Estimating Distribution and Range Extent for Grizzly Bear Populations

U.S. Department of the Interior
U.S. Geological Survey

Photo: J. Davis

Current Method

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Tools and Technology

Methods to Estimate Distribution and Range Extent of Grizzly Bears in the Greater Yellowstone Ecosystem

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ABSTRACT The distribution of the Greater Yellowstone Ecosystem grizzly bear (*Ursus arctos*) population has expanded into areas unoccupied since the early 20th century. Up-to-date information on the area and extent of this distribution is crucial for federal, state, and tribal wildlife and land managers to make informed decisions regarding grizzly bear management. The most recent estimate of grizzly bear distribution (2004)

This information is preliminary and is subject to revision. It is being provided to meet the need for timely best science. The information is provided on the condition that neither the U.S. Geological Survey nor the U.S. Government shall be held liable for any damages resulting from the authorized or unauthorized use of the information

Current Method

- Uses all **verified** grizzly bear location data (telemetry locations, capture, reported mortalities, reported conflicts, DNA, observations)
- Uses a 3km x 3km grid, each cell has verified occurrence or does not
- Uses zonal analysis and ordinary kriging to develop a predicted surface of grizzly bear distribution
- Defines outer perimeter of occupied range without overestimating

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 Not for Citation or Distribution

Verification of Reported Occurrences

- Important for reports outside of know ranges
- Candidate photos of bears, tracks, and/or other evidence is sent to a panel of grizzly bear researchers and managers, hair samples are sent for DNA analysis
- Unanimous opinion or confirmation by DNA is needed for a report to be considered verified

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Tail camera picture from Little Belt Mountains, 2016

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Greater Yellowstone Ecosystem

- National Parks = 10,344 km^2
- Primary Conservation Area/Recovery Zone = 23,828 km^2
- Demographic Monitoring Area (DMA) = 49,931 km^2

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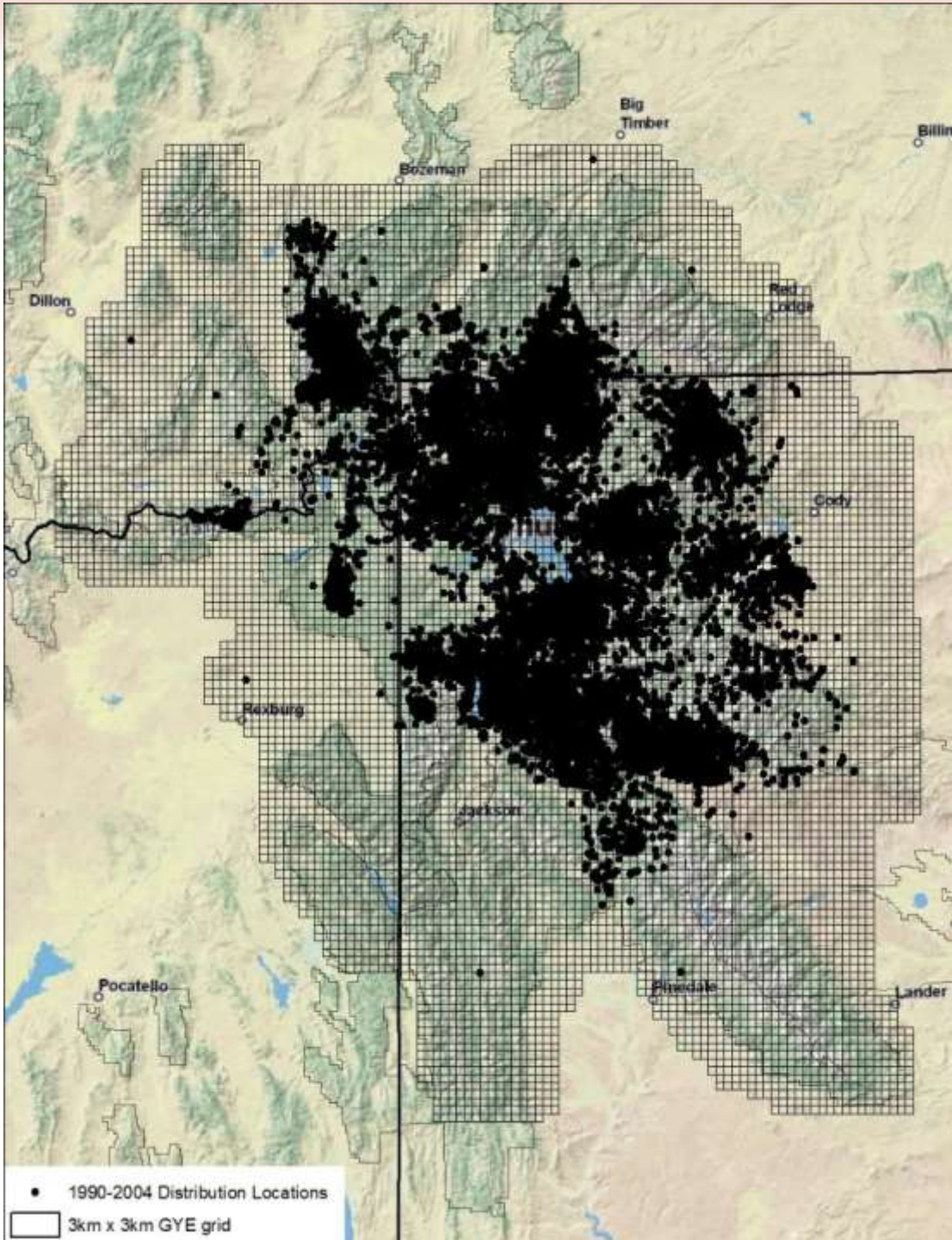
3x3 km grid cells in with verified occurrences, 1990-2004



