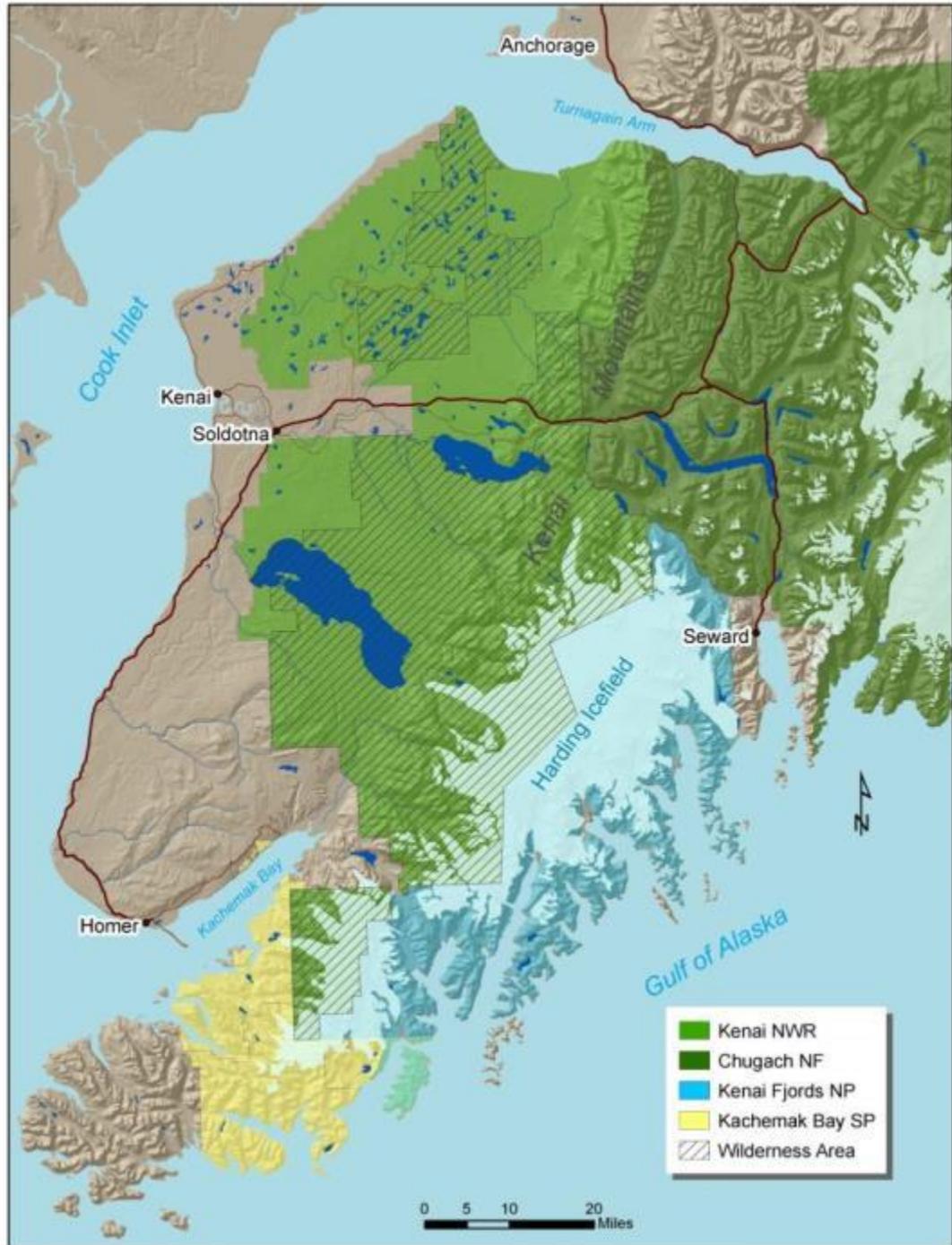


Using Best Available Science to Manage Brown Bears on the Kenai National Wildlife Refuge



John Morton



Similar but different agency mission statements



KENWR's mission:

To conserve fish and wildlife populations and habitats in their **natural diversity** including, but not limited to, moose, **bears**, mountain goats, Dall sheep, wolves and other furbearers, salmonids....



ADF&G's mission:

To protect, maintain, and improve the fish, **game**, and aquatic plant resources of the state, and manage their use and development in the best interest of the economy and the well-being of the people of the state, consistent with **the sustained yield principle**.



United States Department of the Interior
KENAI NATIONAL WILDLIFE REFUGE
P.O. Box 2139
Soldotna, Alaska 99669-2139
(907) 262-7021



NOTICE OF EMERGENCY CLOSURE

Emergency Closure: Sport hunting of Brown Bears on
Kenai National Wildlife Refuge

Effective Date and Time: October 26, 2013 at 12:01 AM

Issued by: U.S. Fish and Wildlife Service
Kenai National Wildlife Refuge
Soldotna, Alaska 99669

31 Oct 2013 – 25 Nov 2013



United States Department of the Interior
KENAI NATIONAL WILDLIFE REFUGE
P.O. Box 2139
Soldotna, Alaska 99669-2139
(907) 262-7021



NOTICE OF TEMPORARY CLOSURE

Temporary Closure: Sport hunting of Brown Bears on
Kenai National Wildlife Refuge

Effective Date and Time: September 1, 2014 at 12:01 AM,
through May 31, 2015

Issued by: U.S. Fish and Wildlife Service
Kenai National Wildlife Refuge
Soldotna, Alaska 99669

1 Sep 2014 – 31 May 2015

NOTICE:

Pursuant to 50 CFR 36.42, the Kenai National Wildlife Refuge (Refuge) is temporarily closed to the sport hunting of brown bears, effective at 12:01 AM, September 1, 2014 through May 31, 2015. This temporary closure is being implemented as a resource protection measure to ensure consistency with Refuge establishment purposes and other legal mandates. This Notice of Temporary Closure has been published and will be posted, along with a map of the closure area, at appropriate locations throughout the Refuge. Additional information is available from Refuge Headquarters at 1 Ski Hill Road, Soldotna Alaska 99669 or by calling 907-262-7021, and at the following website: <http://www.fws.gov/refuge/kenai>

**And KNWR does not allow
spring harvest of brown bears
over bait**

Why we estimated the Kenai brown bear population in 2010....

