IDAHO DEPARTMENT OF FISH AND GAME

Ed Schriever, Director

Surveys and Inventories

Statewide Report

WOLF

July 1, 2017 to June 30, 2018

Prepared by: Jim Hayden and Katie Oelrich
Wildlife Staff Biologists

2020
Boise, Idaho

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STATEWIDE REPORT

SURVEYS AND INVENTORY

JOB TITLE: Wolf Surveys and Inventories

STUDY NAME: Wolf Population Status and Trend Studies

PERIOD COVERED: July 1, 2017 to June 30, 2018

Statewide

During Calendar Year 2017, Idaho Department of Fish and Game (IDFG) sold 41,612 wolf tags, including 41,240 hunting tags and 372 trapping tags. This number includes hunting and trapping tags purchased individually and those wolf hunting tags included in the Sportsman's Package. It is unknown how many of the individuals who purchased tags hunted specifically for wolves.

The Idaho Fish and Game Commission adopted some significant changes to wolf seasons during the reporting period for the 2017 & 2018 Big Game Season Setting.

- Annual wolf harvest limits were removed from the Sawtooth, Southern Mountains, Beaverhead, and Island Park Elk Zones.
- Wolf hunting seasons were expanded in Game Management Units (GMU) 19A, 20A, 22, 23, 24, 25, 29, 30, 30A, 32, 32A, 31, 33, 34, 35, 36, 36A, 36B, 37, 37A, 39, 43, 44, 45, 48, 49, 50, 51, 52, 58, 59, 59A, 60, 60A, 61, 62, 62A, 63, 63A, 64, 65, 66, 66A, 67, 69, 76 and portions of GMUs 21 and 28 outside of designated wilderness to open August 30 and run through April 30.
- Wolf trapping seasons (including snares) were opened in 32A, 33, 66, and 69, to open October 10 and run through March 31.
- Expand wolf trapping season dates in GMUs 2, 4A, 39, 43, and 44 to open October 10 and run through March 31.

Through 2015 wolf monitoring data were summarized on a calendar year (CY) basis for monitoring relative to delisting criteria. However, with initiation of harvest seasons, it became more useful to shift summaries to a biological year (BY) basis, starting with the birth pulse (approximately May 1). This allowed a more informative interpretation of the harvest characteristics and impacts on the wolf population. Unless otherwise stated, harvest data in this report are summarized on a BY basis, May 1– April 30. Hunters are required to report harvest of a wolf within 10 days of kill. Harvest from hunting primarily occurs incidentally during elk and deer hunting seasons. Harvest increased during this reporting period compared to the past three years (36% over the past 3 years/period).

Management Objectives

Wolves are currently managed under the 2002 Idaho Wolf Conservation and Management Plan and are classified as a big game animal, see link:
https://idfg.idaho.gov/old-web/docs/wolves/plan02.pdf . Harvest has been authorized by the Fish and Game Commission by hunting since 2009 and by trapping since 2011.

Idaho Department of Fish and Game's goal is to manage wolves to reduce conflicts, ensure a self-sustaining wolf population, balance with other big game species and maintain state management authority. Idaho Department of Fish and Game will monitor mandatory reporting and check-in data, as well as other sources of wolf mortality, to ensure harvest does not cause the population to approach the 15 wolf pack delisting criteria. Seasons and areas can be closed if mortality is determined to be excessive.

Monitoring

Until May 2016 wolf monitoring was focused on assessing population characteristics relative to ESA delisting criteria. Since then monitoring has been intended to assess the population relative to criteria in the 2002 Wolf Plan and to inform harvest and other management decisions.

Where wolf densities are high, management need not be very restrictive, and population monitoring may be limited, evaluating the population primarily for broad-scale changes. Most monitoring tools can be used at different levels of intensity, but practical and financial considerations typically dictate the extent to which a given tool is used. Monitoring will be more intensive at low population densities than at high densities.

Population Surveys and Monitoring

The 2002 Wolf Plan identified a wolf population of more than 15 packs as a criterion for wolf management, depredation control, and monitoring under Idaho Fish and Game Commission authority. Below 15 packs, monitoring is heavily reliant upon radio-collaring. When more than 15 packs are present monitoring is done primarily by indirect management indicators (Idaho Legislative Wolf Oversight Committee 2002).

Available Monitoring Tools

Several monitoring tools were used during the reporting period to provide insight into Idaho's wolf population including:

1. A statewide array of remote cameras to document wolf distribution and pack demographics in an occupancy model framework (Ausband et al. 2014);
2. Genetic identification of individual wolves through sampling of scats at rendezvous sites (Stansbury et al. 2014) to determine pack characteristics and trend in abundance (Ausband, 2018);
3. A mandatory, physical check of all harvested wolves to help determine population composition and distribution;
4. Incidental observations of wolves by members of the public to help determine distribution;
5. Direct observation during big game aerial survey flights;
6. Monitoring of lethal control actions authorized by IDFG; and,
7. Radio-collared wolves.

