Science Update

NCDE SUBCOMMITTEE MEETING, FALL 2023
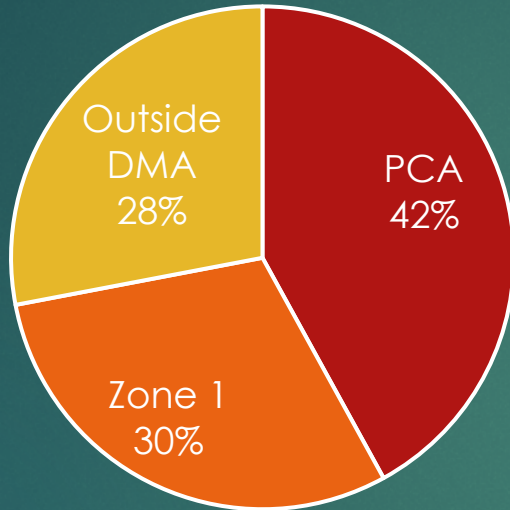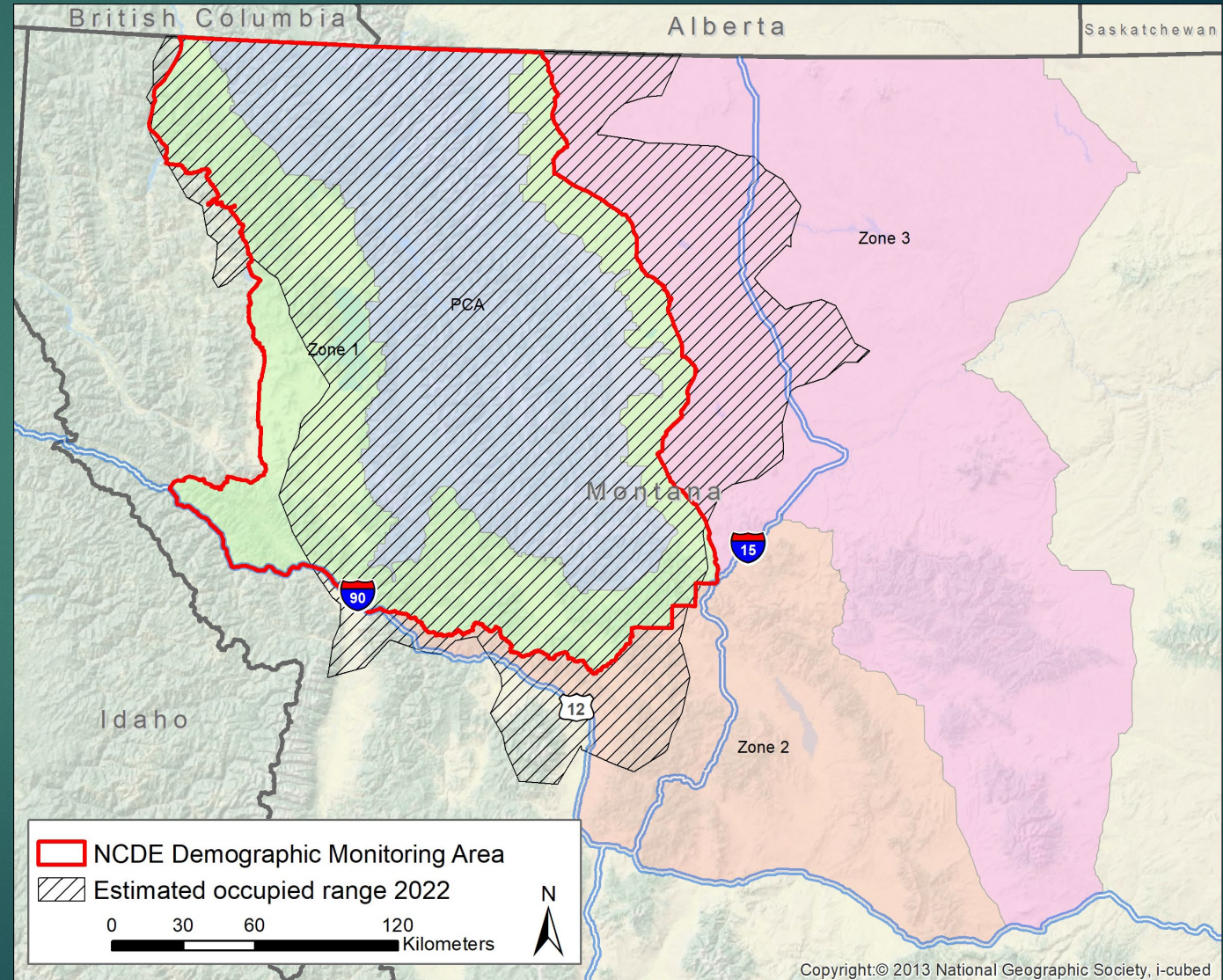
TOPICS

- 2022 Occupied Range
- 2023 Field Monitoring for Trend
- 2023 Mortalities
- Conservation Strategy Management Period
- Research Projects

2022 Occupied Range

Area = 55,650 km^2

Pie chart:
- PCA 42%
- Zone 1 30%
- Outside DMA 28%

PCA: 100% occupied
Zone 1:   84% occupied
Zone 2:   15% occupied
Zone 3:   21% occupied

Map legend:
- NCDE Demographic Monitoring Area
- Estimated occupied range 2022
- 0 30 60 120 Kilometers

2022 area = 55,650 km^2

2020 area = 67,650 km^2

What gives?