- ✓ Designated *Population of Special Concern* by State of Alaska in 1998 – 2010
- ✓ Genetically less diverse than (and distinct from) adjacent mainland Alaskan brown bears
- ✓ Only estimate of 250-300 brown bears based on multiplying the area of suitable habitat by mean bear density from other AK studies
- ✓ Population trend unknown ($\lambda = 0.9364 - 1.0588$)
- ✓ Low yearling survivorship and small proportion of subadult females suggested low recruitment
- ✓ Annual DLPs increased from <1 in 1960s to 5 in 1990s to >20 in 2000s

John Morton (Kenai National Wildlife Refuge)

Marty Bray (Chugach National Forest)

Greg Hayward (USFS Alaska Region)

Gary White (Colorado State University)

Dave Paetkau (Wildlife Genetics International)

DNA-based mark-recapture
model to estimate population

**THE KENAI BROWN BEAR POPULATION ON
KENAI NATIONAL WILDLIFE REFUGE
AND
CHUGACH NATIONAL FOREST**

JANUARY 2013
(REVISED APRIL 2014)



Simple Lincoln-Petersen Estimator

$$N = MC/R$$

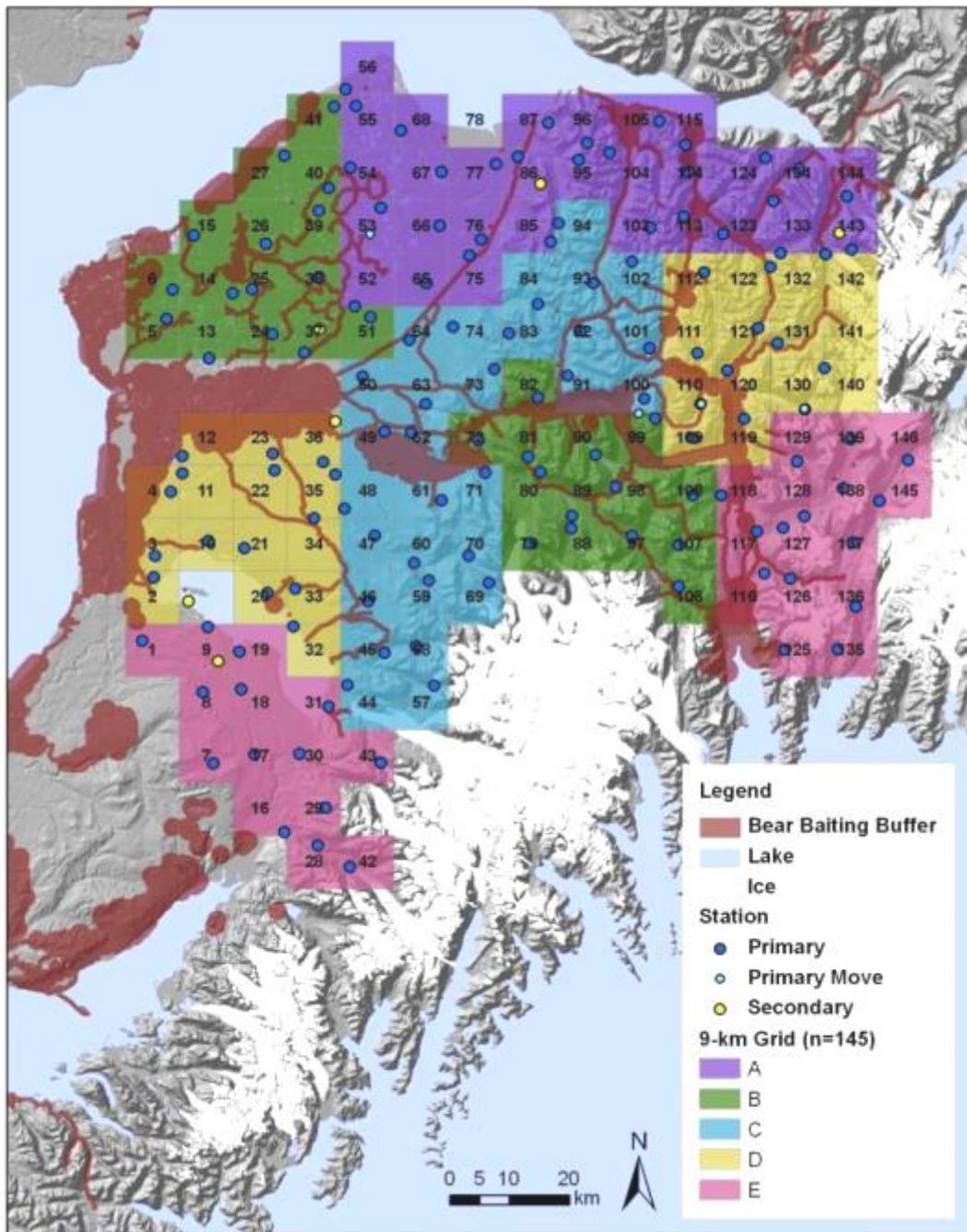
N = Estimate of total population size

M = Total number of animals captured and marked on the first visit

C = Total number of animals captured on the second visit

R = Number of animals captured on the first visit that were then recaptured on the second visit

...estimate is not based on the number of individuals marked (i.e., genotypes) but on their recapture rates



**145 primary hair stations
subjectively placed within 81-
km² cells systematically
distributed over 11,700 km²
study area**