Capture, Radio-mark and or Telemetry

Twenty wolves fitted with GPS radio collars were being monitored at the start of BY2017. At the end of the BY, nine remained. Collar failure was a prominent factor during the BY (Table 1).

Twelve wolves were captured and radio-collared during the report period. Four wolves were captured and radio-collared by IDFG in the Lolo Elk Zone to assist in wolf removals under the

Lolo Predation Management Plan. Under authority of IDFG, eight wolves were radio-collared by USDA Wildlife Services to assist in wolf removals to address livestock depredations. Of these, four remained available for monitoring at the end of the BY2017 (Table 1).

Wolf Distribution and monitoring

From 2009 to 2017, wolf distribution was monitored through multiple data sources and occupancy models based on non-invasive genetic sampling in predicted rendezvous site habitat, locations of radio-collared wolves, a survey of wolf observations by hunters, and covariates such as slope, elevation, and forest cover.

During summer 2017, IDFG systematically surveyed wolf habitat for wolf presence north of the Snake River Plain with remote cameras to improve wolf occupancy models. This portion of the state was divided into 222 grid cells of 686 km^2 (approximating the size of an average wolf territory in Idaho). One remote camera was placed in modeled predicted wolf habitat within each cell (Figure 1). Cameras were deployed by July 1 and retrieved after September 30. Idaho Department of Fish and Game personnel deployed 207 cameras along roads and trails within 500 m of predicted wolf rendezvous site habitat in each non-wilderness cell. In these units, only covariates were used for modeling occupancy included livestock density, forest cover, slope elevation, elk density and proximity to occupied cells. Cameras yielded 1,233 images of wolves.

The most supported, and parsimonious occupancy model considered contained forest cover (β = 0.15, SE = 0.05) and livestock density (β = -0.66, SE = 0.18) in addition to camera observations (Ausband. 2018). Forest cover is likely a surrogate for available prey species and livestock density a surrogate for wolf removal due to depredation events. The probability of detection was most affected by length of the camera detection zone. Occupancy models populated with data from wolf sightings made by big-game hunters were unreliable. Wolves were well-distributed across Idaho during summer 2017 (Figure 2). Estimated occupancy north of the Snake River Plain was 0.44 (SE = 0.04).

We were also able to calculate the number of packs in the state using a patch occupancy methods. Naïve occupancy (one, overall estimate of occupancy accounting for imperfect detection and cells not sampled) of wolves statewide was estimated to be 40.7% (SE ± 0.04). Following Ausband et al. (2014), the average size of a wolf pack territory (686 km^2) was multiplied by the total number of cells (N = 222), then multiplied by the naïve occupancy estimate (0.407), providing a total area estimated to be occupied by wolves in Idaho (61,982.84 km^2). The total area was then divided by the average territorial size (686 km^2), estimating a total of 97 packs (Table 1).

To expand upon occupancy modeling efforts developed by IDFG research staff, we propose a more intensive trail camera effort to estimate wolf abundance, to use in tandem with multiple data streams (e.g., DNA from harvest) for an Integrated Population Model. To obtain a statistically robust, statewide abundance estimate of wolves using trail cameras, it is important to consider the variability of wolf density throughout the state. To account for sampling effort needed from high to low density areas, we created three strata (high, medium, and low) from the mean estimates of wolf occupancy; in other words, each state cell was assigned a low, medium or high stratum. Within each state cell (26,200 meters resolution), we created a grid of smaller, focal cells that are much higher in resolution (6,550 meters) (Figure 3). There are 16 focal cells

within each state cell. Results are still being analyzed and a more precise occupancy model for wolves is being developed by IDFG research personnel.

In 2017, DNA was collected at rendezvous site and from harvested wolves to provide a minimum count of gray wolf reproductive packs through reconstruction of sibling groups among harvested young of the year. Genotypes were generated using nuclear DNA microsatellite loci (as reported in Stansbury, et al., 2014) for 95 individuals designated as young of the year (YOY) through tooth analysis. Of the original 95, 77 samples were of adequate quality to provide consensus genotypes at 90% or more of the loci. These assignments were based on genotyped tissue samples from 2,734 wolf samples previously collected in Idaho. The maximum-likelihood configuration identified 39 total full-sibling groups, with 29 sibling groups of 2-4 individuals and 10 individuals that represented the only detected members of their putative sibling groups (Clendenin, H. 2018. Unpublished Internal Report). Analyses from previous years produced higher counts of sibling groups among harvested YOY (49 for 2014, 55 for 2015, and now 39 for 2016). However, this may reflect lower detection rather than a reduction in number of reproductive packs in the field.

