the state estimate. None of this is likely to change the status criteria but it would provide a more accurate reflection of the population estimate and associated variance for the entire state.

e. -The BSR states that the population has increased over the past 3 generations and will likely increase over the next 3 generations (page 3, second paragraph), which is used for the review criteria A and C. For criterion A, the status review table refers to the historical records based on previous publications (presented in Fig. 1) as ‘estimated data’ (E). However, the first and only reliable population estimates

were based on the DNA studies during 2001-2003. I don't doubt the population has increased over the past 24 years, but I would hesitate to interpret the trend based on the older studies as estimated data.

-For Criterion C, FWC (2010) is provided as the reference but in my review of the Draft Black Bear Management Plan, I did not find information or analyses that specifically provided evidence of past or projected population increases; trends of nuisance incidents and other indicators presented in the Draft Black Bear Management Plan are consistent and compelling but these data are not sufficient to determine whether this criterion was met. Maybe this was the reason for the 'projected' data category? Regardless, some clarification is needed here.

-Similarly, the estimated area of unoccupied but potential habitat, and how this was derived, should be provided rather than just presenting the Hoctor (2006) reference.

(4) Quantitative Analysis

a. The population viability analysis (PVA) is an appropriate technique to address the probability of extinction criterion. Similar to my previous comments, I suggest providing pertinent information on the PVAs. What parameter estimates were used, what data were they based on, was this a stochastic or deterministic model, was a sensitivity analysis performed, what were the assumptions, etc.?

b. After reviewing the PVAs conducted by Root and Barnes (2006), I have some concerns about their assumptions. They state the general assumptions of all PVAs they conducted on page 6 and they mostly seem reasonable. However, one of those assumptions has implications for the black bear PVA: "*There was no dispersal among populations unless specifically specified. We assumed that distinct populations were independent.*" In the PVA results for black bears (pages 62-65), however, it is clear the authors considered this to be one population: "*Females tend to remain in their natal home ranges, but do make occasional long-distance dispersal movements and one subadult female reportedly dispersed 54km (Maehr 1997). Males generally disperse and average movements are 32-64 km with a maximum observed distance of 350 km (Scott 2004). The potential habitat maps showed that patches were less than 40 km from one another. Based on these data, we treated the potential habitat of the Florida Black Bear as a single population, shown in the figure below. Although some areas may be isolated from others, this probably has more to do with behavioral aversion to areas of high human activity rather than movement ability of the bears themselves.*" There are several problems with these assumptions. There seems to be substantial evidence that the subpopulations, with the exception of Ocala-St. John's, are genetically isolated (Dixon et al. [2007] and other studies cited in the BSR). Previous black bear studies provide substantial evidence that female dispersal is limited; the 54 km documented by Maehr (1997) is an exception. In one of my studies, we documented 177 potential dispersal occasions for female black bears in North America from the literature and 82.5, 7.1, 1.3 and 0.6%

dispersed ≥5 km, ≥10 km, >20 km, and ≥60 km, respectively. Given these observations and given the distances and anthropogenic barriers to movement among the Florida subpopulations, it seems much more reasonable to assume that demographic connectivity (inter-population movement of both sexes) among the subpopulations is very limited or non-existent. The only exception may be the Osceola and Ocala population, which are connected by secondary range and for which there is evidence of limited genetic exchange (Dixon et al. 2006; note that this study did not provide strong evidence of demographic exchange as only 3 females were identified in the corridor, all within 20 km from Ocala; these bears may represent a slow, northward expansion of primary range from the Ocala population). Based on these observations, using a single population in the PVA seems an unreasonable assumption. Moreover, the PVA was applied to all areas of potential habitat (page 63, Root and Barnes 2006), which is substantially more than what is currently occupied (interestingly, many of these patches likely are not occupied because females have not been able to disperse to them). Using habitat patches based on managed lands only (page 63) is more representative of the current distribution but even that scenario would include many unoccupied patches in between the large, occupied tracts and thus 'allow' demographic interchange in the PVA that currently does not occur. Thus, the PVA by Root and Barnes (2006) may reflect an unrealistic scenario of future demographic connectivity among all subpopulations and I question the validity of the results. A PVA for *each* distinct subpopulation, using bear habitat patches within primary and secondary range, would provide a much more accurate assessment of population viability.

(5) Biological Status Assessment

a. It was not entirely clear to me what the purpose of this section is and how it relates to the status review criteria.
b. *Threats* - I agree the 2 primary threats to black bears in FL are human-bear interactions and habitat loss/fragmentation. Moreover, recognition that increased conflicts between humans and bears could cause devaluation of bears is important because it is a real concern.
c. *Habitat Loss* - The authors correctly point out that habitat loss/fragmentation and human-bear conflicts issues are not independent. The authors also indicate that there is substantial evidence for genetic and spatial isolation among the subpopulations, which support my previous concerns regarding the PVA.
d. *Bear Mortality* - The authors make the important point that mortality is the main concern with regard to human-bear interactions. They also point out the different subpopulations may be able to sustain different levels of mortality. Thus, one question that may need to be addressed is if mortalities associated with human-bear interactions (including vehicle collisions) could present future concerns for

the smaller subpopulations? This may be particularly important given that reported mortalities due to vehicle collisions or nuisance conflicts often are highly underreported.

-Based on Bunnell and Tait (1980), the report suggests that Florida black bears can sustain an annual mortality of up to 23%. This statement should be qualified: as Bunnell and Tait (1980) point out, this represents a 'near-absolute limit on the harvest rate' (meaning *any* mortality) and under specific conditions.

-The authors make a valuable observation that an increase in human-bear interactions could potentially cause devaluation of bears among the public; if the cultural carrying capacity for black bears is exceeded, increased mortality can be expected.

e. Current management efforts

i. Description of current management efforts indicates a highly pro-active approach towards human-bear conflicts. This effort is one of the leading state programs in the nation.

ii. Despite habitat loss and degradation being a major concern, the current management section presents relatively little information on FWC programs that enhance habitat management/protection or identification and protection of potential habitat linkages. FL is one of the leading states with regard to state-wide land-use and ecological planning and it seems this would be a valuable effort to build on in the black bear management plan.

(6) Biological Status Review information (Table)

a. Please describe the data types used in the table (*observed (O), estimated (E), inferred (I), suspected (S), or projected (P)*). The order of this list represents decreasing reliability of data but a footnote may be helpful to clarify the differences in these categories.

b. The information in this table was relevant, well organized, and easy to interpret. It clearly identifies the various components and criteria that, combined, lead to an unambiguous finding. However, as indicated in my previous comments, further clarification and interpretation of the data and information in the text would be important to substantiate whether a criterion was met or not.

c. Under sections C and D, you mention the population estimate of 2,212 – 3,433 for the criteria of <10,000 and <1,000 *mature* individuals, respectively, the first time this is indicated in the document. With 2 strands of barbed wire used in the DNA sampling, I suspect that many subadults and possibly some yearlings had a chance to be captured as well. Please clarify in the text whether your estimates reflected mature animals only or change the estimates accordingly.

Literature Cited:

Bunnell, F.L., and D.E.N. Tait. 1980. Bears in models and reality-implications to management. International Conference on Bear Research and Management 4:15-24.

Clark, J.D., R. Eastridge, and M.J. Hooker. 2010. Effects of exploitation on black bear populations at White River National Wildlife Refuge. Journal of Wildlife Management 74:1448–1456.

Efford, M. G. 2004. Density estimation in live-trapping studies. Oikos 106:598–610.

Dixon, J.D. M. K. Oli, M. C. Wooten, T. H. Eason. J. W. McCown, and D. Paetkau. 2006. Effectiveness of a regional corridor in connecting two Florida black bear populations. Conservation Biology 20:155-162.

Dixon, J.D., M.K. Oli, M.C. Wooten, T.H. Eason, J.W. McCown, and M.W. Cunningham. 2007. Genetic consequences of habitat fragmentation and loss: the case of the Florida black bear (*Ursus americanus floridanus*). Conservation Genetics 8:455-464.

Efford, M., D.K. Dawson, and C.S. Robbins. 2004. DENSITY: software for analyzing capture recapture data from passive detector arrays. Animal Biodiversity and Conservation 27:217–228.

Luikart, G., N. Ryman, D.A. Tallmon, M.K Schwartz, and F.W. Allendorf. 2010. Estimation of census and effective population sizes: increasing usefulness of DNA-based approaches. Conservation Genetics 11:355–373.

Pollock, K.H. 1981. Capture–recapture models: a review of current methods, assumptions, and experimental design. Pages 426–435 in C. J. Ralph and J. M. Scott, editors. Estimating numbers of terrestrial birds. Studies in Avian Biology, No. 6. Cooper Ornithological Society, Lawrence, Kansas, USA.

Pollock, K.H. 1982. A capture–recapture design robust to unequal probability of capture. Journal of Wildlife Management 46:757–760.

Powell, L.A. 2007. Approximating variance of demographic parameters using the delta method: A reference for avian biologists. The Condor 109:949–954.

I hope you find these comments useful. Please do not hesitate to contact me if you have any questions concerning my review.

Respectfully submitted,

Frank T. van Manen, Ph.D.
Research Ecologist
U.S. Geological Survey
Leetown Science Center
Southern Appalachian Field Branch

Peer review #4 from Stephanie Simek

From: Stephanie L. Simek
To: Imperiled
Subject: BSR: Florida Black Bear
Date: Tuesday, January 18, 2011 12:29:55 AM
Attachments: SIMEK_FloridaBlackBear_Independent_Review.pdf

Dear Species Conservation Planning Staff,

Attached please find a PDF containing my independent review of the document entitled "Biological Status Review for the Florida black bear (*Ursus americanus floridanus*)". The document was concise and well-written. I am hopeful you will find my comments useful in FWC's effort to evaluate the Florida black bear.

Thank you for the opportunity to provide an independent review as part of your listing process.

Please contact me if you need anything further.

-Stephanie

Stephanie L. Simek
Carnivore Ecology and Research Lab
Mississippi State University
PO Box 9690
Mississippi State 39762

Stephanie L. Simek
Carnivore Ecology Lab
Mississippi State University
Independent Review: BSR Florida Black Bear

Delisting a species is a monumental management decision and requires that all information and data we have learned regarding Florida black bears within Florida to be taken into account. As an independent reviewer of the Florida Fish and Wildlife Conservation Commission's (FWC) Biological Status Review (BSR) for the Florida black bear (*Ursus americanus floridanus*), I was specifically requested to comment on the following:

1. The completeness and accuracy of the biological information and data analysis in the BSR, and

2. the reasonableness and justifiability of our assumptions, interpretations of the data, and conclusions.

Here are my findings, concerns, and suggestions based on my independent review of the BSR:

The FWC has adopted and used the IUCN criteria for listing species in Florida and consequently, implemented the IUCN criteria in this BSR of the Florida black bear (*Ursus americanus floridanus*). Under the IUCN criteria (including the Red List at Regional Levels), the BSR conclusion is supported. However, despite its compliance with the IUCN criteria, there are limitations to the biological information, interpretation, and assumptions used within this document. First, the IUCN criterion may not be legitimate criteria to assess the fragility of black bear sub-populations in Florida. Therefore, this BSR may represent a rudimentary assessment of Florida black bear status and not present what is necessary to evaluate this listing decision. There are several points that should be further reviewed, addressed, and considered prior to determining if delisting is warranted and subsequently during the development of management plans for the sub-species.

The variation between the criteria used to initially list the sub-species and the current IUCN criteria should be reviewed. It is questionable under the IUCN criteria that the species would have been listed during the first listing process. Notably, however, the increase in bear population numbers and habitat are likely a direct result of the initial listing; which minimized harvest and improved habitat conservation efforts. Thus using the appropriate criteria to address the sub-species, in its fragmented state, and its existing habitat is imperative to the decision process required for considering delisting the sub-species. Because the sub-populations of black bears are fragmented in Florida, the IUCN criteria may be too lax to provide any meaning for the long term conservation of black bears within the state. Consideration should be given to understanding the appropriateness of using the IUCN criteria for this sub-species within Florida and a justification should be provided within the BSR.

A contributing factor to the limitations of this BSR is the treatment of Florida black bears existing in one population instead of the 5-8 fragmented sub-populations that exist. One would expect that if the IUCN criteria were considered at the sub-population level, some of the sub-
Stephanie L. Simek Carnivore Ecology Lab Mississippi State University Independent Review:

BSR Florida Black Bear populations of Florida black bear would likely result in not meeting the criteria for listing. However, a few of the sub-populations may still meet the criteria for listing and it is these sub-populations that will be most vulnerable should delisting occur as a result of consolidating the sub-populations in Florida into one population such as in this BSR.

Although the sub-populations are mentioned in the BSR and the Florida black bear distribution is described as fragmented, with little landscape connectivity and little genetic exchange, these factors are not adequately addressed in the IUCN criteria once the sub-populations are consolidated into one population. Additionally, while the genetics of the St. Johns and Ocala populations are mentioned (suggesting the two sub-populations be merged into one sub-population); the genetic variation between the Aucilla and Apalachicola bears is not addressed.

Under the Population Size and Trend section, it should be noted that the population estimates obtained through genetic sampling (Simek et. al 2005) may not be the number of "mature" individuals because age of individuals is not identified through genetic sampling. While the greater number of individuals is likely to be "mature"; it cannot be stated as fact. A recommendation to consider for addressing this issue is to use known age ratios from the sub-populations to determine an appropriate estimate for "mature" individuals in the population rather than using the number of individuals generated from the genetic sampling.

Also, the population viability analysis cited under the Quantitative Analysis Section (Root and Barnes 2006) suggests the probability of extinction over the next 100 years is zero and the model is most sensitive to changes in adult survival. However, this model: 1) uses sub-populations as one population and 2) is based on current conditions and did not incorporate projected changes over time that may occur, as indicated in the Wildlife 2060 report, or potential changes in adult bear survival if delisting occurred. These limitations to the model should be noted and considered in the BSR, especially because the BSR acknowledges the 2 greatest threats to Florida black bear are habitat loss and fragmentation and negative interactions with people.

A final note, the document text fluctuates, sometimes within one paragraph, between "the entire population of Florida black bear in the state", the population of American black bear in North America, and the population of Florida black bear in the Southeastern United States. The reader can easily be confused therefore a recommendation is to clarify which species and regional level is being addressed. Additionally, the BSR classifies Florida black bear as non-endemic to Florida, however, the level of immigration and emigration occurring between adjacent states (Georgia, Alabama, and Florida) is unknown. Stephanie L. Simek Carnivore Ecology Lab Mississippi State University Independent Review: BSR Florida Black Bear

Summary:
1. Under the IUCN criteria the BSR conclusion is supported, but the BSR does not provide enough information to make the decision that the IUCN criteria are the appropriate measures for determining if the fragmented sub-populations of Florida black bear do not meet the criteria for listing.

2. Determine if the IUCN criteria are appropriate for assessing biological status of the fragmented sub-populations of Florida black bear.

3. Determine the population scale necessary: sub-population vs. single population
i) if a single population is deemed appropriate then address potential impacts to vulnerable sub-populations and provide conservation measures in management plans.
4. Be consistent and identify clearly the species, sub-species, and Regional level being addressed.

5. Be consistent with the combining or splitting of sub-populations based on genetics.

6. Address and correct where necessary the use of the genetic data (for sub-population identification and mature individuals) and specify the limitations and assumptions of the population viability analysis.

Peer review #5 from Mike Pelton

From: mpelton
To: Imperiled
Date: Saturday, January 15, 2011 10:41:32 AM
Attachments: Florida bear plan 2011.docx

To whom it may concern:

Attached are my comments about the Biological Status Review for the Florida black bear. Please feel free to contact me if there are questions/comments.

Thanks,

Mike Pelton

14 January 2011

To whom it may concern:

I examined the Biological Status Review (BSR) for the Florida black bear. The BSR is short (4pp) and concise, and I assume covers the published and relevant materials currently available on this species in Florida. Most of the natural history and ecology data concur with study results in similar habitats in the southeastern coastal plain; this is no surprise and helps confirm their validity. Although I did not examine the published material in detail, I assume the peer reviewed papers are accurate. I cannot say the same for those papers that are unpublished and/or unreviewed state reports.

For an animal that has been listed as a threatened state species since 1974, I am dismayed at the paucity of research and peer reviewed papers, particularly in regard to population density and indices efforts. Until the DNA research in 2002, population estimates/indices were nothing more than anecdotal observations, or what is known in our profession as SWAG (scientific wild-ass guesses!). The cited unpublished reports listed in Figure 1 are interesting but not supportable. I have little confidence in the population estimates until the 2002 study using DNA. Even the DNA report apparently has not appeared in a peer reviewed publication; therefore these data are subject to question until they have passed through a thorough peer review by qualified experts in the field. The BSR infers that DNA sampling was done on all occupied areas in Florida; is this true, or were extrapolations made to arrive at these estimates?

To my dismay one of the primary authors cited in this report confirmed to me that he never kept trapping records that reflected catch or visits per unit effort; over time, these kinds of data would be a better indices of the population than anecdotal observations.

With the above said, I am confident that the observations over the years do indicate that Florida has a thriving bear population (road kills, sightings, sign, nuisance activities). Sustained hunting success on the Apalachicola and Osceola areas from 1974 until 1994 indicates there were and likely still are healthy populations on those areas, and supports the evidence that bears are thriving in Florida; this is no surprise, given the population growth of this species throughout its range in North America, and in the Southeast in particular. The other reason bears are thriving in Florida is that over ¼ of the state is in public ownership, second only to New York in the East and 3 times more than any other state in the South. The 3 national forests combined cover 1.2 million acres of forested habitat. The Big Cypress preserve accounts for another ¾ million acres. These habitats have been in place for decades, and in my opinion supported more bears than the state agency recognized; this is based on my experience working on 18 different study areas throughout the South. In every case but one, we found far more bears present than anecdotal records indicated, or that anyone ever imagined. Based on our density estimates on other study sites, the 2002 density estimates for Florida are likely conservative (one bear / 3863 acres - based on the BSR report of 10.9 million acres of occupied habitat and an estimated mean of 2822 bears).

No mention is made in the BSR of the number of bears killed on highways through time; the mortality rate reported for 2002 is 4.8%; I assume that means there were over 135 bears killed on Florida highways in 2002? Irrespective of the inherent variables (traffic volume and reporting nuances) this is an indicator that Florida has a healthy bear population. The BSR indicates that

current management efforts in Florida only involve educational programs, handling nuisance bear issues, and road-kills concerns. Are there no other population or habitat management considerations? With the numbers I am seeing, I feel it is time to give more serious consideration to the use of hunting as a method to deter nuisance activities, both directly in terms of thinning the population and indirectly in terms of making bears more shy of humans. Also, no mention is made of active or planned research. Does anyone know what the growth rate is for these populations? For a charismatic umbrella species that is approaching a cultural carrying capacity, there should be an active research program, particularly addressing population dynamics questions.

I think it is obvious at this point that I agree with the listing recommendation of the BSR and support removing the Florida black bear from the threatened list. This species does not meet the criteria for listing; this is assuming that the DNA study is even remotely close to the population estimates presented.

Thanks for the opportunity to review this document. If anyone has any questions of comments, please feel free to contact me.