REVISED METHODS

- Consistent methods for all ecosystems
- Adopted zonal analysis & ordinary kriging, Bjornlie et al. 2014, current method in GYE
  - 3 x 3-km grid cells
  - 15-year moving window
  - 1 per day for GPS data
  - Screening of relocated bears

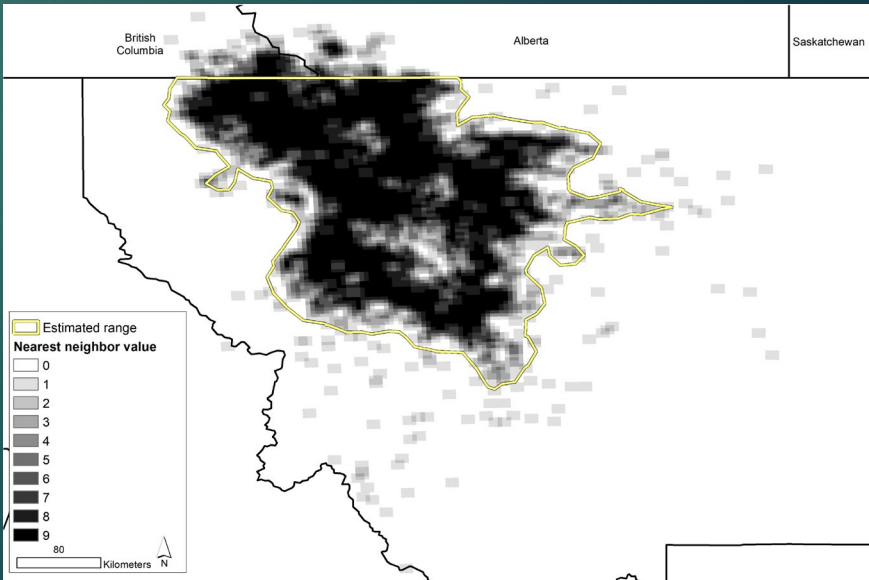# Zonal analysis & ordinary kriging; Bjornlie et al. 2014
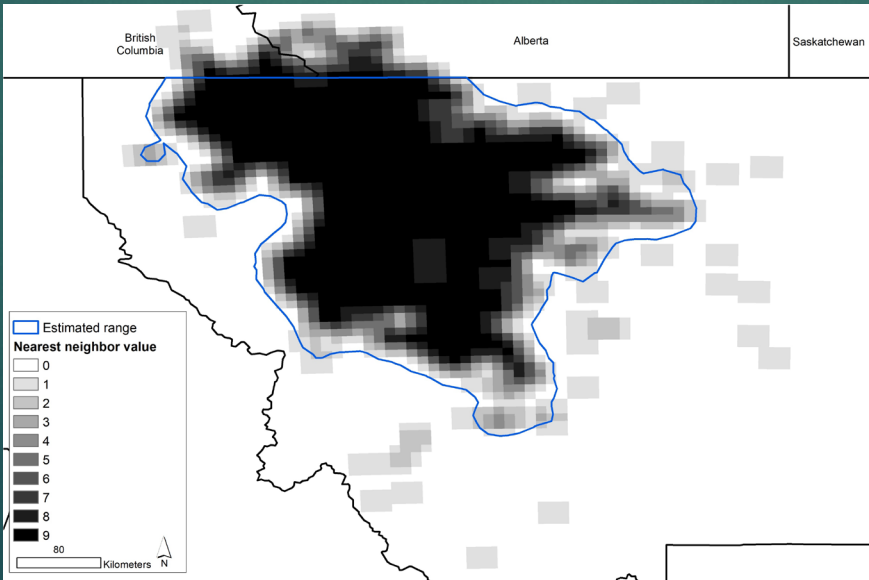

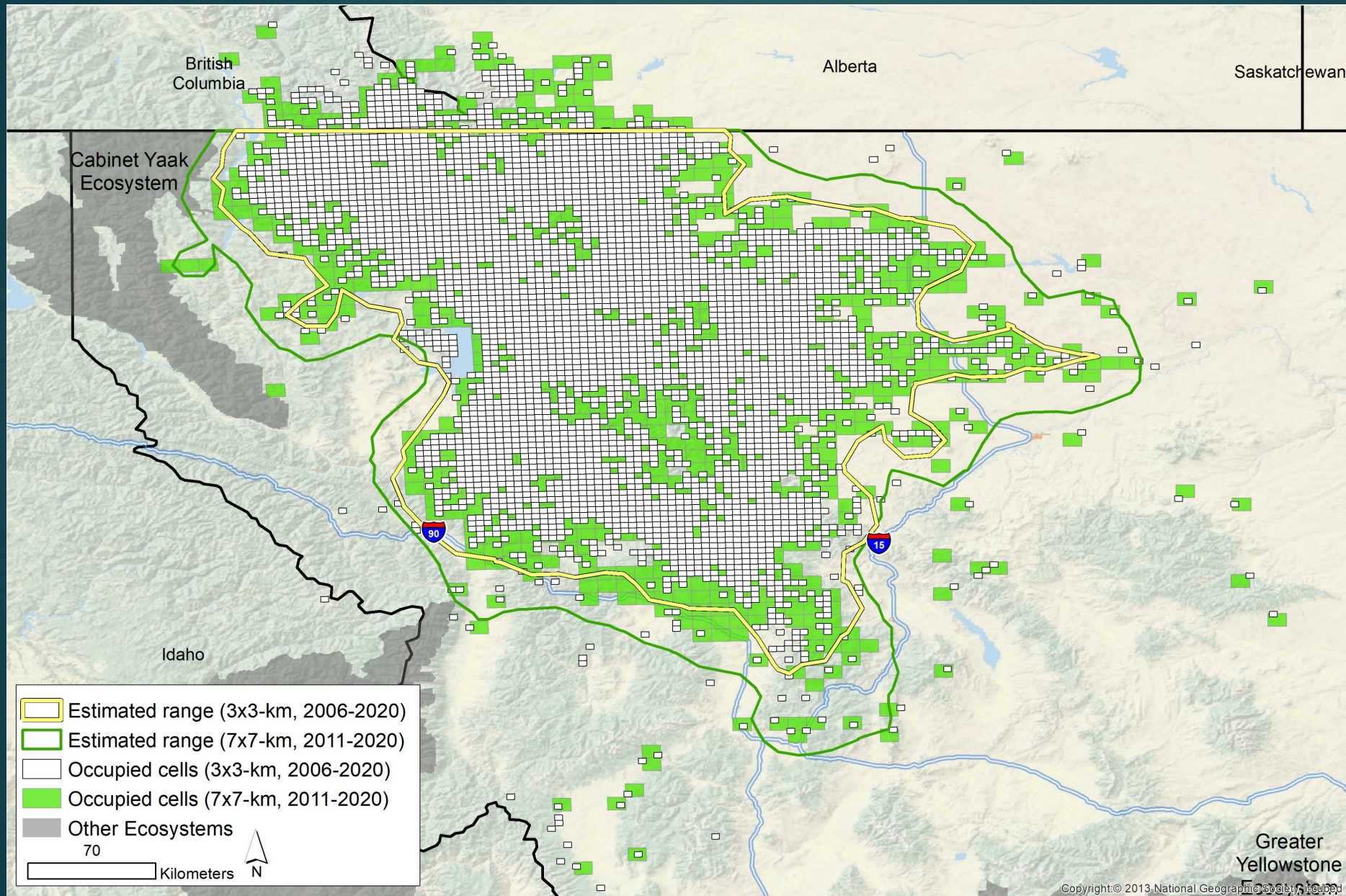
7 x 7-km grid cells, all GPS, 10 yrs   3 x 3-km grid cells, 1 per day GPS, 15 yrs

