TESTIMONY TO THE ALASKA BOARD OF GAME
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Good morning. For the record, my name is Andy Loranger. I am the Refuge Manager of the Kenai National Wildlife Refuge. I'd like to begin by thanking the Chair and members of the Board for providing us this opportunity to present to you on Kenai brown bear management issues. I'll begin with a general statement, and then Dr. John Morton, the Refuge's Supervisory Wildlife Biologist, will give a brief powerpoint presentation. We'd also be happy to answer any questions you may have.

Available demographic data for the Kenai brown bear population generated through ongoing telemetry studies being conducted by Dr. Sean Farley of the Alaska Department of Fish and Game and previously by the Kenai IBBST, data on human-caused mortality provided by the Department, and the population estimate generated through our 2010 DNA-based mark-recapture study were used by Refuge biologists to model population changes since 2010. Dr. Morton will provide details on these analyses in his presentation to follow. In summary, modeling suggests that known human-caused mortality of Kenai brown bears since 2012, which totaled 184 brown bears, has reversed the previous increasing trajectory of the population and resulted in modeled decline of approximately 18 percent from our 2010 estimate of 582 bears. High mortality of adult females, and of females overall, occurring primarily in 2012 and 2013, also negatively impacted the future productivity of this population, an effect which is expected to continue at least several years.

These modeled population level impacts, which were generated using the best available scientific information on Kenai brown bears, provided the basis for the Fish and Wildlife Service's decisions to implement brown bear hunting closures on the Kenai National Wildlife Refuge in 2013 and 2014. These closures were implemented in order to meet the Service's legal responsibilities on the Refuge, which include conserving a healthy brown bear population in its natural diversity, ensuring continued opportunity for the public to hunt, view and photograph brown bears, maintaining wilderness character in the Congressionally-designated Kenai Wilderness, and ensuring continued opportunity for subsistence uses.

The Service believes that a cautious approach to management of Kenai brown bears is scientifically warranted due to several factors, and that these considerations are especially germane to ensuring that the Refuge's legal mandates are met. As a species, brown bears have one of the lowest reproductive potentials of any North American mammal, and at current densities, the Kenai brown bear population remains a relatively small population that is highly sensitive to high adult female and high overall human-caused mortality levels. Genetics studies conducted by Dr. Farley and his USGS associates have determined that Kenai brown bears are an

isolated population, such that immigration from mainland Alaska will not assist in sustaining the population, and that Kenai brown bears have very low haplotypic genetic diversity, which has unknown but potentially important conservation implications. The Kenai brown bear population will continue to be strongly influenced by habitat loss and fragmentation and multiple potential sources of human-caused mortality as the human population continues to grow on the Kenai Peninsula and recreational use of public lands increases. Finally, timely and accurate monitoring the status of this bear population is extremely difficult at best. These factors, many of which provided the basis for the Kenai brown bear population being listed by the State of Alaska in 1998 as population of special concern, remain relevant today.

With these considerations in mind, I'd like to reiterate points that the Service has made in previous communications with the Board and the Department. Based on the status and indicated rate of growth of the Kenai brown bear population prior to 2012, we were supportive of providing increased hunting opportunity, while expressing concerns in 2013 related to levels of human-caused mortality being proposed. The Service strongly supports hunting as one of six priority public uses of national wildlife refuges, when conducted in a manner compatible with Refuge purposes and the Refuge System mission. In addition to the need to meet our legal mandates, our recent closure decisions were in the interest of ensuring the continued compatibility of sport hunting of brown bears as an authorized use of the Refuge. We remain committed to working with the Board and the Department to find common ground which will allow for a compatible brown bear hunt on the Refuge.

