



LIVE OAK ASSOCIATES, INC.

an Ecological Consulting Firm

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SUBJECT: Comments on the Draft Environmental Document regarding Bear Hunting in the State of California, Prepared by the California Department of Fish and Game, January 27, 2010

Dear Mr. Yeates:

At your request I have reviewed the Draft Environmental Document (DED) regarding Bear Hunting in the State of California prepared by the California Department of Fish and Game (CDFG), January 27, 2010. I respond to this DED as an expert on the ecology and biology of large mammals (particularly large predators) and as co-founder and Principal of Live Oak Associates, Inc., (LOA) an ecological consulting firm based in California with three offices, Oakhurst, San Jose and Bakersfield. LOA has supervised the preparation of more than 800 CEQA studies in the past ten years. As such, our firm specializes in the preparation of endangered species evaluations, wetland analysis, wildlife/human conflicts, permit assistance relating to the Clean Water Act and federal and state endangered species acts and the preparation of environmental documents specific to CEQA and NEPA.

I have reviewed the DED as prepared by CDFG and the state's "Black Bear Management Plan, July 1998" included as an appendix to the document. Based on this review, it is my professional opinion that this DED fails to provide the detailed information about the environmental consequences of the proposed expansion of the black bear hunting season; most importantly, it fails to provide adequate information for the recommendation to increase the black bear quota in the state from 1,700 bears annually up to 2,500 annually (a 47% increase). The DED completely fails to make the case that the state should not move from managing bears as if they exist as a single population to managing bears based on Bear Management Units – an ecological scale that would be particularly relevant to this species.

I have chosen to focus on three areas that I believe are completely inadequate, because the recommendations in the DED are unsupported by any facts presented in this document.

Bear Management Units

CDFG notes that recent research has identified four “genetically distinct sub-populations within the State’s bear population”. Managing bears separately within these four Bear Management Units (BMU) is discussed as an alternative in the DED, but CDFG rejects this alternative claiming the alternative interjects unnecessary complications into bear management.

I find CDFG’s recommendation unconvincing and unsupportable given the importance of managing species at ecological scales that are relevant to the relevant species, not the convenience of the wildlife manager. The State of California is the 3rd largest state in the U.S. encompassing some 403,932 km² (155,959 mi²). This state is roughly 1239 km long (north-south) and 402 km wide (east-west) with a diverse climate, topography, and land cover types (vegetation complexes). Garshelis and Noyce (2008) argue that diversity in food resources is an important contributor to stability in bear populations. Thus, given the diversity in weather patterns and the variation in food production for bears across its broad distribution in this state, it would be nearly impossible to conclude (and the DED provides no contrary analysis) that changes in bear food resources in Southern California are a good predictor of changes in food resources in northern California – the annual variation in the diversity, spatial and temporal distribution of food resources for bears in Humboldt County is almost certainly going to be different than what is available to bears in Santa Barbara County. In fact, there can be significant differences within a much smaller region as food resources in low elevation mountain ranges are almost certainly going to be different than in high-elevation ranges.

Many other smaller-sized states (e.g., Minnesota), actually manage bears based on a greater number of BMUs than the relatively low number of four suggested by the DED as an Alternative. Given the complexities of bear ecology (i.e., the importance of the diversity of food resources as a significant driver for population stability) the California should shift to managing bears relying on a more ecologically relevant and meaningful management unit and not treat bears in the state as one large population. This approach is predicated on the assumption that bear reproductive capacity and age/gender survivorship varies little statewide – an assumption that is almost certainly violated as food resources and availability (both spatially and temporally) is vastly different across the bear range in this State. Garshelis and Noyce (2008) have noted that a series of poor food years could result in poor reproduction and higher harvest of older females thereby reducing the growth rate of the population. This possibility strongly argues that bear harvest quotas should be managed at the BMU and not at a statewide basis.

As will be discussed below understanding how variations in food diversity (e.g., during a drought) influences bear populations is critical to how California should establish harvest quotas.

Population Estimate.

The CDFG estimates that bear populations have increased since 1984 and estimate the current statewide estimate to be approximately 36,000 bears (see Figure 2.1 of the DED). These estimates have apparently been derived using tooth cementum annuli analyses. Statewide

estimates of large carnivores are inherently inaccurate and imprecise. The use of tooth cementum annuli as the basis for the statewide estimate, while it may provide some insight to trend, is not very convincing for providing statewide estimates. Not unless a more theoretically grounded and a statistically robust methodology (e.g., patch-occupancy framework that has successfully been used for bear research throughout its range) is used to validate the predictions of the above analysis.