Occupied cells
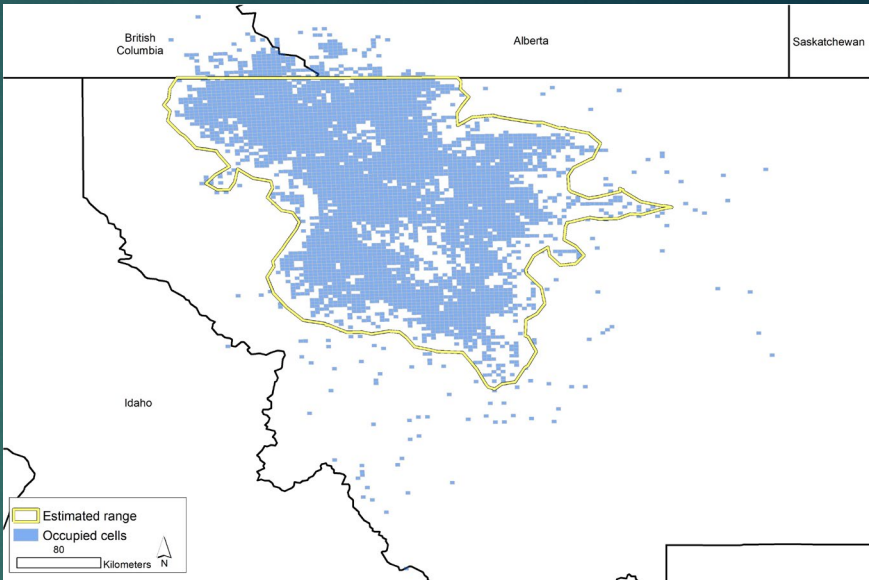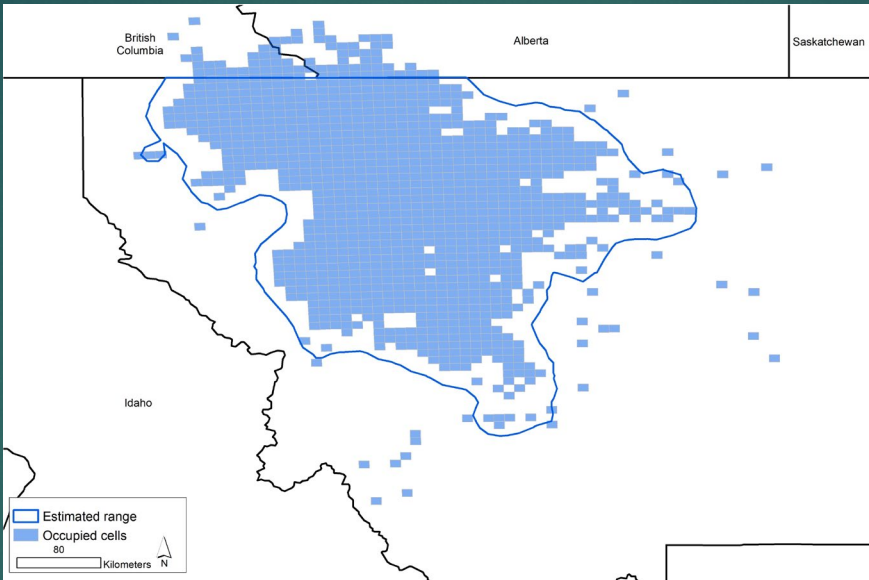
Zonal analysis