Respectfully submitted,

Miichael R. Pelton, Professor Emeritus
Department of Forestry, Wildlife and Fisheries
University of Tennessee, Knoxville
545 Balser Lane
Middlebrook, VA 24459

Letters and emails received during the solicitation of information from the public period of September 17, 2010 through November 1, 2010

Email from Dick Kempton

From: HowardR85@aol.com
To: Imperiled
Subject: Florida Black Bears
Date: Wednesday, October 06, 2010 1:37:01 PM

There are at least 2 bears living in the pine lands north of US 41, approximately 11-15 miles from the highway. Observed on several occasions..

Dick Kempton

Email from Meagan Jackson

From: Meagan Jackson
To: Imperiled
Subject: florida black bear
Date: Friday, October 08, 2010 11:35:15 AM

I spend several months through the year scouting in the north osceola national forest (sandlin bay), and also hunt archery through turkey season and have found there to what I believe is a more than stable population of the florida black bear, seeing scat among the ground through out, I see close to as many bears as i do deer, approximately one bear for about every three or four deer, I have come face to face with several different black bears while walking down different trails. This location would be an effective area for observing black bears in there natural habitat and to get a more effective census on the black bear population, there are almost more black bears in this region than what I believe this area can with stand, but I'm no expert.

Email from Chris Papy

From: chrispapy@comcast.net
To: Imperiled
Subject: biological reviews on all species on the state"s list of threatened species
Date: Sunday, October 10, 2010 9:42:05 AM

I hunted aucilla WMA for the first time this year. I sat four times and saw two (2) black bear. Both were in the area of Grade 17 and Grade 15 intersections. Additionally, I only made one trip on the Oneil Tram side of Aucilla. While walking the road I saw numerous bear tracks .

Email from David Dapore

From: David Dapore
To: Imperiled
Subject: Bear Sightings Input
Date: Monday, October 11, 2010 10:12:16 AM

To Whom It May Concern:

I am writing to provide some public input on bear sightings in the Central FL area. I hunt several WMA's including Tiger Bay, Tiger Bay Rima Ridge Unit, Seminole Forest, Rock Springs Run, and Lake Monroe. I have seen or found bear sign (tracks) on all of these WMA's. In particular, the number of bears in and around the Wekiva River basin and within Rock Springs Run and Seminole Forest WMA's is almost unbelievable.

Restoration efforts of the black bear in our State have been nothing short of a success...in fact, we often times see more bears than other game while hunting in the two aforementioned WMA's. Last fall, during a archery hunt at Seminole Forest, I saw 7 bears (2 sows, 3 cubs, 2 boars) and about the same number of deer in just three days. Just this weekend (3 days), while hunting as a guest of a permit holder at Rock Springs Run, between two hunters, we saw with our own eyes 8 bears and heard others in the woods (the unmistakable noises they make in palmettos)...combined, the two of us saw less deer than that. In fact, the gentlemen I hunted with was stared down by 3 of the bears he saw (2 one day and 1 the next) and had to clap and wave to scare shoo them away fearing for his own safety. The 2 bears I saw myself were from a vehicle and they did scoot off rather quick, but some of these bears seem to have no fear of humans.

Case in point - at Seminole Forest last fall there was a bear milling around within FEET of the Check Station while many people were hanging out talking and carrying on. The FWC biologist for that area, Ms. Conners, can verify. That bear certainly had no fear of humans.

It would seem to us, and many others who frequent the woods, that there are healthy bear numbers in much of the State and the species is doing well. As such, the re-introduction of a limited hunting season on bears would be justified in certain areas such as the Wekiva River Basin. Hunters are some of the finest conservationists this Country has to offer. They help manage these resources and the habitat and provide valuable information regarding the species.

I hope you find my input to be of some value.

Sincerely,

D. Dapore
Deltona, FL

Email from James Aldridge

From: james
To: Imperiled
Subject: Bears
Date: Monday, October 11, 2010 12:53:25 PM

Come on guys we have got to do something with the bear population I am hunting the Ocala forest on the way to the deer stand looks like a cow pasture from all the bear droppings everytime I have seat in the stand I have seen bear I know at least 5 different bears and one deer that the bears run off. And one seems to be very aggressive and from what I can read everyone is having the same problem.

Thanks

James Aldridge

Email from Kitty Loftin

From: Kitty Loftin
To: Imperiled
Subject: black bears
Date: Tuesday, October 12, 2010 2:01:57 PM

hello-- we live in Medart on Jack Crum Rd. in Wakulla County. We have seen two black bears on our land and near by lands for atleast a couple of years. We mainly see their paw prints on our dirt roads.

Kitty and Allan Loftin

Email from Betsy Knight

From: Betsy Knight
To: Imperiled
Subject: Florida Black Bear
Date: Tuesday, October 19, 2010 12:37:15 PM

The answer to problems of the Florida Black Bear is simple:

l. Protect enough land for the survival of the Florida Black Bear and you protect enough land to support protection of most all Florida Species. There should be a corridor from Big Cypress Swamp to Eglin AirForce Base for these large mammals to range, breed and maintain a healthy population . When you divide the State in to segments you end up with bits and pieces of bear habitat such as the Chassahowitzka population where inbreeding is occurring.

2. The answer is education, education and more education, I have been signed up as a volunteer for about a year, have received my DVD for educational programs, but haven't been asked to go to one single program. We need to utilize all volunteers and saturate the State with education on the Florida Black Bear.

Hunting of the Florida Black Bear should be prohibited. In an effort to compromise, I might suggest in healthy populations such as the Apalachicola National Forest, you might suggest allowing dogs to run a bear a day for a ten day period, but the dogs would not be able to continue to run the same bear continuously for days.

The Florida Black Bear needs to be kept on the Threatened Species list!!!

Thank you

Betsy R. Knight
Big Bend Wildlife Sanctuary, Inc.
9287 NW Felix Flanders Road
Altha, Florida 32421

Email from Paula Halupa

From: Paula_Halupa@fws.gov
To: Imperiled; McCown, Walter
Cc: Dana_Hartley@fws.gov
Subject: Re: Florida black bear
Date: Tuesday, November 02, 2010 1:12:40 PM
Attachments: Final Report S7552 - SW FL Black Bear Cons Strategy.pdf
Importance: High

Hi Walt,

I did not see this report on the sharepoint site for the Florida black bear, but found it in our files here.

Thanks,
-Paula
p.s. Chris says hi
(See attached file: Final Report S7552 - SW FL Black Bear Cons Strategy.pdf)
^^
Paula J. Halupa
Fish and Wildlife Biologist
Listing, Candidate Conservation, and Recovery
U.S. Fish and Wildlife Service
South Florida Ecological Services Office
1339 20th Street
Vero Beach, FL 32960-3559

SOUTHWEST FLORIDA BLACK BEAR HABITAT USE, DISTRIBUTION, MOVEMENTS, AND CONSERVATION STRATEGY

by

E. Darrell Land

Final Report
Study Number: 7552
Federal Number: W-41 XXXII
Study Period: 1 July 1991 - 30 June 1994

Bureau of Wildlife Research
Division of Wildlife
Florida Game and Fresh Water Fish Commission
620 South Meridian Street
Tallahassee, Florida 32399-1600
September 1994

SOUTHWEST FLORIDA BLACK BEAR HABITAT USE, DISTRIBUTION, MOVEMENTS, AND CONSERVATION STRATEGY

E. Darrell Land

Biological Scientist III, Florida Game and Fresh Water Fish Commission, Wildlife Research Laboratory, 4005 South Main Street, Gainesville, FL 32601

Abstract: We captured and radio-instrumented 60 black bears (Ursus americanus) between 1 July 1991 and 30 June 1994 and collected over 5,700 telemetry observations. Habitat use and activity data were analyzed . Analysis of 738 scats indicated that cabbage palm berries, Brazilian pepper berries, ants, and aquatic emergent vegetation were important bear foods in southwest Florida. Over 50 food items were identified. Average litter size was 1.8, based on observations of 11 litters ranging in age from 1 week to 1.3 years. Average annual home range sizes were 57 km^2 for adult females, and 303 km^2 for adult males. Annual survival rates were higher for females than for males (0.97 and 0.76 respectively). Illegal shootings and roadkills were responsible for 80% of all mortalities.

INTRODUCTION

Recent studies on the Florida panther (Felis concolor coryi) indicated that space and the availability of necessary habitat were important limiting factors governing the ability of the population to increase (Maehr 1990). While black bears are similar in that they require large natural landscapes to provide their annual ecological requirements (Pelton 1982:507), anecdotal evidence suggests that they utilize a greater diversity of habitats and tolerate a higher level of human disturbance than do panthers. Further, because their primary foods are plants (Maehr and Brady 1984, Maehr and De Fazio 1985), black bears may be less susceptible than panthers to other disturbance factors that may affect availability of prey.

Despite smaller home ranges than panthers, black bears can exhibit extensive home range shifts as a result of fruit availability and plant phenology (Pelton 1982). Further, dispersal events can be more extensive than those of panthers (Maehr et al. 1988), suggesting black bears may be better adapted to overcome landscape obstacles. If this is characteristic of black bears in Florida, such behavior may ameliorate the effects of habitat fragmentation.

A recent black bear habitat study revealed that highway collisions were the most common cause of death in Ocala National Forest (Florida Game and Fresh Water Fish Comm. [GFC] unpub. data) and suggested that most bears were vulnerable to highway collisions. Density of roads vary throughout Florida and some populations may be more vulnerable highway mortality. More bears have been hit by vehicles in Collier County than in any other county (Wooding and Brady 1987), despite a seemingly lower density of roads compared to other Florida counties. This may be due to 3 major highways running through occupied bear range in Collier County and a relatively high bear density. The impacts on population dynamics of this high unnatural mortality is unknown for any bear population in Florida. Further, the cumulative effects of road mortality, illegal killing, habitat loss and fragmentation on black bears in southwest Florida is unknown.

Patterns of socio-ecology in black bears are similar to other solitary carnivores. Adults are essentially solitary except during the breeding season and when females raise their cubs. Adult resident males have large home ranges encompassing several females (Rogers 1987). Young males typically disperse further than females. Females typically

establish home ranges within or adjacent to their mothers'. Given a significant amount of habitat fragmentation and a high occurrence of road mortality in southwest Florida, the black bear population may be responding in some way to compensate for these losses. Detailed information on a variety of movement and demographic parameters such as home range size, home range overlap, social interactions, intraspecific aggression, age structure, habitat use, movement patterns, mortality, natality, dispersal, and recruitment patterns will enable the GFC to evaluate the status of black bears in southwest Florida and recommend strategies for sustained management of a viable population.

Objectives of this study were to delineate the range of black bears in southwest Florida, describe key demographic parameters reflecting the species' status in relation to habitat and human influences, and to recommend a landscape conservation strategy for the long-term survival of black bears in southwest Florida.

STUDY AREA

The study area encompassed the southwest Florida landscape that also is occupied by panthers. Trapping of study bears occurred in Collier County on Collier-Seminole State Park, Florida Panther National Wildlife Refuge, Fakahatchee Strand State Preserve, Big Cypress National Preserve, and adjacent private lands. This area was generally north of U.S. 41, east of C.R. 951, south of Immokalee, and west of the L-28 Feeder Canal (Fig. 1).

METHODS

Trap sites were chosen according to the presence of bear activity at existing wildlife feeders, garbage dumps, or human residences. We also attracted bears by dispensing whole kernel corn from battery-operated feeders or scattered on the ground in Fakahatchee Strand State Preserve, Florida Panther National Wildlife Refuge, and Collier Seminole State Park. We used culvert traps (Black 1958), snares (Johnson and Pelton 1980), opportunistic treeings by neighborhood dogs (Canis familiaris) and biologists, and non-fatal highway collisions to capture study animals. Traps were baited with corn, stale pastries, pet food, and table scraps. Bears were immobilized using Ketamine hydrochloride and Xylazine (Lynch et al. 1982) with a pole syringe, or a Palmer capture rifle.

Standard measurements (weight, length, girth, etc.) were taken, a premolar pulled for aging, and a radio collar attached to bears > 1 year old. A "breakaway" device was added to the collar if significant growth was expected. Blood samples were taken to facilitate analysis of nutritional and metabolic status (blood chemistry) and kinship patterns (genetic analysis). These analyses were conducted by Diagnostic Services, Naples, Florida, and Steve Fain, U.S. Fish and Wildlife Service, Ashland, Oregon, respectively.

Scats were collected during routine field activities and at trap sites. Contents were analyzed by rinsing each scat through a fine-mesh sieve. Each food item was identified as close to species as possible using field guides and reference collections. Food items were separated into 6 categories: human origin (garbage, animal feed), vertebrates, plant fiber, insects, soft mast, and hard mast.

Radio-instrumented bears were located from fixed-wing aircraft at least 3 times per 2-week period. We recorded Universal Transverse Mercator coordinates, habitat type, and activity (if the collar contained an activity sensor) for each bear. All flights were conducted between 0700 and 1000.

Mortality rates were calculated following Heisey and Fuller (1985). We divided the year into 3 seasons: spring (January-April), summer (May-August), and fall (September-December) in part based on food habits/plant phenology as well as the annual cycle of bear activity.

RESULTS AND DISCUSSION

We captured and radio-instrumented 60 bears between 1 July 1991 and 15 December 1993 in Collier County, Florida (Table 1). Five bears were captured in response to complaints prior to the beginning of this study and 3 of these were included as study animals. Twenty-one bears were trapped twice, 2 were trapped 3 times, and one was captured 4 times for a total of 91 captures. Males and females appeared to be equally susceptible to recapture (31% of captures were recaptures for both sexes).

Successful trapping occurred when bears responsed to bait stations within 3 weeks of deployment. Bait stations also were maintained for 20 weeks in the Eastern Monument Unit of BCNP, but no bears responded. It is likely that this failure to successfully bait bears to a favored, albeit unnatural food (primarily corn), is a reflection of the relative density of bears in this area.

Morphology

Radio-instrumented female bears ranged from 1 to 9 years of age; body weights ranged from 31.8 kg to 154.5 kg. Male bears were 1 year of age to > 14 years of age and ranged in mass from 29.5 kg to 220.5 kg. Female bear ages were normally distributed whereas the distribution of male bear ages was skewed toward the younger age classes. Young males may have been more vulnerable to trapping because of their wider movements and inexperience.

Chest girth was a good predictor of bear mass (Fig. 2). This relationship was exponential and the regression of log girths and log weights explained 97% of the variation.

Food habits

Food habits analyses were based on 738 scats and 1544 occurrences of food items (Table 2). General patterns of food consumption were similar to findings of in a statewide black bear food habits study based on stomachs and scats collected mostly in north and central Florida (Maehr and Brady 1984). The diet of south Florida black bears, according to annual percent frequency, was composed of plants (81%), insects (16%), vertebrates (2%), and foods of human origin (1%).

The plant species (scientific names appear in Table 2) utilized by bears in south Florida, however, included several not available to bears further north (eg. alligator flag, bromeliads, Brazilian pepper, and wild coffee), and others that appeared unimportant but readily available. For example, bears readily ate galberry fruits in northern Florida but apparently avoided this abundant plant in southern Florida. The fruits of saw palmetto appeared to be the most consistently eaten food of black bears throughout the state, and may have been of particular importance for bears preparing for winter denning and parturition.

A phenology of food habits showed seasonal shifts in the types of foods consumed by black bears (Fig. 3, Table 3). Soft mast comprised 40% of the items eaten from January to March. Bears were generally less active during early spring, but those that continued to feed focused primarily on Brazilian pepper berries. Brazilian pepper, an invasive exotic, produces copious small fruits; these small berries accounted for about 54% of the soft mast consumed during this time, and were available at a time when other mast-producing species were without fruit. The

remainder of the spring diet was composed of dwindling hard mast, especially cabbage palm seeds, and plant fibers, particularly pickerel weed.

Plant fibers from sawgrass, pickerel weed, and alligator flag dominated the summer diet. Bears utilized the fleshy stems and new leaf growth of these emergent wetland plants. Insects, especially carpenter ants, also reached their peak as a bear food during summer. We often observed the remains of rotten logs, torn apart by bears in their search for colonial insects. These logs, killed or felled by fires and wind, appeared to be sought by south Florida black bears because they harbored an abundance of insects (ants, termites, and bessie bugs). We observed bears eating termites; however, these insects did not show up in scats because of their delicate exoskeletons.

Fall foods were dominated by hard mast species such as the fruits of saw palmetto and cabbage palm. Acorns accounted for less than 6% of the fall diet and probably reflected the relative scarcity of hardwood hammocks. Bears were observed feeding in the branches of oak trees, however, when acorns were locally abundant,. Plant communities containing saw palmetto and cabbage palm were more widespread than those characterized by oaks.

Home ranges, movements, and habitat use

We used 5711 radio locations to characterize seasonal (Tables 4,5) and annual home range sizes (Table 6) of 19 and 32 independent females and males, respectively. Both sexes exhibited an increase in area used from spring to fall, however, only female spring and fall and summer and fall use areas were significantly different ($\alpha = 0.05$, df = 37). Mean annual home range size for females was 57.1 km^2 and was smaller than the 303.2 km^2 mean for males ($\alpha = 0.05$, df = 21).

Nine bears (2 ♀, 7 ♂) temporarily left their home ranges during fall to take advantage of habitats with mast-producers (saw palmetto and hardwood hammocks) not available within their normal use areas. These movements occurred from mid-October through December and were 10-20 km from their established ranges. As an example, an area south of I-75 within the Big Cypress National Preserve was used only in the fall of 1993 by 6 radio-instrumented bears (Fig 4). Bears in areas with more abundant pine/palmetto communities tended to remain in their home ranges during the fall, but it was not uncommon to find 3-6 bears attracted to the same saw palmetto thicket.

Habitat types used by all bears combined were pine flatwoods (30.4%), mixed swamp (19.5%), cypress swamp (13.3%), hardwood hammock (12.5%), cabbage palm forest (10.1%), agricultural/disturbed (5.4%), mangrove (5.3%), thicket swamp (2.2%), and herbaceous marsh (1.3%) (Fig. 5). Habitat use differed seasonally ($\chi^2 = 437.8$, $\alpha < 0.0001$, df = 16) (Fig 6) caused primarily by greater than expected use of pine/palmetto and agricultural/disturbed habitats in fall and spring, respectively, ($\chi^2 = 78.6$ and $\chi^2 = 34.7$; df =16, $\alpha < 0.0055$) and less than expected use of pine/palmetto and mixed swamp in spring and fall, respectively ($\chi^2 = 44.4$ and $\chi^2 = 73.0$; df = 16, $\alpha < 0.0055$). These findings were consistent with the food habits analysis that showed the importance of saw palmetto mast in the fall diet and brazilian pepper berries (widespread in disturbed habitats) in the spring.

Habitat use on a smaller scale was examined by describing plant species associated with day-use sites of radio-instrumented black bears (Table 7). Dominant species reflected general habitat use patterns and included cypress, cabbage palm, a variety of fern species, saw palmetto, slash pine, red maple,

wax myrtle, and live oak. A total of 29 plant species were recorded at 55 day-use sites.

Mortality

Ten radio-instrumented bears died during the study period. Subadult male M10 was killed by an uncollared black bear on FPNWR and represents the only natural mortality we documented. Five males were poached (M04, M09, M11, M12, and M31) and a sixth (M18) was suspected of being poached. Three bears were killed by vehicles (F06, M03, M32). Annual survivorship among females averaged 0.97 and was higher than the male survival rate of 0.76 (α = 0.05)(Table 8). It appears that males, especially subadults, were more vulnerable to unnatural mortality than females. This disparity was likely caused by the wider movements and longer dispersals of this sex and age class.

