

Interagency Grizzly Bear Study Team 2022 Update & IPM Implementation



Photo: J. Davis

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Overview

1) Status update 2022

- Occupied range
- Implementation of integrated population model (IPM)

2) Miscellaneous updates

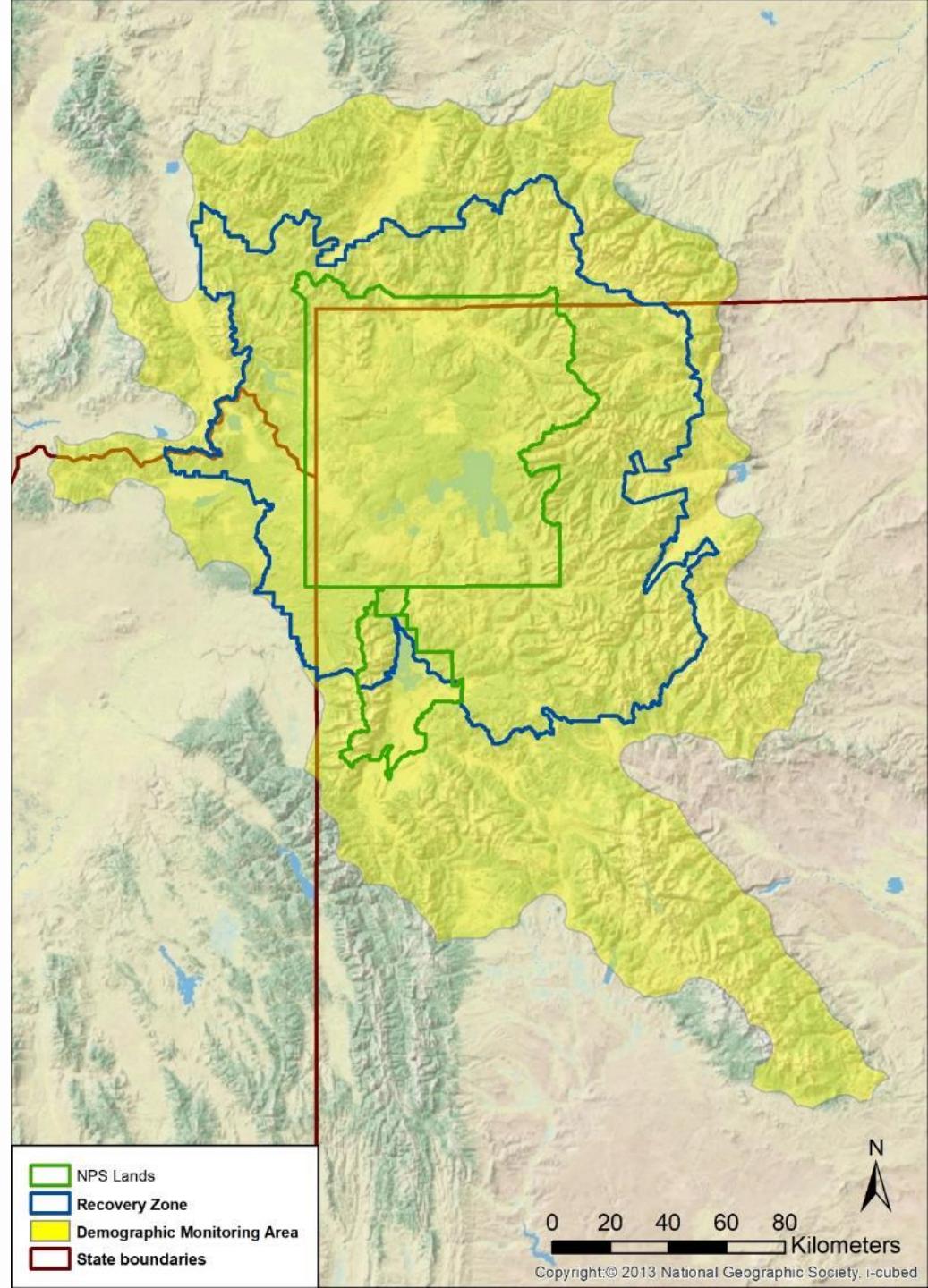
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Greater Yellowstone Ecosystem

National Parks = 10,344 km²

Primary Conservation Area/Recovery Zone = 23,828 km²

Demographic Monitoring Area (DMA) = 49,931 km²



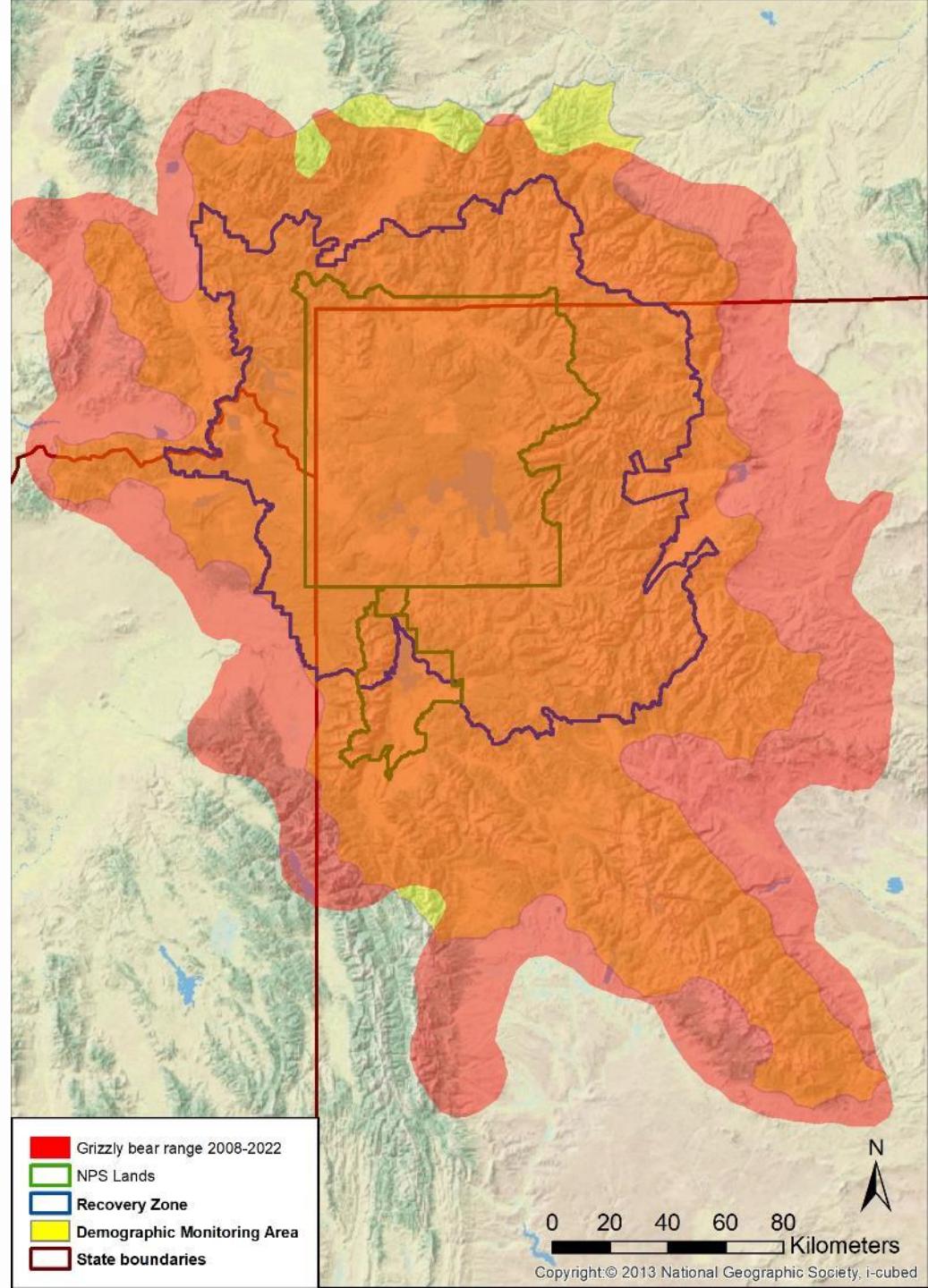
Greater Yellowstone Ecosystem

National Parks = 10,344 km²

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Estimated Grizzly Bear Range = 70,101 km²