Original 2020 area = 67,650 km²

Revised 2020 area = 50,040 km²
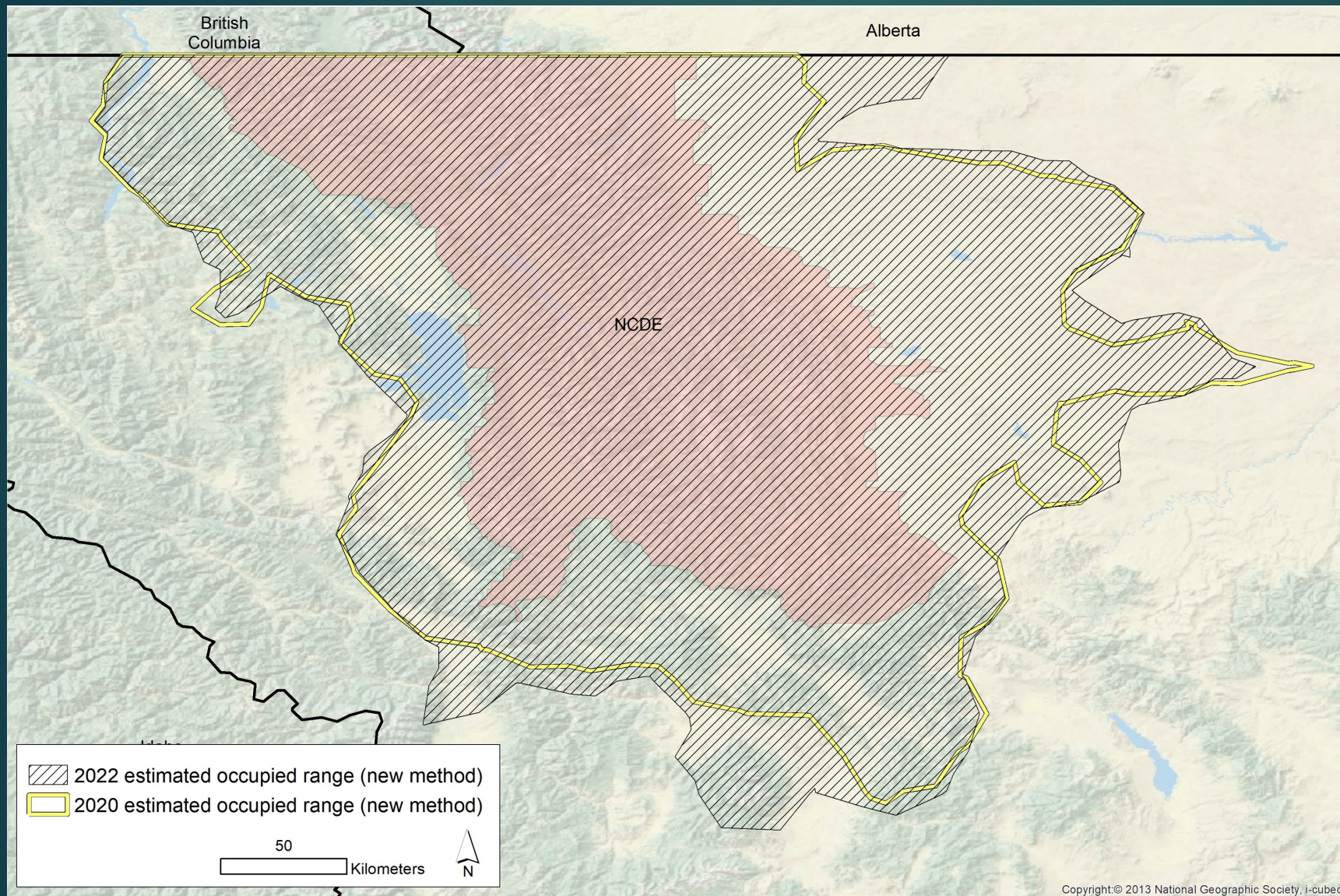
Revised 2020 area =
50,040 km^2

2022 area =
55,650 km^2

11% increase
(5.6 % per year)