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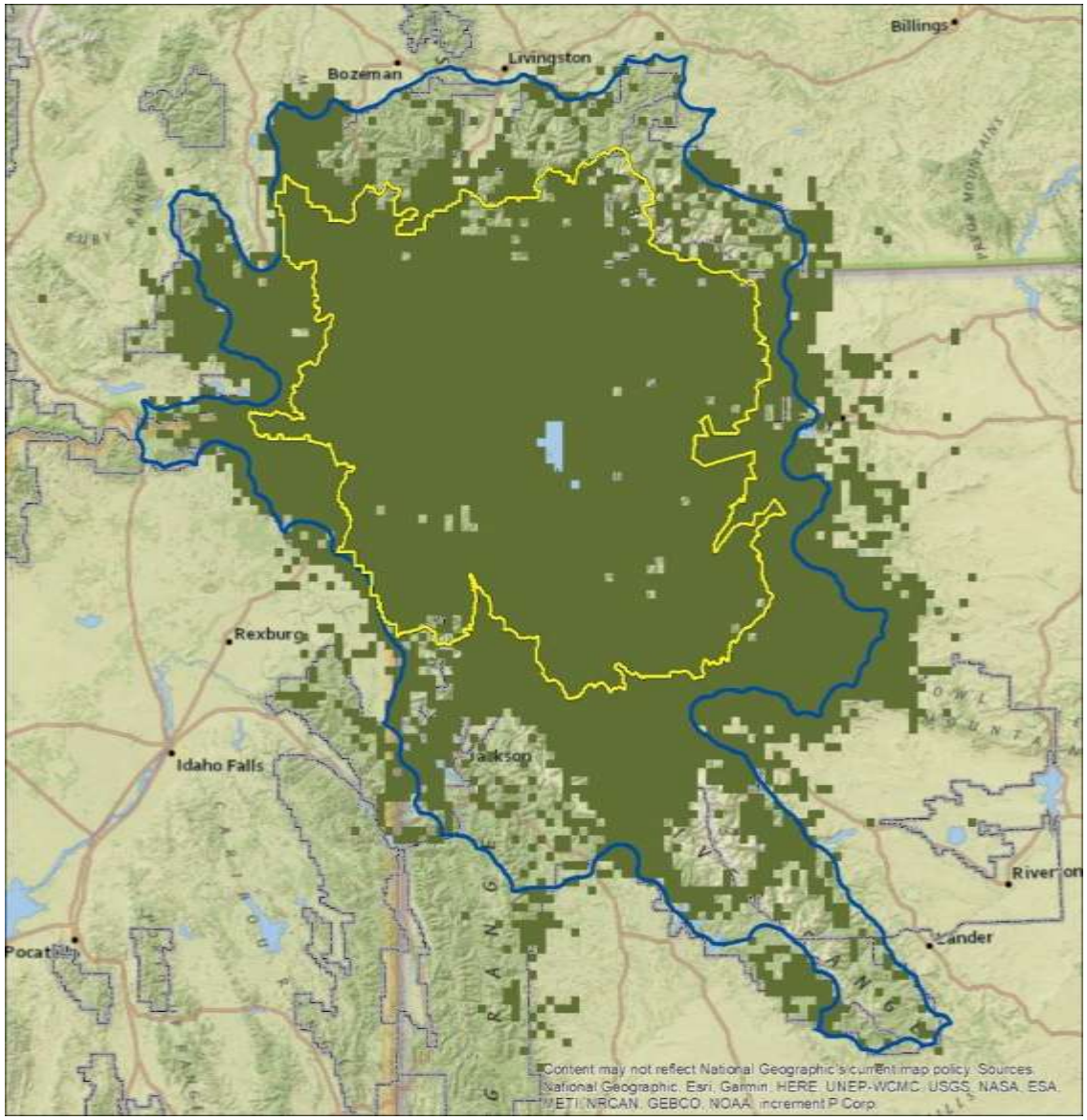
Occupied grid cells, 2004-2018