In summary, the combination of several techniques, including rendezvous population estimates, occupancy modeling, high density camera grids, along with supporting data such as litter size and DNA harvest estimates, can produce reliable annual estimates of wolf population dynamics from camera surveys.

Hunting, Trapping, and Harvest Characteristics

Seasons

Hunting seasons vary across the state depending on management objectives and social considerations. Most GMUs were open to wolf hunting August 30–March 31. Seasons were open year-round across all land ownerships in 24 of Idaho's 99 GMUs, and across private land only in six GMUs. The year-round season framework was implemented by the Fish and Game Commission to help reduce predation on livestock and elk populations.

Most wolf trapping seasons were open November 15-March 31. An earlier opening date of October 10 is used to help address elk management conflicts in 10 GMUs. Both foothold traps and snares were legal for trapping wolves, with some regulation restrictions on configurations. In three GMUs, only foothold traps were legal. In 18 GMUs, trapping equipment was limited to foothold traps only on public lands. In four units, trapping was allowed only on private property.

Bag Limits

Individuals could harvest up to five wolves with hunting tags per calendar year. Certified trappers could also purchase up to an additional 5 trapping tags per trapping season (valid July 1 – June 30 rather than for a calendar year). Wolf hunting tags are also valid for trapped wolves). Despite bag limits allowing multiple wolves, few individuals take more than one in a year.

Harvest

Hunters and trappers are required to present the hide and skull of all harvested wolves to an IDFG staff person. The required check of harvested wolves provides detailed harvest information

for management. During BY2017, hunters and trappers took 331 wolves, 30% above the previous three-year average (Table 3). During BY2017, trappers took 133 wolves, 22 % above the previous three-year average and hunters took 197 wolves, 36% above the previous three-year average. The percent of 3 year old and older wolves comprised 17% of the harvest, a decrease from 24% in BY2016.

The wolf harvest density (number of wolves harvested per 100 square miles) is greatest in the northern half of the state, particularly in well-roaded areas close to population centers (Figures 4 and 5). Wolf harvest combined among the Panhandle, Clearwater, and Southwest Regions comprised 70-75% of the total statewide harvest during BYs 2016-2018. Wolf harvest density provides information on relative differences between units for harvest, but provides no information as to differences in harvest rates between units.

However, during both BY2016 and BY2017, genetic samples from harvested wolves were compared to these DNA samples collected from rendezvous site surveys to determine harvest rates in five game management units from three study area including units 4, 28, and 33-35 (Ausband et al. 2010, D. Ausband. 2018). Genotypes were established from 125 scat and hair samples collected at rendezvous sites and analyzed at the University of Idaho genetics lab. Results from BY2016 estimated (pooled) the 11.2% of the animals sampled we harvested during the hunting season in these units, less than half the rate of human-caused mortality suggested to be necessary to reduce a wolf population (Adams et al. 2008). Results from BY2017 showed that 25.5% of the wolves we collected scat from in summer 2017 ended up in harvest that following fall/winter. These rate pertains only to these units. The percentage of wolves that was harvested in other units is unknown.

Wolf Depredation on Livestock

Management to reduce wolf depredation on livestock remains a top priority. Livestock depredations occur largely southward and eastward of the lower Clearwater to Island Park (Figure 5). The scarcity of depredations in central and northern Idaho is associated with a lack of significant livestock grazing. The scarcity of depredations south of the Snake River Plain in southern Idaho is associated with minimal wolf activity.

During calendar year 2017, USDA APHIS Wildlife Services recorded 139 confirmed and probable depredation incidents of domestic animals; almost double the number of incidents from 2015 and 2016 (Table 4). Cattle were associated with 109 reports (78%), sheep with 29 reports (21%), and other animals with 1 report (1%). A total of 319 confirmed and probable livestock deaths were wolves caused; of those, 133 cattle were mortalities and 182 sheep mortalities (Table 5). During CY2017, 65 wolves were killed in response to livestock depredations or were killed by livestock producers/landowners in defense of property.

Wolf Predation

Management of predation is an important priority for elk managers (Idaho Department of Fish and Game 2014). The impact of wolf predation on ungulate populations likely varies with the species of prey, their abundance and recent population trends, the type and abundance of other predators, and the types and abundance of other prey. Across the state in 21 different areas, 868 radio-collared elk were monitored throughout the winter. Adult cow survival was 98% and calf

survival was 66%. Leading cause of mortality for both adult cow elk and calves was mountain lions (Idaho Department of Fish and Game, Elk Statewide Report FY2018).

From May 2017 through April 2018, 10 wolves were killed to address wolf predation on elk in the Lolo Elk Zone.