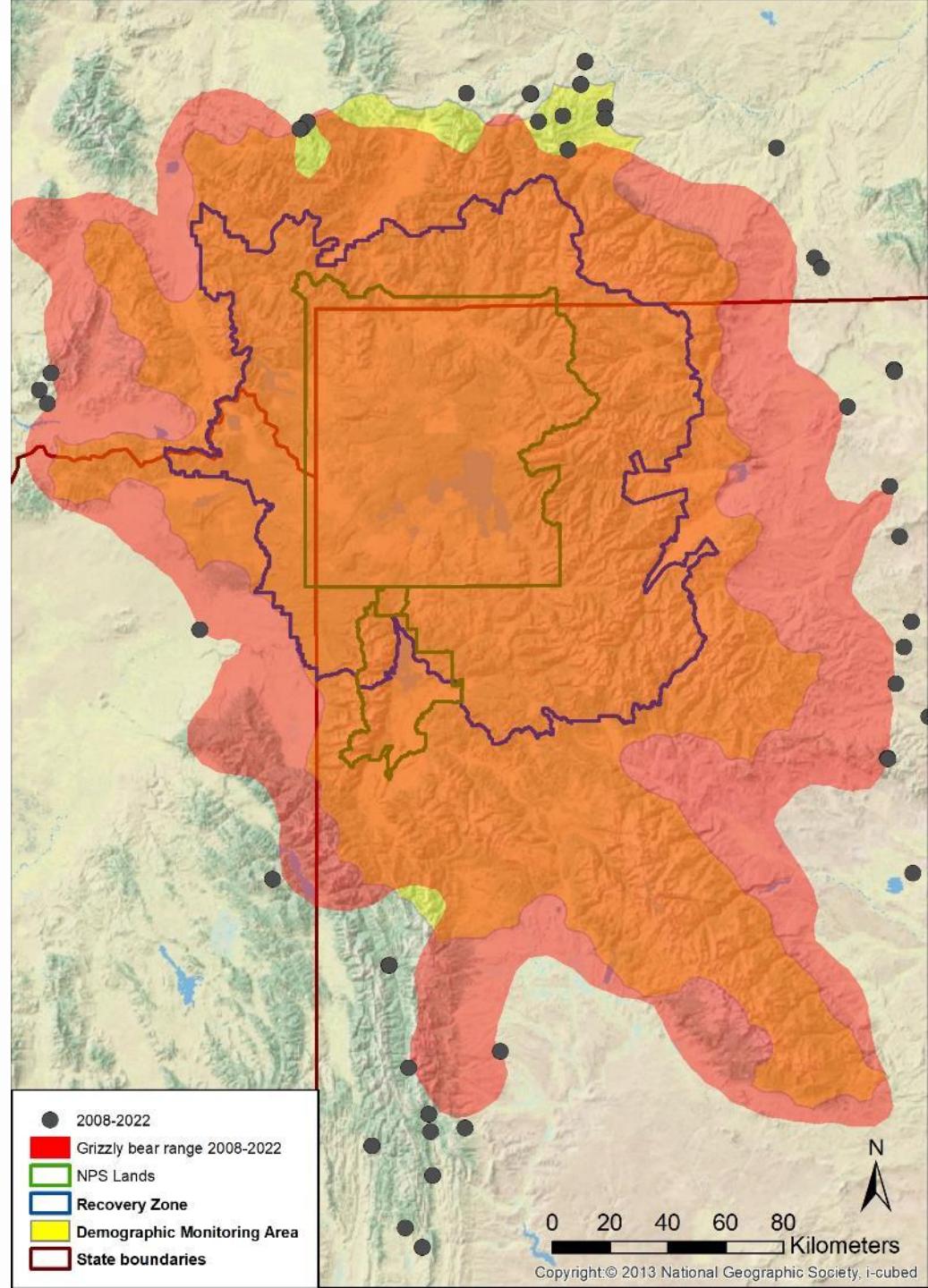
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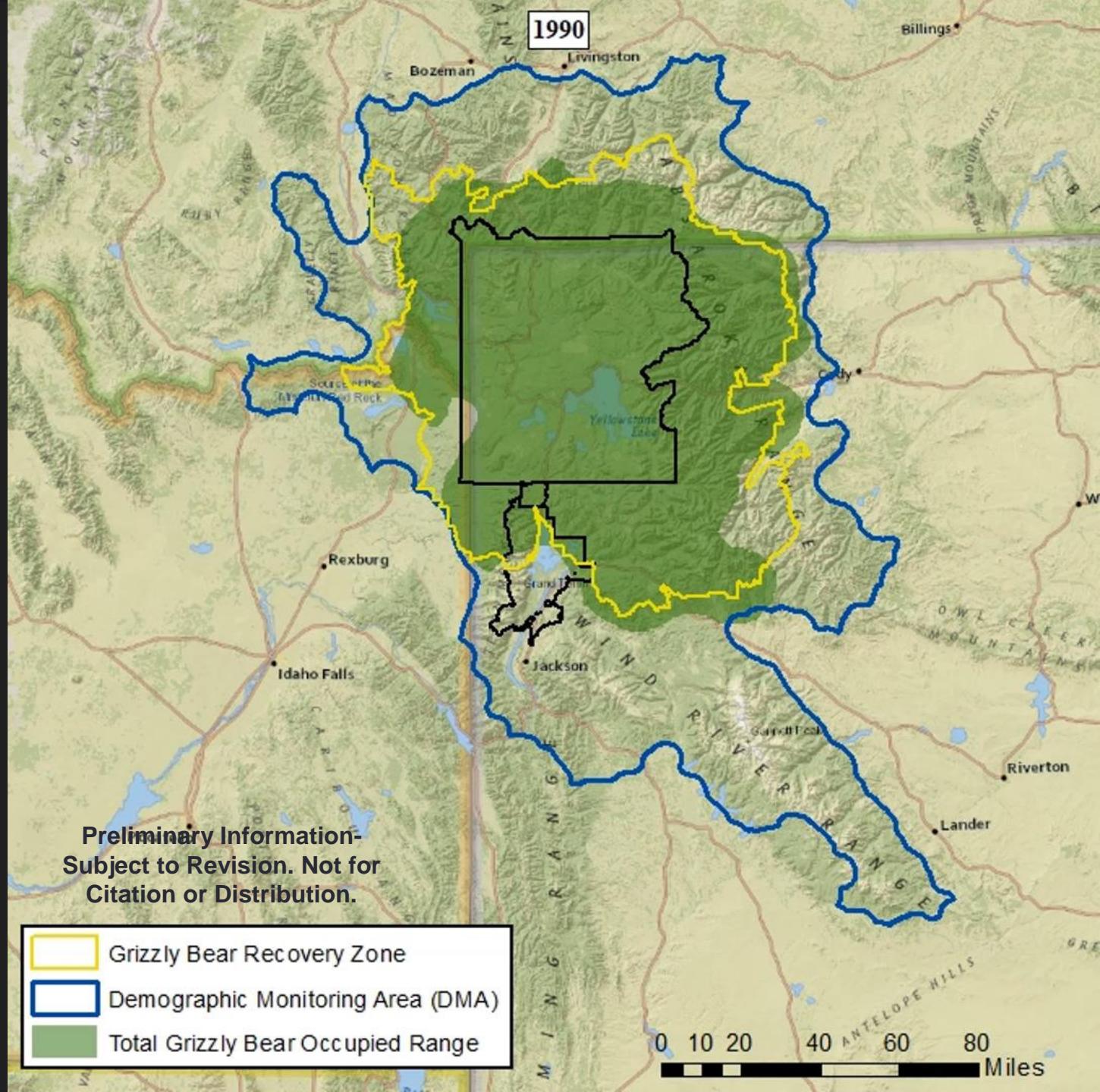
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Demographic Monitoring Area (DMA) = 49,931 km²

Estimated Grizzly Bear Range = 70,101 km² with outliers



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Demographic Recovery Criterion #1: Females with Cubs and Population Size



Photo: J. Davis

Number of females with cubs 2022 (16-km distance criterion, inside DMA)