RANGE EXPANSION

New methods, 2004-2022
2.9% per year

Old method, 2004-2020
2.5% per year
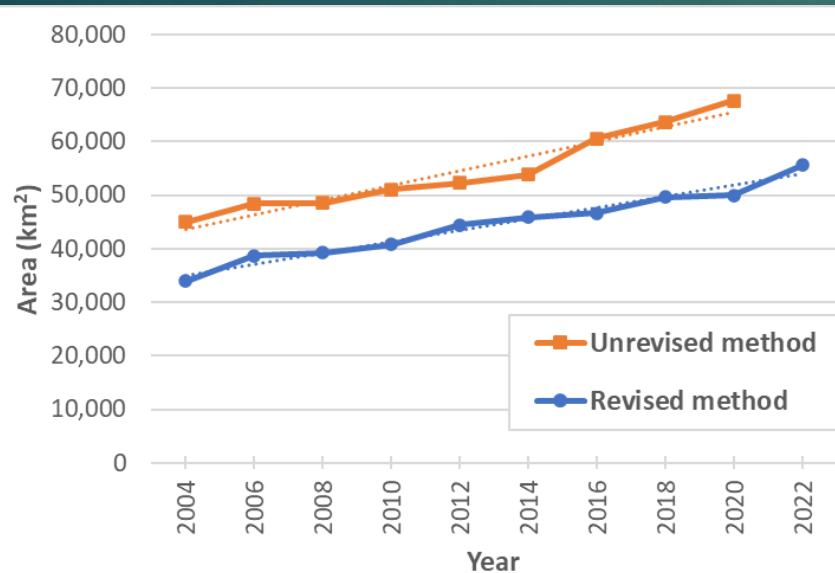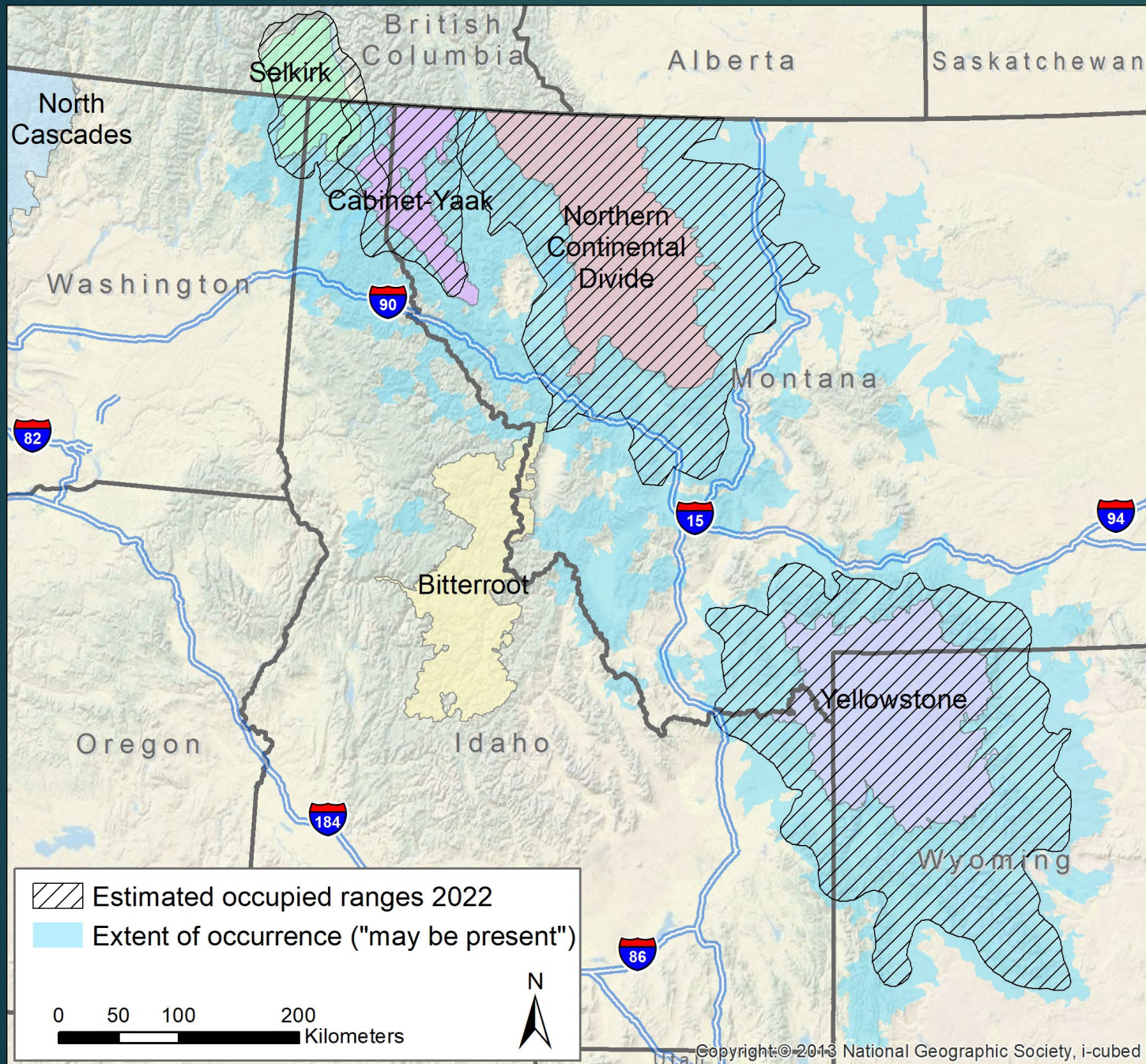
ALL RANGES

- Occupied range now estimated in all ecosystems with same method

- NCDE just touching Bitterroot Ecosystem boundary

- NCDE to GYE distance = ~100 km

- Overlap among SE, CYE, and NCDE should not be considered evidence for genetic or demographic connectivity

- "May be present" map still provides information about bear observations outside of occupied range

2023 field monitoring for trend

- CAPTURES

  11 total: 5 females, 6 males

- RADIO-MONITORING

  27 females: 18 alive and still collared, 6 censored, 3 died

  5 males: 2 alive and still collared, 3 censored

- REPRODUCTIVE STATUS

  24 females: 8 with cubs, 4 with yearlings, 12 with none

*Preliminary data, do not cite

2023 Mortalities

KNOWN AND PROBABLE MORTALITIES

	Ageclass	Female	Male	Unknown sex	Total
Inside DMA	Dependent	5	6	7	18
	Independent	8	10	0	18
	Total	13	16	7	36
Outside DMA	Dependent	1	2	3	6
	Independent	2	0	0	2
	Total	3	2	3	8