Management Discussion

As wolf population monitoring needs have shifted from federal delisting needs to state management needs, IDFG has shifted its wolf monitoring focus from telemetry-based methods to methods based on remote cameras and DNA from wolf scats as well as harvest data. Occupancy modeling and wolf harvest patterns, indicate Idaho's wolf management continues to maintain wolves remain well-distributed and self-sustaining within the state.

Conflict resolution remains a top agency priority. Wolf depredations on livestock will likely remain a difficult issue wherever distributions of wolves and livestock overlap. Some relief can be obtained through measures to reduce wolf-livestock interactions through harvest, focused wolf control, changes to animal husbandry practices, and through measures that discourage wolf presence. USDA Wildlife Service agents are now radio-collaring wolves in high depredation areas under IDFG oversight.

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Tables

Table 1. Status of radio-collared wolves during BY2017 (May 1, 2017 – Apr 30, 2018).

Time Period	Collared wolves	Fate at end of BY2017						
		Harvested		Depredation Kill (Livestock)	Dispersed from Idaho	Unknown mortality	Unknown fate (lost tracking)	Alive
		Hunting	Trapping					
Available at start of BY2017	20	1	2	0	1	1	6	9
Collared during BY 2017	12	2	2	2	0	0	2	4

Table 2. Number of wolf packs (95% CI) estimated from an occupancy model using images of wolves captured at camera traps in Idaho, summers 2016 and 2017. The number of estimated packs is the sum of the occupancy estimates for each cell sampled by a region and assumes grid cell size equals wolf pack territory size.

Region	2016	2017
1	16.7 (13.3 – 19.9)	20.7 (17.3 – 23.4)
2	22.8 (18.9 – 26.9)	26.9 (22.6 – 31.0)
3 McCall	9.3 (7.6 – 11.2)	10.5 (8.8 – 12.3)
3 Nampa	9.1 (6.7 – 12.3)	9.9 (7.9 – 12.2)
4	4.9 (3.5 - 6.8)	3.9 (2.8 – 5.5)
5	0.8 (0.4 – 1.7)	0.4 (0.2 – 0.9)
6	10.3 (7.6 – 14.0)	9.7 (7.3 – 13.1)
7	14.0 (10.9 – 17.2)	14.8 (11.9 – 17.9)
Idaho total	87.9 (69.0 – 109.9)	96.8 (78.7 – 116.2)

Table 3. Idaho wolf harvest, BY2009 - BY2017 (BY = May 1 – Apr 30).

Harvest Type	BY2009	BY2010	BY2011	BY2012	BY2013	BY2014	BY2015	BY2016	BY2017
General Season Harvest	181	0	376	316	291	258	272	233	331
Predator Control	0	0	22	6	34	21	20	0	9
Depredation Kill	8	13	13	4	13	5	1	2	13
Wildlife Services	112	37	56	42	70	35	63	54	62
Other	23	9	26	13	16	13	23	8	11
Unknown	23	19	13	6	17	17	8	6	1
Total	**347**	**78**	**506**	**387**	**441**	**349**	**387**	**303**	**427**

General Season Harvest: General hunting and trapping harvest.
Predator Control: wolves harvested to address elk populations below objectives.
Depredation Kills: A landowners harvests a wolf protecting their property.
Wildlife Services: Control actions implemented after a confirmed livestock depredations that resulted in a harvested wolf
Other: includes capture mortality, illegal kill, road kill, pick up and other minimal harvest categories.

Table 4. Probable and confirmed wolf-caused livestock depredation incidents in Idaho, CY2015 - CY2018.

Livestock Affected (# Incidents)	Year			
	2015	2016	2017	2018
Cattle	44	60	109	173
Dog	4	3	1	4
Goat	0	0	0	1
Llama	0	0	0	2
Horse	2	0	0	1
Sheep	21	13	29	33
Grand Total	**71**	**76**	**139**	**214**

Table 5. Probable and confirmed wolf-caused livestock deaths in Idaho, CY2015 - CY2018.

Livestock Affected (# Animals)	Year			
	2015	2016	2017	2018
Cattle	44	86	133	225
Dog	3	9	3	8
Goat	0	0	0	1
Llama	0	0	0	3
Horse	1	1	1	2
Sheep	134	93	182	243
Grand Total	**182**	**189**	**319**	**482**