In addition, point estimates as provided for in Figure 2.1 are meaningless in ecology. They convey little useful information and are hard to interpret within a conservation or management framework. Population estimates if they are statistically derived are bounded by the variance associated with the quality of the data and methodology. The conservation goals or management strategies would likely be very different if for example, the true size of the population is between 35,000 and 37,000 instead of between 21,000 and 51,000. In other words, higher levels of uncertainty in the population estimate should be reflected in a more cautious approach in setting harvest quotas.

As noted previously, statewide estimates are of limited use, particularly when the black bear should be managed at a scale that is much more relevant to its ecology (at least four BMUs as identified by the DED).

Conflicts with Bears

The DED claims that increasing the harvest quota by some 47% will reduce conflicts with bears. Garshelis and Noyce (2008) cautions that poor food years can increase sightings and conflict with bears, giving people the perception that bears numbers have increased, when in fact growth rates may have declined. In addition, some conflicts, such as nuisance bears (e.g., breaking into to cars or homes) are not as vulnerable to hunting as non-nuisance bears – thereby minimizing the effectiveness of hunting in reducing conflicts. I own a home in South Lake Tahoe, and bears are very much a part of my neighborhood (my house backs up to a 1200 acre State Park occupied by bears); bears that roam through our neighborhood are much less vulnerable to hunting than those bears that occur in the backcountry with minimal contact with humans. Killing a bear not involved in conflicts with humans in the backcountry has no affect on the level of conflicts in the Tahoe Basin. At a recent meeting at Incline Village, Nevada State Wildlife Officials noted that the problem in the Tahoe Basin was not bears but people.

Conflicts are more likely influenced by poor food years and the availability of human foods in or near human habitation. Thus, it is an unsupported assertion that increasing the harvest will likely reduce conflicts with bears – not unless of course the harvest is increased well above what is proposed here for the expressed purpose of reducing the population to a much lower level, which is not being recommended.

Population and Habitat Suitability Models

I concur with the DED that models can be powerful tools to aid conservation decisions regarding species, but there are too many examples of poorly constructed models. Generality, precision and realism are three aspects of modeling that cannot be maximized simultaneously. The

population model that the DED relies on to support conclusions that increasing the harvest level by 47% is supportable is conducted at too large of an ecological scale. As already noted in the DED and discussed above, management of the harvest (not of bears) should be based at least on the four BMUs and not on a statewide basis. Thus, relevant demographic parameters (age structure, age specific survivorship data, etc.) would be inputted into the model based on more relevant ecological scales. Given the variation in the diversity of food resources (an important predictor of stability of bear populations) across the state, it is inappropriate to pool data on a statewide basis.

The DED includes a habitat suitability model derived by using the California Wildlife Habitat Relationship (CWHHR) model. This model predicts high, medium and low suitability habitats throughout the state. CDFG also validated some predictions of the model by overlaying locations of bear kills, radio-telemetry locations, and other observation data. CWHHR is a coarse model that relies almost entirely on vegetation cover to predict ranges of suitability of habitat. This approach was developed 20 years ago and has been regularly updated, but the basic premise and input data remain relatively the same – it is driven largely by expert-based opinions of the importance of various vegetation classes to a species. While as a first cut, CWHHR provides some information of likely suitable habitats in the state, far more advanced spatial tools now exist to build habitat suitability models today that far exceed the capacity of the predictive power of CWHHR.

For example, in association with some colleagues I have developed a habitat suitability model for cougars in 40,000 km² in Southern California relying on important predictor variables such as habitat (including a patch metrics – vegetation context), topographic complexity, distance from high-speed roads and density of roads. We then used some robust decision rules in weighting the importance of each data layer. The information conveyed in this exercise greatly exceeds the coarse level predictions of the more one-dimensional vegetation-based CWHHR.

If a model relies on vegetation as the primary input data, the results from the model will tend to overestimate the value of certain habitats, while failing to take into account other important data layers (e.g., distance from high speed roads or density of roads) that may greatly influence how animals use space. We know that many large carnivores including black bears exhibit avoidance behavior associated with roads. Therefore, a habitat suitability model that does not include a road layer will almost certainly overestimate the quality of available habitat.

This is simply one example of how to build more statistically robust habitat suitability models; many more examples exist in the scientific literature. Given the importance of bears in influencing ecosystem function, and the significant variation of habitats across the state, the patchwork of roads, etc., I would encourage CDFG to rely on more robust spatial tools in any future management plans.