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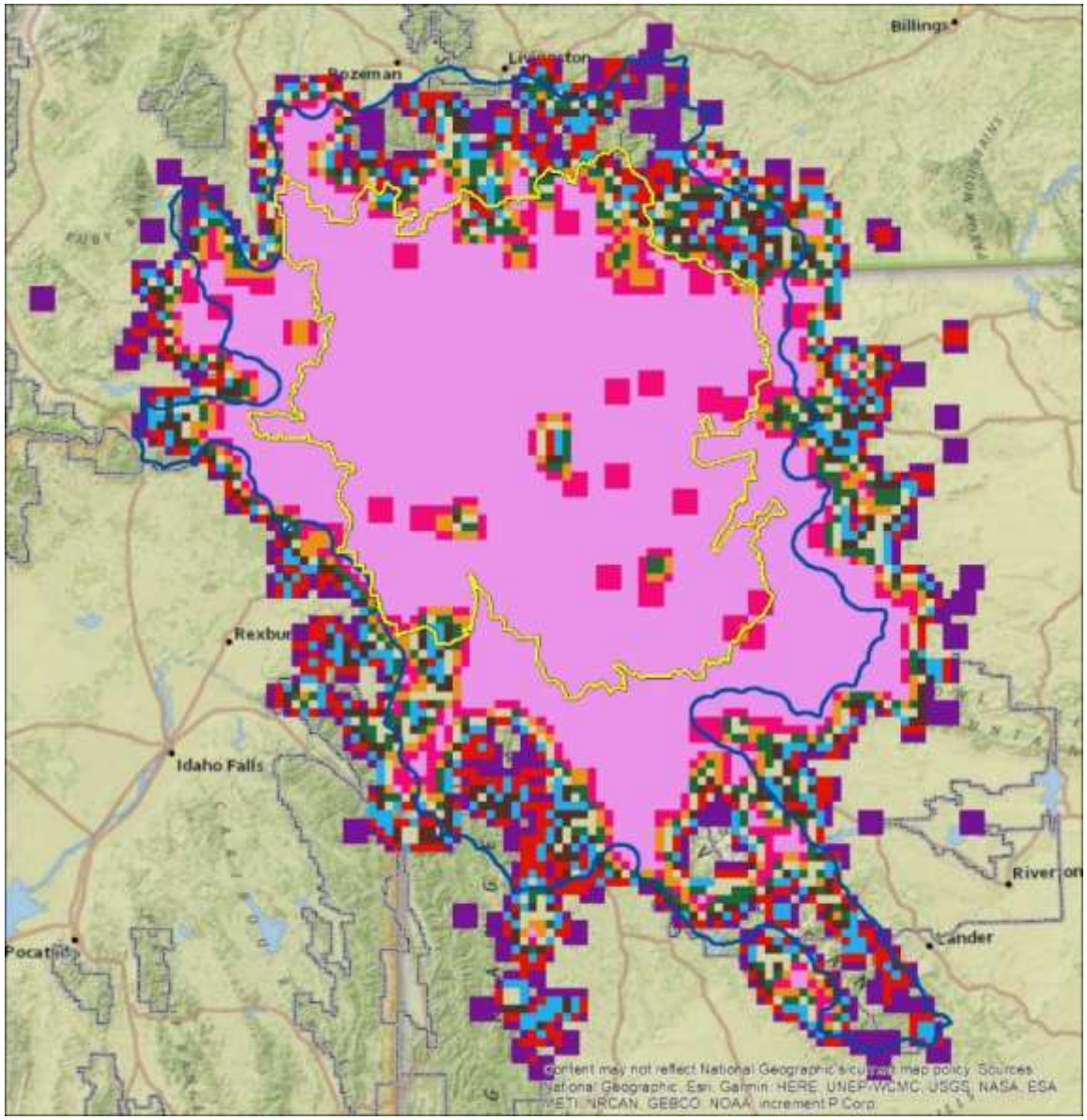
Nearest-neighbor grid cells, 2004-2018