Figures

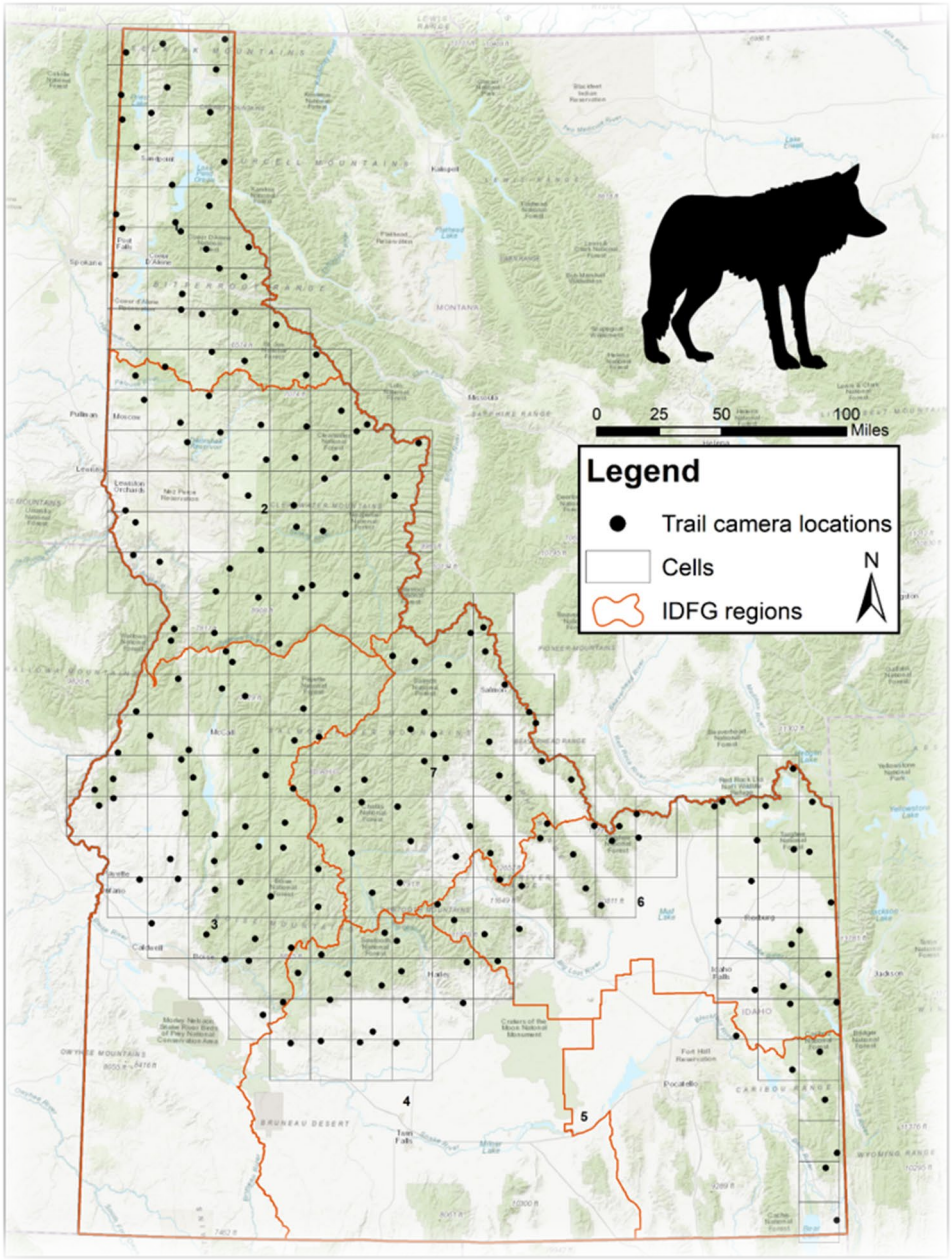

Figure 1. Sampling grid and remote camera locations used for 2017 occupancy modeling.