Expansion of Hunting into San Luis Obispo County

The DED has recommended the inclusion of a portion of San Luis Obispo County (SLO) to be included in the statewide hunt for the coming year. CDFG concludes that based on a series of indices (including local perception of the number of bears), similarity in the number of

depredation incidents reported for the adjacent Santa Barbara County (see Table 2-4 of the DED) and estimates of bears within the County, derived by the number of acres of low, medium and high quality habitat in County multiplied by estimates of bear density for each category.

The use of indices such as the perception of locals and local biologist are notoriously poor predictors of trends in wildlife populations. As noted by Garshelis and Noyce (2008) increased sightings of bears can just as easily be explained by a lack of food resources than an increase in the bear population. Given that we are at the end of the 3rd year of a drought, it is more likely that these perceptions are highly unreliable and should be simply ignored.

Table 2-4 provides a comparison of bear-related incidences and depredation permits filed with CDFG between 2004 and 2008 for Santa Barbara and San Luis Obispo Counties. CDFG implies the similarity in the reports for both counties provides another line of reasoning that population estimates for both counties are similar. I would argue it is impossible to infer anything useful from this Table, other than there have been a low number of incidents for both counties. The limited amount of information (small number of incidents – 1 to 2 each year, except for 4 in 2008 for Depredation Permits Issued and bears removed in Santa Barbara County) in any given year or over time is best explained as limited variation in rare events.

Lastly, CDFG estimates the number of bears in SLO based on the elements of Table 2-5. There are a series of errors and poor assumptions that rendered any conclusion regarding SLO meaningless. The most important error is that CDFG estimates there is 4,918 mi² of low, medium and high quality habitat (based on CWHR) in a county that measures only 3,316 mi². That is an error of at least 33% and likely much more because it is doubtful the entire county is bear habitat. In addition, they estimate bear density for each HIS category based on Brinkhaus (2000) and the professional opinion of local biologist Bob Stafford. The second error is that Brinkhaus did not provide any density estimates in her thesis. This is not surprising since Ms. Brinkhaus was studying habitat utilization for urban bears in the San Gabriel Mountains by radio-collaring 2 female bears and 4 male bears. I suspect the broad area of where these bears were captured and small sample size precluded her estimating density, as this was not really central to her research question. As mentioned above, population or density estimates based on imprecise measurements or uncertainty are nearly impossible to interpret. In reality CDFG's population estimate is not a true estimate, but better classified as "guesstimate." For example, as one can readily see that nice round numbers of 0.5, 0.25 and 0.1 bears/mi² were used to calculate the number of bears in the county.

CDFG has not provided adequate information to evaluate whether the environmental effects of expanding bear hunting into SLO will have a significant adverse impact on the local bear population, given the significant number of errors integrated into this table and the reliance on unbounded guesstimates for bear density by habitat category.

Conclusion

In summary, in evaluating the proposed changes in the black bear hunting program the DED takes an approach to manage the harvest of black bears in this state on a spatial scale that would swamp important local variations in food resources and growth rates. At the spatial scale that

these analyses were conducted for the DED, this “statewide” scale will mask or overlook the environmental consequence of increasing the harvest of black bear by 47% within certain local and regional areas of the state. Further, the spatial scale minimizes the ability of CDFG and the Commission to take corrective action (e.g., reducing the harvest) because the perspective is a statewide perspective rather than an ecological scale that would be particularly relevant to this species.

For the recommended expansion of black bear hunting into San Luis Obispo County, I would strongly urge that the Commission reject the expansion into SLO as CDFG is relying on an error-riddled analysis and is using perception to guide the setting of hunting quotas.

If you have any questions regarding my analysis please contact me at your earliest convenience.

Sincerely,

A handwritten signature in black ink, appearing to be 'A. Hopkins', with a horizontal line extending to the right.

Rick A. Hopkins, Ph.D.,
Principal and Senior Conservation Biologist

Literature Cited and Attached

Brinkhaus, A.J. 2000. Characteristics of an urban black bear (*Ursus americanus*) population in the San Gabriel Mountains of Southern California. Master of Science Thesis, California State University, Sacramento.

Garshelis, D. L. and K.V. Noyce. 2008. Seeing the world through the nose of a bear – diversity of foods fosters behavioral and demographic stability. Eds, T. E. Fulbright and D. G. Hewitt, pages 139 to 163 in *Wildlife Science: Linking Ecological Theory and Management Applications*. CRC Press. NY.