Reproduction

Vaginal swelling in adult females and interactions of radio-instrumented study animals suggested a longer breeding season than reported for more northern populations (Pelton 1982:505). We captured 3 females in estrous from mid-June to early August and female/male interactions peaked from May through August (Fig. 7). Pregnant females entered winter dens in late January or early February, and appeared to give birth at the end of February or early March (Table 9). Litter size (N=11) ranged from 1 to 3 and averaged 1.8. Den emergence occurred from mid-April through early May.

Female bears denned in a variety of habitats and were not restricted to upland areas. Bears in wetland habitats chose elevated den sites such as hollow cypress stumps (N=3). These stumps varied in structure from an enclosed 1.5 m deep basin to an open platform < 1 m above ground level. Females in other areas chose sites with thick overhead cover such as a windthrown tree with vine overgrowth (N=2) or under cabbage palms covered by grape vines (N=1). Bears also selected sites in saw palmetto thickets similar to Florida panther dens (Maehr et al. 1990).

Researcher presence at dens caused the abandonment of at least 1 cub and perhaps 2 others. The females left the den area and never returned in all 3 cases. We confirmed abandonment of F11's cub during a follow-up visit; this cub was placed in F03's den with unknown results. The fates of the other 2 cubs was never determined. No dens were visited after the abandonment by F11. Unlike Florida panther denning behavior, bear denning behavior and physiology likely evolved as a survival strategy for coping with a harsh winter environment. Two factors may have contributed to the abandonment of dens by female south Florida bears. First, mild south Florida winters may not induce as deep a lethargy as in more northern climates. If undisturbed, female bears do not leave the den until the cubs are able to travel. Without this physiological stimulus for remaining in the den, a female bear's maternal instincts may not be strong enough to compel her to return to her cubs. In contrast, Florida panthers must leave the densite regularly in search of food and as a result, they have a compelling instinct for returning to the den. A second factor may have been related to bear cub behavior. Panther kittens have strong instincts for remaining quiet in the absence of their mother. Black bear cubs do not behave similarly in the absence of their mother; rather, they begin loud vocalizations immediately after her departure. These distress calls could have lured predators to the unprotected cubs.

The denning season and the peak fire season, both natural and man-caused, coincide. Bear dens are vulnerable to consumption by fire because they can occur in fire-maintained plant communities. We

observed one incident where a prescribed fire may have consumed the den of a radio-instrumented bear. In mid January 1994, bear F17 retreated to a saw palmetto thicket and established a den. A prescribed fire was conducted in early March by personnel of the Florida Panther National Wildlife Refuge in close proximity to the suspected den. F17 left the site she had occupied for 6 weeks shortly after the burn. Although not determined, F17 should have just given birth to cubs.

Blood analyses

We collected 82 blood samples from 59 black bears between 5 August 1991 and 15 December 1993 (Appendix I). Circannual patterns and values of hematocrit (HCT), hemoglobin (HGB), and red blood cells (RBC) have been useful in describing nutrition and physiology patterns in black bears. Although there was a seasonal pattern common to all 3 blood components (Fig. 8), the values and effects of season were less than in the northern bear populations noted above. A north to south decline in HCT, RBC, and HGB values has been noted among bears in Alaska, Minnesota, and Virginia (E. Hellgren, pers. comm.). Even lower values among southwest Florida bears suggests a latitudinal effect upon these indices. Levels of serum total protein and creatinine were utilized to provide insight into the metabolic rhythms of bears (Hellgren et al. 1989). These values peaked during denning in northern bear populations (Franzmann and Schwartz 1984, Hellgren et al. 1989). We expected creatinine and total protein to fluctuate similarly in southwest Florida bears, but this pattern may have been masked by our small sample size from wintering bears (Fig. 9). The lower amplitude of seasonal change in nutritional indices among bears in southwest Florida may have been due to the longer period of food availability and shorter period of denning. Blood urea nitrogen/creatinine ratios also have been commonly used as an index to metabolic activity and Nelson et al. (1984) suggested that denned bears have U/C ratios $\leq$ 10. However, 89% (73 of 82) of blood samples had U/C ratios $\leq$ 10 (Table 4), which, according to Nelson et al. (1984), suggested that some southwest Florida black bears were in hibernation year-round. We doubt the likelihood of such a phenomenon and suggest that low U/C ratios may be diet-related due to the strong direct relationship between urea nitrogen and dietary protein in monogastrics (Corn and Warren 1985, Antinmo et al. 1974).

MANAGEMENT IMPLICATIONS

A cause of concern for bear conservation in southwestern Florida may be that humans are the primary mortality agent in the form of collisions with vehicles and illegal shootings. The mortality rates reported in this study, skewed as they are to human causes, should not threaten this bear population. However, with the human population expansion, these rates are likely to increase and coupled with habitat losses, could threaten bears in the future. Road improvement projects in areas occupied by Florida panthers are being equipped with wildlife crossings that will also serve to protect bears. These crossings need to be considered in all areas prone to wildlife/vehicle collisions. Illegal shootings will be more difficult to address.

The Commission handles many nuisance bear complaints statewide. These complaints typically stem from bear depredations on livestock, feed, beehives, crops, or garbage. Most complaints in Collier County are from people living in a semi-rural estate area who have lost domestic animals or beehives to bears. The majority of these people have taken few precautions to protect their property from

depredation and they often threaten to kill the bear. Three of the 5 known poached bears occurred in Golden Gate Estates and 2 were depredating a turkey feeder and a beehive in other locations. Additionally, we documented missing and injured eyes consistent with gunshot wounds in 3 other bears we captured. The proportion of bears that were killed as depredators versus those that were killed or wounded by poachers is unknown.

A public information campaign is needed to educate people on where bears occur and how to live in areas occupied by bears. Preparation of news releases and brochures that describe effective techniques for preventing bear depredation might lessen the likelihood of an irate person shooting a bear. Greater public awareness of the threatened status of bears may also curtail poaching by encouraging use of the Wildlife Alert program.

Land managers in areas occupied by black bears should be aware that prescribed fires during late February to early May could destroy newborn cubs at dens. There is no strategy to minimize this loss short of cessation of prescribed burning during these months. The magnitude of this potential problem is unlikely to be a significant factor affecting the current bear population, but if the range of bears in southern Florida becomes highly restricted, this issue would become more important.

LITERATURE CITED

Atinmo, T.C., W.G. Pond, and R.H. Barnes. 1974. Effect of dietary energy vs. protein restriction on blood constituents and reproductive performance in swine. J. Nutr. 104:1033-1040.

Black, H.C. 1958. Black bear research in New York. Trans. N. Amer. Wildl. and Nat. Resour. Conf. 23:443-461.

Corn, J.L., and R.L. Warren. 1985. Seasonal variation in nutritional indices of collared peccaries in south Texas. J. Wildl. Manage. 49:57-65.

Franzmann, A.W., and C.C. Schwartz. 1988. Evaluating condition of Alaska black bears with blood profiles. J. Wildl. Manage. 52:63-70.

Hellgren, E.C., M.R. Pelton, and R.L. Kirkpatrick. 1989. Seasonal patterns in physiology and nutrition of black bears in Great Dismal Swamp, Virginia - North Carolina. Can. J. Zool. 67:1837-1850.

Johnson, K.G., and M.R. Pelton. 1980. Prebaiting and snaring techniques for black bears. Wildl. Soc. Bull. 8:46-54.

Lynch, G.M., W. Hall, B. Pelchat, and J.A. Hanson. Chemical immobilization of black bear with special reference to the use of ketamine-xylazine. Pages 245-266 in L.Nielsen, J.C. Haigh, and M.E. Fowler, eds. Chemical immobilization of North American wildlife. The Wisconsin Humane Soc. Milwaukee.

Maehr, D.S. 1990. The Florida panther and private lands. Conserv. Biol. 4:167-170.

Maehr, D.S., and J.R. Brady. 1984. Food habits of Florida black bears. J. Wildl. Manage. 48:230-235.

Maehr, D.S., and J.R. De Fazio. 1985. Foods of black bears in Florida. Fla. Field Nat. 13:8-12.

Maehr, D.S., E.D. Land, J.C. Roof, and J.W. McCown. 1990. Day beds, natal dens, and activity of Florida panthers. Proc. Annu. Conf. Southeast. Fish and Wildl. Agencies 44:310-318.

Maehr, D.S., J.N. Layne, E. Darrell Land, J. Walter McCown, and J. Roof. 1988. Long distance movements of a Florida black bear. Fla. Field Nat.
16:1-6.

Nelson, R.A., T.D. Beck, and D.L. Steiger. 1984. Ratio of serum urea to serum creatinine in wild black bears. Science 226:841-842.

Pelton, M.R. 1982. Black bear. Pages 504-514 in J.A. Chapman, and G.A. Feldhammer, eds. Wild mammals of North America. The Johns Hopkins Univ. Press. Baltimore, MD.

Rogers, L.L. 1987. Effects of food supply and kinship on social behavior, movements, and population growth of black bears in northeastern Minnesota. Wildl. Monogr. 97:1-72.

Wooding, J.B., and J.R. Brady. 1987. Black bear roadkills in Florida. Proc. Annu. Conf. Southeast. Assoc. Fish and Wildl. Agencies 41:438-442.

Table 1. List of captured black bears, southwest Florida, Aug. 1988 - Dec. 1993.

Sex/ID	Capture Date	Age	Weight (lbs)	Location	Loss Date	Cause of Loss
F01[1]	8/22/88	4	175	west Golden Gate Estates		suspected poaching
F02	5/9/91	7	223	Fakahatchee Conservation Club	-	
	11/10/93		340	Fakahatchee Conservation Club		alive
F03	8/15/91	6	155	Fakahatchee Strand	-	
	5/28/92		172	Fakahatchee Strand		alive
F04	8/15/91	6	140	Florida Panther NWR	11/26/93	radio out
F05	9/20/91	3	128	Collier-Seminole State Park	-	
	10/31/92		181	Collier-Seminole State Park		alive
F06	10/28/91	1	90	DeSoto Blvd.		
	7/15/92		105	DeSoto Blvd.		
	11/5/93		178	Roadkill mm 89 I-75	11/5/93	road kill mm 89 I-75
F07	10/29/91	9	195	Collier-Seminole State Park		radio out
F08	11/5/91	7	246	DeSoto Blvd.	11/8/93	slipped collar
F09	11/8/91	3	170	Collier-Seminole State Park		
	12/4/91		185	Collier-Seminole State Park	3/10/94	unknown (slipped collar?)
F10	11/14/91	3	167	Fakahatchee Strand		
	6/3/92		167	Fakahatchee Strand	-	alive
F11	5/12/92	3	140	Florida Panther NWR	4/07/93	breakaway collar
F12	6/1/92	4	170	Fakahatchee Strand	-	alive
F13	6/17/92	4	180	Everglades Blvd.	-	alive
F14	8/13/92	2	122	Florida Panther NWR		
	10/5/93		210[2]	Florida Panther NWR	-	alive

Table 1. Continued.

Sex/ID	Capture Date	Age	Weight (lbs)	Location	Loss Date	Cause of Loss
F15	10/25/92	2	150	Fakahatchee Conservation Club		
	9/7/93		135	Florida Panther NWR		alive
F16	10/27/92	2	110	Everglades Blvd.	8/10/93	breakaway collar
F17	11/25/92	6	200[2]	Florida Panther NWR	-	alive
F18	11/27/92	3	187	Florida Panther NWR	11/28/92	slipped collar
F19	12/16/92	6	195	Florida Panther NWR	-	alive
F20	7/28/93	1.5	70	Fakahatchee Conservation Club		
	9/13/93		70[2]	Fakahatchee Conservation Club	-	alive
F21				Copeland Road Prison	-	alive
M01	5/4/86[1]		200	Golden Gate Estates	7/28/86	destroyed per nuisance policy
M02	9/30/90	3	210	US 41 Ochopee	6/30/93	radio out
M03	2/18/91		325	Fakahatchee Conservation Club	4/25/92	roadkill SR 29 Sunniland
M04	7/26/91	2	240	DeSoto Blvd.	10/23/91	poached
M05	8/5/91	2	198	Golden Gate	9/20/91	breakaway collar
M06	8/8/91	14	305	Fakahatchee Strand		
	11/14/91		350	Fakahatchee Strand	8/20/92	radio out
M07	8/11/91	2	220	Golden Gate		
	8/10/92		200	DeSoto Blvd.		
	11/6/92		325	Florida Panther NWR	3/31/93	breakaway collar
M08	8/14/91	5	230	Florida Panther NWR	5/20/94	radio out
M09	8/27/91	2	220	Florida Panther NWR		
	12/5/91		230	DeSoto Blvd.	8/3/92	poached
M10	9/16/91	19 mos.	105	Florida Panther NWR		

Table 1. Continued.

Sex/ID	Capture Date	Age	Weight (lbs)	Location	Loss Date	Cause of Loss
	5/8/92		135	Florida Panther NWR	9/30/92	killed by bear
M11	9/24/91	1	125	north Golden Gate Estates		
	6/17/92		180	Everglades Blvd.	9/23/92	poached
M12	9/25/91	14-15	325	DeSoto Blvd.	2/25/92	poached
M13	10/18/91	3	340	Collier Seminole State Park		
	12/10/92		368	Collier-Seminole State Park	-	alive
M14	10/27/91	1.5	142	DeSoto Blvd.	7/29/92	breakaway collar
M15	11/11/91	2.5	181	Collier Seminole State Park	9/9/92	breakaway collar
M16	12/2/91	1.9	130	DeSoto Blvd.	10/21/92	radio out - N Lee County
M17	1/19/92	3	275	Big Cypress National Preserve	5/1/92	radio failure?
M18	1/30/92	12	485[2]	Ochopee Post Office	12/17/93	unknown
M19	2/6/92	6	380	Fakahatchee Conservation Club		
	5/5/92		220[2]		6/10/92	breakaway collar
M20	2/7/92	9	247	Fakahatchee Conservation Club	5/27/94	radio out
M21	5/23/92	1	70	Fakahatchee Strand		
	2/5/93		130	Fakahatchee Strand	5/2/93	breakaway collar
M22	10/20/91	7 mos.	40	Fakahatchee Strand		
	5/25/92		65	Fakahatchee Strand	12/30/92	breakaway collar
M23	8/15/91	6 mos.	16	Fakahatchee Strand		
	5/26/92		75	Fakahatchee Strand	4/19/93	breakaway collar
M24	6/12/92	4	360	Everglades Blvd.	7/24/93	radio out
M25	7/30/92	6	308	Collier Seminole State Park	3/31/93	breakaway collar
M26	9/4/92	6	175	Collier Seminole State Park	2/24/93	breakaway collar

Table 1. Continued.

Sex/ID	Capture Date	Age	Weight (lbs)	Location	Loss Date	Cause of Loss
M27	10/4/92	3	145	Fakahatchee Conservation Club		
	11/27/92		155	Florida Panther NWR	9/10/93	breakaway collar
M28	10/18/92	3	215	Collier Seminole State Park	11/19/93	breakaway collar
M29	10/8/92	4	275[2]	Everglades Blvd.		
	10/22/92		340	Everglades Blvd.	7/20/94	radio out
M30	10/12/92	2	238	Florida Panther NWR		
	7/26/93		238	Fakahatchee Conservation Club	-	alive
M31	11/10/92	14	230	Florida Panther NWR		
	11/21/92		250	Florida Panther NWR		
	12/6/92		265	Florida Panther NWR		
	1/25/93	dead	270	6 L's Farm	1/25/93	poached
M32	11/18/92	1.5	130	Florida Panther NWR		
	12/8/92		135	Florida Panther NWR		
	2/2/93		195	Florida Panther NWR	7/18/93	roadkill US 41, ½ mi. W CR 92
M33	12/11/92	2	162	Collier Seminole State Park	6/7/93	radio out
M34	12/15/92	2	145	Florida Panther NWR	10/15/93	radio out
M35	5/23/93	4	250	Fakahatchee Strand	-	alive
M36	5/26/93	9	365[2]	Fakahatchee Strand	-	alive
M37	5/31/93	6	402	Fakahatchee Strand	8/21/93	breakaway collar
M38	6/10/93	2	154	Everglades Blvd.	8/13/93	breakaway collar
M39	7/28/93	12	325	Fakahatchee Conservation Club	-	alive
M40	7/28/93	3	118	Fakahatchee Conservation Club	12/24/93	breakaway collar
M41	7/31/93	5	230[2]	South Blocks	1/18/94	breakaway collar

Table 1. Continued.

Sex/ID	Capture Date	Age	Weight (lbs)	Location	Loss Date	Cause of Loss
M42	8/12/93	5	315[2]	South Blocks	-	alive
M43	8/31/93	3	180	South Blocks	6/15/94	breakaway collar
M44	9/8/93	7 mos.	55	Florida Panther NWR	7/22/94	breakaway collar

[1] Captured and monitored prior to current study, not included as a study animal.

[2] Weight estimated from mass/chest girth relationship.

Table 2. Foods of black bears in south Florida from July 1991 through June 1994.

Species			Frequency
PLANT FIBERS			423
Serenoa repens	Saw palmetto		57
Sabal palmetto	Cabbage palm		69
Pontederia spp.	Pickerel weed		81
Cladium jamaicense	Sawgrass		52
Potamogeton spp.	Pondweed	1	
Thalia geniculata	Alligator flag		99
Tillandsia spp.	Bromeliad		8
Cirsium horridulum	Thistle		23
Graminae	Grass	12	
Unknown			21
SOFT MAST			276
Psychotria nervosa	Wild coffee		20
Psychotria sulzneri	Wild coffee		1
Lantana involucrata	Lantana		27
Vitis spp.	Wild grape		34
Persea borbonia	Red bay		12
Celtis laevigata	Sugarberry		4
Callicarpa americana	American beautyberry	7	
Ardisia escalloniodes	Marlberry	1	
Schinus terebinthefolius	Brazilian pepper		178
Ilex cassine	Dahoon holly		11
Cornus foemina	Swamp dogwood		52
Smilax spp.	Greenbriar		2
Rubus spp.	Blackberry		8
Unknown seed			7
HARD MAST			366
Serenoa repens	Saw palmetto		197
Sabal palmetto	Cabbage palm		206
Quercus spp.	Oak		53
Carya pallida	Sand hickory		1
Roystonea elata	Royal palm		1

Table 2. Continued.

INSECTS		196	
Odontotaenius disjunctus	Bessie bug		14
Rynchophorous cruentatus	Giant palm weevil		18
Polistes spp.	Paper wasp		2
Apis mellifera	Honey bee		14
Xylocopa spp.	Bumble bee		62
Campanotus floridanus	Carpenter ant		77
Vespula squamosa	Yellow jacket		18
Unknown Coleoptera Beetle		16	
Cicadidae	Cicada		1
Unknown wasp	Wasp		3
Unknown ant	Ant		19
Unknown pupa			3
Unknown insect			8
VERTEBRATES			26
Dasypus novemcinctus	Nine-banded armadillo		8
Odocoileus virginianus	White-tailed deer		9
Sus scrofa	Wild hog		4
Ursus americanus	Black bear		2
Sylvilagus spp.	Rabbit		2
Capra spp.	Domesticated goat		1
Unknown bone			3
Unknown hair			2
Eggshell			1
HUMAN ORIGIN			12
Lumber			2
Garbage			7
Bird seed			2
Glass			1
TOTAL NUMBER OF FOOD ITEMS			1544

Table 3. Food habits of black bears in south Florida from July 1991 through June 1994; based on 738 scats.