*Preliminary data, do not cite

Independent mortalities by zone
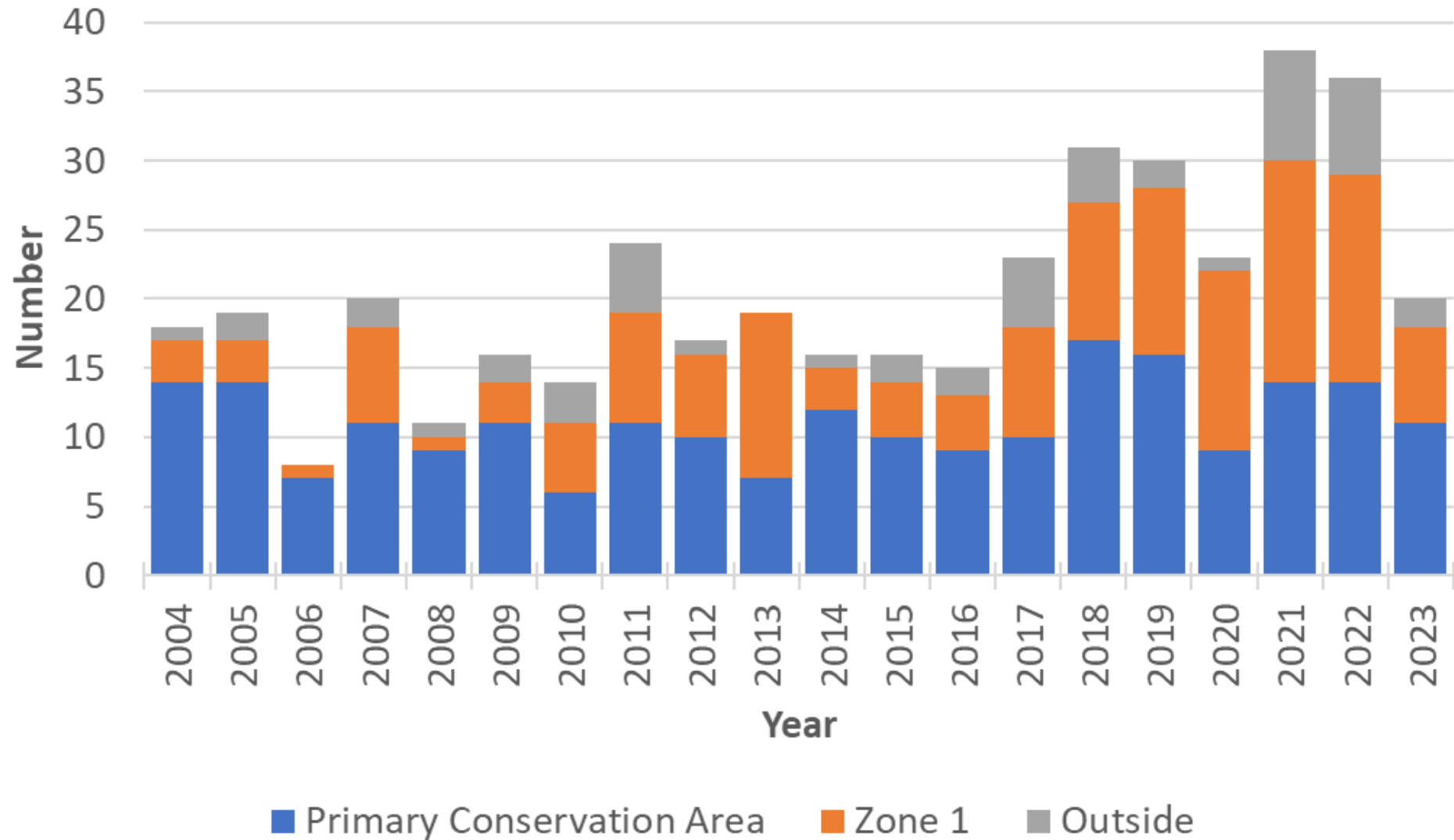
ESTIMATED TOTAL REPORTED & UNREPORTED MORTALITY

Sex	Documented mortalities by method of discovery				Estimated reported & unreported (C)	Estimated total mortality (A + B + C)
	Agency removal (A)	Telemetry (B)	Reported (high)	Reported (low)		
Female	3	2	3	0	4	9
Male	4	0	6	0	8	13
Total	7	2	9	0	12	22

*Preliminary data, do not cite

MORTALITY THRESHOLDS
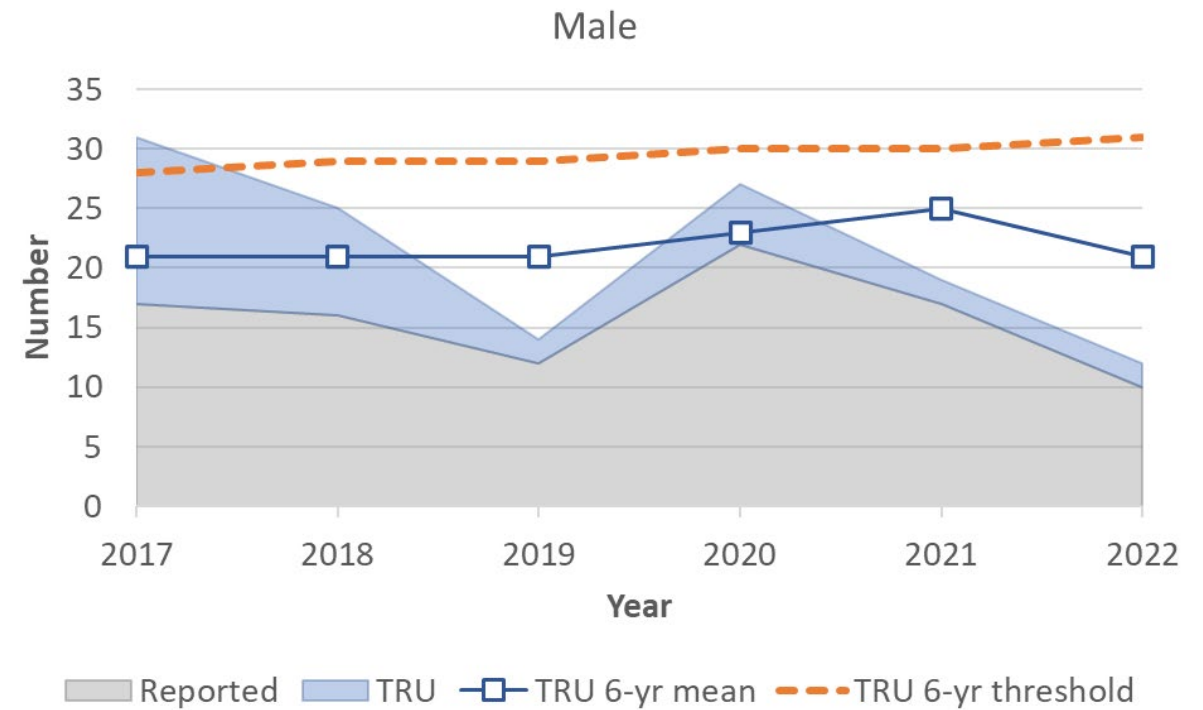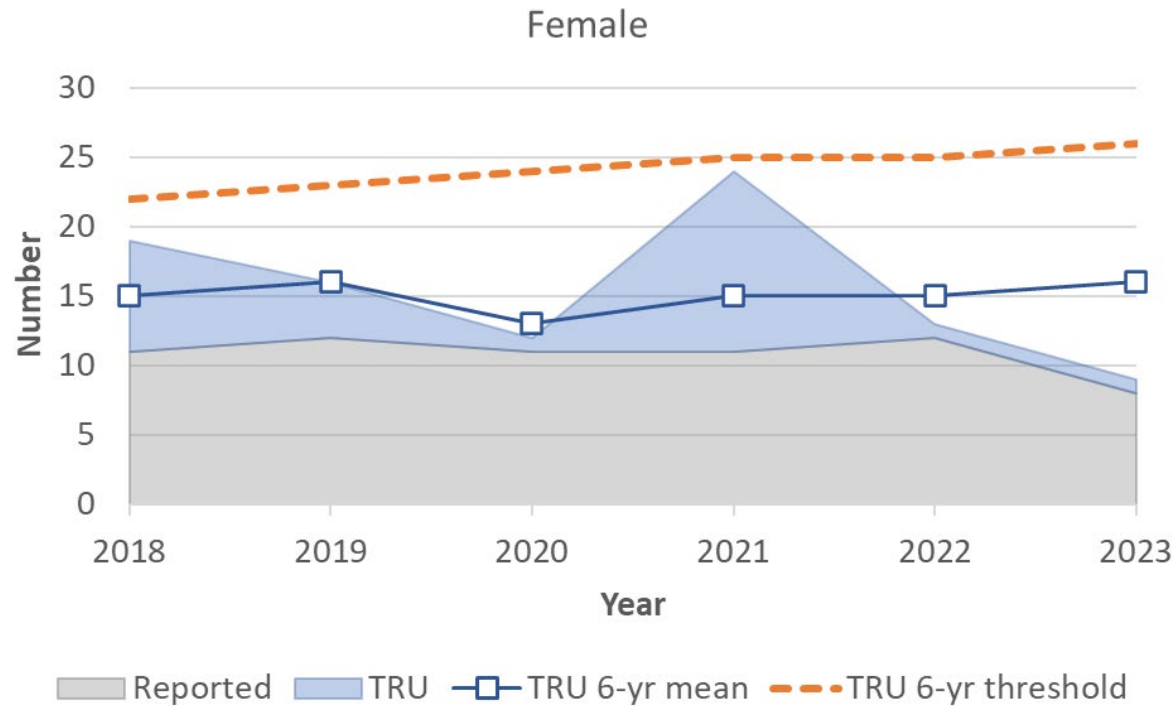
Conservation Strategy Management Period