Parameter	Estimate
Unique females with cubs	57
Unique females with cubs (excluding telemetry observations)	49
Chao2 estimate	60

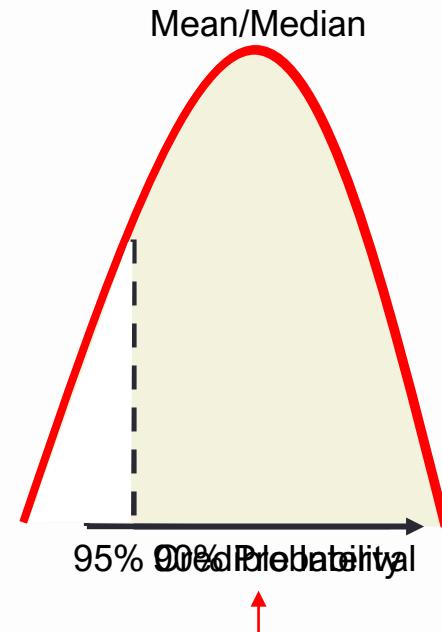
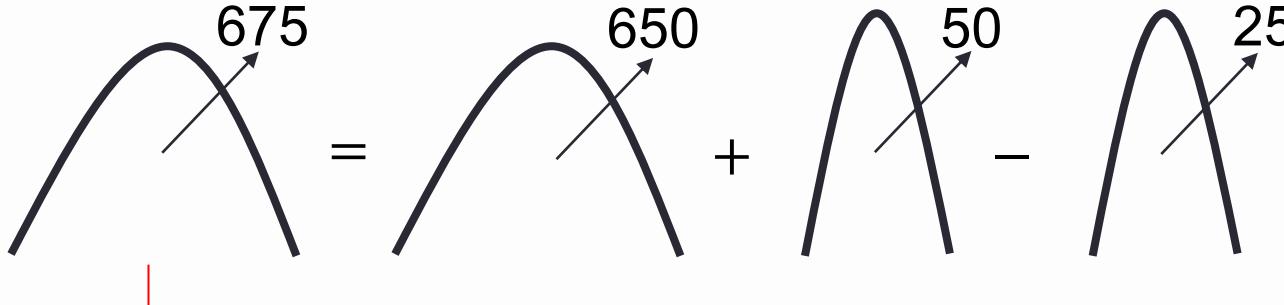
Integrated Population Models

- Started investigations in 2018
- Allows for a more unifying and flexible monitoring and management framework
- Fundamentally an extension of current monitoring
- Implementation with data through 2022

Bayesian statistics

$$\hat{N}_t = \hat{N}_{t-1} + Births - Deaths$$

$$675 = 650 + 50 - 25$$

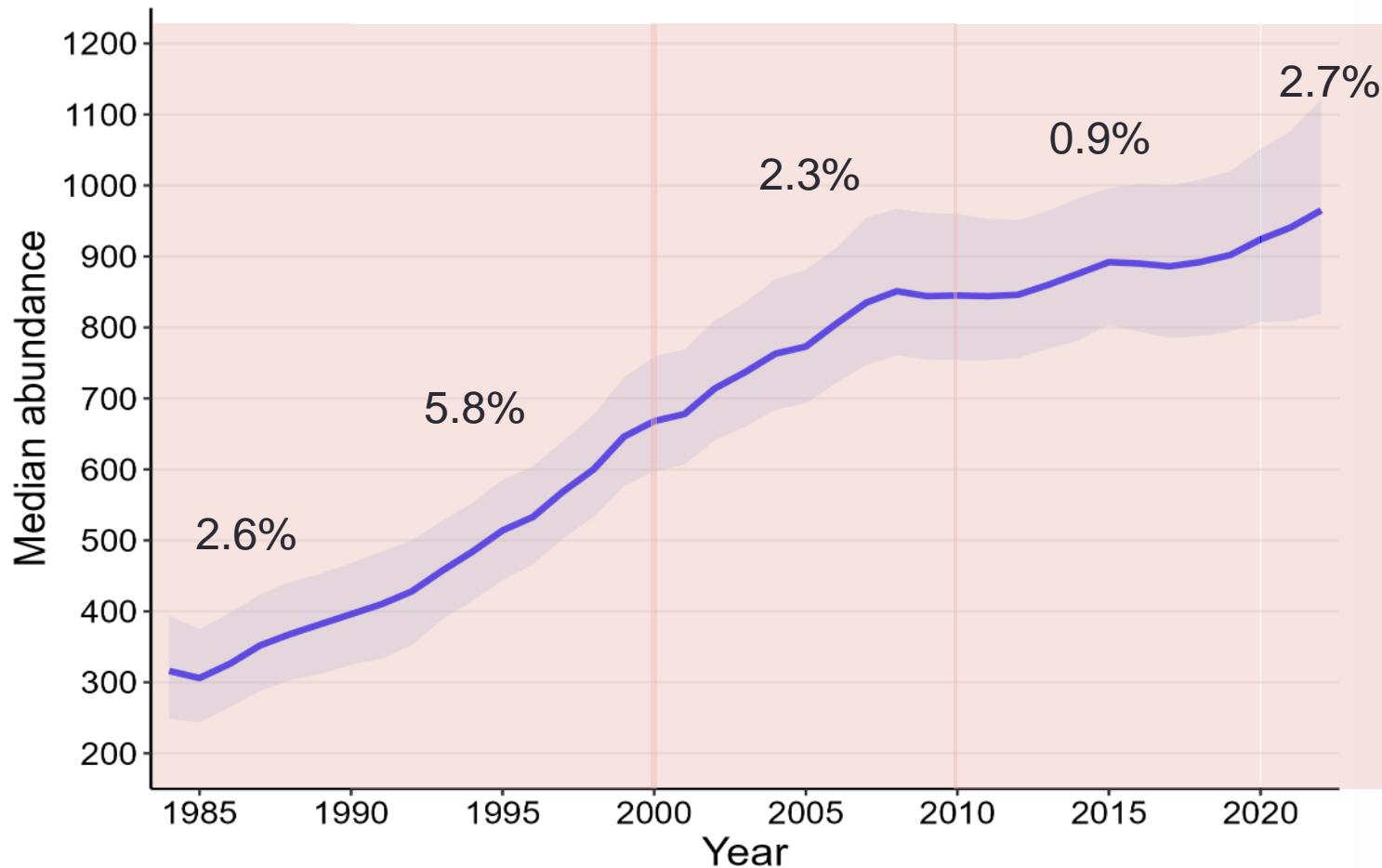


Population size 2022 (IPM, DMA)