Category	Seasons[1] Spring(N=113) frequency (%)	Summer(N=174) frequency (%)	Fall(=451) frequency (%)	Total
Plant Fiber	60 (32)	169 (48)	194 (19)	423
Soft Mast	83 (44)	80 (22)	201 (20)	364
Hard Mast	20 (11)	12 (3)	426 (43)	458
Insects	20 (11)	80 (22)	155 (16)	255
Vertebrates	6 (3)	5 (1)	21 (2)	32
Human Origin	0	9 (3)	3 (<1)	12
Total occurrence	189	355	1000	1544

[1] Winter= January-April, Summer= May-August, Fall= September-December

Table 4. Seasonal home ranges for female black bears, southwestern Florida, June 1991 to June 1994.

Bear Number	Summer 1991	Fall 1991	Spring 1992	Summer 1992	Fall 1992	Spring 1993	Summer 1993	Fall 1993	Spring 1994
F02	2.3	13.9	0.98	10	38.7	20.8	20.8	17.2	0.17
F03		6.5[1]		4.4	47.2	0.02	7.3	185.9	8.3
F04		32.2	8.1	23.69	23.5	0.24	6.8	104.4	1.3
F05			27.7	3.9[1]	14.2[1]	12.8	25.6	25.6	1.3
F06			2.4	10.1	6.9	0.5	6.1		
F07			15.8	13.3	13.8	0.8	12.2	59.2	
F08			1	9.8	7.7	0.4	4.5	27.5	
F09			0.5	8.8	16	2.6	25.3	53.3	0.4
F10			13.4	14.1	78.6	8	24.1	26.6	0.3
F11				69.6	27.4	2			
F12				15.6	136.9	2.1	4.7	20.6	20.2
F13				10.5	5.3	0.2	3.1	43.2	16.1
F14					9.5	7.3	5.5	10.7	0.2
F15						1.1	13.6	7	2.6
F16						2	263.6[1,2]		
F17						11	16.6	87.1	5.8
F19						21.3	8.2	14.2	0.04
F20								13.3	3.8
F21									21
Average	2.3	17.5	8.7	16.2	32.7	5.5	28	46.4	6.2

	Mean Home Range (km^2)	N	Std. Dev.	Lower Bound	Upper Bound
SPRING	6.4	38	7.7	0[3]	21.5
SUMMER	14.0	27	12.9	0[3]	39.3
FALL	37.9	31	41.1	0[3]	121.7

[1] Home range based on < 15 locations; value not used for calculating means.

[2] Dispersing individual; value not use for calculating means.

[3] Lower bound truncated at 0.

Table 5. Seasonal home range size for male black bears, southwestern Florida, June 1991 to June 1994.

Bear Number	Summer 1991	Fall 1991	Spring 1992	Summer 1992	Fall 1992	Spring 1993	Summer 1993	Fall 1993	Spring 1994
M02	222.2	87.3	59.7	112.7	72.7	38.8	24.8[1]		
M03	150.3	147.5	26						
M06		440.5	74.3	55.6					
M07						117.6			
M08		158.8	11.8	125.1	37.2	71.2	113.3	61.9	37.1
M09		227	38.3	30					
M10		33	5.9	47.8					
M11		147.4	2.6	52					
M12		586.2	4.8[1]						
M13			95.8	106.7	83.8	105.7	136.1	293.5	49.2
M14			22.7	1204.2[2]					
M15			19.5	498.7					
M16			24.3	1159.6[2]	7.9[1]				
M17			25						
M18			179.3	57.3	49.6	149.4	131	668.1	
M20				83.6	107	41.4	83.4	64.2	25
M24					115.6	310.1	65.7		
M25					150.2	2.5			
M26					46.1	2.9[1]			
M27						22.7	154.2		
M28						20.3	218.5	261.4	
M29						75.5	44.6	60.2	18.4

Table 5. Continued.

Bear Number	Summer 1991	Fall 1991	Spring 1992	Summer 1992	Fall 1992	Spring 1993	Summer 1993	Fall 1993	Spring 1994
M30							38.9[1]	53.7	46.1
M32						50.8	223.6		
M33						51.6			
M34						254.3	735.4		
M35							56	271.4	23
M36							40.9	224.7	2.5
M39								85.5	62.3
M41								199	
M42								227.8	35.6
M43								407.6	309.5
Average	186.3	228.5	42.1	294.4	74.5	87.7	147.6	221.5	60.9

	Mean Home Range (km^2)	N	Std. Dev.	Lower Bound	Upper Bound
SPRING	67.7	37	77.4	0[3]	219.4
SUMMER	147.7	24	156.1	0[3]	453.7
FALL	185.1	29	160.0	0[3]	498.7

[1] Home range based on < 15 locations; values not used for calculating means.
[2] Dispersing individual; values not used for calculating means.
[3] Lower bound truncated at 0.

Table 6. Annual home range sizes (km^2) for female and male black bears, southwestern Florida, June 1991 to June 1994.

Female Number	First Year (km^2)	Second Year (km^2)	Male Number	First Year (km^2)	Second Year (km^2)
F02	40.5	48.9	M02	307.5	
F03	205.6		M03	296.4	
F04	40.7	108.6	M06	476.7	
F05	37.0	65.4	M08	125.5	175.4
F06	13.2		M09	238.9	
F07	21.9	81.2	M11	245.9	
F08	11.9	28.6	M13	159.3	338.6
F09	17.8	68.4	M18	362.1	729.1
F10	101.9	40.6	M20	144.4	
F11	73.0		M24	345.3	
F12	23.5		M28	574.5	
F13	43.2		M29	119.8	
F14	13.6		M30	115.4	
F17	98.1		M35	398.4	
F19	73.3		M36	305	
MEAN HOME RANGE	57.1 km^2		MEAN HOME RANGE	303.2 km^2	
STANDARD DEVIATION	43.6		STANDARD DEVIATION	161.7	

Table 7. Composition of 55 Florida black bear day use sites in South Florida

Use site	Frequency (%)
Cypress (Taxodium distichum)	49
Cabbage Palm (Sabal palmetto)	49
Fern (assorted)	27
Saw palmetto (Serenoa repens)	24
Slash pine (Pinus elliotti)	22
Red maple (Acer rubrum)	18
Wax myrtle (Myrica cerifera)	15
Live oak (Quercus virginianus)	15
Grape vine (Vitis spp.)	13
Brazilian pepper (Schinus terebinthefolius)	11
Poison ivy (Toxicodendron radicans)	9
Red bay (Persea borbonia)	7
Sawgrass (Cladium jamaicense)	7
Pickerelweed (Pontederia cordata)	6
Greenbriar (Smilax spp.)	5
Willow (Salix caroliniana)	5
Salt bush (Baccharis halimifolia)	5
Buttonbush (Cephalanthus occidentalis)	4
Caesar weed (Urena lobata)	4
Lantana (Lantana camara)	4
Myrsine (Myrsine floridana)	4
Pop ash (Fraxinus caroliniana)	4
Staggerbush (Lyonia ferruginea)	4
Virgina creeper (Parthenocissus quinquefolia)	4
Galberry (Ilex glabra)	2
Red mangrove (Rhizophora mangle)	2
Persimmon (Diospyros virginiana)	2
Swamp lilly (Crinum spp.)	2
Thistle (Cirsium horridulum)	2

Table 8. Survival rates for male Florida black bears, January 1992 through December 1993. (Spring = January through April, summer = May through August, fall = September through December)

Season	Season Length (days)	# of Bear Radio- Days	# of Deaths	Survival Rate	Variance
Spring 1992	120	1730	2	0.8704	0.0073
Summer 1992	122	1802	1	0.9345	0.0040
Fall 1992	121	1503	2	0.8512	0.0094
ANNUAL				0.6924	0.0130
Spring 1993	119	1928	1	0.9401	0.0034
Summer 1993	122	1786	1	0.9340	0.0041
Fall 1993	121	1801	1	0.9350	0.0039
ANNUAL				0.8210	0.0088
		AVERAGE ANNUAL SURVIVAL		0.7567	0.0041
			95% CI =	(0.6261, 0.9188)	

Table 9. Survival rates for female Florida black bears, January 1992 through December 1993. (Spring = January through April, summer = May through August, fall = September through December).

Season	Season Length (days)	# of Bear Radio- Days	# of Deaths	Survival Rate	Variance
Spring 1992	120	1080	0	1.0	0.0
Summer 1992	122	1464	0	1.0	0.0
Fall 1992	121	1573	0	1.0	0.0
ANNUAL				1.0	0.0
Spring 1993	119	2023	0	1.0	0.0
Summer 1993	122	1952	0	1.0	0.0
Fall 1993	121	1880	1	0.9376	0.0034
ANNUAL				0.9394	0.0034
		AVERAGE ANNUAL SURVIVAL		0.9656	0.0011
			95% CI =	(0.9014, 1.0)	

Table 10. Denning dates, cub production, and habitat types for female Florida black bears, southwestern Florida, June 1991 - June 1994.

Bear Number	Den Season	Dates of Den Attendence	Cub(s) Status	Habitat	Comments
F02	1992	2-3 to 4-20	3 ♀	pine/palmetto	cubs handled at den
	1994	1-17 to 4-29	unknown #	thicket swamp	den not visited
F03	1991	-	3 ♂	-	1991 cubs prior to capture
	1993	1-29 to 4-19	2 or more	mixed swamp	denned in cypress stump; cubs heard vocalizing
F04	1992	2-3 to 3-6	1 ♂	cypress swamp	cub handled at den, abandoned by female
F05	1994	2-14 to 4-22	2	mangrove	cubs observed from plane 7/11/94
F06	1993	2-1 to 4-16	1 ♀, 1 ♂	cabbage palm	cubs handled at den
F07	1993	1-6 to 3-1	unknown #	mangrove	higher than normal tides caused by storm of century may have inundated area, female promptly abandoned den site
F08	1992	2-3 to 3-24	1 ♂	hardwood hammock	cub handled at den, abandoned by female
	1993	2-1 to 4-12	1 ♀, 1 ♂	pine/cabbage palm	cubs handled at den
F09	1992	1-29 to 5-6	unknown #	mangrove	den not visited
	1994	1-19 to 3-9*	unknown #	mangrove	* collar probably fell off bear at den due to weight loss
F10	1994	1-19 to 4-22	unknown #	mixed swamp	female observed with adult ♂ 7/94, any cubs may have died
F11	1993	2-8 to 3-11	1 ♀	cypress swamp	cub handled at den, abandoned by female
F12	1993	2-10 to 4-28	unknown #	mixed swamp	den not visited, lack of denning in 1994 suggests cubs still alive
F13	1993	1-22 to 4-7	2	hardwood hammock	den not visited, cubs treed 5/93 and observed 10/93
F14	1994	1-12 to 4-25	1+(?)	cabbage	den not visited, at least 1 cub treed 5/94
F15	1994	2-28 to 5-13	unknown #	pine/palmetto	den not visited
F17	1994	1-12 to 2-28	?	pine/palmetto	den not visited, prescribed fire may have destroyed den
F19	1994	1-3 to 4-29	unknown #	mixed swamp	den not visited

Southwest Florida Black Bear Study Area

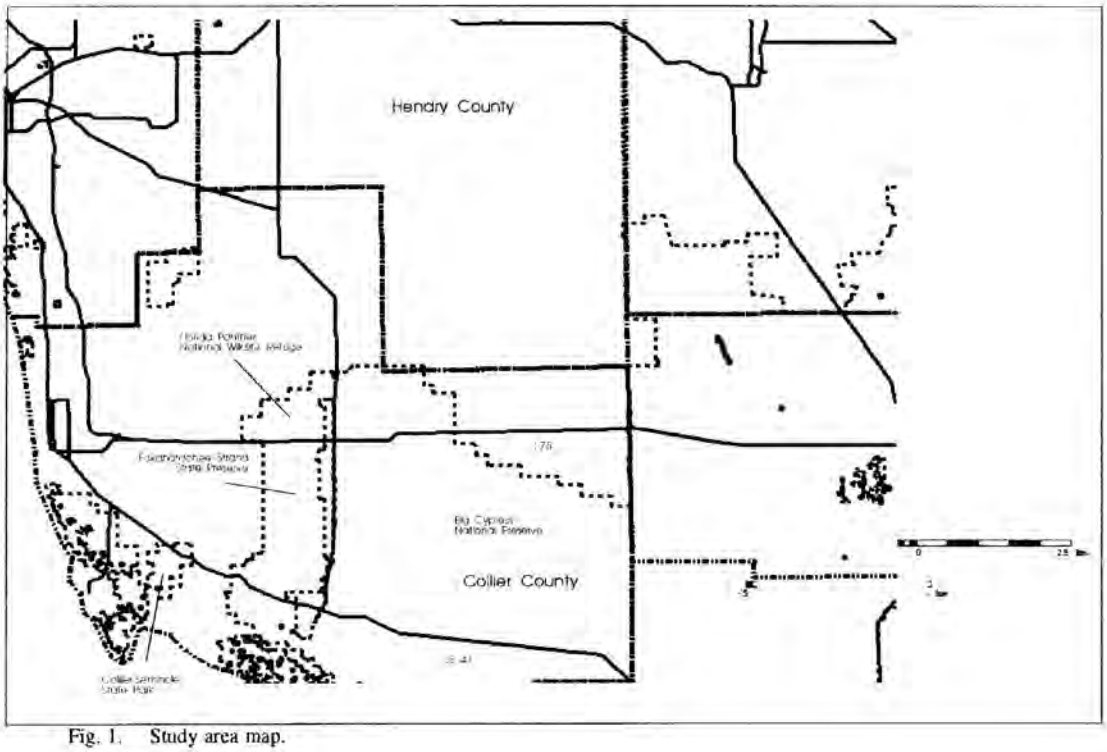


Fig. 1. Study area map.

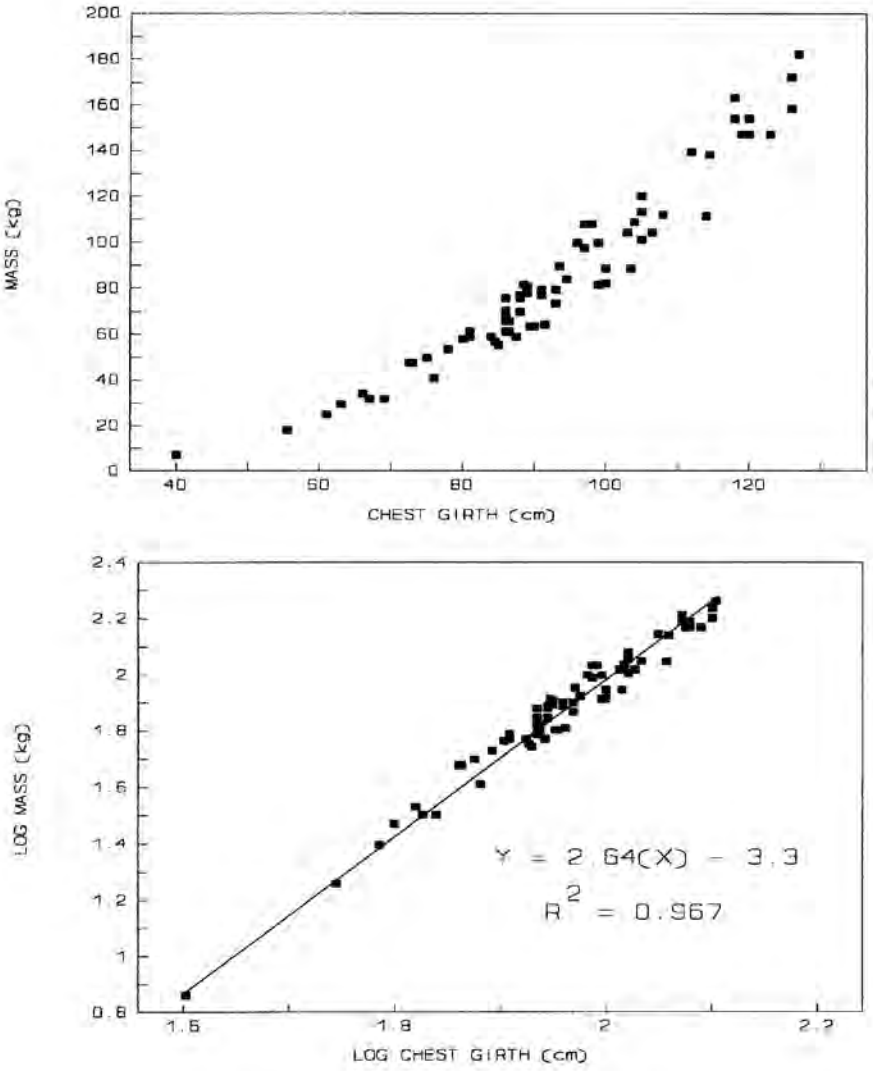


Fig. 2. Relationship of black bear girth to mass, southwest Florida, June 1991 - June 1994.

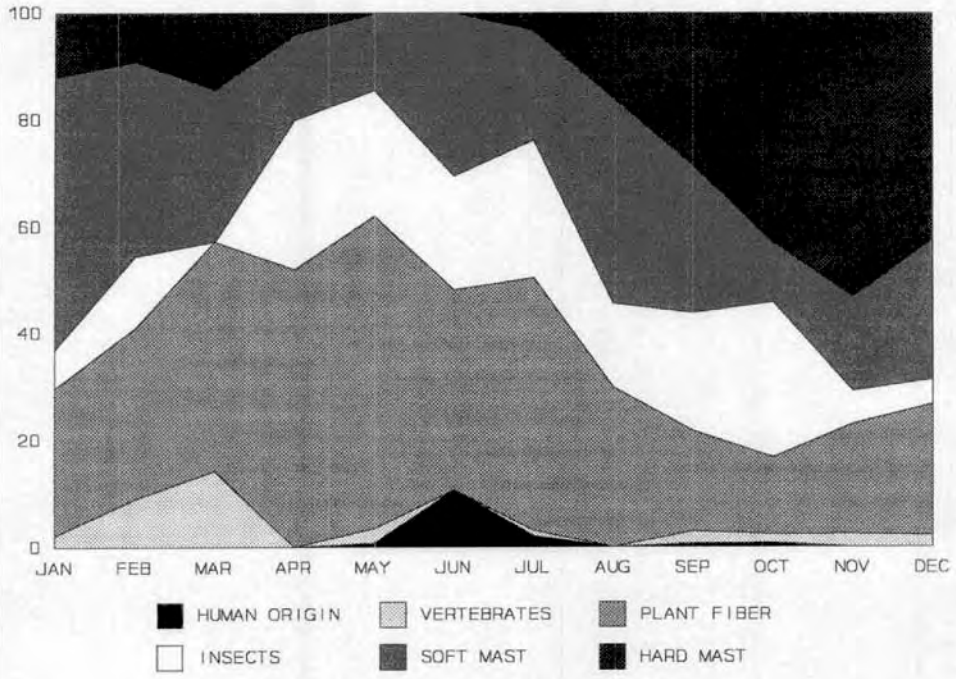


Fig. 3. Black bear food habits phenology, southwest Florida, June 1991 - June 1994.