We hope that the information we are presenting today, which supplements the proposal we submitted to the Board in spring 2014, can provide a foundation for that common ground. Dr. Morton's modeling presentation will provide the technical basis for our recommendations, which are as follows:

- Increasing survival of adult female brown bears will have the greatest impact on Kenai brown bear population dynamics, but our modeling also indicates a need to consider overall human-caused mortalities. Modeling suggests preventing further decline of the Kenai brown bear population requires that HCMs be currently capped at 8 adult females and 40 total bears. Modeling suggests that applying caps of 5 adult females and 30 total HCMs would allow for slow growth of the Kenai brown bear population. We recommend applying caps which remain within these ranges for adult females (5-8) and total (30-40) HCMs during the upcoming regulatory cycle, beginning with the 2015 calendar year. A slow increase in the Kenai brown bear population would allow for increased harvest and enhanced viewing opportunities in the near future. Conversely, further decline of the Kenai brown population would reduce recreational opportunities and likely necessitate more conservative management.
- We recommend adjusting season dates to reduce the vulnerability of adult female bears. Our recommended season dates are April 1 to May 10, and fall dates are October 15 to

November 30. Reducing potential to harvest adult females by adjusting season dates would have the added benefit of reducing the need for in-season management, thus allowing more consistent hunting opportunity over time.

- We recommend consideration of a harvest management framework which provides greatest opportunity to harvest brown bears proximal to developed areas. This approach would have the dual benefits of having the greatest potential to reduce human-bear conflicts, while maintaining bear densities and recreational opportunities in the Kenai Peninsula's core brown bear habitats.
- Adaptive management going forward will be necessary, and would be facilitated by improving our ability to monitor this population. We believe this provides ample opportunities for future collaboration with the Department.
- Lastly, we recommend and are committed to expanding educational efforts which seek to minimize human-bear conflicts by reducing human-generated bear attractants and promoting bear awareness and safety in the backcountry. We can also promote the Department's educational tools aimed at teaching hunters how to differentiate male and female brown bears.

Mr. Chairman and members of the Board, thank you again for this opportunity to present to you, and thank you for your service on the Board.

VORTEX simulations of the effects of varying harvest regimes on the Kenai brown bear population

A stochastic model called VORTEX (version 10; Lacy 2000, Lacy and Pollack 2014) was used to examine the demographic effects of varying levels of human-caused mortality on the Kenai brown bear population. The population forecasts are not intended to be taken literally, but are a quantitative and repeatable method for showing population trajectories and providing sideboards for management. The general approach was to estimate the intrinsic rate of population growth during 1995-2010, and then explicitly model the effect of increased mortality during 2012-2014 as harvest on growth rate. Data from radio-telemetered adult female brown bears, collected by the Alaska Department of Fish and Game and the Interagency Brown Bear Study Team, were used to generate age-specific estimates of reproduction and mortality (Farley 2010, 2013). The mean peninsula-wide population estimate of 582 brown bears in 2010, developed from a mark-recapture model using hair DNA (Morton et al. 2014), was used to initialize the model.

In VORTEX, the model was parameterized as a polygynous system with 100% of adult males breeding; reproductive age of both males and females is 6 years; maximum breeding age of both males and females is 26 years; sex is 50% males, 50% females; percentage of adult females breeding is 34%, and the initial population is 582. The model explicitly assumes a stable age distribution and no density-dependent mortality. Model inferences implicitly assume that the telemetered population of adult females is representative of the peninsula-wide population.

In the 15 years prior to the population estimate of 582 brown bears in 2010, modeling in VORTEX suggests the brown bear population increased on average 2.3% per year during a period of conservative management in which 20 total bears were killed by humans annually, of which 4 were adult females on average. During 2012-2014, the average rate increased to 61 bears per year, of which 12 were adult females (Table 1). The effect of this 3-fold increase in mortality was to decrease the population by 18% to 478 bears by the end of 2014 (Figure. 1).

Table 1. Human-caused brown bear mortalities during 2012-2014. *Includes 1 unknown age bear.

SEX	AGE	2012	2013	2014	TOTAL
MALE	ADULT	8	12	26	46
	SUBADULT	9	19	24	52
	YEARLING/COY	*3	6	0	9
FEMALE	ADULT	13	23	6	42
	SUBADULT	8	11	12	31
	YEARLING/COY	3	0	1	4
TOTAL	ALL AGES	44	71	69	**184**

The current harvest regime is being managed using caps of 70 human-caused brown bears per year or up to 17 adult females. If this human-caused mortality was realized in 2015, modeling suggests the population would continue to decline to 441. If this level of human-caused mortality continued through 2020, modeling suggests the population would continue to decline to 361, with a worst case scenario of virtual extirpation from the Kenai Peninsula (Figure 2).