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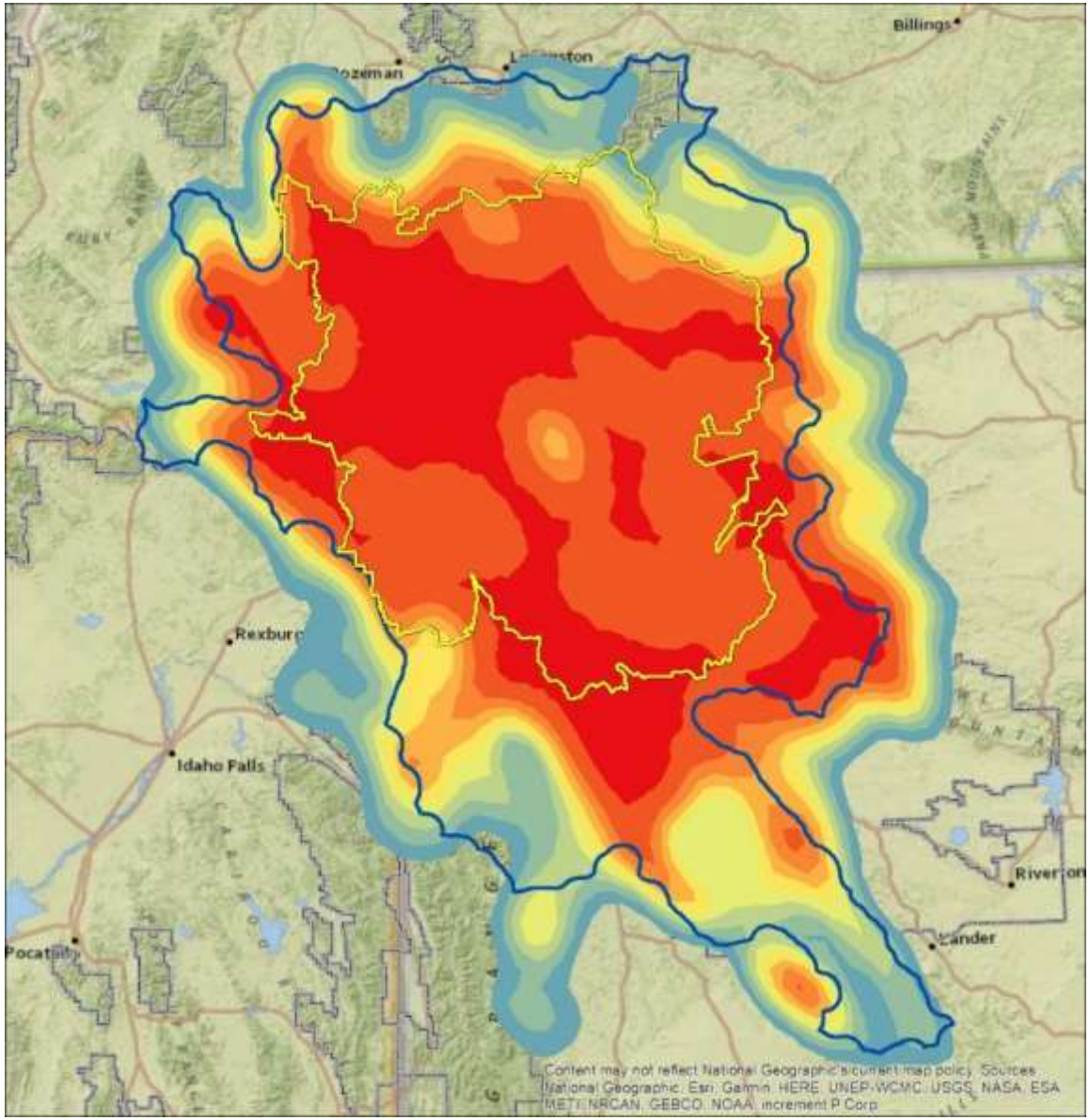
Kriged density surface, 2004-2018