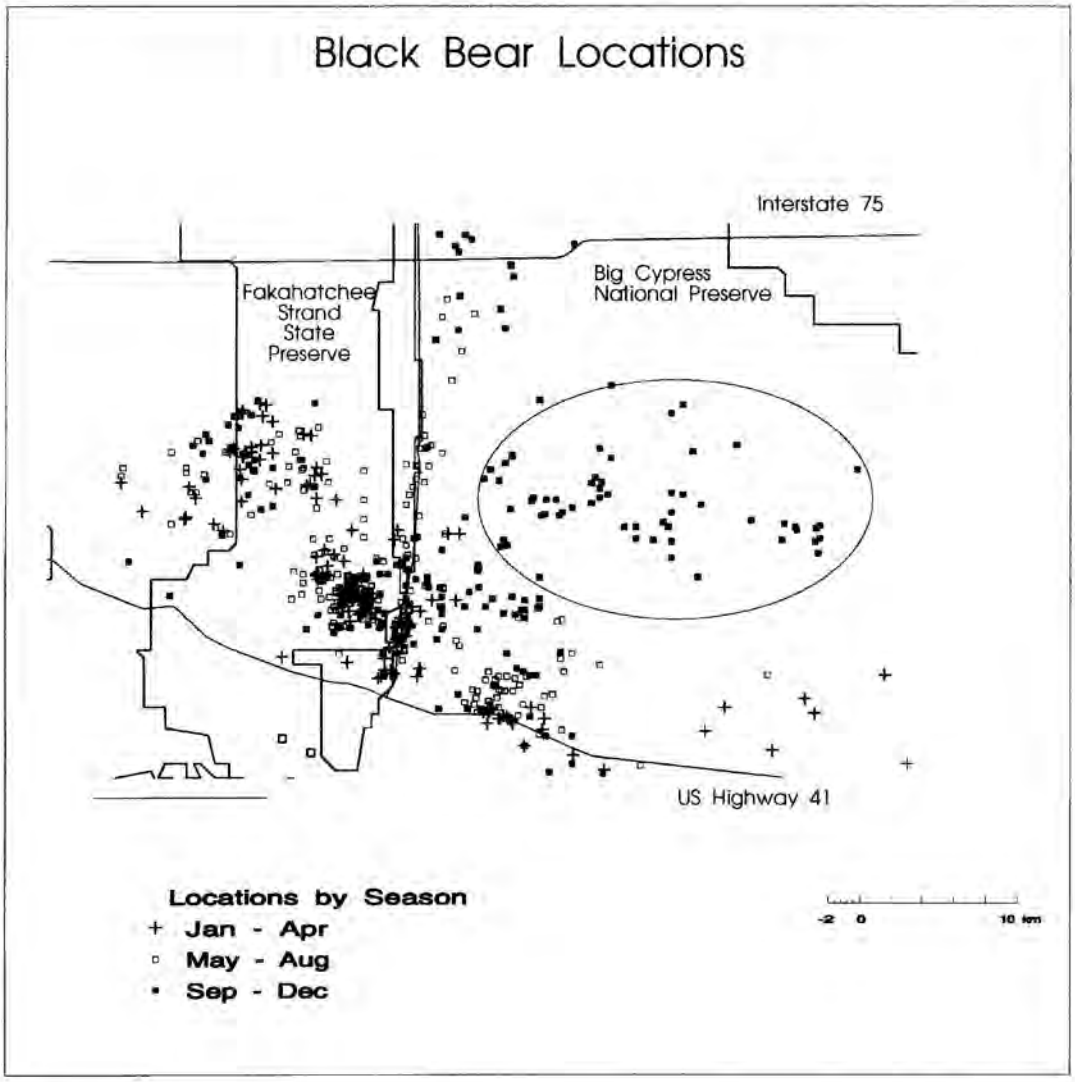


Fig. 4. Seasonal use of the southwest Florida landscape by selected radio-instrumented black bears, July 1991 - June 1994.

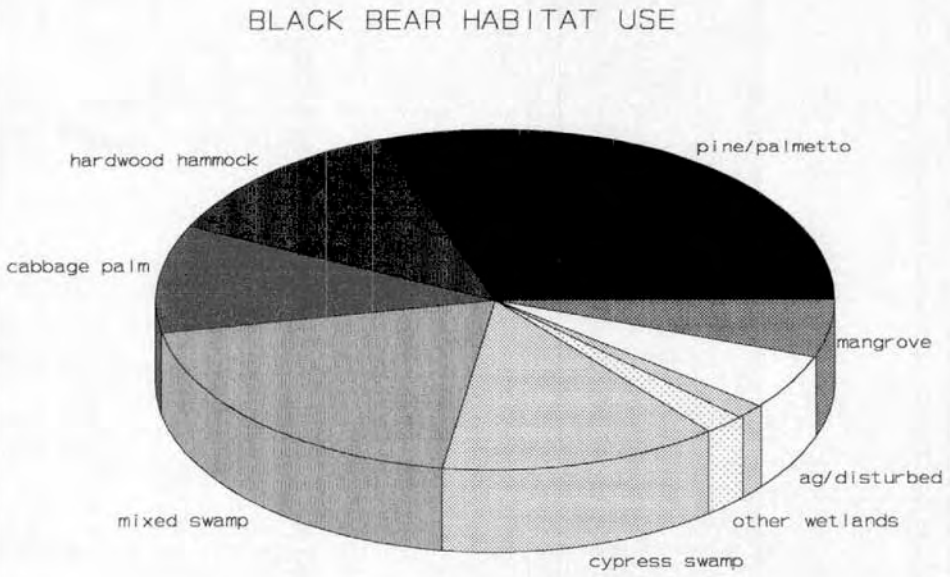


Fig. 5. Percentage of locations in various habitat types for all radio-instrumented black bears combined, southwest Florida, July 1991 - June 1994.

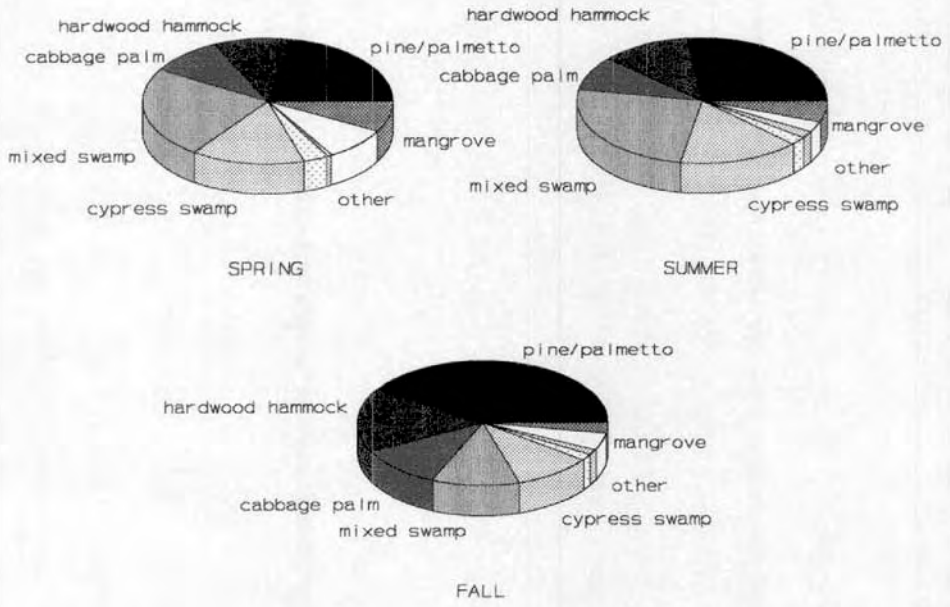


Fig. 6. Percentage of locations in various habitat types for all radio-instrumented black bears combined, southwest Florida, July 1991 - June 1994.

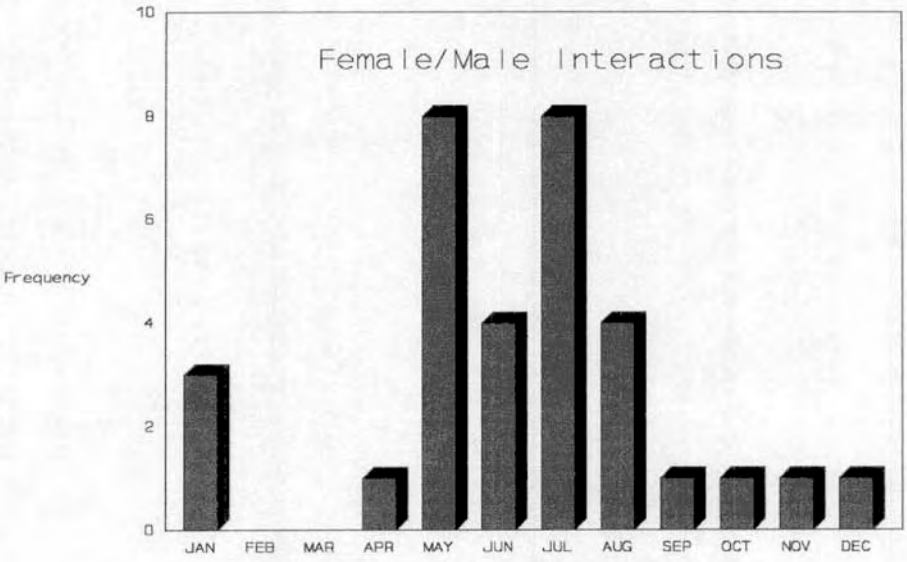


Fig. 7. Seasonality of radio-instrumented female/male black bear interactions, July 1991 - June 1994.

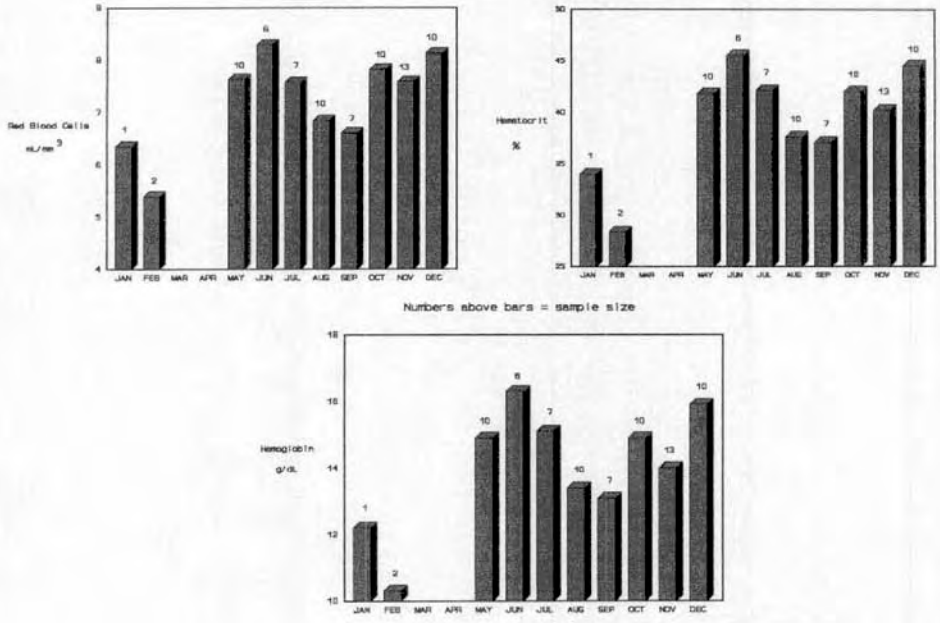


Fig. 8. Seasonal changes in red blood cell parameters in southwest Florida black bears, July 1991 - June 1994.

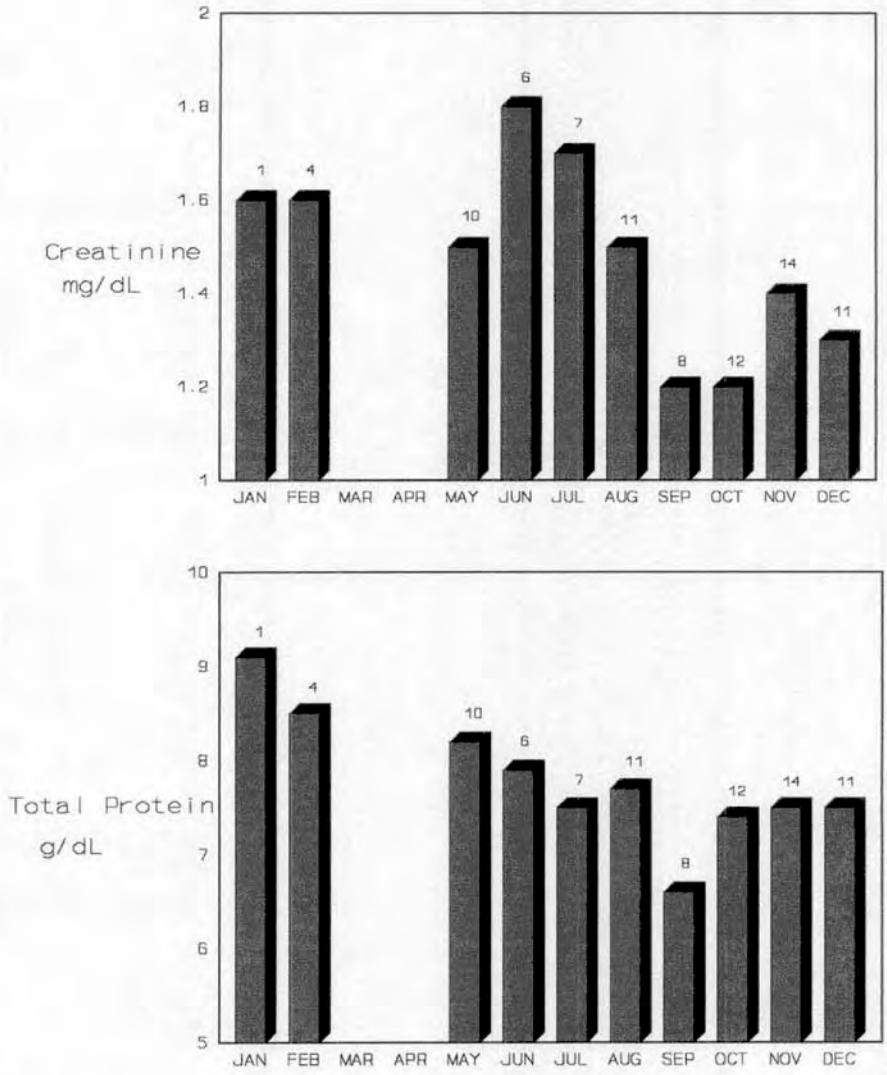


Fig. 9. Seasonal changes in uric acid, creatinine, and BUN/creatinine in southwest Florida black bears, July 1991 - June 1994.

APPENDICES

Appendix A. Selected blood chemistry values for captured black bears in southwest Florida, July 1991 - 12 December 1993.

Date	Bear Number	Age	Weight (lbs)	Red Blood Cell ($ml./mm^3$)	Hemoglobin (g/dL)	Hematocrit (%)	Total Protein (g/dL)	Creatinine (mg/dL)	Urea/ Creatinine (ratio)
11/10/93	F02	10.0	360.0	7.64	15.2	43.8	7.4	1.2	5.8
08/15/91	F03	6.0	155.0	6.52	12.5	36.0	6.8	1.7	10.6
05/28/92	F03	7.0	172.0	7.39	14.3	39.9	8.1	1.7	7.1
08/15/91	F04	6.0	140.0	6.77	13.6	38.9	8.5	1.7	7.6
09/20/91	F05	3.0	128.0	7.26	14.5	40.6	6.7	1.1	3.6
10/31/92	F05	4.0	181.0	8.31	16.0	44.5	7.3	1.2	7.5
10/28/91	F06	1.0	90.0	6.80	12.4	36.3	5.9	1.3	3.1
07/15/92	F06	2.0	105.0	6.98	13.7	38.8	6.7	1.5	2.7
10/29/91	F07	9.0	195.0	-	-	-	7.2	1.7	6.5
11/05/91	F08	7.0	246.0	7.68	14.9	41.0	7.1	1.5	4.0
11/08/91	F09	3.0	170.0		-	-	7.3	1.5	5.3
12/04/91	F09	3.0	185.0	7.73	16.6	45.4	7.7	1.3	7.7
11/14/91	F10	3.5	167.0	7.25	12.9	36.8	7.2	1.2	9.2
06/03/92	F10	4.0	167.0	9.23	17.6	49.5	8.6	1.7	5.3

Appendix A. Continued.

Date	Bear Number	Age	Weight (lbs)	Red Blood Cell (mL/mm^3)	Hemoglobin (g/dL)	Hematocrit (%)	Total Protein (g/dL)	Creatinine (mg/dL)	Urea/ Creatinine (ratio)
05/12/92	F11	2.0	140.0	8.83	17.5	49.3	7.8	1.5	3.3
06/01/92	F12	3.0	170.0	7.84	15.0	42.2	7.8	1.6	6.9
06/17/92	F13	3.0	180.0	8.54	16.7	46.2	8.3	2.4	4.2
08/13/92	F14	2.5	0.0	6.95	13.7	38.6	8.0	1.3	13.0
10/05/93	F14	3.8	200.0	8.92	16.7	47.6	8.2	1.4	5.7
10/25/92	F15	2.0	150.0	8.83	17.3	49.4	7.8	1.2	5.0
09/07/93	F15	3.0	135.0	7.14	14.6	41.3	7.2	1.0	2.0
10/27/92	F16	2.0	110.0	8.52	15.2	42.1	7.0	1.0	6.0
11/25/92	F17	6.0	200.0	8.59	16.8	46.9	7.5	1.6	0.6
11/27/92	F18	3.0	187.0	8.66	17.3	48.1	7.3	1.4	5.0
12/16/92	F19	4.0	195.0	9.00	18.0	51.8	8.4	1.3	6.9
07/28/93	F20	1.5	70.0	7.56	14.7	40.7	6.5	1.4	5.7
12/12/93	F21	7.0	160.0	7.01	13.7	38.5	5.3	1.3	1.0
11/20/92	F90	0.0	295.0	7.55	14.0	38.9	7.5	3.0	1.3
08/05/91	M05	2.0	198.0	5.93	11.7	32.6	7.3	1.3	13.8
08/08/91	M06	14.0	305.0	7.29	13.7	38.5	9.3	1.8	3.9

Appendix A. Continued.

Date	Bear Number	Age	Weight (lbs)	Red Blood Cell (mL/mm^3)	Hemoglobin (g/dL)	Hematocrit (%)	Total Protein (g/dL)	Creatinine (mg/dL)	Urea/ Creatinine (ratio)
11/14/91	M06	14.0	350.0	6.49	12.0	35.0	7.8	1.4	6.4
08/11/91	M07	2.0	220.0	-	-	-	7.4	1.4	0.7
08/10/92	M07	3.0	265.0	7.46	14.4	40.7	7.3	1.6	13.8
11/06/92	M07	3.0	325.0	7.62	14.3	41.0	8.4	1.4	1.4
08/14/91	M08	5.0	230.0	6.19	12.1	33.2	7.0	1.6	1.9
08/27/91	M09	2.0	220.0	6.15	11.7	33.3	6.9	1.1	0.9
09/03/91	M09	2.0	0.0	-	-	-	7.1	1.1	3.6
12/05/91	M09	2.0	230.0	7.87	15.5	42.5	6.9	1.4	6.4
09/16/91	M10	1.0	105.0	7.19	14.0	40.2	6.9	1.2	7.5
05/08/92	M10	2.0	135.0	8.98	17.4	49.3	7.7	1.4	10.0
09/24/91	M11	1.0	145.0	7.59	15.2	42.9	6.6	0.9	1.1
06/17/92	M11	2.0	180.0	8.32	17.3	47.7	7.6	1.4	4.3
09/25/91	M12	15.0	325.0	6.26	13.0	36.4	6.8	2.0	3.5
10/18/91	M13	3.0	340.0	8.31	16.0	46.1	8.4	1.3	5.4
12/10/92	M13	4.0	368.0	8.08	15.4	42.6	8.4	1.3	6.2
10/27/91	M14	1.5	142.0	-	-	-	7.3	1.1	3.6

Appendix A. Continued.