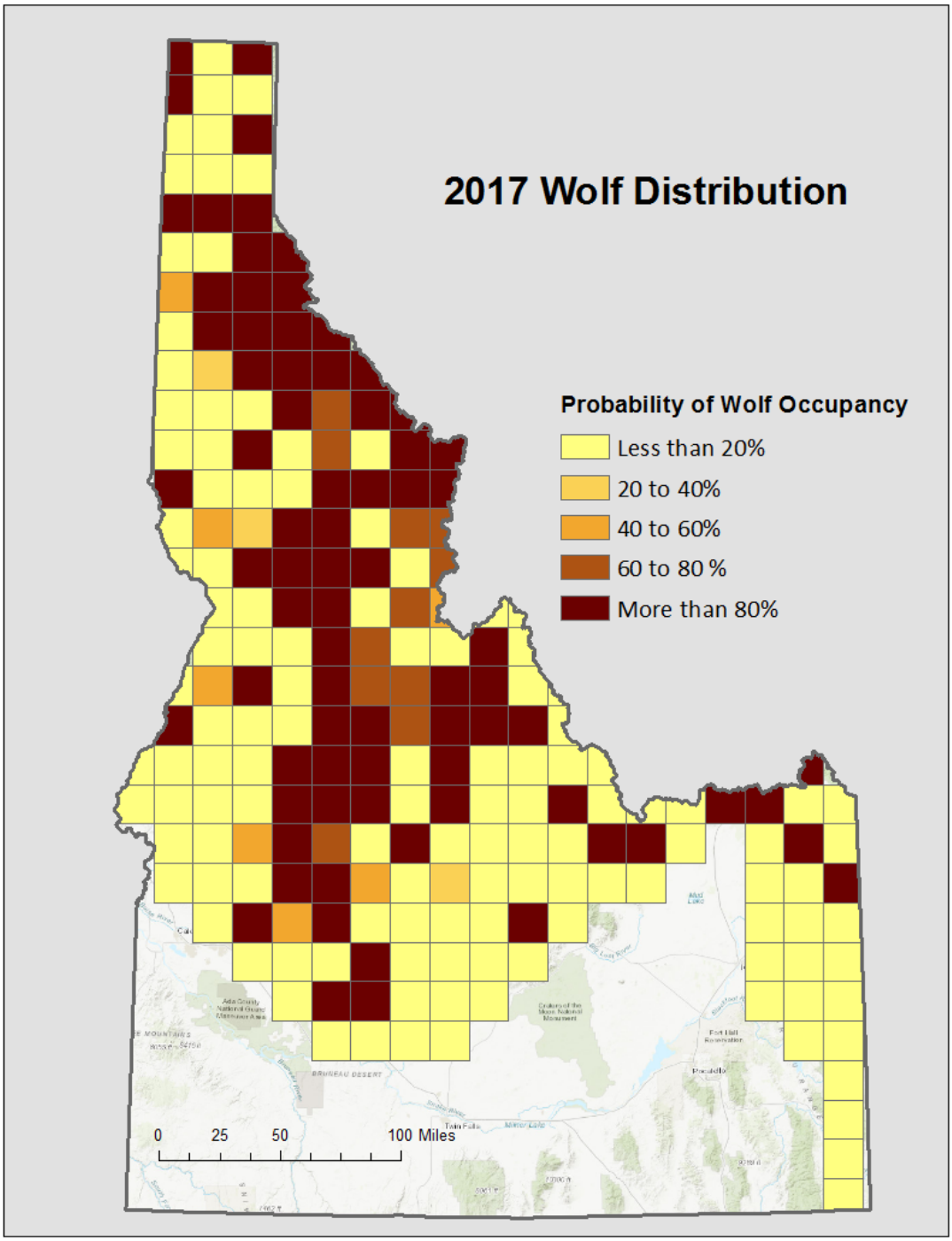

Figure 2. Wolf occupancy distribution during summer 2017. (Estimated conditional wolf occupancy from a model using images of wolves captured at camera traps in Idaho. Conditional occupancy defines any cell with a wolf detection as occupied. Occupancy is then estimated only for the remaining cells without wolf detections.