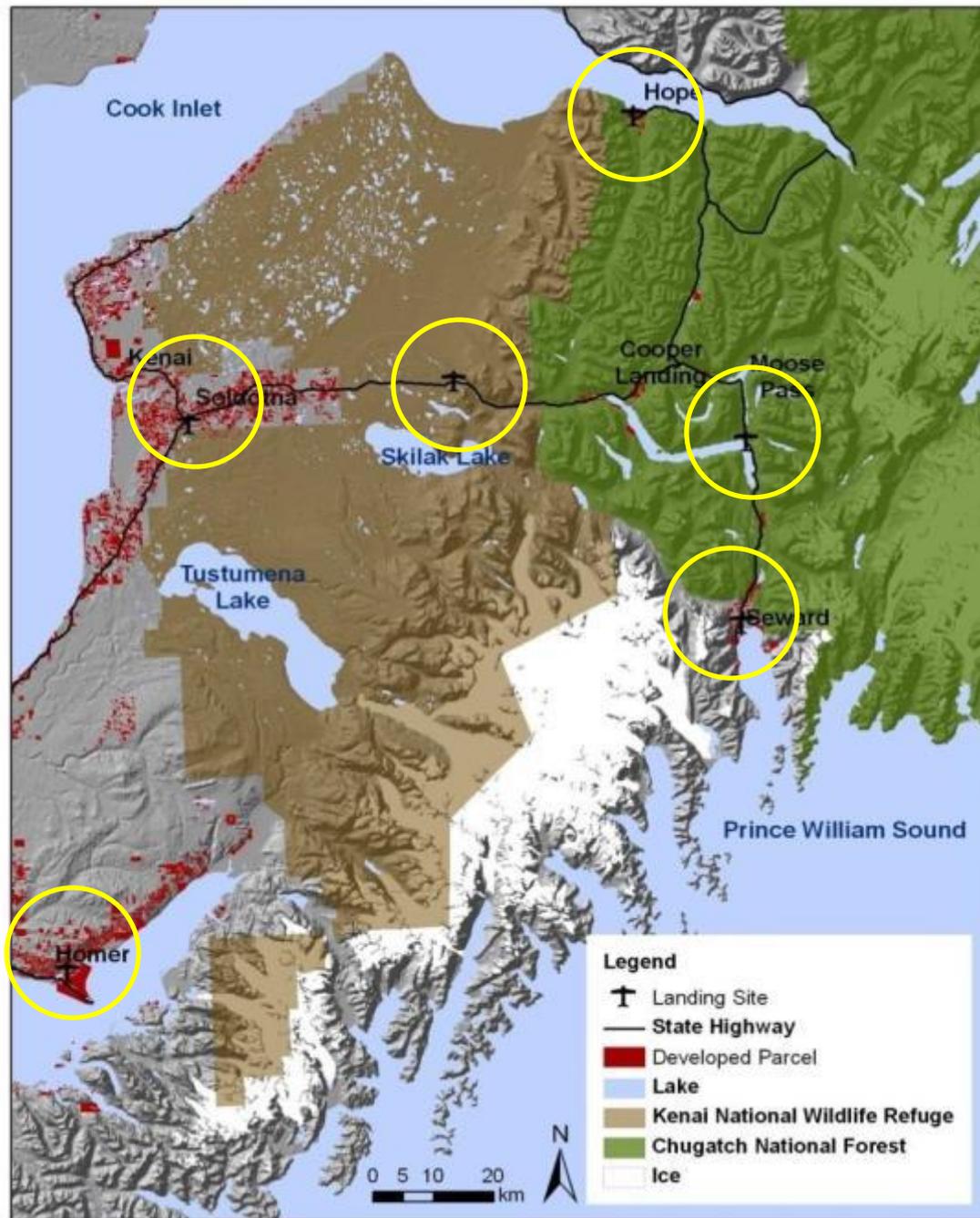
**29 stations sampled daily over
five 5-day trap sessions using
rotating panel design**

Selection criteria for hair stations

- ✓ adequate space for helicopter access
- ✓ > 400m from trails, cabins, roads
- ✓ riparian/wetland corridors
- ✓ other travel corridors (ridges, shoulders, chutes)
- ✓ OTBE, ensure good spatial separation among sites within a cell







Four sets of 2-person field crews operated out of Moose Pass and Soldotna for 31 consecutive days





N204PA

2000 GAL



FLAMMABLE

NO SMOKING











1MINUTE

07

JUN.19,10 08:00 AM



1MINUTE

07

JUN.19,10 08:01 AM



1MINUTE

07

JUN.19,10 08:04 AM



1MINUTE

07

JUN.19,10 08:05 AM



1MINUTE

07

JUN.19,10 08:06 AM



1MINUTE

07

JUN.19,10 08:09 AM



1MINUTE

07

JUN.19,10 08:10 AM



1MINUTE

07

JUN.19,10 08:11 AM

Hair station: _____ Barb # _____ Session # _____

Date: June ____, 2010

3 hairs or less? Y / N

Hair Location: Upper strand / Lower strand

Probable species: Brown bear / Black bear / unknown

Comments: _____



11,175 hair samples (grid) + 91 hair samples (rub tree)

11,266 hair samples

2,671 DNA samples

1,034 brown bear samples

211 unique genotypes

104 males + 99 females (n = 203)



How many brown bears on the Kenai Peninsula?

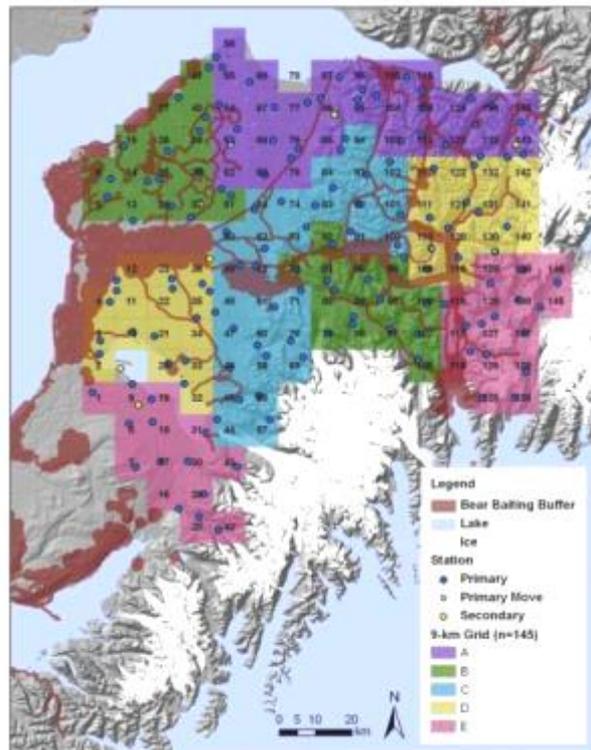
428 (353-539) brown bears estimated (all ages) on 11,700 km² sample frame
of which 10,200 km² is available habitat