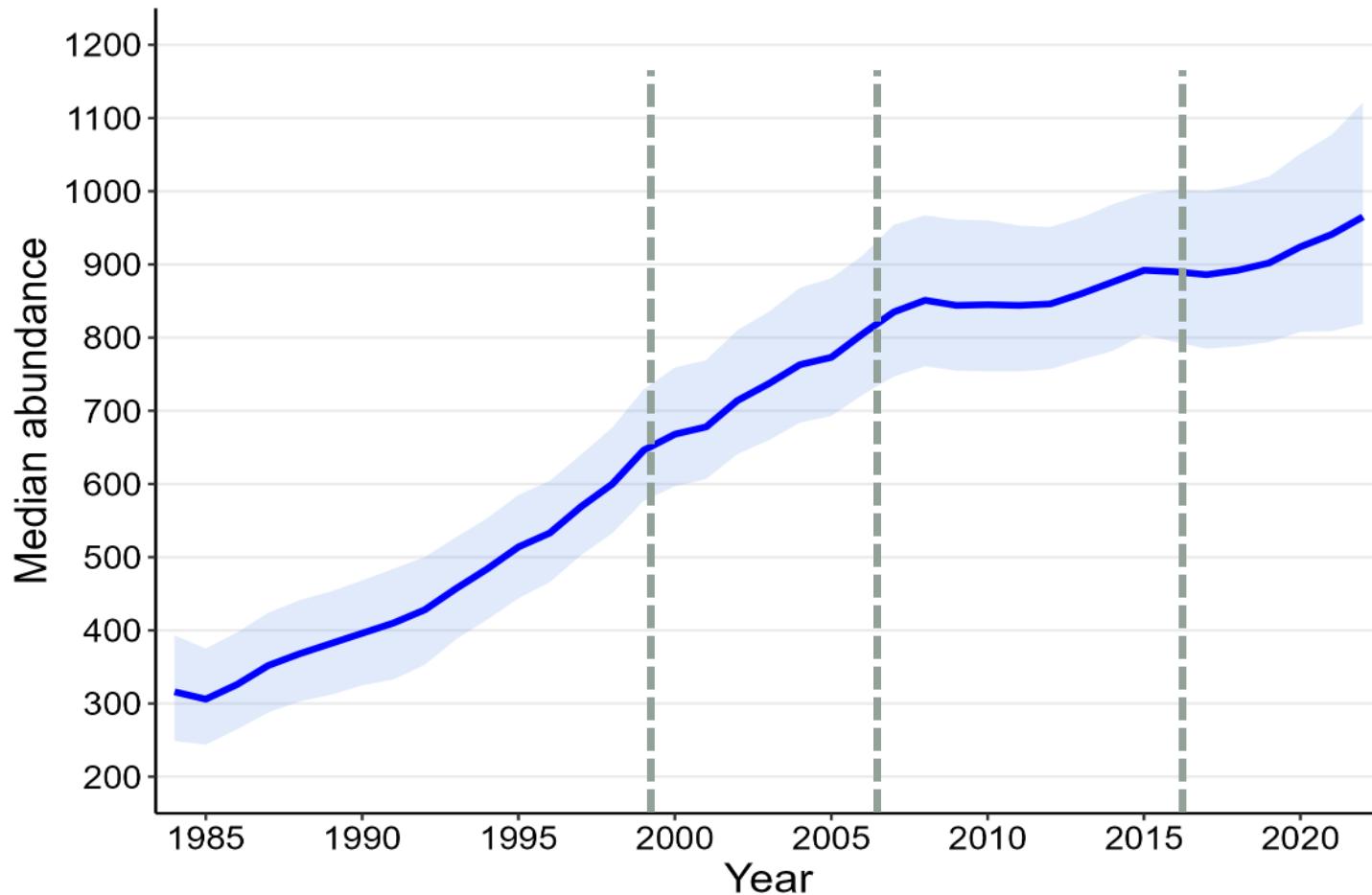
Population segment	Median estimate
Independent females (≥ 2 yrs)	328
Independent males (≥ 2 yrs)	332
Yearlings	98
Cubs born	200
<hr/>	
Total estimate 2022*	965 (95% CI = 819–1121)

*Sum of segment medians slightly different from median of total estimate

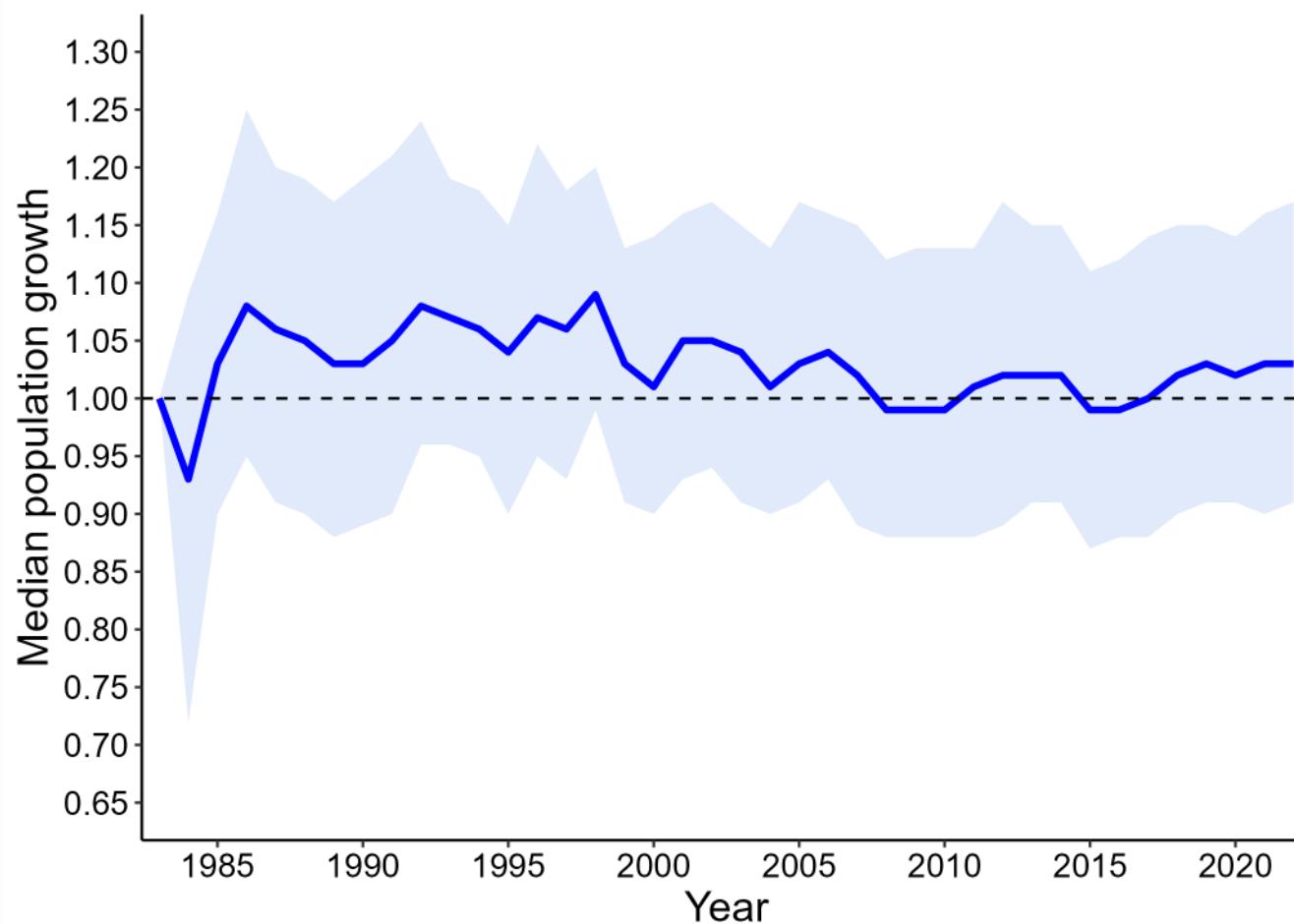
Total population size (IPM, DMA)