Date	Bear Number	Age	Weight (lbs)	Red Blood Cell (mL/mm^3)	Hemoglobin (g/dL)	Hematocrit (%)	Total Protein (g/dL)	Creatinine (mg/dL)	Urea/ Creatinine (ratio)
11/11/91	M15	2.0	181.0	7.28	12.1	40.0	7.6	1.3	7.7
12/02/91	M16	2.0	130.0	8.18	16.0	46.4	7.7	1.6	1.9
12/18/91	M17	3.0	275.0	7.59	14.9	42.2	7.4	1.4	9.0
01/31/92	M18	12.0	485.0	6.35	12.2	34.0	9.1	1.6	6.9
02/06/92	M19	6.0	380.0	5.31	10.1	27.0	9.2	2.1	4.3
05/05/92	M19	6.0	220.0	2.62	4.5	12.7	9.9	1.5	14.0
02/07/92	M20	9.0	0.0	5.47	10.6	29.9	7.8	1.1	9.1
05/23/92	M21	1.0	70.0	8.44	16.5	47.0	8.2	1.0	8.0
05/25/92	M22	1.0	65.0	8.25	15.5	42.3	7.1	1.1	16.4
05/26/92	M23	1.0	75.0	7.81	14.8	41.2	7.5	0.9	8.9
06/12/92	M24	6.0	360.0	8.67	17.5	49.2	8.2	2.5	2.4
07/30/92	M25	6.0	308.0	8.05	16.6	47.4	7.7	2.2	3.2
09/04/92	M26	6.0	175.0	4.78	9.8	27.8	5.8	1.6	1.3
10/04/92	M27	3.0	145.0	7.20	13.7	38.3	6.9	0.9	4.4
11/27/92	M27	3.0	155.0	8.84	14.7	44.4	6.8	1.0	1.0
10/08/92	M28	3.0	215.0	7.51	13.9	38.2	7.3	1.2	6.7

Appendix A. Continued.

Date	Bear Number	Age	Weight (lbs)	Red Blood Cell (mL/mm^3)	Hemoglobin (g/dL)	Hematocrit (%)	Total Protein (g/dL)	Creatinine (mg/dL)	Urea/ Creatinine (ratio)
10/08/92	M29	4.0	300.0	7.04	14.2	39.7	7.4	1.3	0.8
10/12/92	M30	2.0	238.0	6.76	13.7	37.6	7.7	1.1	5.5
07/26/93	M30	2.5	238.0	7.28	14.3	40.0	7.0	1.4	5.0
11/10/92	M31	14.0	230.0	5.65	9.8	27.1	6.9	1.0	2.0
11/21/92	M31	14.0	240.0	5.75	9.9	27.4	7.2	1.0	4.0
12/06/92	M31	14.0	265.0	-	-	-	8.2	1.1	9.1
11/18/92	M32	1.7	130.0	9.50	18.1	51.6	8.8	1.1	3.6
12/08/92	M32	1.6	135.0	9.57	17.8	50.6	8.3	1.0	5.0
12/11/92	M33	1.8	162.0	8.70	16.5	45.6	7.2	1.3	2.3
12/15/92	M34	1.8	145.0	7.61	14.4	39.1	7.0	1.1	10.9
05/23/93	M35	3.2	250.0	7.23	14.7	40.6	8.5	1.9	9.5
05/26/93	M36	7.2	365.0	7.96	15.2	43.9	8.0	1.9	1.6
05/31/93	M37	6.0	402.0	8.84	18.2	52.2	9.0	2.2	2.7
06/10/93	M38	2.0	154.0	7.17	13.8	38.0	6.8	0.9	11.1
07/28/93	M39	10.0	325.0	7.85	16.2	43.6	9.1	2.2	4.1
07/28/93	M40	1.5	118.0	6.54	13.4	37.4	6.9	1.3	6.9

Appendix A. Continued.

Date	Bear Number	Age	Weight (lbs)	Red Blood Cell (mL/mm^3)	Hemoglobin (g/dL)	Hematocrit (%)	Total Protein (g/dL)	Creatinine (mg/dL)	Urea/ Creatinine (ratio)
07/31/93	M41	3.5	250.0	8.72	16.8	47.1	8.4	1.8	5.0
08/08/93	M42	5.5	350.0	8.30	16.8	46.6	8.7	1.7	2.9
08/31/93	M43	2.0	180.0	6.83	13.7	38.0	7.3	1.7	0.6
09/08/93	M44	1.5	55.0	6.04	10.9	30.8	5.7	0.9	7.8

Appendix B. Selected blood chemistry values for captured black bears in southwest Florida, July 1991 - December 1993.

Date	Bear Number	Blood Urea (mg/dL.)	Uric Acid (mg/dL.)	Sodium (mmol/L.)	Potassium (mmol/L.)	Calcium (mg/dL.)	Iron (ug/dL.)	Phosphorus (mg/dL.)	Chloride (mmol/L.)	CO_2 (mmol/L.)	Glucose (mg/dL.)
11/10/93	F02	7	1.4	136	5.2	8.0	184	3.5	98	21	89
08/15/91	F03	18	2.0	140	4.0	7.9	107	3.8	104	18	123
05/28/92	F03	12	1.3	141	4.7	7.9	79	3.5	112	18	90
08/15/91	F04	13	1.3	138	5.1	7.9	119	5.3	103	16	72
09/20/91	F05	4	1.3	142	3.8	8.0	514	3.9	105	18	97
10/31/92	F05	9	1.4	144	4.2	8.2	91	3.0	111	17	120
10/28/91	F06	4	1.5	137	4.4	7.6	127	5.3	103	17	84
07/15/92	F06	4	1.1	133	5.1	8.6	309	5.7	104	18	97
10/29/91	F07	11	2.5	145	4.0	8.4	166	1.6	104	17	96
11/05/91	F08	6	1.3	135	4.3	7.5	89	3.4	100	17	120
11/08/91	F09	7	2.2	145	4.2	8.5	160	3.1	106	15	80
12/04/91	F09	10	1.3	141	3.8	7.9	85	3.9	106	19	134
11/14/91	F10	11	1.4	136	4.8	7.5	124	5.2	99	14	104
06/03/92	F10	9	1.6	141	5.2	8.5	95	5.3	107	17	59
05/12/92	F11	5	2.1	137	5.7	8.1	184	4.1	103	17	85
06/01/92	F12	11	1.7	139	4.8	8.3	76	4.4	107	20	69
06/17/92	F13	10	2.2	143	3.7	8.5	153	1.6	109	15	61

Appendix B. Continued.

Date	Bear Number	Blood Urea (mg/dL)	Uric Acid (mg/dL)	Sodium (mmol/L)	Potassium (mmol/L)	Calcium (mg/dL)	Iron (ug/dL)	Phosphorus (mg/dL)	Chloride (mmol/L)	CO_2 (mmol/L)	Glucose (mg/dL)
08/13/92	F14	13	1.7	137	5.3	7.5	301	6.9	101	21	63
10/05/93	F14	8	1.4	139	5.2	8.3	151	4.4	101	19	87
10/25/92	F15	6	2.5	137	4.3	9.8	250	2.2	105	21	87
09/07/93	F15	2	1.7	140	4.2	8.4	115	3.0	105	20	128
10/27/92	F16	6	1.7	142	4.3	8.3	59	4.6	109	17	83
11/25/92	F17	1	1.9	138	4.5	7.8	118	1.8	103	19	121
11/27/92	F18	5	1.9	141	4.9	8.8	157	5.5	102	18	70
12/16/92	F19	9	1.7	141	3.9	8.1	148	2.0	106	17	104
07/28/93	F20	8	1.8	143	4.2	9.4	176	3.1	108	18	82
12/12/93	F21	1	1.3	129	4.0	0.7	153	4.4	96	22	160
11/20/92	F90	4	6.3	143	5.9	7.9	152	10.2	101	12	168
08/05/91	M05	18	1.3	136	4.7	9.0	190	7.3	105	20	81
08/08/91	M06	7	1.9	143	4.3	7.7	88	4.7	108	17	54
11/14/91	M06	9	1.7	137	4.3	7.6	144	3.7	99	17	148
08/11/91	M07	1	2.0	133	5.5	8.5	117	5.7	105	17	139
08/10/92	M07	22	1.3	138	4.2	8.7	229	6.2	103	19	84

Appendix B. Continued.

Date	Bear Number	Blood Urea (mg/dL)	Uric Acid (mg/dL)	Sodium (mmol/L)	Potassium (mmol/L)	Calcium (mg/dL)	Iron (ug/dL)	Phosphorus (mg/dL)	Chloride (mmol/L)	CO_2 (mmol/L)	Glucose (mg/dL)
11/06/92	M07	2	2.1	146	4.3	8.4	157	4.6	109	19	101
08/14/91	M08	3	1.9	142	4.7	8.4	248	4.6	102	22	37
08/27/91	M09	1	1.8	145	4.7	7.9	213	6.5	104	18	108
09/03/91	M09	4	2.2	142	3.8	7.9	136	5.0	101	19	54
12/05/91	M09	9	1.8	131	4.7	10.1	127	4.1	102	25	118
09/16/91	M10	9	1.4	150	4.9	8.8	98	6.8	114	22	78
05/08/92	M10	14	1.2	142	4.6	9.2	245	6.7	106	20	73
09/24/91	M11	1	1.6	136	5.6	8.8	186	7.3	102	12	133
06/17/92	M11	6	1.8	139	4.9	8.4	180	5.5	102	15	126
09/25/91	M12	7	1.5	142	4.3	8.0	83	2.4	106	17	75
10/18/91	M13	7	1.7	142	4.2	8.5	149	3.6	102	17	68
12/10/92	M13	8	1.8	135	4.5	8.2	120	5.2	104	0	105
10/27/91	M14	4	2.5	134	4.6	8.4	175	4.5	107	23	88
11/11/91	M15	10	1.7	145	4.2	9.2	56	6.3	104	14	64
12/02/91	M16	3	1.9	140	3.8	9.2	193	2.9	101	13	123
12/18/91	M17	12	1.3	147	4.2	8.4	211	3.7	107	20	117

Appendix B. Continued.

Date	Bear Number	Blood Urea (mg/dL.)	Uric Acid (mg/dL.)	Sodium (mmol/L.)	Potassium (mmol/L.)	Calcium (mg/dL.)	Iron (ug/dL.)	Phosphorus (mg/dL.)	Chloride (mmol/L.)	CO_2 (mmol/L)	Glucose (mg/dL)
01/31/92	M18	11	1.8	144	4.6	8.4	170	5.7	101	20	56
02/06/92	M19	9	1.5	139	4.4	7.4	67	3.6	101	16	85
05/05/92	M19	21	0.9	129	4.4	7.2	49	4.7	102	16	83
02/07/92	M20	10	1.3	141	4.1	7.1	76	2.8	105	19	160
05/23/92	M21	8	2.7	151	5.1	10.0	78	8.2	123	20	84
05/25/92	M22	18	2.8	139	4.5	9.0	62	9.2	111	16	91
05/26/92	M23	8	2.7	138	4.4	9.1	187	6.5	106	14	142
06/12/92	M24	6	1.8	138	4.3	8.5	166	3.7	99	19	114
07/30/92	M25	7	1.5	141	4.1	7.9	198	4.4	101	18	80
09/04/92	M26	2	1.7	142	5.0	7.2	44	6.3	109	11	97
10/04/92	M27	4	1.7	139	4.2	8.7	85	6.5	108	20	88
11/27/92	M27	1	2.6	139	5.1	8.1	159	4.1	99	18	52
10/08/92	M28	8	1.9	140	4.7	8.6	196	4.7	103	17	99
10/08/92	M29	1	1.9	142	3.4	7.9	83	3.1	101	16	126
10/12/92	M30	6	1.6	144	5.1	8.9	118	7.3	110	16	57
07/26/93	M30	7	1.5	140	4.5	8.4	155	4.1	101	17	200

Appendix B. Continued.

Date	Bear Number	Blood Urea (mg/dL)	Uric Acid (mg/dL)	Sodium (mmol/L)	Potassium (mmol/L)	Calcium (mg/dL)	Iron (ug/dL)	Phosphorus (mg/dL)	Chloride (mmol/L)	CO_2 (mmol/L)	Glucose (mg/dL)
11/10/92	M31	2	1.7	136	3.7	6.5	59	2.9	100	21	165
11/21/92	M31	4	2.2	137	4.2	7.4	157	3.9	98	14	63
12/06/92	M31	10	1.2	141	4.4	7.6	93	3.7	107	22	111
11/18/92	M32	4	2.5	145	4.4	10.6	179	5.8	107	12	88
12/08/92	M32	5	1.9	145	4.1	9.2	173	5.2	108	15	82
12/11/92	M33	3	1.8	142	4.5	8.5	64	4.9	110	14	90
12/15/92	M34	12	1.5	138	4.4	8.4	145	5.6	102	21	110
05/23/93	M35	18	1.8	140	3.8	9.2	137	4.4	110	21	100
05/26/93	M36	3	1.6	142	4.4	7.3	57	4.3	109	16	89
05/31/93	M37	6	1.7	140	4.0	8.4	146	3.6	102	21	221
06/10/93	M38	10	1.5	137	4.6	8.1	100	6.6	103	20	65
07/28/93	M39	9	1.5	143	3.9	8.4	107	3.1	104	19	79
07/28/93	M40	9	1.7	133	4.4	8.4	209	3.9	98	15	127
07/31/93	M41	9	1.8	139	3.6	8.9	60	2.9	101	15	125
08/08/93	M42	5	1.5	141	4.0	8.2	228	4.1	105	16	124
08/31/93	M43	1	2.0	137	4.4	7.9	185	4.2	104	16	104

Appendix B. Continued.

Date	Bear Number	Blood Urea (mg/dL)	Uric Acid (mg/dL)	Sodium (mmol/L)	Potassium (mmol/L)	Calcium (mg/dL)	Iron (ug/dL)	Phosphorus (mg/dL)	Chloride (mmol/L)	CO_2 (mmol/L)	Glucose (mg/dl.)
09/08/93	M44	7	1.7	139	4.1	7.3	35	4.0	107	20	121

Appendix C. Selected blood chemistry values for captured black bears in southwest Florida, July 1991 - December 1993.

Date	Bear Number	White Blood Cells (th/mm_3)	Albumin (g/dL)	Platelets (th/mm_3)	Bilirubin (mg/dL)	LDH (IU/L)	Cholesterol (mg/dL)	Triglycerides (mg/dL)	Globulin (g/dL)
11/10/93	F02	10.2	3.8	597	0.12	523	401	225	3.6
08/15/91	F03	14.3	2.7	243	0.13	910	241	178	4.1
05/28/92	F03	9.1	3.2	719	0.15	723	244	265	4.9
08/15/91	F04	17.6	3.1	822	0.12	754	197	231	5.4
09/20/91	F05	23.6	3.8	391	0.16	1415	221	220	2.9
10/31/92	F05	20.3	3.6	448	0.13	842	211	250	3.7
10/28/91	F06	11.5	2.7	551	0.13	626	272	245	3.2
07/15/92	F06	9.6	3.3	412	0.10	676	182	178	3.4
10/29/91	F07	0.0	3.4	0	0.20	1360	195	197	3.8
11/05/91	F08	14.8	3.0	360	0.09	515	226	161	4.1
11/08/91	F09	0.0	3.5	0	0.21	7710	199	287	3.8
12/04/91	F09	15.2	3.5	369	0.16	1279	216	220	4.2
11/14/91	F10	13.4	3.1	567	0.10	575	231	169	4.1
06/03/92	F10	14.4	3.8	503	0.15	710	258	204	4.8
05/12/92	F11	8.7	3.8	109	0.22	1039	213	215	4.0
06/01/92	F12	8.9	3.9	458	0.13	809	197	144	3.9

Appendix C. Continued.

Date	Bear Number	White Blood Cells (th/mm_3)	Albumin (g/dL)	Platelets (th/mm_3)	Bilirubin (mg/dL)	LDH (IU/L)	Cholesterol (mg/dL)	Triglycerides (mg/dL)	Globulin (g/dL)
06/17/92	F13	18.7	3.7	111	0.29	1715	272	306	4.6
08/13/92	F14	14.8	3.0	641	0.13	862	142	147	5.0
10/05/93	F14	14.5	4.0	696	0.14	719	237	178	4.2
10/25/92	F15	16.3	3.7	547	0.20	1337	332	218	4.1
09/07/93	F15	17.3	3.3	576	0.09	961	278	168	3.9
10/27/92	F16	15.9	3.2	567	0.14	1288	407	368	3.8
11/25/92	F17	14.0	3.5	541	0.12	765	303	227	4.0
11/27/92	F18	21.6	3.5	593	0.28	806	442	255	3.8
12/16/92	F19	21.3	3.7	600	0.18	1958	289	152	4.7
07/28/93	F20	17.0	3.7	411	0.28	2512	215	185	2.8
12/12/93	F21	19.3	2.1	370	0.18	1559	230	201	3.2
11/20/92	F90	19.8	2.9	709	0.24	5042	286	269	4.6
08/05/91	M05	14.5	3.1	459	0.12	757	260	197	4.2
08/08/91	M06	25.2	2.9	428	0.13	797	180	249	6.4
11/14/91	M06	14.7	3.0	535	0.12	657	267	191	4.8
08/11/91	M07	0.0	3.5	0	0.17	0	317	302	3.9

Appendix C. Continued.

Date	Bear Number	White Blood Cells (th/mm_3)	Albumin (g/dL)	Platelets (th/mm_3)	Bilirubin (mg/dL)	LDH (IU/L)	Cholesterol (mg/dL_3)	Triglycerides (mg/dL)	Globulin (g/dL)
08/10/92	M07	19.2	3.4	488	0.11	772	210	196	3.9
11/06/92	M07	21.1	3.8	418	0.44	1038	345	283	4.6
08/14/91	M08	28.7	2.7	497	0.15	795	194	224	4.3
08/27/91	M09	14.0	2.8	418	0.24	771	305	248	4.1
09/03/91	M09	0.0	3.2	0	0.15	1431	335	178	3.9
12/05/91	M09	14.7	3.6	335	0.12	669	284	211	3.3
09/16/91	M10	11.5	3.2	565	0.12	614	331	179	3.7
05/08/92	M10	9.7	3.8	0	0.11	1158	260	211	3.9
09/24/91	M11	13.2	2.6	417	0.27	671	357	290	4.0
06/17/92	M11	16.6	3.4	527	0.20	1303	334	285	4.2
09/25/91	M12	22.5	2.8	593	0.00	1122	309	275	4.0
10/18/91	M13	24.8	3.7	418	0.14	1581	372	410	4.7
12/10/92	M13	16.0	3.4	394	0.16	706	243	202	5.0
10/27/91	M14	0.0	3.7	0	0.25	949	379	159	3.6
11/11/91	M15	23.3	3.5	560	0.09	2690	339	310	4.1
12/02/91	M16	20.9	3.3	553	0.15	794	320	300	4.4

Appendix C. Continued.