≈ 42 bears per 1,000 km²

≈ 582 bears on the KP (469-719)

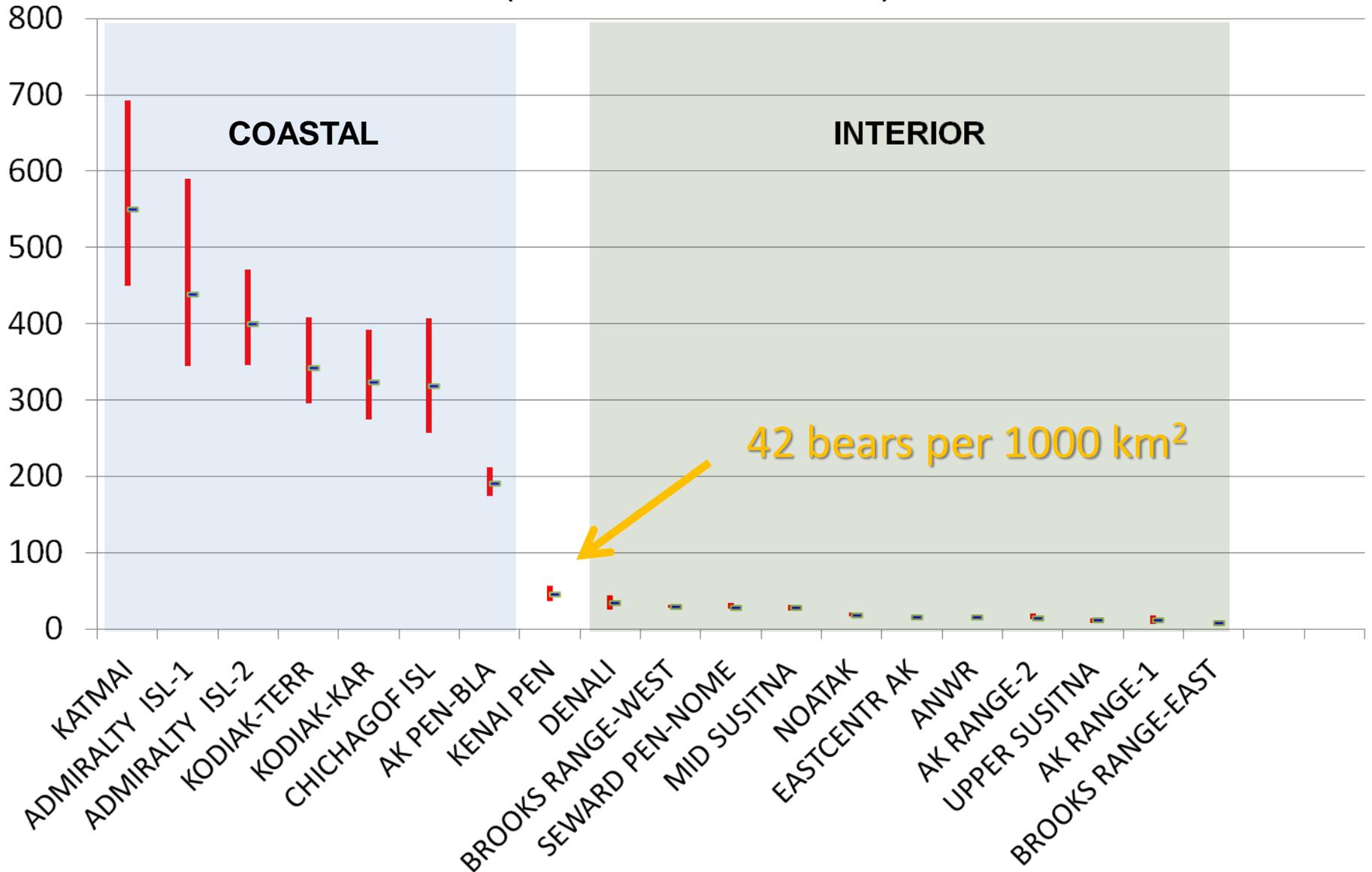
≈ 188 independent females

≈ 206 dependent young



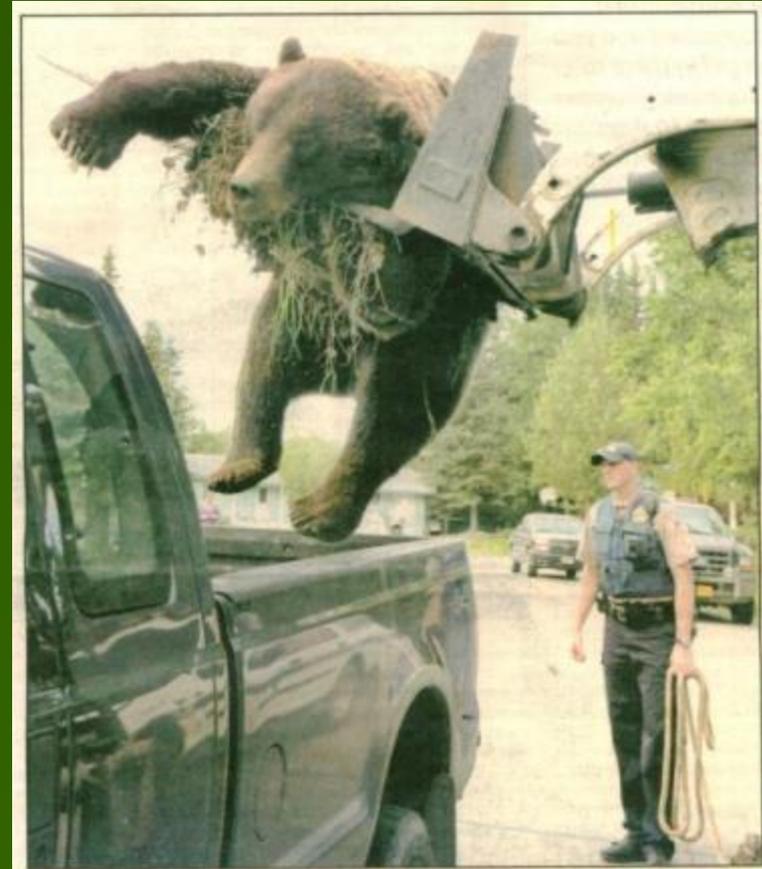
ALASKA BROWN BEAR DENSITIES (PER 1000 KM²)