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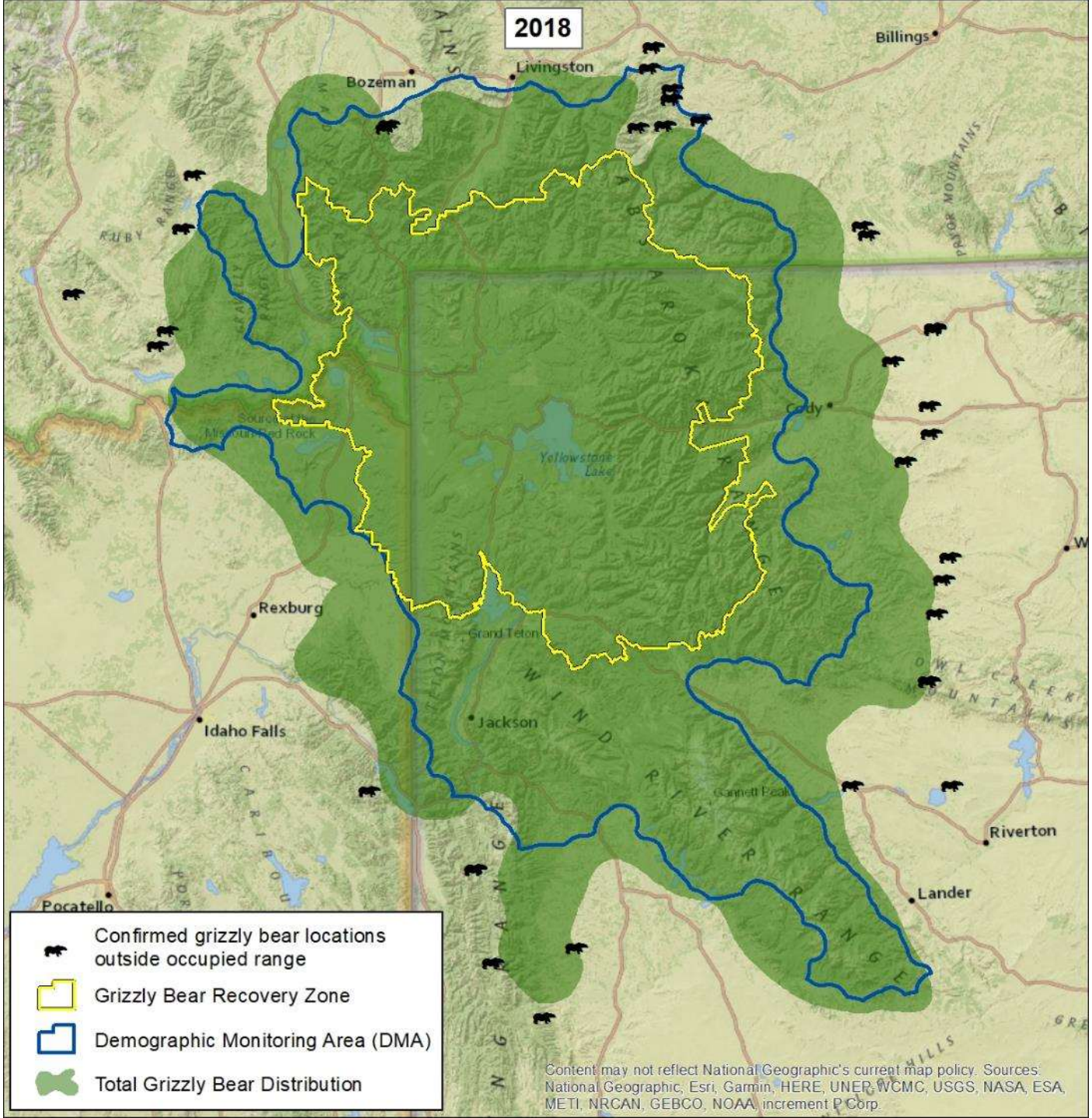
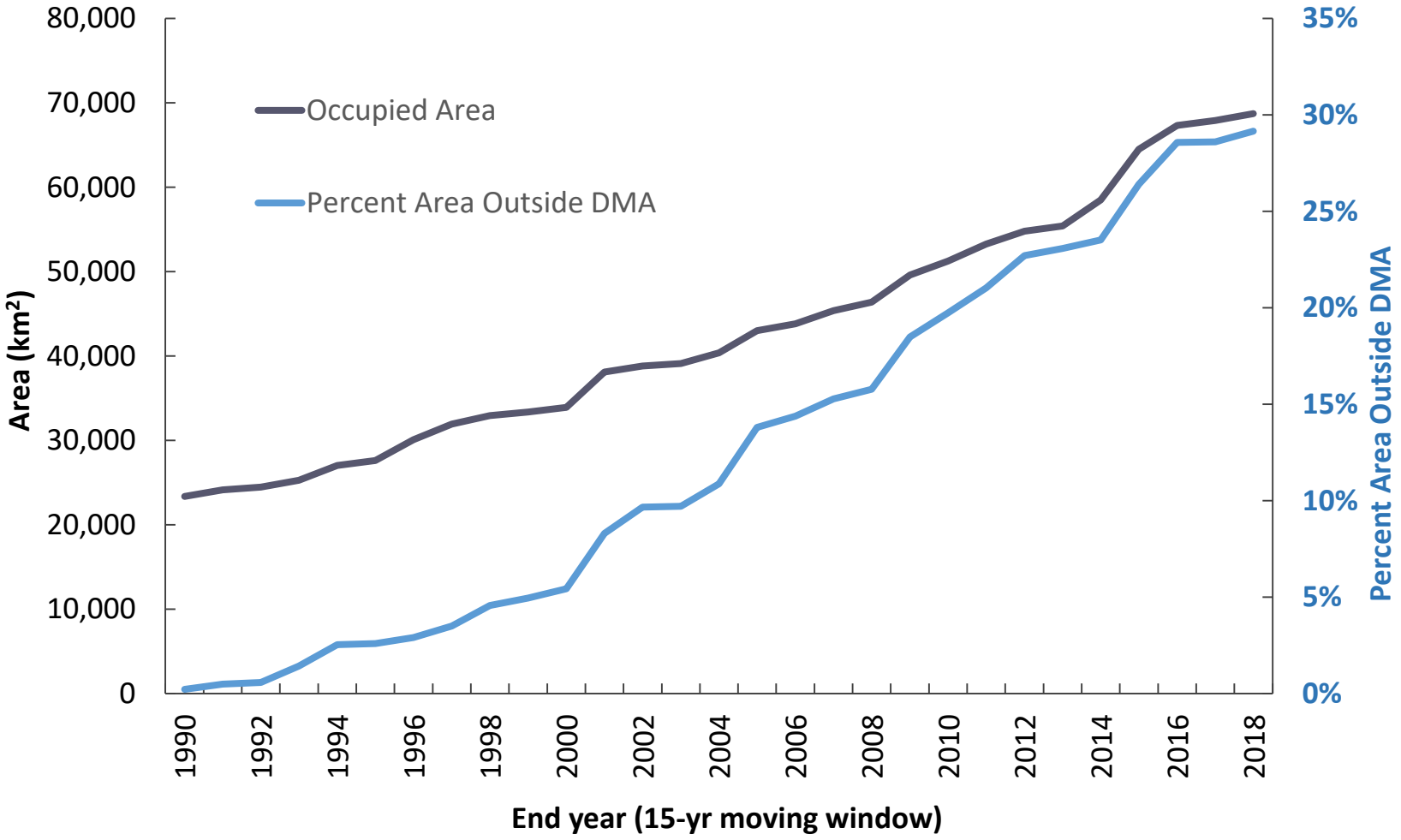