Demographic Thresholds

- Independent female survival
- Independent female mortality
- Independent male mortality

"Thresholds will be established annually or for multi-year management periods up to six years" (page 53), based on population projections from stochastic population modeling with observed vital rates.

Table 3. Example of assignment and evaluation of annual thresholds for two hypothetical management periods beginning in 2013, including observed parameters for the years 2013–2017.

Parameter	Period	Period year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
							Period thresholds involved in 6-year running average						
Female survival	2013–2018	1	0.93	0.93	0.93	0.93	0.93	0.93					
		2		0.93	0.93	0.93	0.93	0.93	0.93				
		3			0.93	0.93	0.93	0.93	0.93	0.93			
		4				0.93	0.93	0.93	0.93	0.93	0.93		
		5					0.93	0.93	0.93	0.93	0.93	0.93	
		6						0.93	0.93	0.93	0.93	0.93	0.93
	2019–2023	1							0.92	0.92	0.92	0.92	0.92
		2								0.92	0.92	0.92	0.92
		3									0.92	0.92	0.92
		4										0.92	0.92
		5											0.92
6-year-average threshold			0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.92	0.92
6-year-average observed			0.95	0.95	0.96	0.95	0.95						
At or above threshold			Yes	Yes	Yes	Yes	Yes						
Female TRU	2013–2018	1	22	22	22	22	22	22					
		2		22	22	22	22	22	22				
		3			22	22	22	22	22	22			
		4				22	22	22	22	22	22		
		5					22	22	22	22	22	22	
		6						22	22	22	22	22	22
	2019–2023	1							27	27	27	27	27
		2								27	27	27	27
		3									27	27	27
		4										27	27
		5											26
6-year-average threshold			22	22	22	22	22	22	23	24	25	25	26
6-year-average observed			10	15	15	16	15						
At or below threshold			Yes	Yes	Yes	Yes	Yes						
Male TRU	2013–2018	1	28	28	28	28	28	28					
		2		28	28	28	28	28	28				
		3			28	28	28	28	28	28			
		4				28	28	28	28	28	28		
		5					28	28	28	28	28	28	
		6						28	28	28	28	28	28
	2019–2023	1							31	31	31	31	31
		2								31	31	31	31
		3									31	31	31
		4										31	31
		5											
6-year-average threshold			28	28	28	28	28	28	29	29	30	30	31
6-year-average observed			16	16	17	16	19						
At or below threshold			Yes	Yes	Yes	Yes	Yes						