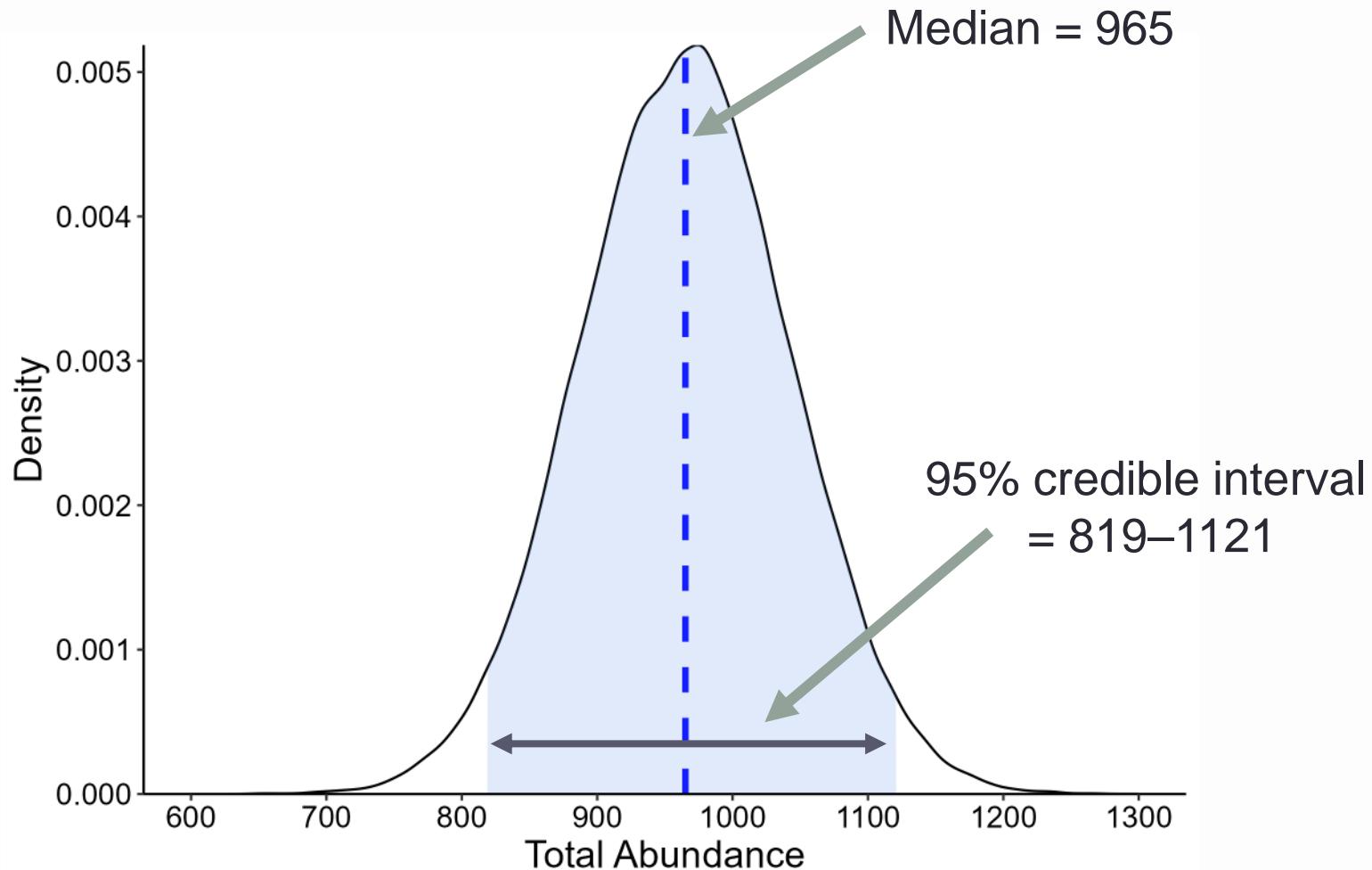
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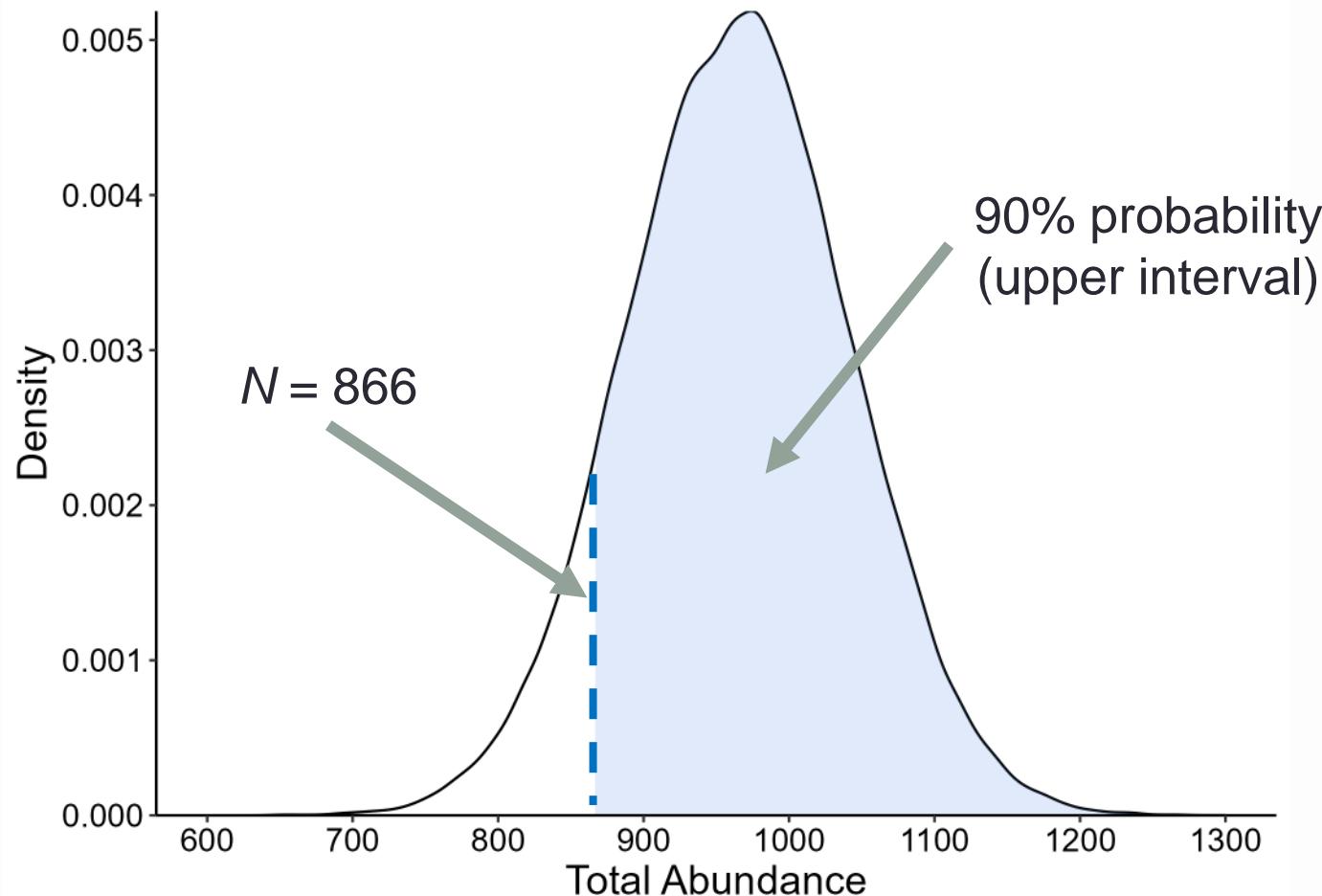
Population growth (IPM, DMA)



Population size as a probability distribution (IPM, DMA)



Population size as a probability distribution (IPM, DMA)



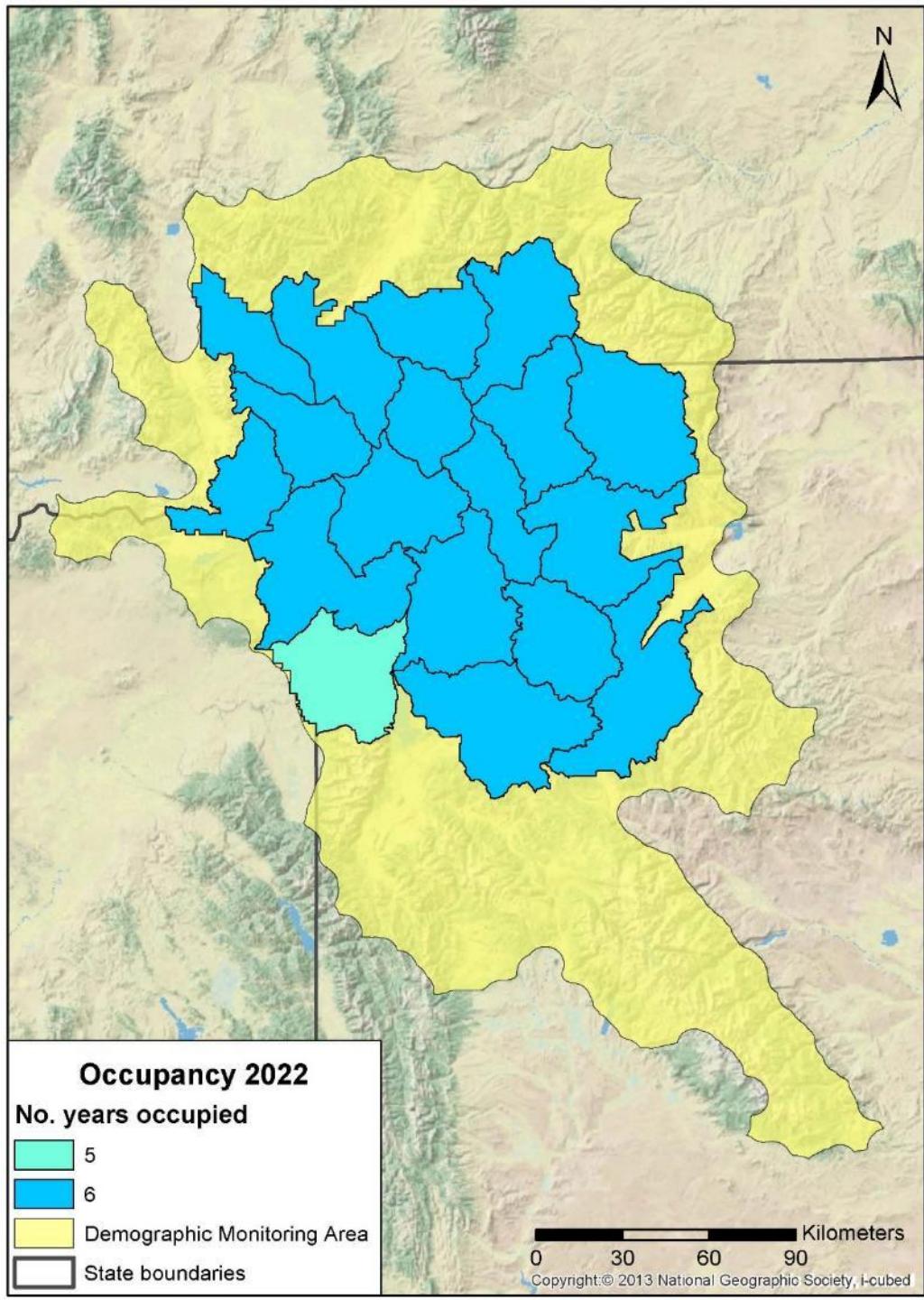
Demographic Recovery Criterion #2: Occupancy by Females with Young