If the harvest regime utilized caps of 40 total human-caused mortalities or 8 adult females, modeling suggests the population would essentially stabilize at its current peninsula-wide population of ~480 bears but with high uncertainty (Figure 3). If the harvest regime was changed to 30 total human-caused mortalities or 5 adult females, modeling suggests the population would gradually increase over the next 6 years to 555 by 2020, within 8% of the 2010 estimate (Figure 4).

Literature cited

Farley, S. 2010. Ecological studies of the Kenai Peninsula brown bear. Interagency collaborative project progress report, Project AG-0120-P-08-0042. Alaska Dept. Fish and Game, Anchorage, AK. 19 pp.

Farley, S. 2013. Kenai Peninsula brown bear population demographics. Federal Aid annual research performance report, Project 4.38. Alaska Dept. Fish and Game, Anchorage, AK. 7 pp.

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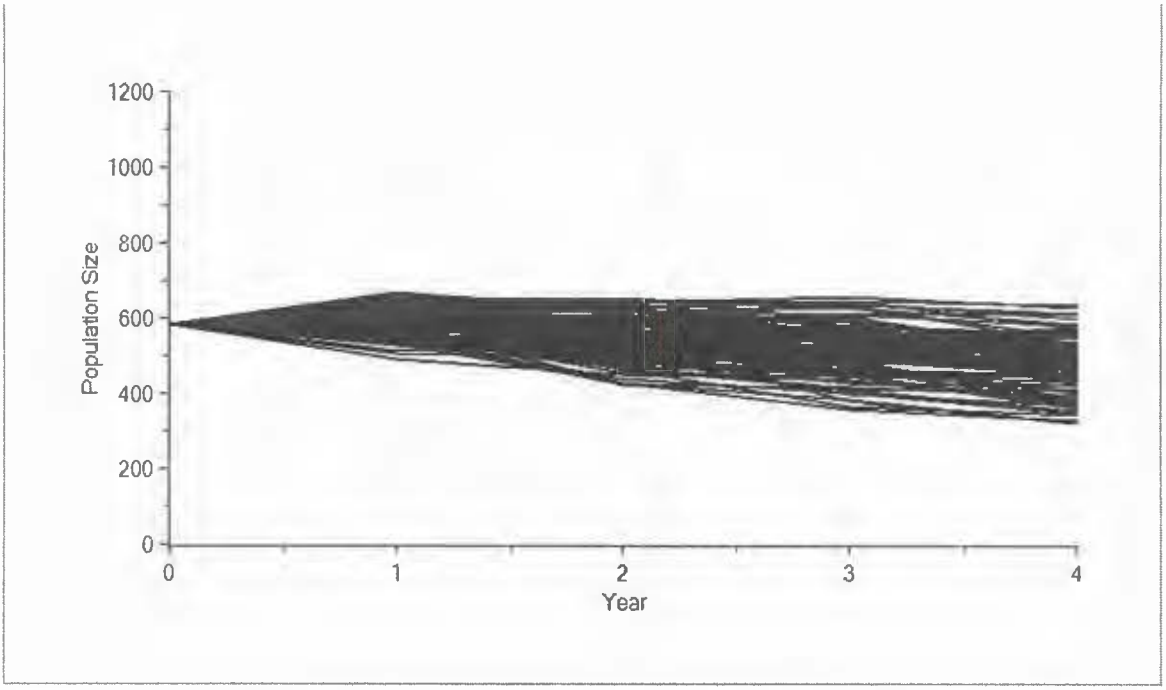

Figure 1. The effect of increased human-caused mortality on the Kenai brown bear population through 2014 as modeled in VORTEX. Year 0 = 2010; year 4 = 2014. Mean population estimate in 2014 is 478.