(after Miller et al. 1997)



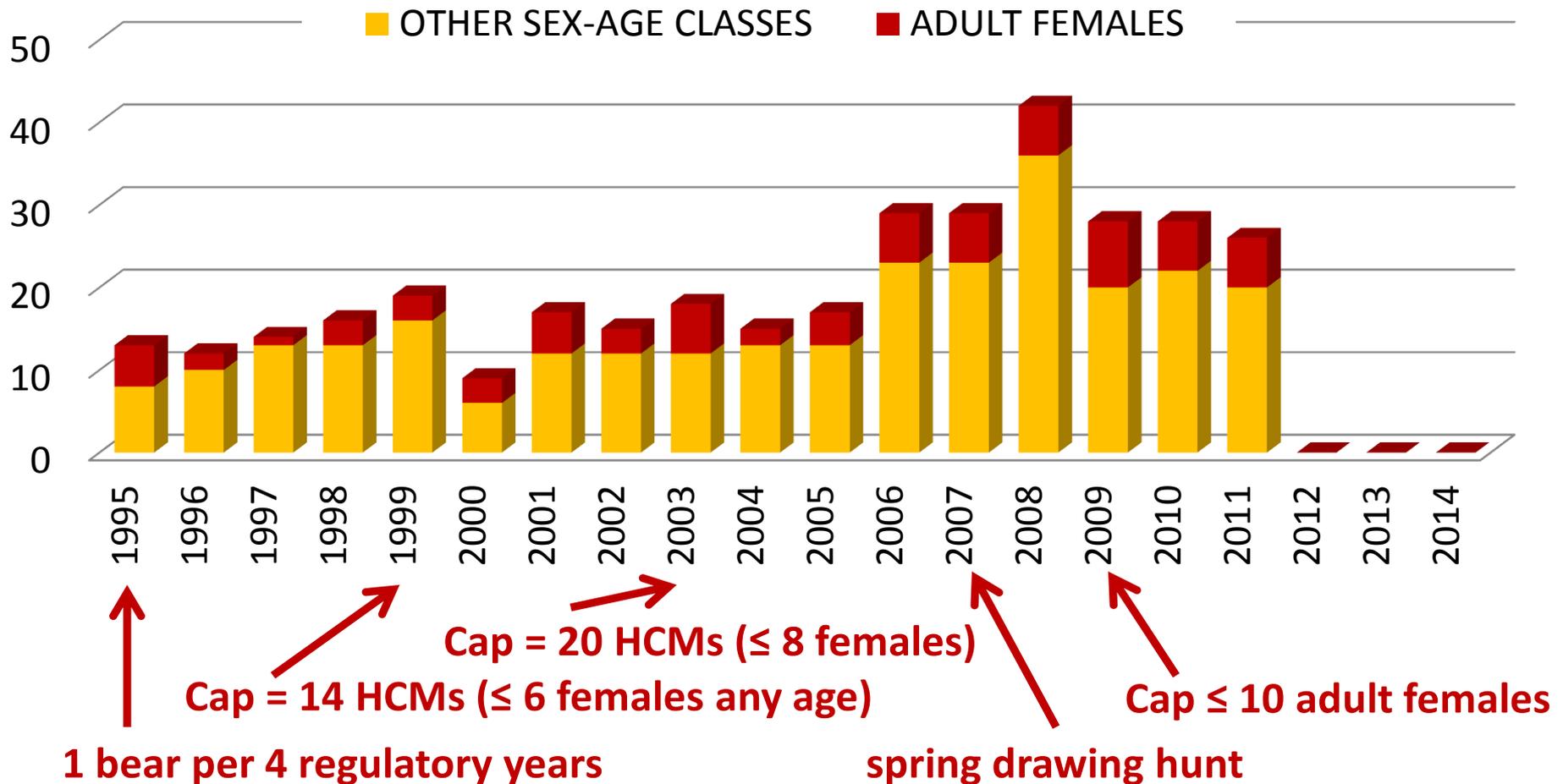
What are the management implications for Kenai brown bears?

- ✓ Represents 1st empirically-based estimate of the Kenai brown bear population
- ✓ Puts human-caused mortality (legal harvest, illegal take, vehicle collisions, agency kills and DLPs) into better demographic context
- ✓ Helps determine sustainable harvest



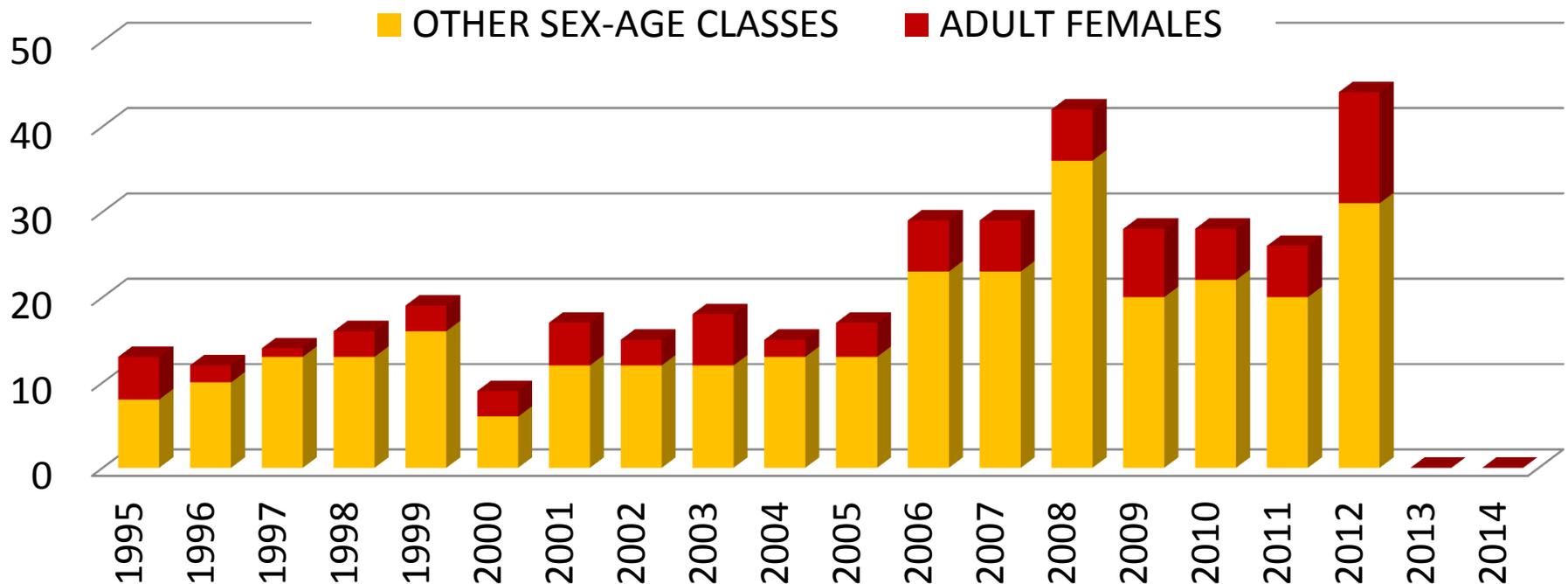
Population management of Kenai brown bears