Photo: J. Davis

Occupancy by females with young (cubs, yearlings, or 2-year-olds) 2022

- 18 of 18 Bear Management Units (BMUs) occupied during 2022)
- 18 of 18 BMUs occupied at least 5 of last 6 years (2017-2022)





Demographic Recovery Criterion #3: Mortalities

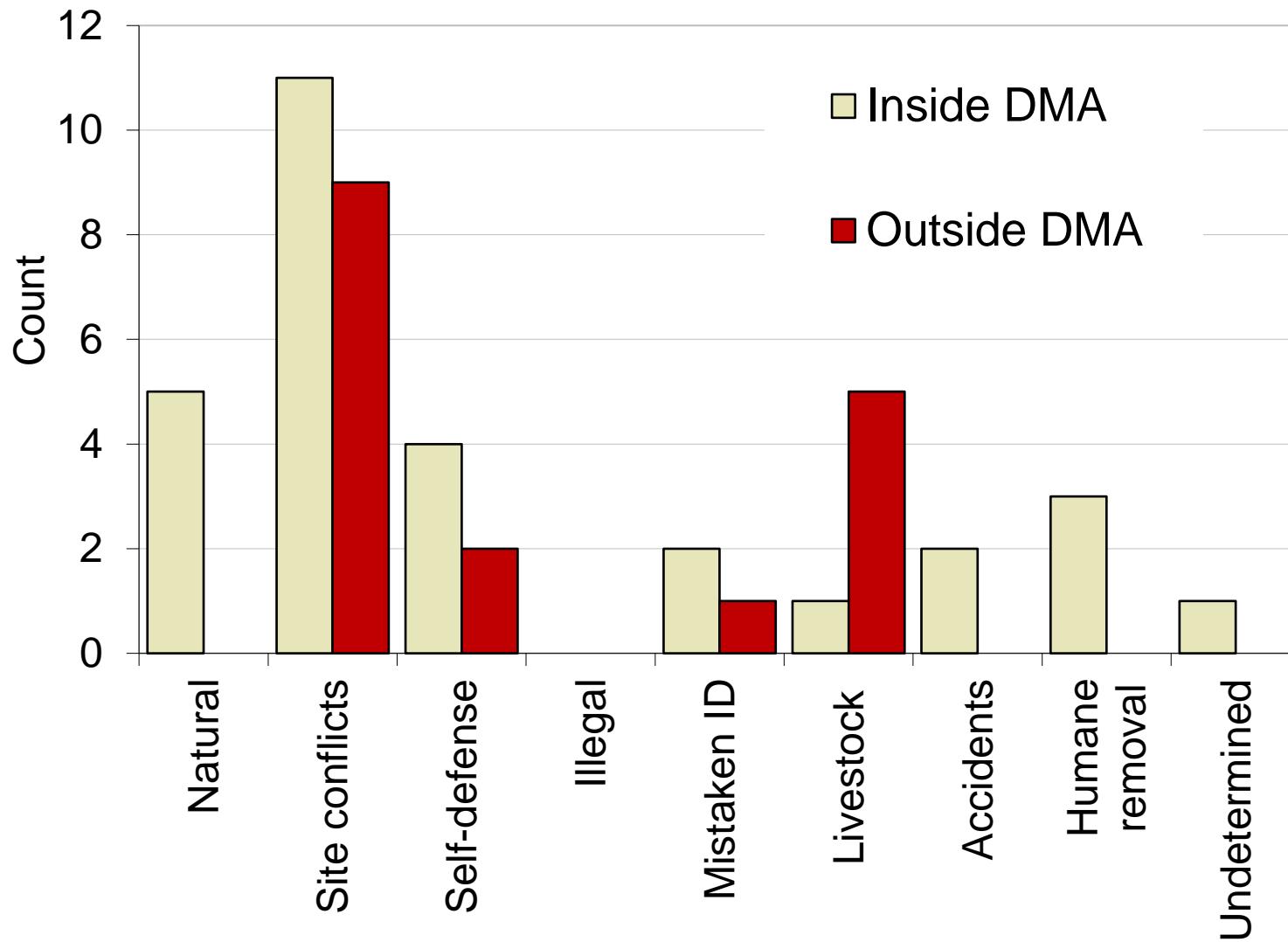
Known and probable mortalities by sex and age class 2022 (DMA)

Area	Sex	Age class		Total
		Dependent (<2 years old)	Independent (≥2 years old)	
Inside DMA	Female	3	10	13
	Male	5	9	14
	Unknown	1	1	2
	Total	9	20	29

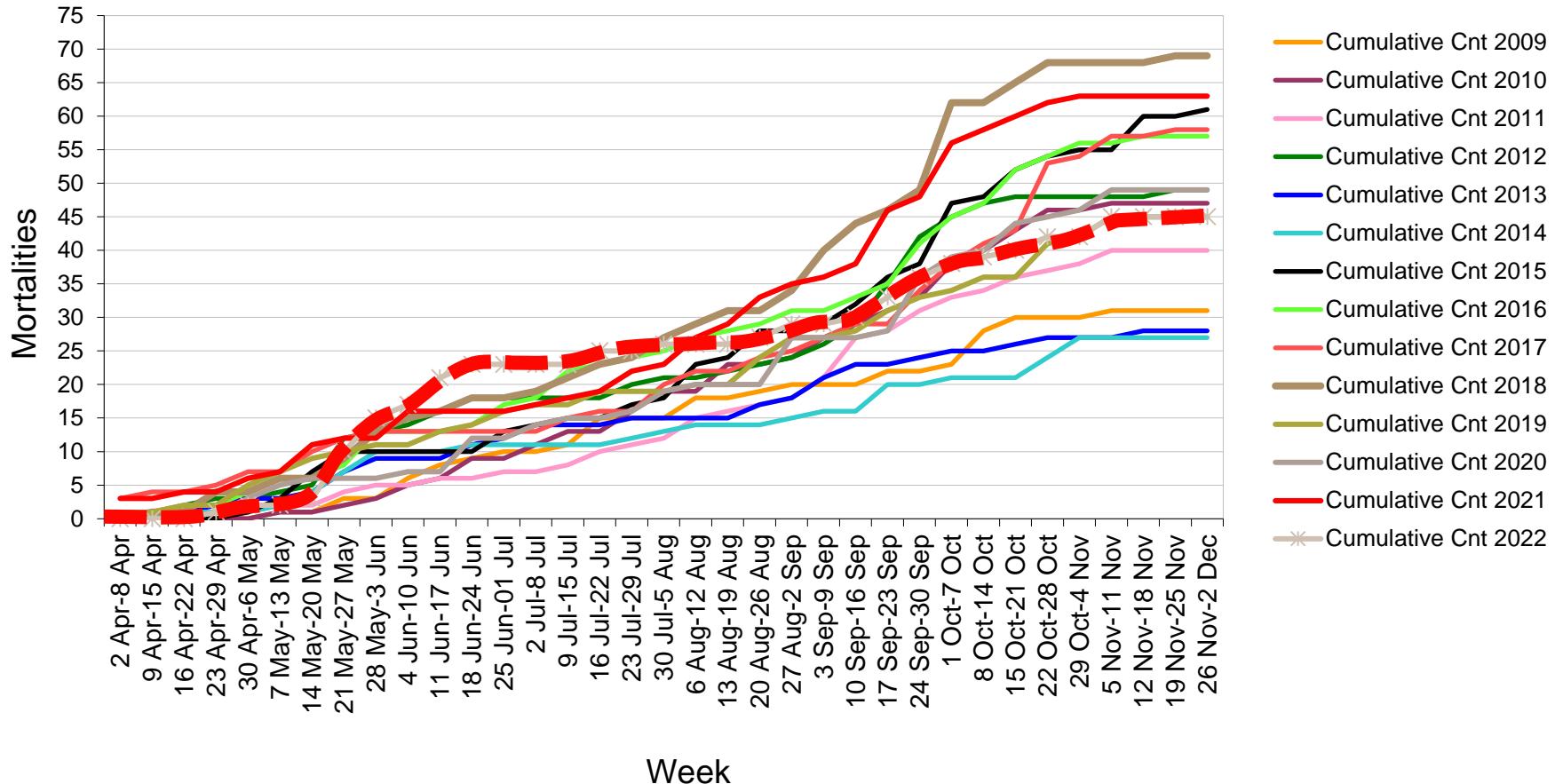
Known and probable mortalities by sex and age class 2022 (outside DMA)