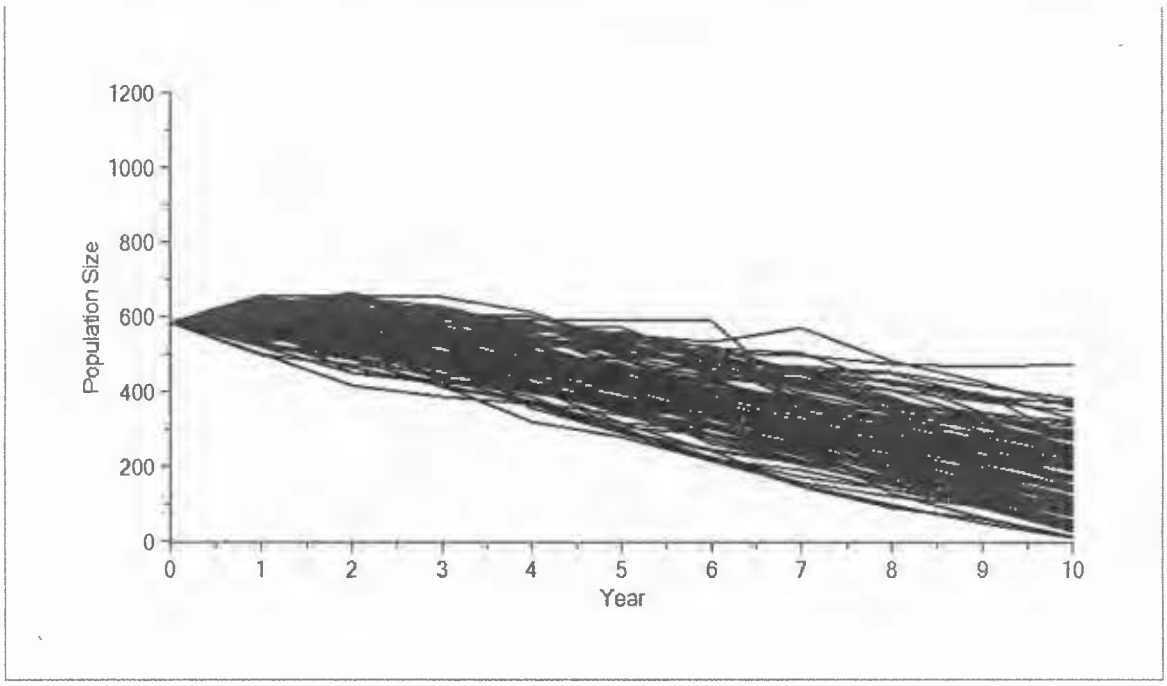

Figure 2. The effect of maintain a total human-caused mortality cap of 70 per year, of which up to 17 could be adult females, on the Kenai brown bear population through 2020 as modeled in VORTEX. Year 0 = 2010; year 10 = 2020. Mean population estimate in 2020 is 361.