2018
Billings
Livingston
Bozeman
Cody
Yellowstone Lake
Rexburg
Grand Teton
Jackson
Idaho Falls
Pocatello
Riverton
Lander
Confirmed grizzly bear locations outside occupied range
Grizzly Bear Recovery Zone
Demographic Monitoring Area (DMA)
Total Grizzly Bear Distribution
Content may not reflect National Geographic's current map policy. Sources: National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.

Occupied grizzly bear range and percent outside DMA 1990-2018



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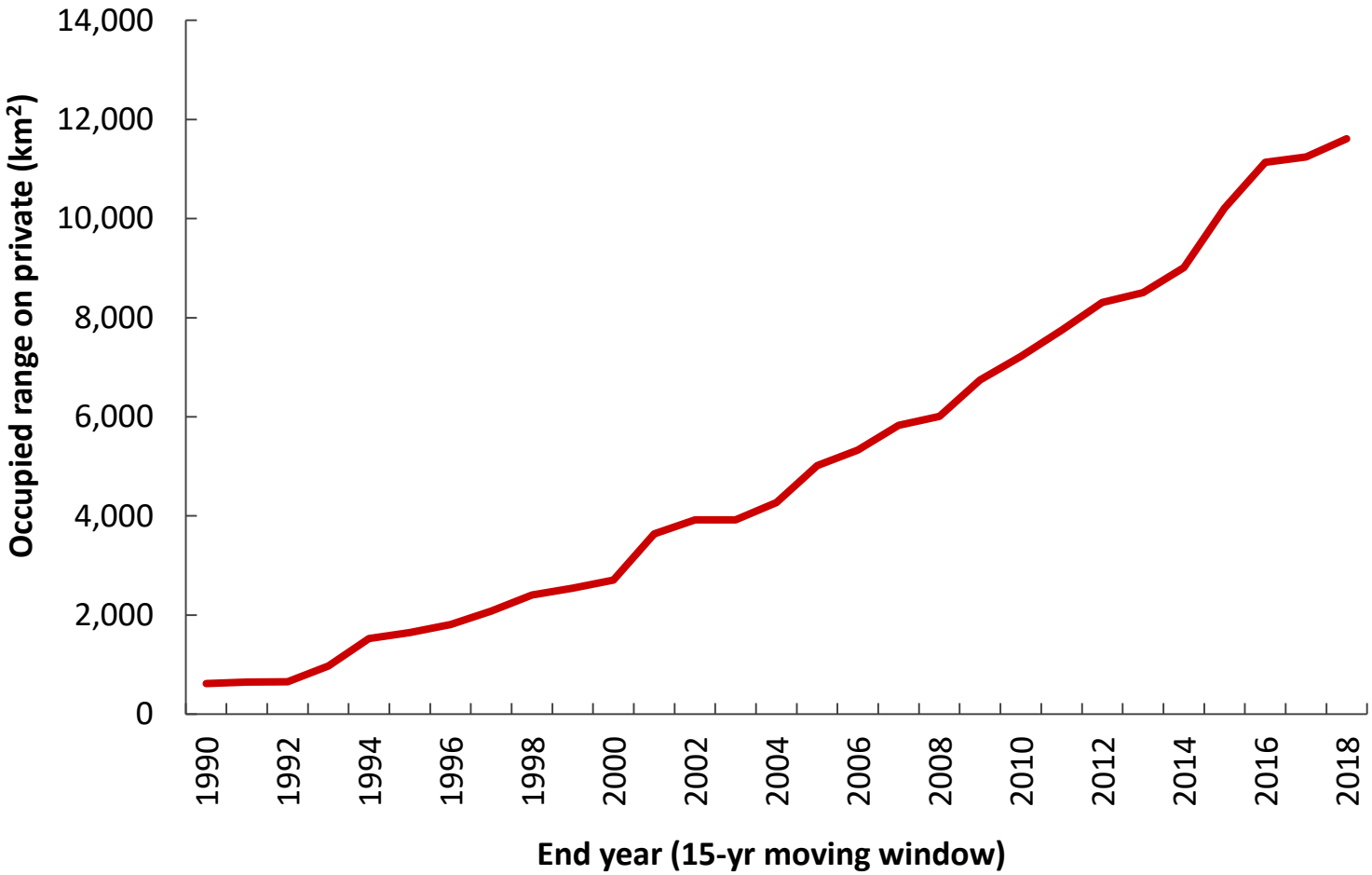
Bjornlie and Haroldson (2019)