Appendix E. Thresholds and observed estimates for demographic objectives described in the 2019 Conservation Strategy, 2017–2022. Parameters include occupancy of females with offspring within 23 Bear Management Units (BMUs) in the Primary Conservation Area (PCA) and 7 Occupancy Units (OUs) in Zone 1, tallied over the last 6 years; survival rate of independent females within the Demographic Monitoring Area (DMA) averaged over the last 6 years; and numbers of total reported and unreported (TRU) mortalities of independent female and male grizzly bears within the DMA averaged over the last 6 years.
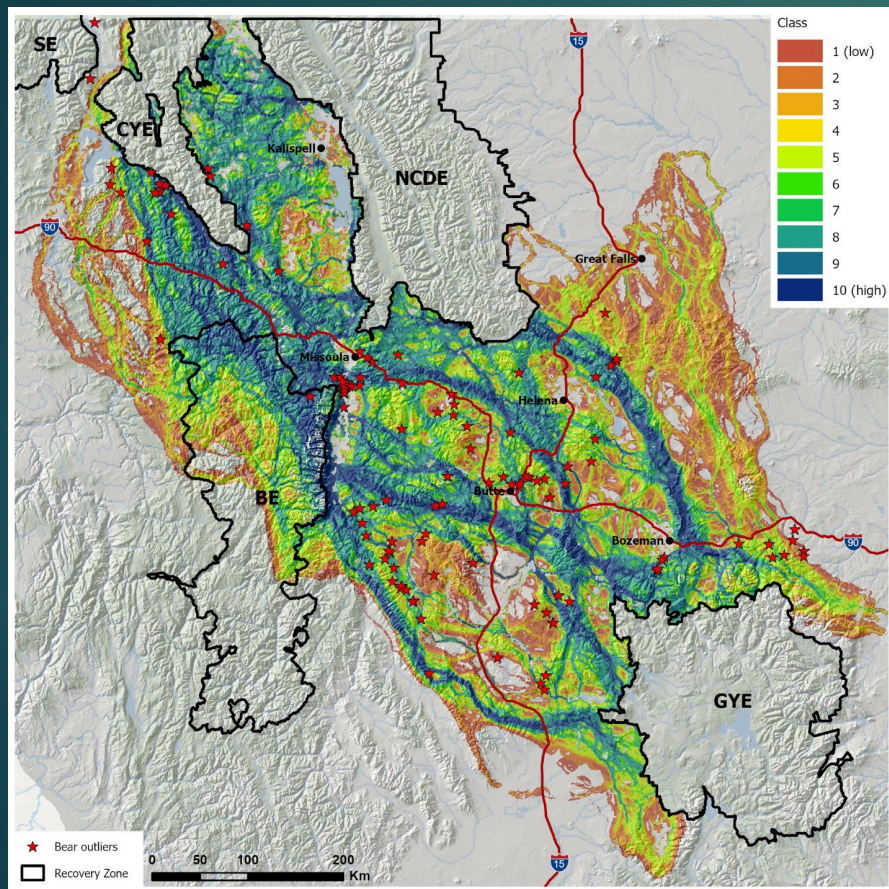
Parameter	Area or Sex	Threshold/ observed	2017	2018	2019	2020	2021	2022
Occupancy	PCA (BMUs)	Minimum	21	21	21	21	21	21
		Observed	23	22	22	23	23	23
	Zone 1 (OUs)	Minimum	6	6	6	6	6	6
		Observed	7	7	7	7	7	7
Survival rate	Female	Minimum	0.93	0.93	0.93	0.93	0.93	0.92
		Observed	0.95	0.93	0.94	0.93	0.93	0.93
TRU mortalities	Female	Maximum	22	22	23	24	25	25
		Observed	14	15	16	13	15	15
	Male	Maximum	28	28	29	29	30	30
		Observed	19	21	21	21	23	25

NCDE Conservation Strategy – page 56

2022 NCDE Annual Report – page 33

…"developing and evaluating additional inputs to the model to explicitly estimate [the proportion of bears that reside outside the DMA] and exclude those individuals from the population estimate as well as the probability that the population is above 800 bears within the DMA.

- Dispersal study underway

Research Projects

https://doi.org/10.5066/P91EWUO8

Manuscripts in preparation

- Using radio collar activity data to detect date of parturition in grizzly bears

- Determinants of birth timing in grizzly bears: physiological cues or energetic tradeoffs?
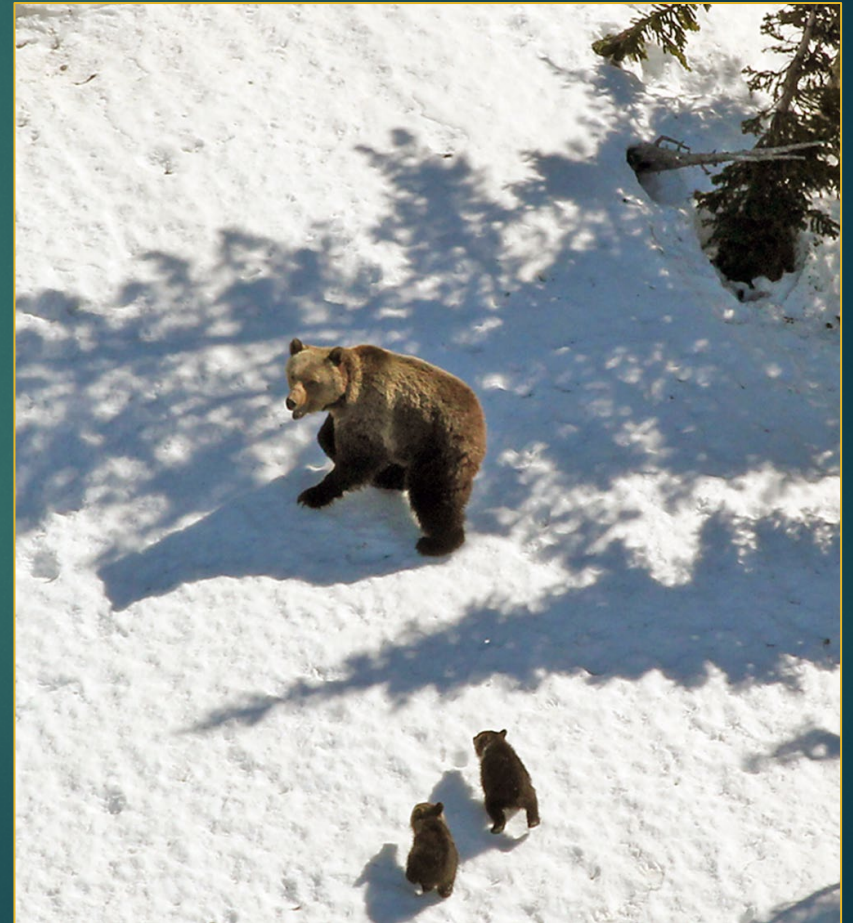
Analyses in progress

- Use of grain bins by prairie grizzly bear on the Rocky Mountain Front, Montana

- Natal dispersal of grizzly bears in the Northern Continental Divide Ecosystem

- Habitat selection response of grizzly bears to forest management practices and wildfire disturbance in the NCDE

MONITORING TEAM

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