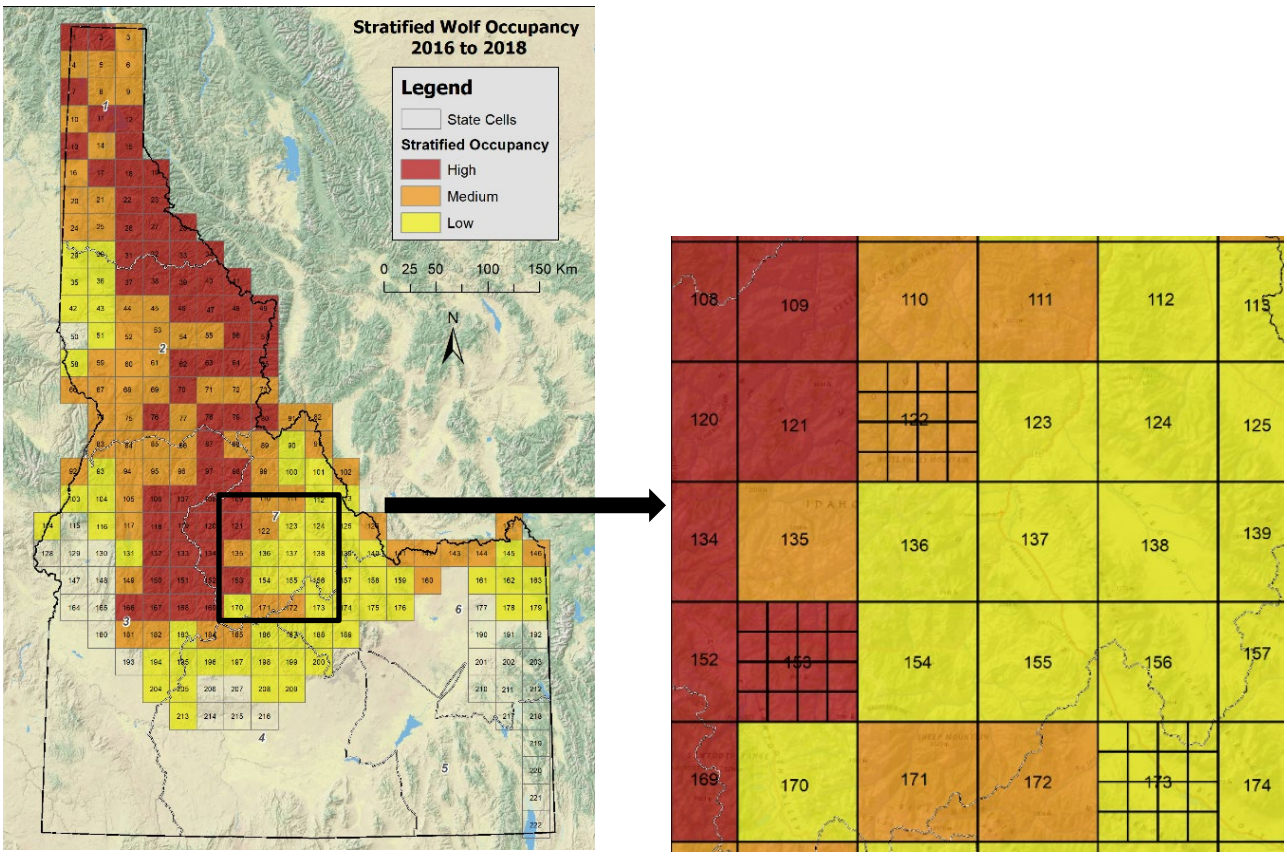

Figure 3. Example of stratified random sampling with focal cells nested within selected state cells. There are 16 focal cells within each state cell.