Occupied grizzly bear range and private land 1990-2018



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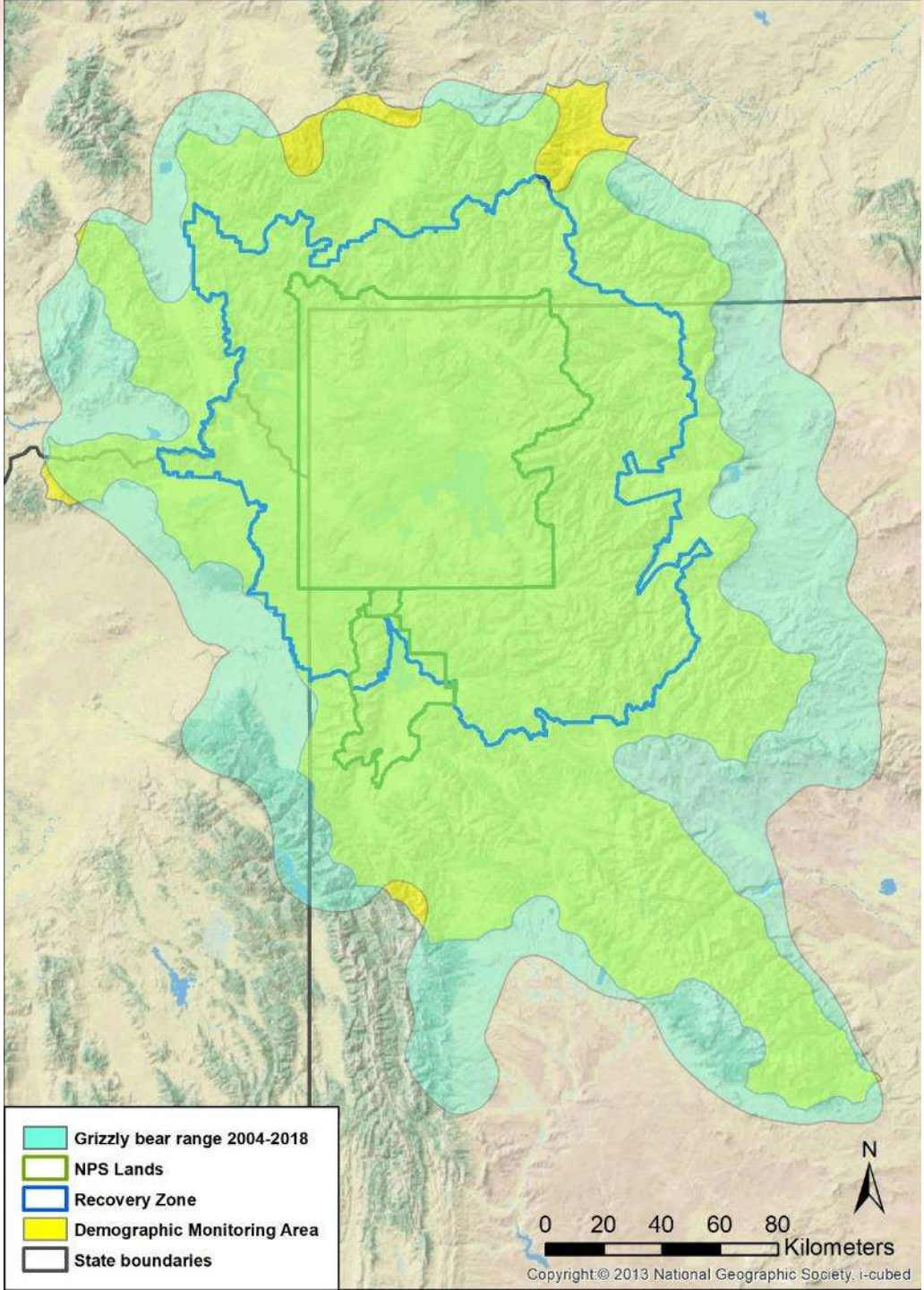
Bjornlie and Haroldson (2019)