Date	Bear Number	White Blood Cells (th/mm_3)	Albumin (g/dL)	Platelets (th/mm_3)	Bilirubin (mg/dL)	LDH (IU/L)	Cholesterol (mg/dL)	Triglycerides (mg/dL)	Globulin (g/dL)
12/18/91	M17	12.1	3.3	490	0.12	605	281	367	4.1
01/31/92	M18	25.3	2.7	726	0.15	845	250	265	6.4
02/06/92	M19	18.0	2.8	654	0.12	1134	245	337	6.4
05/05/92	M19	13.6	2.4	361	0.13	1125	218	340	7.7
02/07/92	M20	12.2	3.2	704	0.08	848	312	208	4.6
05/23/92	M21	13.3	3.8	581	0.11	1356	374	358	4.4
05/25/92	M22	13.8	3.2	632	0.11	2000	355	413	3.9
05/26/92	M23	13.5	3.7	455	0.42	1136	302	267	3.8
06/12/92	M24	20.5	4.0	452	0.25	2237	210	230	4.2
07/30/92	M25	20.3	3.4	567	0.14	936	161	187	4.3
09/04/92	M26	37.4	2.1	1302	0.11	807	295	549	3.7
10/04/92	M27	19.8	3.1	581	0.09	1189	288	205	3.8
11/27/92	M27	19.2	2.8	326	0.29	1020	445	374	4.0
10/08/92	M28	24.0	3.0	544	0.14	998	263	205	4.3
10/08/92	M29	22.6	3.3	625	0.18	1723	350	347	4.1
10/12/92	M30	14.6	3.3	0	0.16	1225	272	302	4.4

Appendix C. Continued.

Date	Bear Number	White Blood Cells (th/mm_3)	Albumin (g/dL)	Platelets (th/mm_3)	Bilirubin (mg/dL)	LDH (IU/L)	Cholesterol (mg/dL)	Triglycerides (mg/dL)	Globulin (g/dL)
07/26/93	M30	14.3	3.4	496	0.14	2060	222	235	3.6
11/10/92	M31	17.7	2.1	822	0.10	520	296	217	4.8
11/21/92	M31	14.7	2.4	570	0.41	1034	293	313	4.8
12/06/92	M31	0.0	2.8	0	0.90	624	299	210	5.4
11/18/92	M32	21.9	4.6	554	0.25	7300	438	404	4.2
12/08/92	M32	14.7	4.1	467	0.23	1425	337	329	4.2
12/11/92	M33	22.4	3.3	371	0.12	2538	471	306	3.9
12/15/92	M34	13.0	3.2	533	0.17	992	356	224	3.8
05/23/93	M35	18.0	4.1	556	0.33	3100	293	392	4.4
05/26/93	M36	17.2	3.4	605	0.17	2090	300	395	5.2
05/31/93	M37	31.6	4.4	440	0.20	4930	254	305	4.2
06/10/93	M38	17.4	3.3	496	0.18	791	239	215	3.5
07/28/93	M39	17.9	3.5	185	0.21	1299	210	376	5.6
07/28/93	M40	12.9	3.1	493	0.15	860	212	169	3.8
07/31/93	M41	19.7	3.2	317	0.17	2500	246	241	5.2
08/08/93	M42	18.1	3.8	382	0.15	873	228	174	4.9

Appendix C. Continued.

Date	Bear Number	White Blood Cells (th/mm_3)	Albumin (g/dL)	Platelets (th/mm_3)	Bilirubin (mg/dL)	LDH (IU/L)	Cholesterol (mg/dL)	Triglycerides (mg/dL)	Globulin (g/dL)
08/31/93	M43	21.4	2.7	468	0.10	1048	231	144	4.6
09/08/93	M44	16.6	2.8	771	0.15	929	220	173	2.9

Copy of the Florida black bear BSR draft report that was sent out for peer review

Biological Status Review
for the
Florida black bear
(*Ursus americanus floridanus*)

EXECUTIVE SUMMARY

The Florida Fish and Wildlife Conservation Commission (FWC) directed staff to evaluate all species listed as Threatened or Species of Special Concern as of September 1, 2010. Public information on the status of the Florida black bear was sought from September 17 to November 1, 2010. The members of the biological review group (BRG) met on November 1-2, 2010. Group members were Walter McCown (FWC lead), Mel Sunquist, and Bill Giuliano. In accordance with rule 68A-27.0012 Florida Administrative Code (F.A.C.), the BRG was charged with evaluating the biological status of the Florida black bear using criteria included in definitions in 68A-27.001(3) and following the protocols in the *Guidelines for Application of the IUCN Red List Criteria at Regional Levels (Version 3.0)* and *Guidelines for Using the IUCN Red List Categories and Criteria (Version 8.1)*. Please visit http://myfwc.com/WILDLIFEHABITATS/imperiledSpp_listingprocess.htm to view the listing process rule and the criteria found in the definitions.

The Florida black bear Biological Review Group concluded from the biological assessment that the Florida black bear no longer met criteria for listing at any level. Based on the literature review, information received from the public, and the biological review findings, staff recommend removing the species from the FWC list of threatened species.

This work was supported by a Conserve Wildlife Tag grant from the Wildlife Foundation of Florida.

BIOLOGICAL INFORMATION

Taxonomic Classification – This report is for the entire population of Florida black bear (*Ursus americanus floridanus*) in the state. The Florida black bear was initially described by Merriam (1896) as a separate species based on its long skull and highly arched nasal bones. Subsequently, Hall and Kelson (1959) and Harlow (1961) recognized the Florida black bear as one of 16 subspecies of the American black bear.

Life History – Florida black bears are uniformly black except for a tan or brown muzzle and occasionally a white chest patch (FWC 2010; Maehr and Wooding 1992). Adult females weigh between 130 to 180 lbs. and adult males usually weigh between 250 to 350 lbs. (FWC 2010).

The habitat used by Florida black bears is diverse and ranges from temperate plant communities in northwestern Florida to subtropical communities in southern Florida (Maehr and

Wooding 1992, Land et al. 1994). Bears inhabit cypress swamps, cabbage palm forests, pine flatwoods, mixed hardwood swamps, sand pine scrub, mixed hardwood hammocks, mixed hardwood pine forests, oak scrub, pine plantations, upland hardwood forests, bay swamps, sandhill communities, and mangrove swamps (Hoctor 2003; Maehr and Wooding 1992). Bears are opportunistic omnivores, eating a wide variety of plant material including soft fruits, hard mast, and herbaceous material but also including insects and some vertebrates, (FWC 2010; Maehr and Wooding 1992). Bears will alter their habitat use and home range size seasonally depending on food availability and reproductive status (Maehr and Wooding 1992; Ulrey 2008, Moyer et al. 2007). Large, contiguous tracts of forest with understories of mast or berry-producing shrubs or trees provide secure habitat for self-sustaining bear populations, whereas smaller, fragmented patches of habitat bordered by urban areas and highways have less secure populations of Florida black bears (FWC 2010; Larkin et al. 2004).

Florida black bear females become sexually mature between 3 and 4 years of age (Garrison 2004). Mating takes place in June or July and females may mate with several males (Maehr and Wooding 1992). Reproductive females den for an average of 113 days beginning in mid-December to mid-January, emerging in late March to late April (Garrison 2004; Dobey et al. 2005). Dens are usually shallow depressions on the ground in dense thickets of shrubs and vines (Garrison 2004; Maehr and Wooding 1992). Cubs are born in January or February in litters of 2-4 offspring (Maehr and Wooding 1992, Dobey et al. 2005, Garrison et al. 2007). Cubs weigh six to eight pounds when they leave the den at 10 weeks old (FWC 2010). Cubs remain with their mother until they are 15-17 months old. Males disperse but females generally form a home range that overlaps their natal home range (Moyer et al. 2006). Variation in home range size and shape is influenced by the temporal and spatial distribution of food, reproductive status, and human influences. Annual home ranges of female Florida black bears vary from 3.8km^2 to 126.9km^2 (Dobey et al. 2005; Moyer et al. 2007). Home range size for male black bears generally varies from 94 km^2 to 185 km^2 (Land et al. 1994, McCown et al. 2004, Ulrey 2008).

Geographic Range and Distribution – The Florida black bear was historically widespread throughout mainland Florida and the southern portions of Georgia and Alabama (FWC 2010; Maehr and Wooding 1992). Currently, there is one subpopulation in and around the Okefenokee National Wildlife Refuge in Georgia, one subpopulation in Alabama (near Mobile), six large Florida subpopulations (Ocala, Osceola, St. Johns, Eglin, Apalachicola, and Big Cypress), and two small, remnant populations in Florida (Chassahowitzka and Glades/Highlands; FWC 2010). Recent analysis has indicated the Ocala and St Johns subpopulations are genetically identical and spatially linked and therefore should be considered one population (Dixon et al. 2007). Although the black bear is widespread in Florida, the distribution is fragmented with little landscape connectivity or genetic exchange among the subpopulations (Maehr and Wooding 1992, FWC 2010). Florida black bears inhabit 18% of their historic range totaling approximately 17,000 mi^2, within which, reproduction occurs on approximately 10,000 mi^2 (FWC 2010).

Population Status and Trend – The species, *Ursus americanus,* is currently listed as Least Concern by the IUCN because "this species is widespread, with a large global population estimated at more than twice that of all other species of bears combined. Moreover, in most

areas populations are expanding numerically and geographically. Threats exist only in a few isolated places" (Garshelis et al. 2008).

The black bear is currently listed as a Threatened species by the state of Florida except in Baker and Columbia counties and Apalachicola National Forest where it is not listed. The exact population size of the Florida black bear is unknown due to the bear's reclusive behavior and occupancy of remote, forested areas (Maehr and Wooding 1992). However, mark/recapture models using DNA collected from bear hair have provided the following 2002 abundance estimates for Florida black bear subpopulations: Apalachicola 438-695 bears; Big Cypress 516-878 bears; Eglin 63-101 bears; Ocala-St. Johns 825-1,226 bears; and Osceola 200-313 bears (Simek et al. 2005). Bear abundance in Chassahowitzka (20 bears; Orlando 2003), Glades-Highlands (150-200 bears; John Cox Univ. of Kentucky 2009 pers. comm.), Georgia (600-800 bears; Dobey et al. 2005, Greg Nelms, Georgia Department of Natural Resources, 2009 pers. comm.) and Alabama (50-100 bears, Hristienko and Olver 2010) were estimated from other field studies. The total population estimate is therefore 2,212-3,433 bears in Florida and 2,862-4,333 bears throughout the entire range of *U. a. floridanus*.

Florida black bear numbers have been steadily increasing over the past 24 years (3 generations) and it is expected that they will continue to increase over the next 24 years due to extensive conservation efforts (FWC 2010) and suitable habitat (Hoctor 2006) that is currently unoccupied but adjacent to occupied range.

Quantitative Analyses – A population viability analysis carried out on the Florida black bear found that the probability of extinction in the next 100 years was zero (Root and Barnes 2006; Endries et al. 2009). The model was found to be most sensitive to changes in adult survival (Root and Barnes 2006).

BIOLOGICAL STATUS ASSESSMENT

Threats – The two greatest threats to Florida black bears are negative interactions with people, and habitat loss and fragmentation (FWC 2010). Human-bear interactions have increased in Florida due to greater populations of both bears and humans. Although some encounters are positive or neutral in their outcome, many are negative and can lead to death of the bear through roadkill, illegal killing, or euthanasia (Annis 2008; Hostetler et al. 2009; Maehr et al. 2004; McCown et al. 2009). Furthermore, increased conflicts between humans and bears could lead to devaluation of the bear among Florida citizens, perhaps the single greatest threat to its continued preservation (FWC 2010).

Habitat Loss. The Florida black bear is particularly vulnerable to habitat loss because of its large home range sizes, low population size and density, low productivity, and additional threats that result from increased interactions with humans in urbanized areas (Hostetler et al. 2009; Maehr and Wooding 1992). Habitat loss and fragmentation has fragmented the Florida black bear population into subpopulations that are genetically and spatially isolated (Brown 2004; FWC 2010; Dixon et al. 2006; Dixon et al. 2007; Larkin et al. 2004; Maehr and Wooding 1992; Maehr et al. 2003; Orlando 2003; Ulrey 2008).

An additional threat to Florida black bears is due to habitat degradation through incompatible land management. Fire management regimes suitable to humans or other species and commercial palmetto berry harvesting may remove important resources utilized by black bears (FWC 2010; Stratman and Pelton 2007). These threats are not significant to black bear populations statewide, but do lower local carrying capacities of bears in some areas (FWC 2010).

Bear mortality is largely due to human factors (FWC 2010). Bears are hit by cars or illegally killed. Bears come into contact with humans more frequently in highly fragmented habitat and human-caused mortality in such habitat can be significant (FWC 2010; Brown 2004; Hostetler et al. 2009). For example, adult female bears living near Ocala National Forest experienced levels of mortality that would not have been sustainable in a smaller, isolated population (McCown et al. 2004). Although bear roadkills are a significant source of mortality (the 2002 annual statewide mortality rate for bear roadkills was 4.8%; Simek et al 2005), it is believed that populations of black bears that are demographically similar to Florida black bears (breed at 3 years of age, females have 2 cubs every other year) can sustain an annual mortality of up to 23% before the populations begin to decline (Bunnell and Tait 1980). Florida Department of Transportation has constructed more than 24 large wildlife underpasses along highways targeting Florida panthers and/or black bears. Additionally, in critical bear roadkill areas, future traffic enhancement projects have incorporated wildlife underpasses that target bears in the design phase of highway planning. Illegal killing of bears occurs but at an unknown level. Florida Fish and Wildlife Conservation Commission documented 140 bears illegally killed in Florida between 1989 and 2009, a rate of 7 bears per year (FWC 2010).

Current management efforts are focused on addressing the primary threats to bears of human-bear conflicts and the effects of habitat loss and fragmentation. In 2009, FWC responded to more than 3,000 bear-related calls from the public with technical assistance, site visits, or trapping and relocation of problem bears when warranted. The agency maintains a database of all roadkills and bear calls from the public. FWC coordinates with Florida DOT to identify and mitigate chronic roadkill hot spots and provides comments on all road projects in bear range. FWC works with stakeholders to produce bear festivals in areas of high human-bear interactions. Staff provides bear educational presentations to schools and civic groups, canvases neighborhoods with frequent bear interactions, and meets one-on-one with residents. FWC produced a video, “Living with the Florida Black Bear”, to allow educators and civic groups to share the message with their students and constituents. FWC worked with Defenders of Wildlife to produce and update the Black Bear Curriculum Guide, which helps elementary school students learn math, science, and history while learning about bears. FWC has partnered with local governments and waste management companies to make garbage less accessible to bears. FWC created and enforces a wildlife feeding rule. The draft black bear management plan, currently under public review, calls for the creation of “Bear Smart” communities where FWC will work with local governments, businesses, and residents to reduce bear conflicts and serve as a model for other communities. FWC documents basic black bear subpopulation parameters. FWC provides comments and information to other agencies and NGOs to help identify and conserve land of high value to bears. FWC provides comments on county comprehensive plans and

developments of regional impact in bear range and has published a wildlife conservation guide for planners, developers, and consultants seeking to reduce impacts of development on bears.

Statewide Population Assessment – Findings from the Biological Review Group are included in a Biological Status Review information table and regional assessment table.

LISTING RECOMMENDATION – The Florida black bear does not meet the criteria for listing.

SUMMARY OF THE INDEPENDENT REVIEW – this will be completed after the peer review.

LITERATURE CITED

Annis, K.M. 2008. The impact of translocation on nuisance Florida black bears. MSc. Thesis. University of Florida. 53pp.

Brown, J.H. 2004. Challenges in estimating size and conservation of black bear in west-central Florida. MSc. Thesis. University of Kentucky. 58pp.

Bunnell, F.G. and D.E.N. Tait. 1980. Bears in models and reality-implications to management. International Conference on Bear Research and Management 4:15-24.

Dixon, J.D., M.K. Oli, M.C. Wooten, T.H. Eason, J.W. McCown, and D. Paetkau. 2006. Effectiveness of a regional corridor in connecting two Florida black bear populations. Conservation Biology 20(1):155-162

Dixon, J.D., M.K. Oli, M.C. Wooten, T.H. Eason, J.W. McCown, and M.W. Cunningham. 2007. Genetic consequences of habitat fragmentation and loss: the case of the Florida black bear (*Ursus americanus floridanus*). Conservation Genetics 8:455-464

Dobey, S., D.V. Masters, B.K. Scheick, J.D. Clark, M.R. Pelton, and M.E. Sunquist. 2005. Ecology of Florida black bears in the Okefenokee-Osceola Ecosystem. Wildlife Monographs 158.

Endries, M, B. Stys, G. Mohr, G. Kratimenos, S. Langley, K. Root, and R. Kautz. 2009. Wildlife Habitat Conservation Needs in Florida. Fish and Wildlife Research Institute Technical Report TR-15. x + 178p.

Florida Fish and Wildlife Conservation Commission (FWC). 2010. Draft black bear management plan for Florida. *Ursus americanus floridanus*. Florida Fish and Wildlife Conservation Commission. Tallahassee, Florida.

Garrison, E.P. 2004. Reproductive ecology, cub survival, and denning ecology of the Florida black bear. Thesis. University of Florida. Gainesville, Florida.

Garrison, E.P., J.W. McCown, and M.K. Oli. 2007. Reproductive ecology and cub survival of Florida black bears. Journal of Wildlife Management 71:720-727.

Garshelis, D.L., D. Crider, and F. van Manen. 2008. *Ursus americanus*. In: IUCN 2010. IUCN Red List of Threatened Species. Version 2010.3 www.iucnredlist.org. Downloaded on 07 October 2010.

Hall, E.R. and K.R. Kelson. 1959. The mammals of North America. The Ronald Press, New York.

Harlow, R.F. 1961. Characteristics and status of Florida black bear. Transactions of the North American Wildlife Conference 26:481-495.

Hristienko, H. and L. Olver. 2010. A survey summary of American black bear populations and human-bear conflict management across eastern Canada and the United States. Western Black Bear Workshop 10: 52-59.

Hoctor, T.S. 2003. Regional landscape analysis and reserve design to conserve Florida's biodiversity. PhD dissertation. University of Florida. 376pp.

Hoctor, T. S. 2006. Developing updated statewide potential habitat and habitat significance for the Florida black bear. Final project report. Florida Fish and Wildlife Conservation Commission. Tallahassee, Florida, USA.

Hostetler, J.A., J.W. McCown, E.P. Garrison, A.M. Neils, M.A. Barrett, M.E. Sunquist, S.L. Simek, and M.K. Oli. 2009. Demographic consequences of anthropogenic influences: Florida black bears in north-central Florida. Biological Conservation 142:2456-2463.

Land, E.D., D.S. Maehr, J.C. Roof, and J.W. McCown. 1994. Southwest Florida black bear distribution, movements, and conservation strategy. Florida Game and Fresh Water Fish Commission. Tallahassee. 51pp.