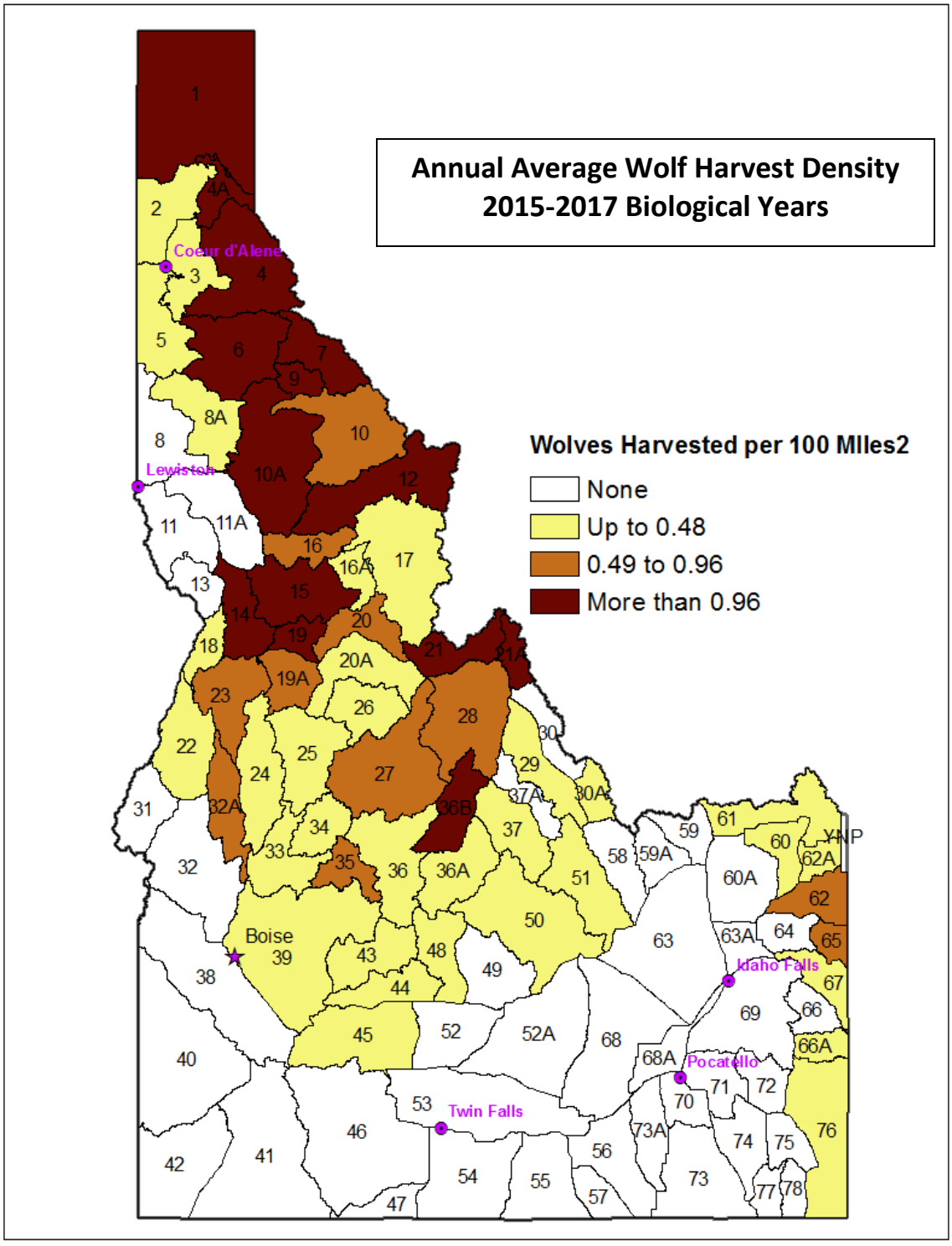

Figure 4. Distribution of wolf harvest (hunting and trapping) by the total of wolves harvested per 100 mi^2 (in each Game Management Unit) 2015-2017 average.

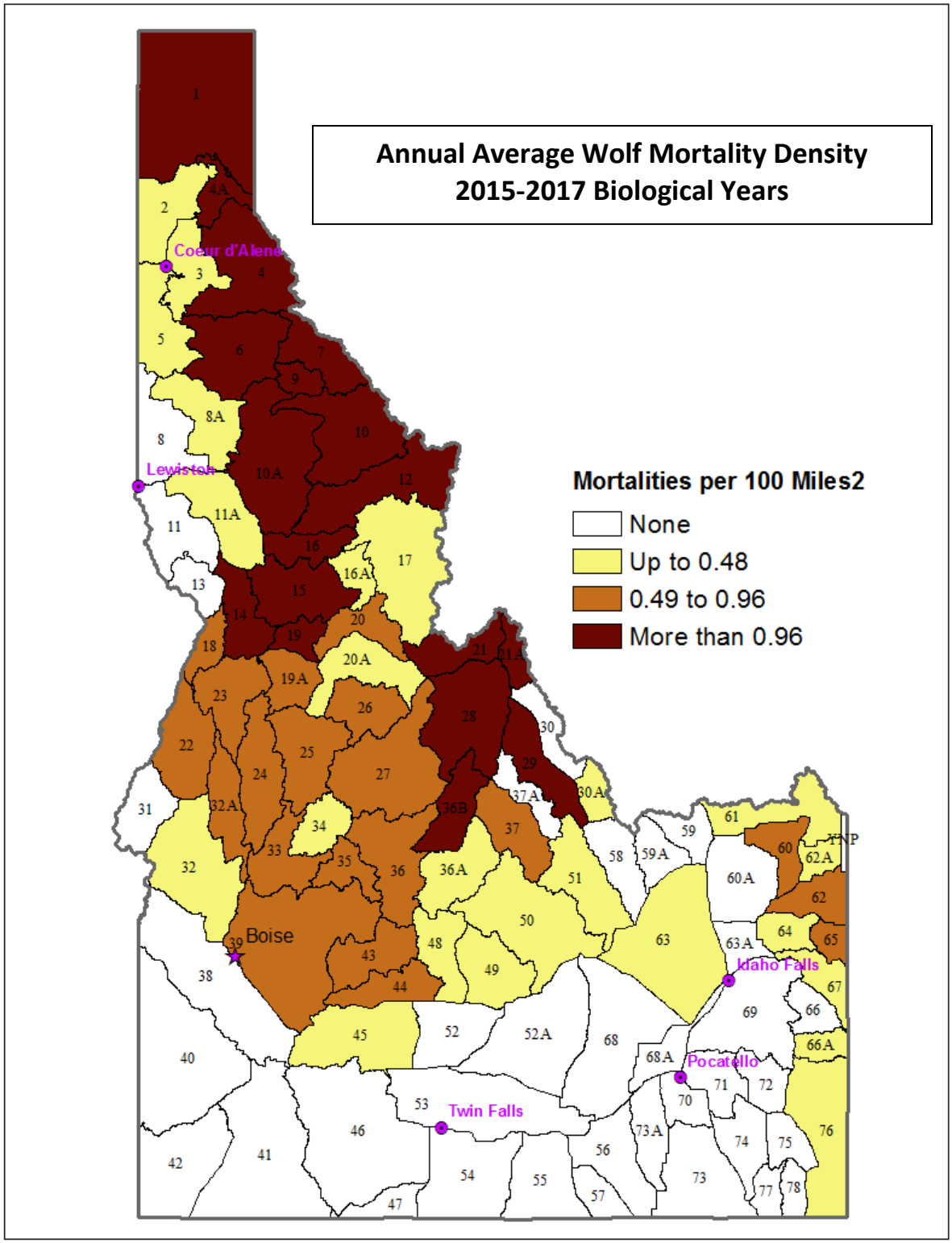

Figure 5. Average annual density of all detected wolf mortalities (i.e. control action, harvest, road kill), by the total of wolves harvested per 100 mi^2 through BY2015 – 2017, by Game Management Unit.