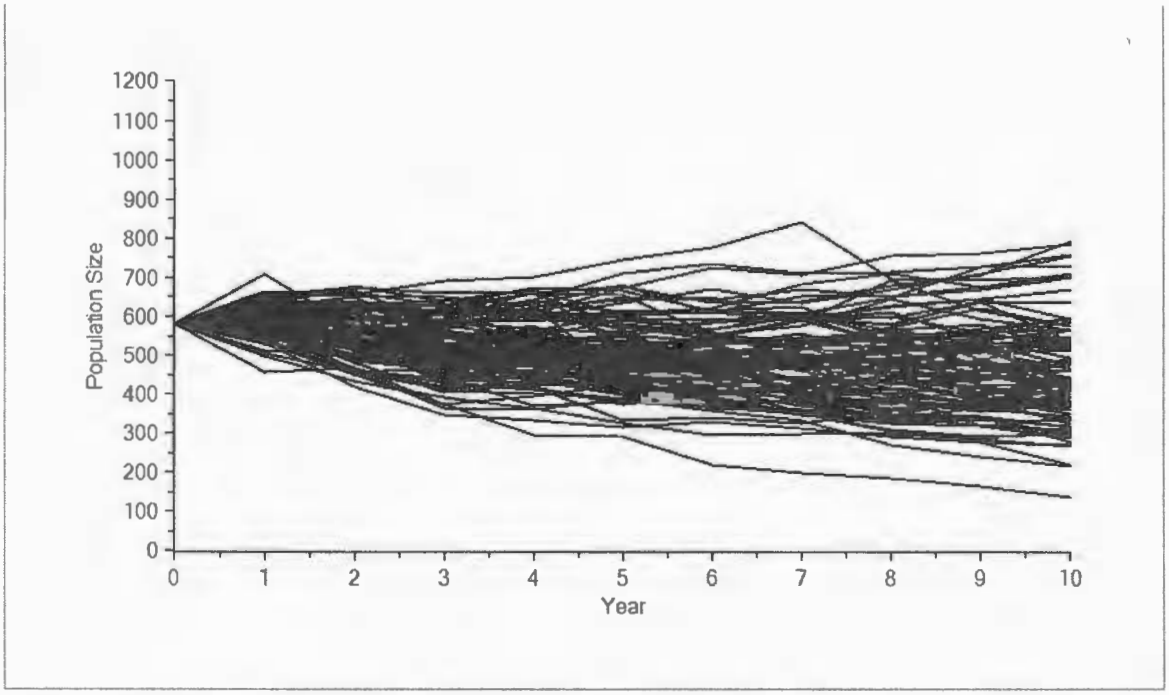

Figure 3. The effect of maintaining a total human-caused mortality cap of 40 per year, of which up to 8 can be adult females, on the Kenai brown bear population through 2020 as modeled in VORTEX. Year 0 = 2010; year 10 = 2020. Mean population estimate in 2020 is 485.

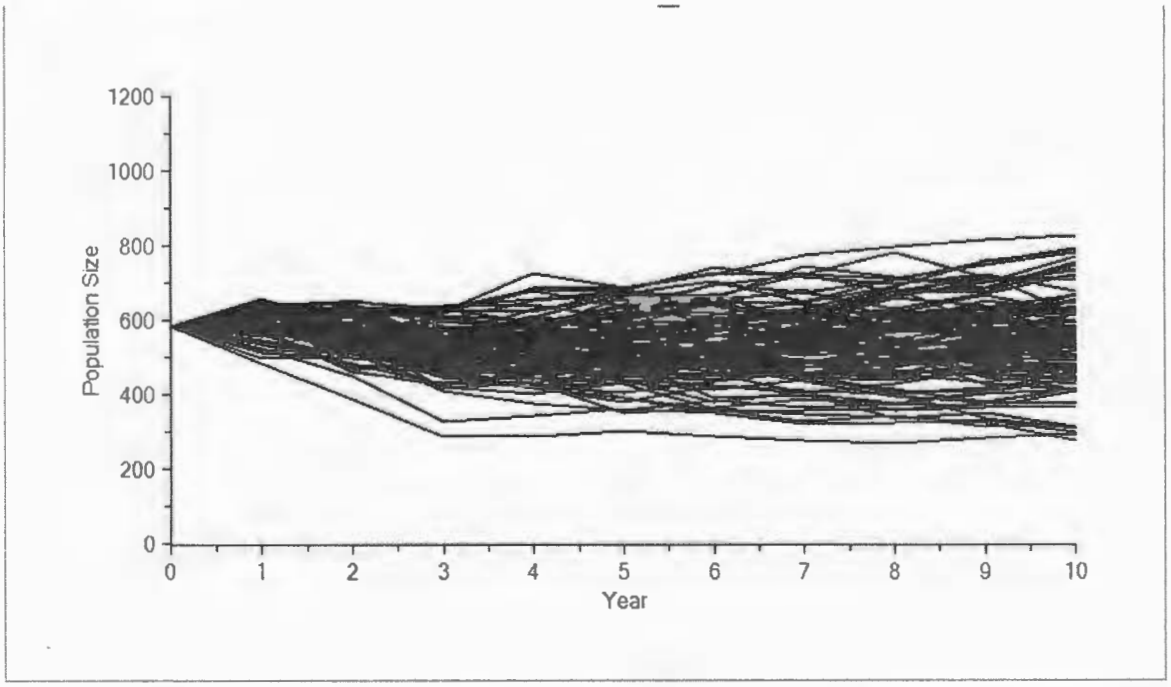

Figure 4. The effect of maintaining a total human-caused mortality cap of 30 per year, of which up to 5 can be adult females, on the Kenai brown bear population through 2020 as modeled in VORTEX. Year 0 = 2010; year 10 = 2020. Mean population estimate in 2020 is 555.