Larkin, J.L., D.S. Maehr, T.S. Hoctor, M.A. Orlando, and K. Whitney. 2004. Landscape linkages and conservation planning for the black bear in west-central Florida. Animal Conservation 7:1-12.

Maehr, D.S. and J.B. Wooding 1992. Florida black bear *Ursus americanus floridanus*. Pages 265-275 in S.R. Humphrey (ed.), Rare and endangered biota of Florida. Vol. I. Mammals. University Press of Florida. Gainesville, Florida.

Maehr, D.S., J.S. Smith, M.W. Cunningham, M.E. Barnwell, J.L. Larkin, and M.A. Orlando. 2003. Southeastern Naturalist 2(3):433-446.

Maehr, D.S., J.N. Layne, T.S. Hoctor, and M.A. Orlando. 2004. Status of the black bear in south-central Florida. Florida Field Naturalist 32(3):85-101.

McCown, J.W., P. Kubilis, T.H. Eason, and B.K. Scheick. 2004. Black bear movements and habitat use relative to roads in Ocala National Forest. Florida Fish and Wildlife Conservation Commission. Final Report Contract BD-016 for Florida Department of Transportation.

McCown, J.W., P. Kubilis, T.H. Eason, and B.K. Scheick. 2009. Effect of traffic volume on American black bears in central Florida, USA. Ursus 20(1):39-46.

Merriam, C.H. 1896. Preliminary synopsis of the American bears. Proceedings of the Biological Society of Washington. 10:65-86.

Moyer, M.A., J.W. McCown, and M.K. Oli. 2006. Does genetic relatedness influence space use pattern? A test on Florida black bears. Journal of Mammalogy 87:255-261.

Moyer, M.A., J.W. McCown, and M.K. Oli. 2007. Factors influencing home-range size of female Florida black bears. Journal of Mammalogy 88:468-476.

Orlando, M.A. 2003. The ecology and behavior of an isolated black bear population in west central Florida. MSc. Thesis. University of Kentucky. 103 pp.

Root, K.V. and J. Barnes. 2006. Risk assessment for a focal set of rare and imperiled wildlife in Florida. Fish and Wildlife Commission.

Simek, S.L., S.A. Jonker, B.K. Scheick, M.J. Endries, and T.H. Eason. 2005. Statewide assessment of road impacts on bears in six study areas in Florida from May 2001 to September 2003. Final Report Contract BC-972. Florida Department of Transportation, Tallahassee, Florida.

Stratman, M.R. and M.R. Pelton. 2007. Spatial response of American black bears to prescribed fire in northwest Florida. Ursus 18(1):62-71

Ulrey, W.A. 2008. Home range, habitat use, and food habits of the black bear in south-central Florida. MSc. Thesis. University of Kentucky. 117pp.

Biological Status Review Information
Findings

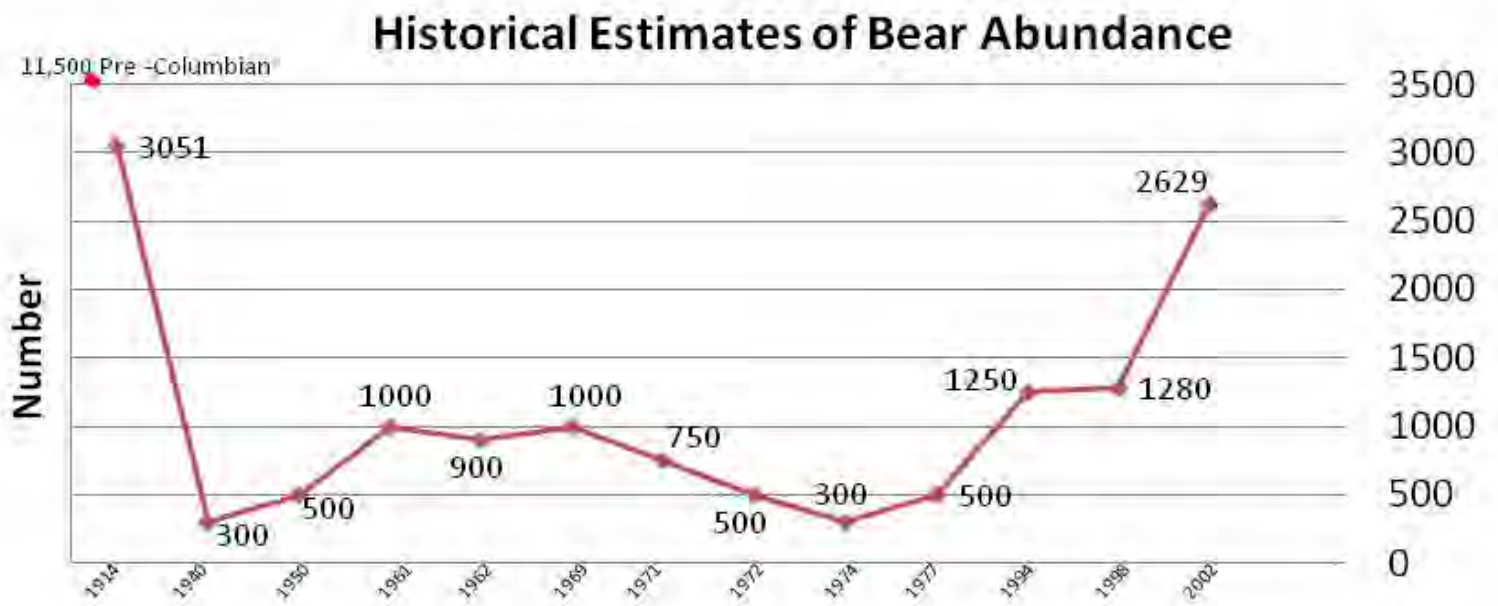
Species/taxon:	Florida black bear (*Ursus americanus floridanus*); Entire population.
Date:	11/3/2010
Assessors:	Walter McCown, Mel Sunquist, and Bill Giuliano
Generation length:	**8.0** (based on ~ 500 ♀ in FWC database ≥ 4.0 y.o. = 7.4)

Criterion/Listing Measure	Data/Information	Data Type*	Criterion Met?	References
*Data Types - observed (O), estimated (E), inferred (I), suspected (S), or projected (P). Criterion met - yes (Y) or no (N).				
(A) Population Size Reduction, ANY of				
(a)1. An observed, estimated, inferred or suspected population size reduction of at least 50% over the last 10 years or 3 generations, whichever is longer, where the causes of the reduction are clearly reversible and understood and ceased[1]	Numbers have been increasing over the past 24 years (3 generations)	E	No	GFC Historical population estimates, Pelton and Nichols 1972, Kasbohm 2004, and others (see figure 1).
(a)2. An observed, estimated, inferred or suspected population size reduction of at least 30% over the last 10 years or 3 generations, whichever is longer, where the reduction or its causes may not have ceased or may not be understood or may not be reversible[1]	Numbers have been increasing over the past 24 years (3 generations)	E	No	GFC Historical population estimates, Pelton and Nichols 1972, Kasbohm 2004, and others (see Figure 1).
(a)3. A population size reduction of at least 30% projected or suspected to be met within the next 10 years or 3 generations, whichever is longer (up to a maximum of 100 years) [1]	Expected to increase over next 24 years due to conservation efforts and suitable vacant habitat	P	No	FWC 2010, Hoctor 2006
(a)4. An observed, estimated, inferred, projected or suspected population size reduction of at least 30% over any 10 year or 3 generation period, whichever is longer (up to a maximum of 100 years in the future), where the time period must include both the past and the future, and where the reduction or its causes may not have ceased or may not be understood or may not be reversible.[1]	Numbers have been and continue to increase due to conservation efforts and suitable vacant habitat.	P	No	FWC 2010, Hoctor 2006
[1] based on (and specifying) any of the following: (a) direct observation; (b) an index of abundance appropriate to the taxon; (c) a decline in area of occupancy, extent of occurrence and/or quality of habitat; (d) actual or potential levels of exploitation; (e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites.				
(B) Geographic Range, EITHER				
(b)1. Extent of occurrence < 20,000 km^2 (7,722 mi^2) OR	EOO > 7,722 mi^2 (17,531 mi^2)	E	No	Simek et al. 2005
(b)2. Area of occupancy < 2,000 km^2 (772 mi^2)	AOO > 772 mi^2 (10,077 mi^2)	E	No	Simek et al. 2005
AND at least 2 of the following:				
a. Severely fragmented or exist in ≤ 10 locations				
b. Continuing decline, observed, inferred or projected in any of the following: (i) extent of occurrence; (ii) area of occupancy; (iii) area, extent, and/or quality of habitat; (iv) number of locations or subpopulations; (v) number of mature individuals				

c. Extreme fluctuations in any of the following: (i) extent of occurrence; (ii) area of occupancy; (iii) number of locations or subpopulations; (iv) number of mature individuals				
(C) Population Size and Trend				
Population size estimate to number fewer than 10,000 mature individuals AND EITHER	2,212 – 3,433 bears	E	Yes	Simek et al. 2005
(c)1. An estimated continuing decline of at least 10% in 10 years or 3 generations, whichever is longer (up to a maximum of 100 years in the future) OR	Has increased for more than last 24 years. Expected to increase over next 24 years due to conservation efforts and suitable vacant habitat.	P	No	FWC 2010
(c)2. A continuing decline, observed, projected, or inferred in numbers of mature individuals AND at least one of the following:	Has increased. Expected to increase over next 24 years due to conservation efforts and suitable vacant habitat.	P	No	FWC 2010
a. Population structure in the form of EITHER				
(i) No subpopulation estimated to contain more than 1000 mature individuals; OR				
(ii) All mature individuals are in one subpopulation				
b. Extreme fluctuations in number of mature individuals				
(D) Population Very Small or Restricted, EITHER				
(d)1. Population estimated to number fewer than 1,000 mature individuals; OR	2,212-3,433 bears	E	No	Simek et al. 2005
(d)2. Population with a very restricted area of occupancy (typically less than 20 km^2 [8 mi^2]) or number of locations (typically 5 or fewer) such that it is prone to the effects of human activities or stochastic events within a short time period in an uncertain future	AOO > 8 mi^2 (10,077 mi2) and locations > 5.	O	No	Simek et al. 2005
(E) Quantitative Analyses				
e1. Showing the probability of extinction in the wild is at least 10% within 100 years	Probability of extinction ~ zero	E	No	Root and Barnes 2006

Initial Finding (Meets at least one of the criteria OR Does not meet any of the criteria)	Reason (which criteria are met)
Does not meet any criteria	
Is species/taxon endemic to Florida? (Y/N)	No
If Yes, your initial finding is your final finding. Copy the initial finding and reason to the final finding space below. If No, complete the regional assessment sheet and copy the final finding from that sheet to the space below.	
Final Finding (Meets at least one of the criteria OR Does not meet any of the criteria)	Reason (which criteria are met)
The Florida black bear does not meet any of the criteria.	

Additional information: In regards to Criteria C2, the team recognized and discussed the potential for habitat loss predicted by Wildlife 2060 to affect the finding for this criterion. Bear populations are centered on large parcels of conserved public lands. However, the predicted loss of non-conserved habitat will be significant and will negatively impact currently occupied bear range and, we inferred, bear numbers. Hard boundaries between bear range and urban development will be created which will increase human-bear interactions which will increase the mortality rate of bears on the fringe of conserved bear habitat. This situation would likely contribute to a reduction in bear numbers from current estimates. Since the 2002 estimate for our largest subpopulation (Ocala) currently straddles the 1,000 mature individuals trigger for c2a(i) a reduction in bear numbers in the future could cause this criterion to be met. However, there is no current decline in bear numbers occurring, thus a decline cannot continue (since it does not now exist) (IUCN guidelines p 26). The team thought that if a decline occurs due to the events predicted by Wildlife 2060, the full impact will occur further out than the specified time horizon of 3 generations. Further, the team thought the potential future reduction in bear numbers would be mitigated somewhat by the occupancy over time of > 1 million acres of currently unoccupied and under-occupied but suitable bear habitat (Hoctor 2006) in the Big Bend region. The Big Bend region is adjacent to currently occupied bear range (Apalachicola) and not predicted to be greatly affected by potential 2060 impacts. Additionally, the potential loss should be mitigated by the current and planned conservation efforts outlined in Current Management (above) and in the draft black bear management plan (FWC 2010). After the discussion the team was unanimous that bears did not meet this criterion.



1914: Florida Department of Game and Fish. 1915. Second Annual Report. Tallahassee.

1940: Florida Game and Fresh Water Fish Commission. 1940. Biennial Report. Tallahassee

1950: Frye, O.E., B. Piper, and L. Piper. 1950. The black bear: saint or sinner? Florida Wildlife 4:6-7

1961: Harlow, R.F. 1961. Characteristics and status of Florida black bear. Transactions of the North American Wildlife Conf. 26:481-495.

1962: Harlow, R.F. 1962. Black bear population investigations. Project W-41-R-9. Florida Game and Fresh Water Fish Commission. Tallahassee

1969: U.S. Department of Interior. 1969. Environmental impact of the Big Cypress Swamp jetport. Mimeo. 155 pp.

1971: Florida Game and Fresh Water Fish Commission. Bear Dilemma Tallahassee. 8pp.

1972: Pelton, M. R., R. G. Nichols. 1972. Status of the black bear (*Ursus americanus*) in the southeast. Eastern Black Bear Workshop 1:18–23.

1974: McDaniel, J. 1974. Status of the black bear in Florida. Eastern Black Bear Workshop. 2:12

1977: East, B. 1977. Bears. Crown Publishers, Inc., New York. 275 pp.

1994: Florida Game and Fresh Water Fish Commission. 1993. Management of the black bear in Florida: A staff report to the commissioners. Florida Game and Fresh Water Fish Commission. Tallahassee.

1998: Kasbohm. J.W. 2004. Federal Register 69[9]: 2100-2108.

2002: Simek, S.L., S.A. Jonker, B.K. Scheick, M.J. Endries, and T.H. Eason. 2005. Statewide assessment of road impacts on bears in six study areas in Florida from May 2001 to September 2003. Final Report Contract BC-972. Florida Department of Transportation, Tallahassee.

Figure 1. Historical estimates of black bear abundance in Florida.

1	Biological Status Review Information Regional Assessment Species/taxon:	Florida black bear (Ursus americanus floridanus); Entire population.
2	Date:	1/0/00
3	Assessors:	Walter McCown, Mel Sunquist, and Bill Giuliano
4		
5		
6		
7		
8	Initial finding	
9		
10	2a. Is the species/taxon a non-breeding visitor? (Y/N/DK). If 2a is YES, go to line 18. If 2a is NO or DO NOT KNOW, go to line 11.	N
11	2b. Does the Florida population experience any significant immigration of propagules capable of reproducing in Florida? (Y/N/DK). If 2b is YES, go to line 12. If 2b is NO or DO NOT KNOW, go to line 17.	N
12	2c. Is the immigration expected to decrease? (Y/N/DK). If 2c is YES or DO NOT KNOW, go to line 13. If 2c is NO go to line 16.	
13	2d. Is the regional population a sink? (Y/N/DK). If 2d is YES, go to line 14. If 2d is NO or DO NOT KNOW, go to line 15.	
14	If 2d is YES - Upgrade from initial finding (more imperiled)	
15	If 2d is NO or DO NOT KNOW - No change from initial finding	
16	If 2c is NO or DO NOT KNOW- Downgrade from initial finding (less imperiled)	
17	If 2b is NO or DO NOT KNOW - No change from initial finding	N
18	2e. Are the conditions outside Florida deteriorating? (Y/N/DK). If 2e is YES or DO NOT KNOW, go to line 24. If 2e is NO go to line 19.	
19	2f. Are the conditions within Florida deteriorating? (Y/N/DK). If 2f is YES or DO NOT KNOW, go to line 23. If 2f is NO, go to line 20.	
20	2g. Can the breeding population rescue the Florida population should it decline? (Y/N/DK). If 2g is YES, go to line 21. If 2g is NO or DO NOT KNOW, go to line 22.	
21	If 2g is YES - Downgrade from initial finding (less imperiled)	
22	If 2g is NO or DO NOT KNOW - No change from initial finding	
23	If 2f is YES or DO NOT KNOW - No change from initial finding	
24	If 2e is YES or DO NOT KNOW - No change from initial finding	
25		
26	Final finding The Florida black bear does not meet any of the criteria	No change

Appendix 1. Biological Review Group Members Biographies

Walter McCown has a B.S. in Biology from Columbus State University. He has worked on a variety of wildlife issues with FWC and since 2004 has been a biologist in FWC's Terrestrial Mammal Research Subsection. Mr. McCown has over 14 years experience in research and conservation of black bears in Florida.

Mel Sunquist has a Ph.D. in Wildlife Ecology from the University of Minnesota. He is currently a Professor Emeritus with the University of Florida. Dr. Sunquist has 20 years teaching and research experience in the UF Department of Wildlife Ecology and Conservation and has more than 30 years experience working on the behavior, ecology, and conservation of mammalian carnivores, in Florida and worldwide.

Bill Giuliani has a PhD from Texas Tech University in Wildlife Science, a MS from Eastern Kentucky University in Biology, and a BS from the University of New Hampshire in Wildlife Management with a Minor in Zoology. Her currently serves as the Professor and State Extension Specialist in the Department of Wildlife Ecology and Conservation at the University of Florida. He has researched and developed management programs for a variety of wildlife species for more than 20 years such as black bears, jaguars, fishers, pine martens, raccoons, coyotes, hogs, rabbits, squirrels, and various rodents, among others.

Appendix 2. Summary of letters and emails received during the solicitation of information from the public.

Betsy R. Knight, Big Bend Wildlife Sanctuary, Inc.
l. Protect enough land for the survival of the Florida Black Bear and you protect enough land to support protection of most all Florida Species. There should be a corridor from Big Cypress Swamp to Eglin AirForce Base for these large mammals to range, breed and maintain a healthy population . When you divide the State in to segments you end up with bits and pieces of bear habitat such as the Chassahowitzka population where inbreeding is occurring.
2. The answer is education, education and more education; I have been signed up as a volunteer for about a year, have received my DVD for educational programs, but haven't been asked to go to one single program. We need to utilize all volunteers and saturate the State with education on the Florida Black Bear.
Hunting of the Florida Black Bear should be prohibited. In an effort to compromise, I might suggest in healthy populations such as the Apalachicola National Forest, you might suggest allowing dogs to run a bear a day for a ten day period, but the dogs would not be able to continue to run the same bear continuously for days.
The Florida Black Bear needs to be kept on the Threatened Species list!!!

Chris Papy commented on the large number of bears in Aucilla WMA.

David Dapore commented on the large number of bears and bear sign in numerous wildlife management areas in central Florida. During an outing he often sees more bears than any other species of wildlife. He considers the restoration of bears to have been successful.

James Aldridge commented on the large number of bears he sees in Ocala National Forest.

Kitty Loftin saw 2 bears in Wakulla County, Florida.

Meagin Jackson commented on the large number of bears in northern Osceola National Forest and mentioned several encounters with bears in the area and believes that the area has as many bears as it will hold.

Dick Kempton has seen bears on several occasions in the Big Cypress National Preserve, 12-15 miles north of Oasis Visitor Center.

Appendix 3. Information and comments received from the independent reviewers.