Greater Yellowstone Ecosystem

- Occupied range (2004-2018) = 68,736 km^2
  - 98% of DMA occupied
  - 30% outside the DMA
  - ~12,000 km^2 private land



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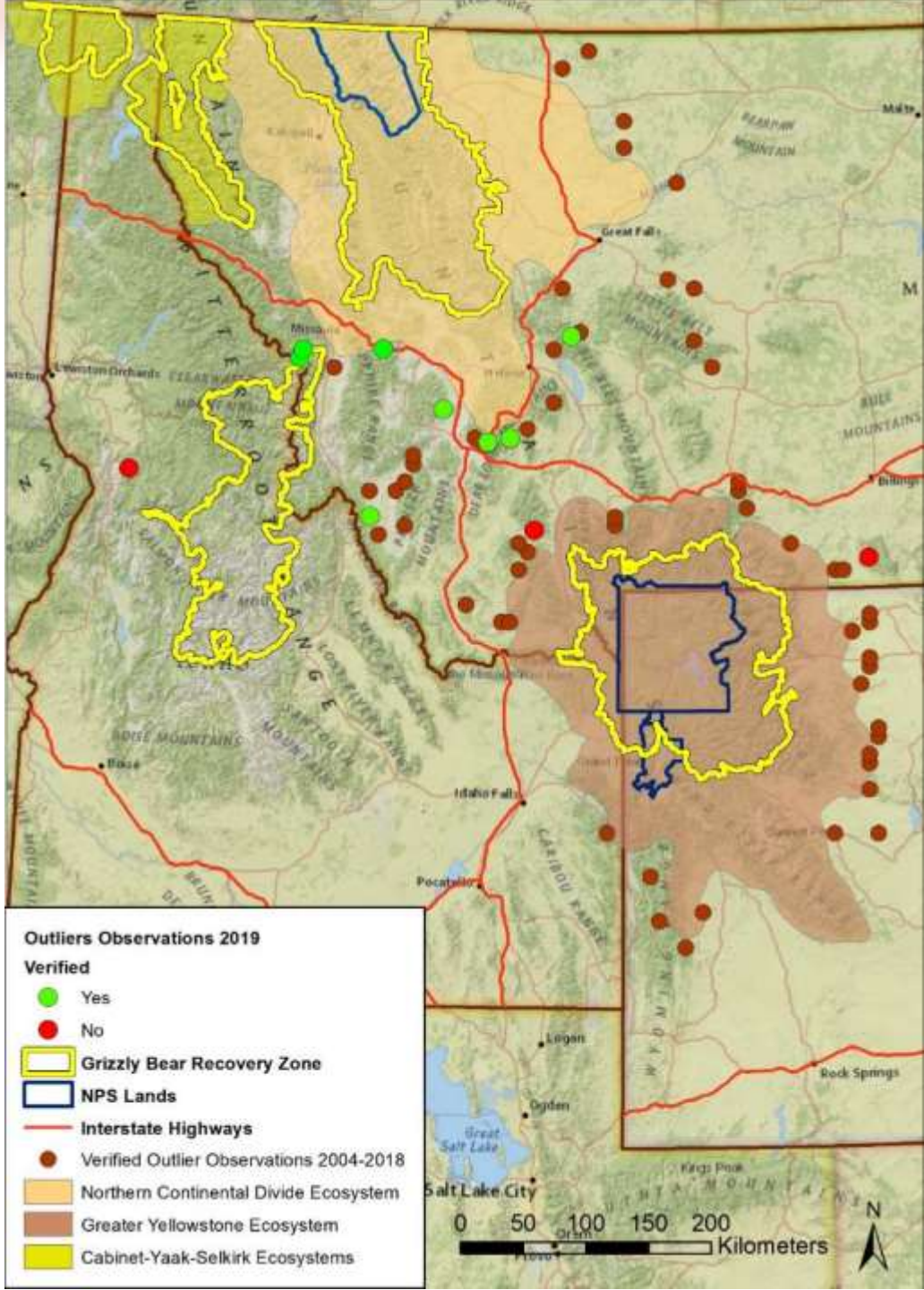
Grizzly bear distributions and outliers



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