Area	Sex	Age class		Total
		Dependent (<2 years old)	Independent (≥2 years old)	
Outside DMA	Female	0	3	3
	Male	4	9	13
	Unknown	1	0	1
	Total	5	12	17

Mortalities inside/outside DMA by cause 2022



Cumulative documented mortalities by week 2009-2022 (GYE)



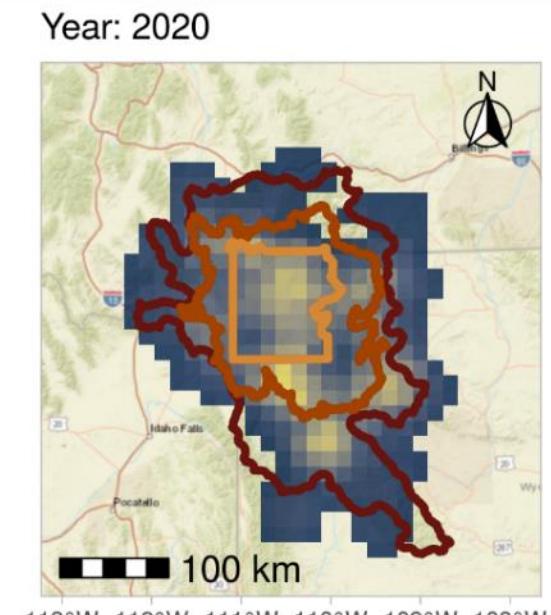
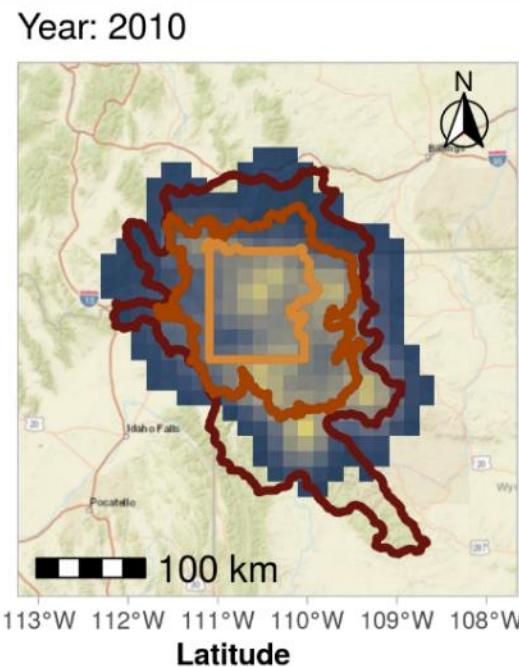
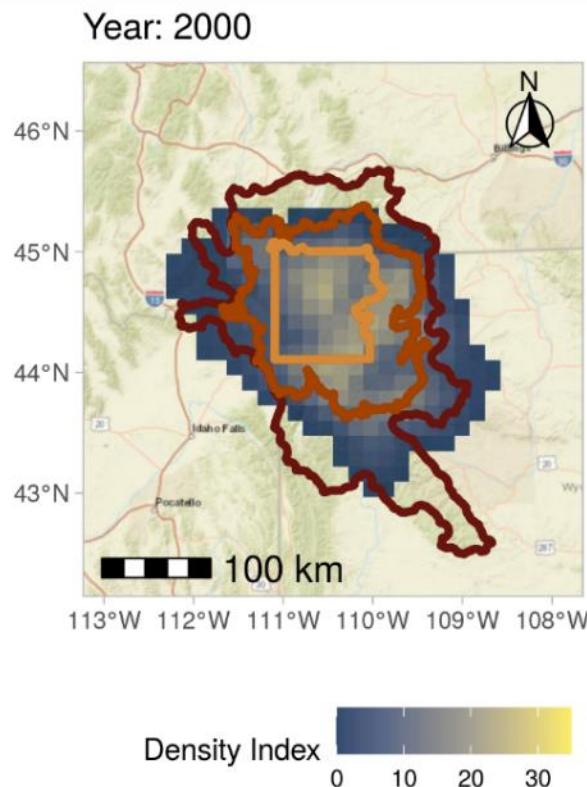
Miscellaneous Updates



Photo: J. Hadley/USGS

Body composition, density, and changing foods

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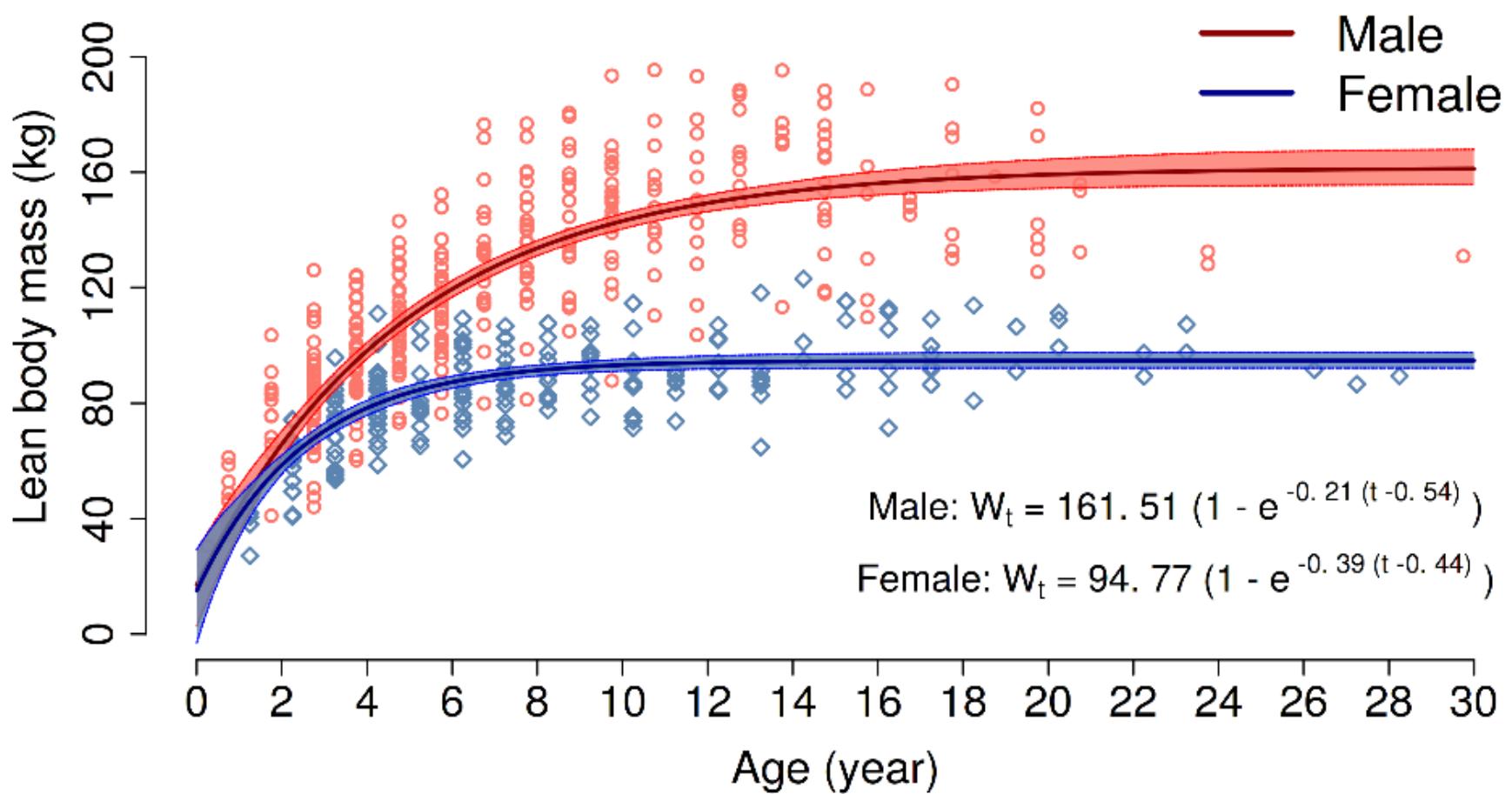