Human-caused mortality of Kenai brown bears



Population management of Kenai brown bears

Human-caused mortality of Kenai brown bears

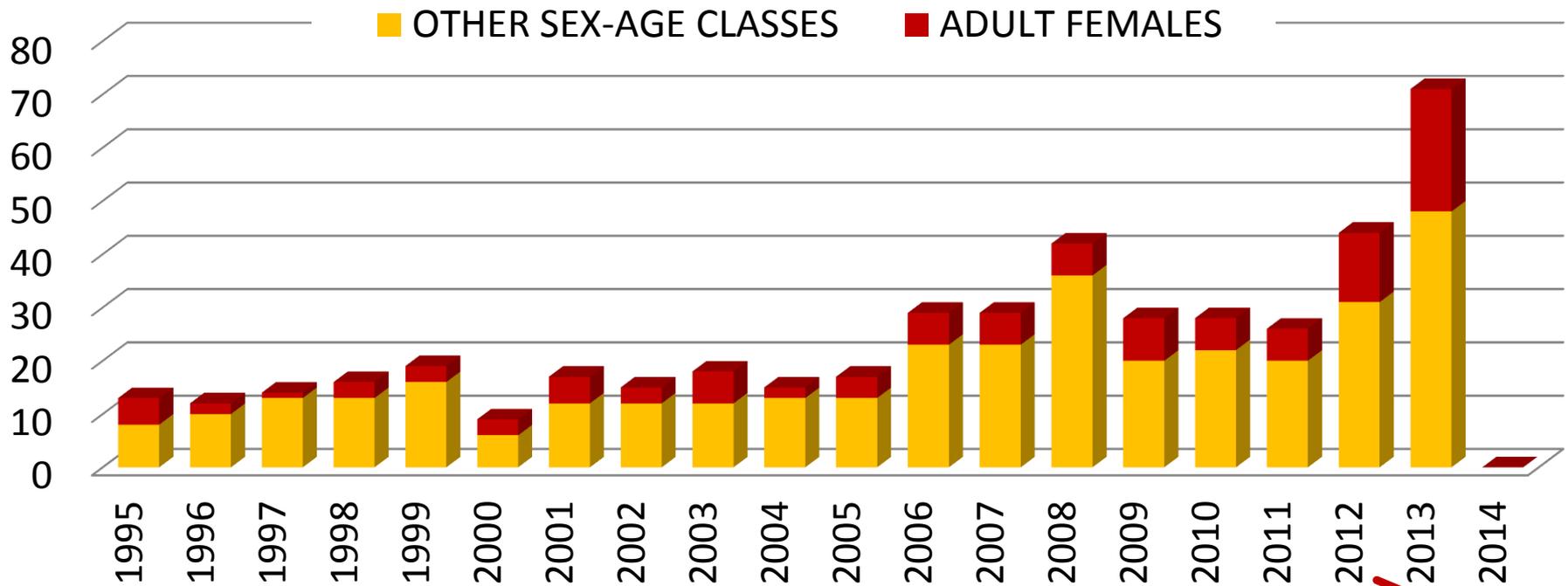


2012 spring drawing changed to general registration hunt

44 total, 13 adult females

Population management of Kenai brown bears

Human-caused mortality of Kenai brown bears

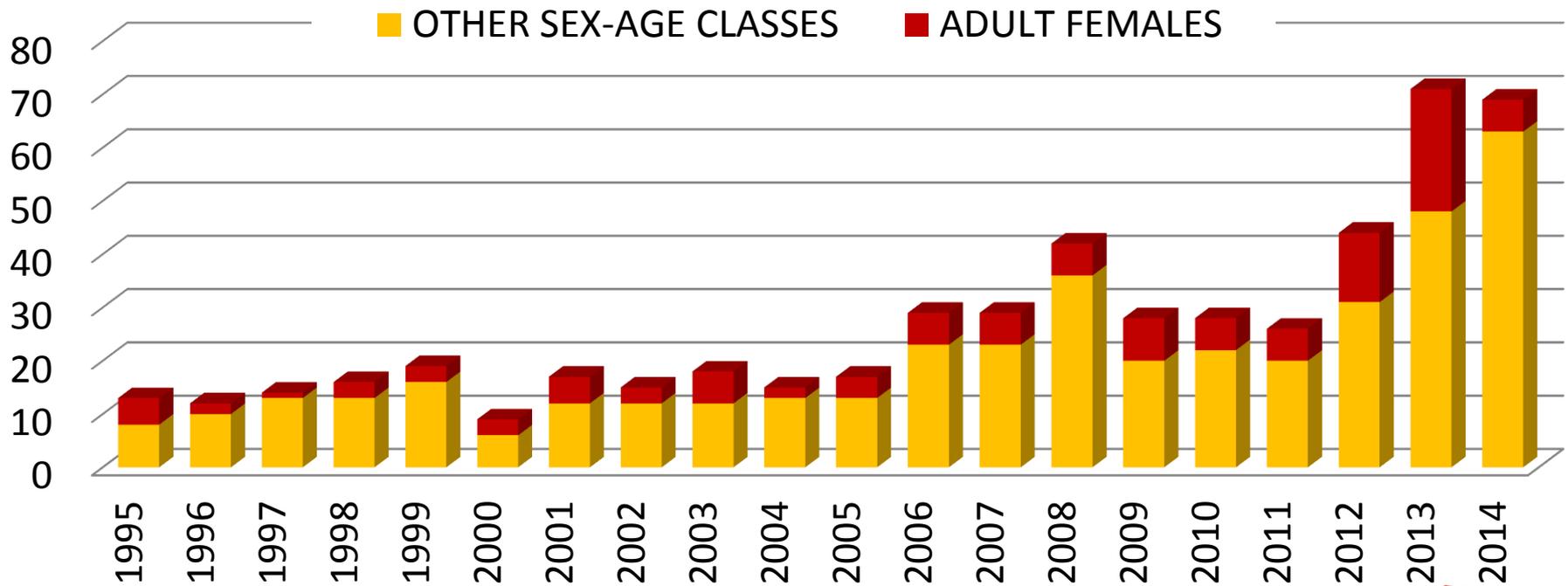


**2013 extended season (1 Sep-May 31), spring hunt over bait,
1 per regulatory year, no cap**

71 total, 23 adult females

Population management of Kenai brown bears

Human-caused mortality of Kenai brown bears



2014 cap = 70 HCM or ≤ 17 adult females

69 total, 6 adult females

Human-caused mortality of Kenai brown bears in past 3 years 3 times more than 1995-2011 annual average

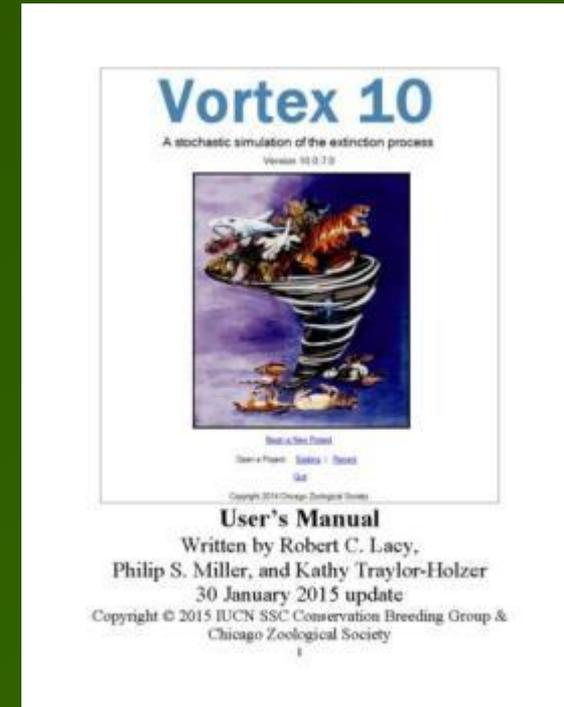
Year	Total HCM	Adult females	% on KENWR
2012	44	13	30%
2013	71	23	35%
2014	69	6	3%
TOTAL	184	42	22%

- ✓ Human-caused mortality of adult female bears averaged 4 per year during 1995-2011 but increased to 14 per year in 2012-14
- ✓ Total brown bears killed by humans averaged 20 annually during 1995-2011 but increased to 61 bears annually during 2012-14

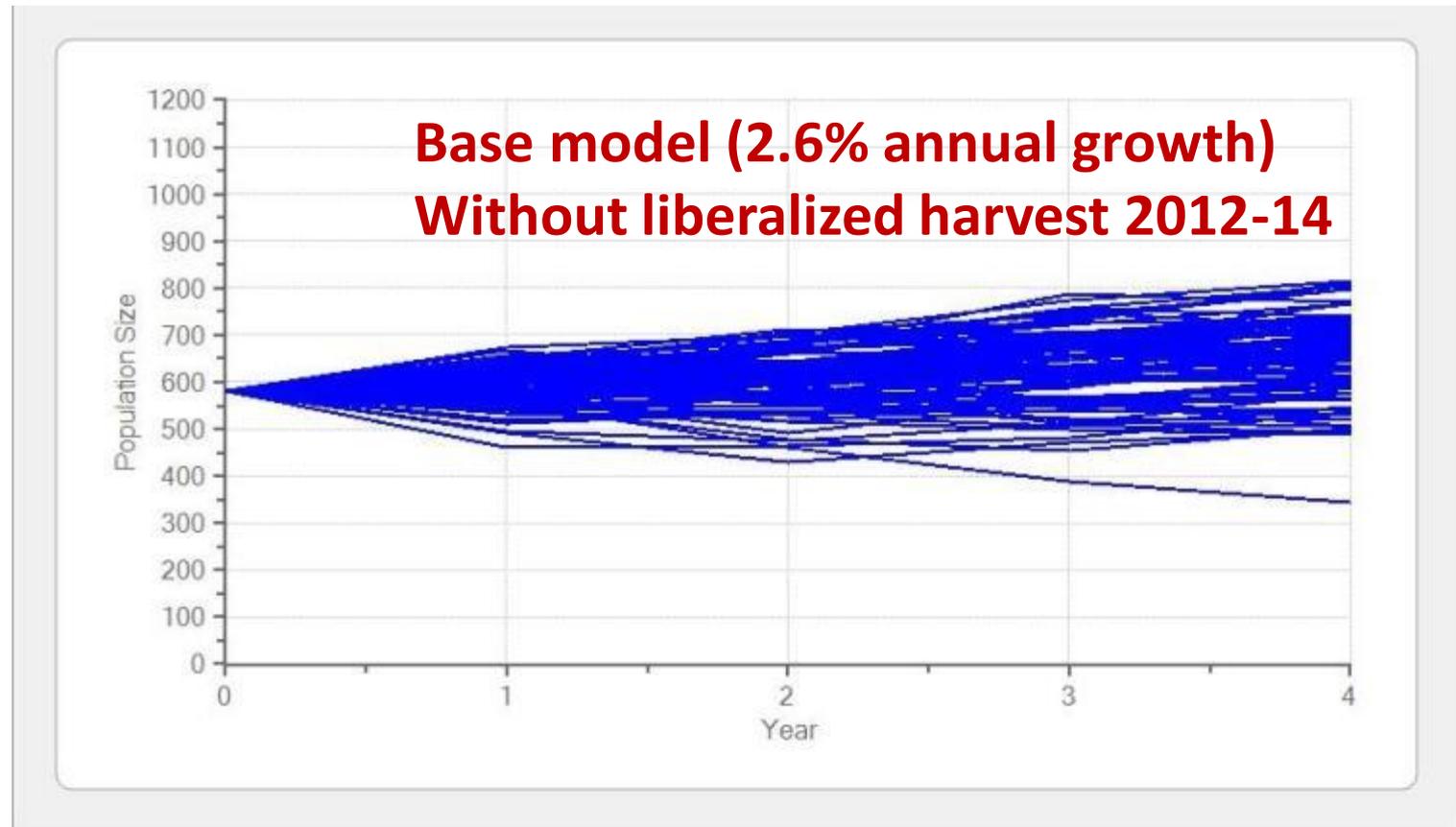
Population demographics used in VORTEX

- ✓ Based on data 1995-2014
- ✓ Polygynous system with 100% of adult males breeding
- ✓ Reproductive age = 6 years
- ✓ Maximum breeding age = 26 years
- ✓ 50% males, 50% females
- ✓ Adult females breeding = 34%
- ✓ Initial population of 582
- ✓ Assumes telemetered population of adult females is representative of peninsula-wide population
- ✓ Assumes stable age distribution, no density-dependent mortality

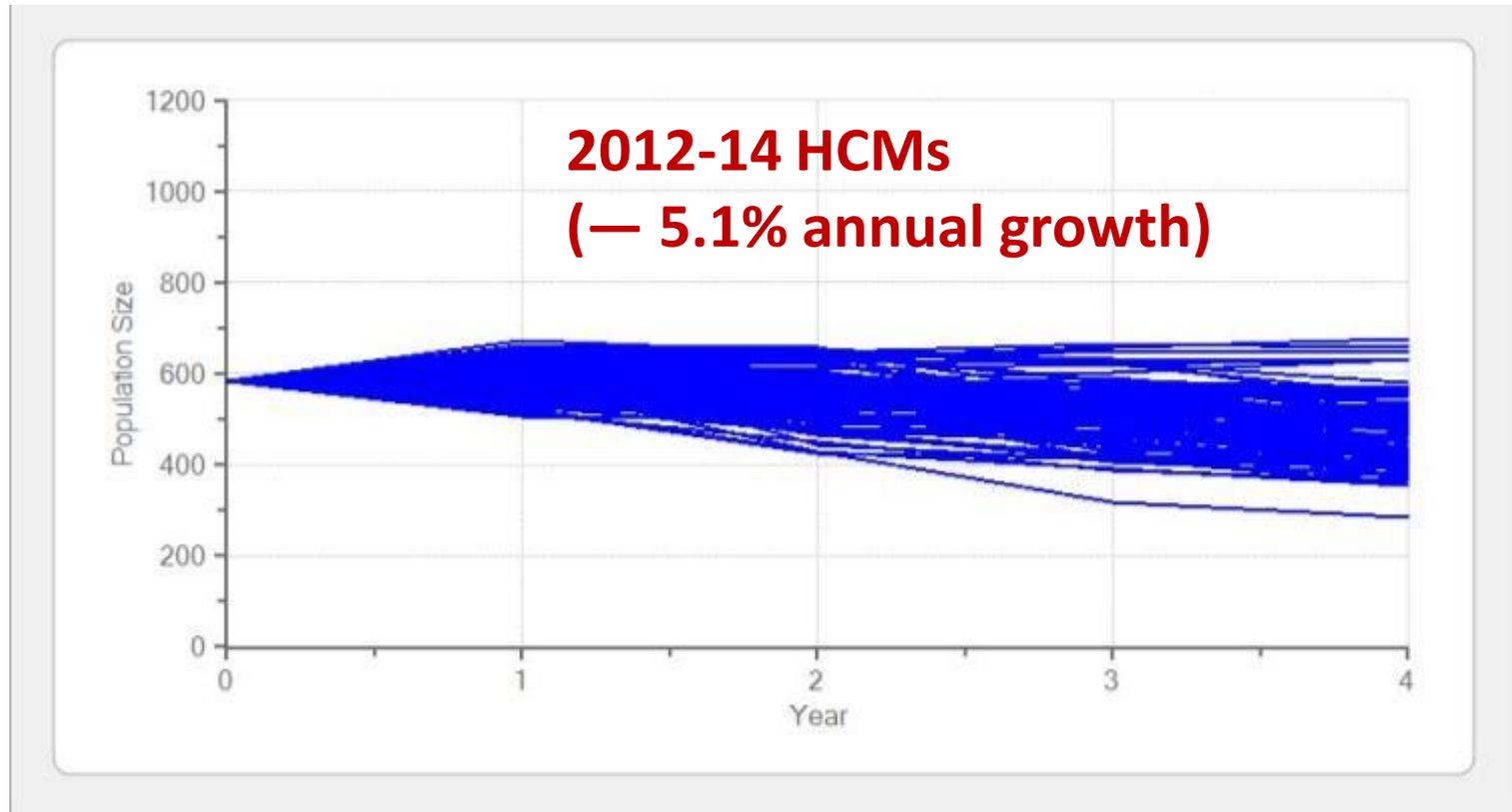
Based on Farley 2013, Morton et al. 2014,
ADF&G harvest data 2012-14 (revised with teeth ages)



$$N_t = N_0 e^{rt}$$



Kenai brown bear population would have grown to 652 by 2014 if harvest had not been liberalized in 2012-14



2012-14 harvest depressed the Kenai brown bear population by **17%** (>100 bears) from 2010 to 2014

And it would have been even higher had KENWR been open in 2014

Questions?

“The Refuge provides the largest continuous, homogenous block of brown bear habitat on the Kenai Peninsula and is the only Kenai Peninsula land unit specifically mandated by Congress to conserve bear populations and habitat in their diversity.

When warranted, the Refuge will alter or eliminate expansion of Refuge recreational opportunities to reduce human-bear conflicts.”

**Conservation Assessment of the Kenai
Brown Bear (IBBST 2001)**