Zone □ Demographic Monitoring Area □ Recovery Zone □ Yellowstone NP

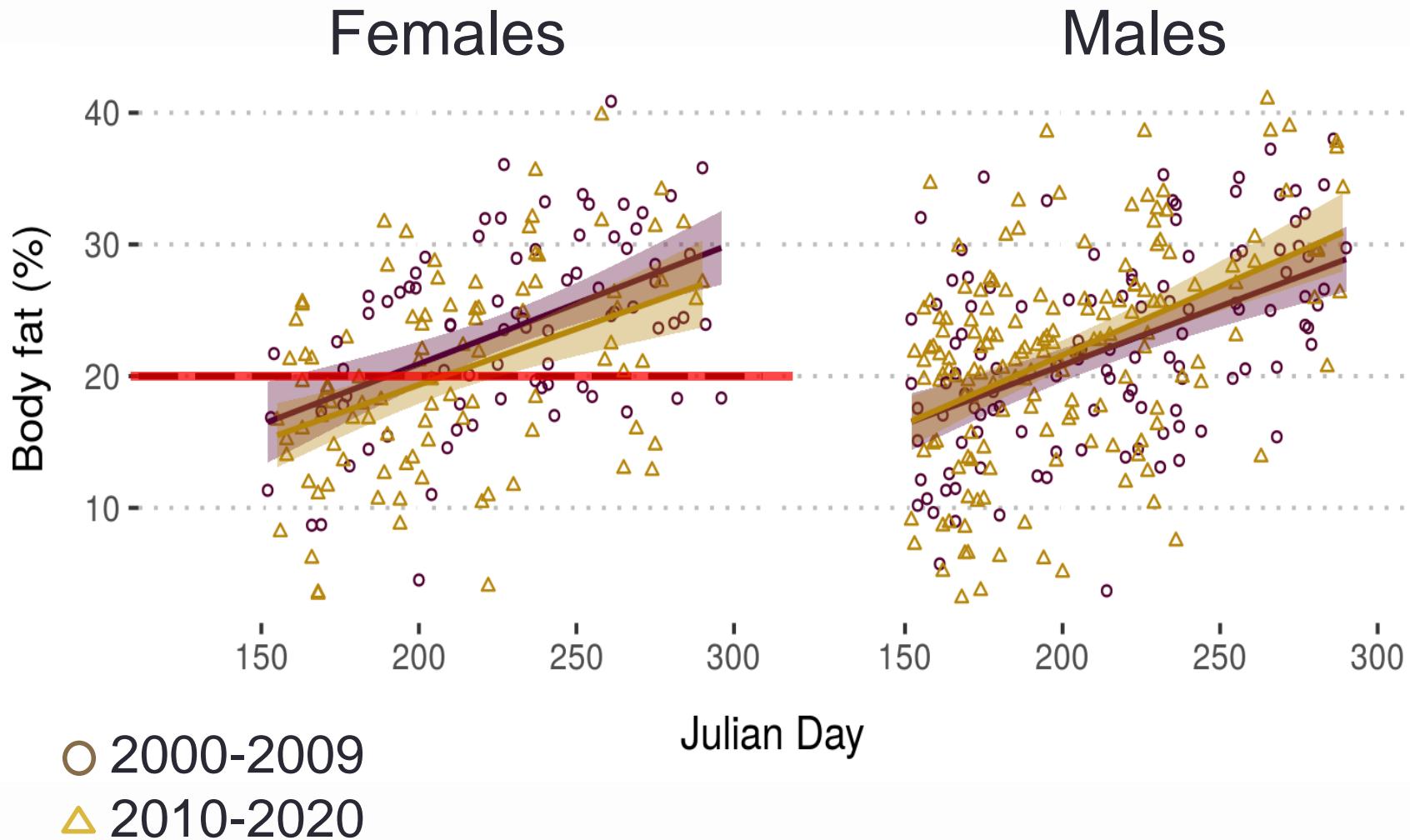
Estimating body condition (% body fat)



Lean body mass

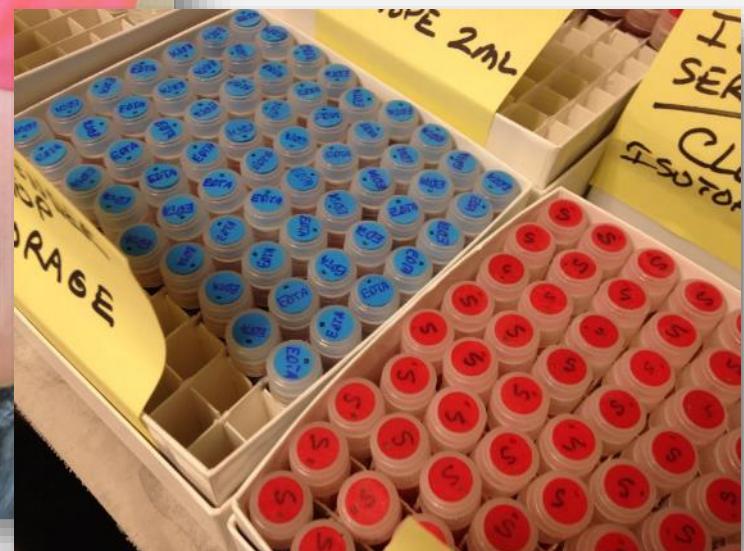


Seasonal body fat gain (2000s vs. 2010s)



Genetic monitoring

- Results for 1983-2020
- 1,331 individuals genotyped (20 microsatellite markers)
- No evidence of non-GYE ancestry in any of the individuals genotyped to date



Grizzly bear occupied range NCDE, CYE/SE, and GYE

55 km (35 miles)

Preliminary Information-
Subject to Revision. Not for
Citation or Distribution.

- Interstate Highways
- Grizzly Bear Recovery Zone
- NPS Lands
- Estimated Occupied Grizzly Bear Range

0 40 80 120 160 Kilometers

N

**Management capture
and removal for cattle
depredation 5/12/2021**



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0 40 80 120 160 Kilometers



**Management capture
and removal for cattle
depredation 5/12/2021**



**2 closely related
individuals**



**Preliminary Information-
Subject to Revision. Not for
Citation or Distribution.**

- Interstate Highways
- [Yellow Box] Grizzly Bear Recovery Zone
- [Blue Box] NPS Lands
- [Orange Box] Estimated Occupied Grizzly Bear Range

0 40 80 120 160 Kilometers





**Study Team website:
search “IGBST”**

**Annual/Technical reports:
IGBC website
(IGBConline.org)**

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