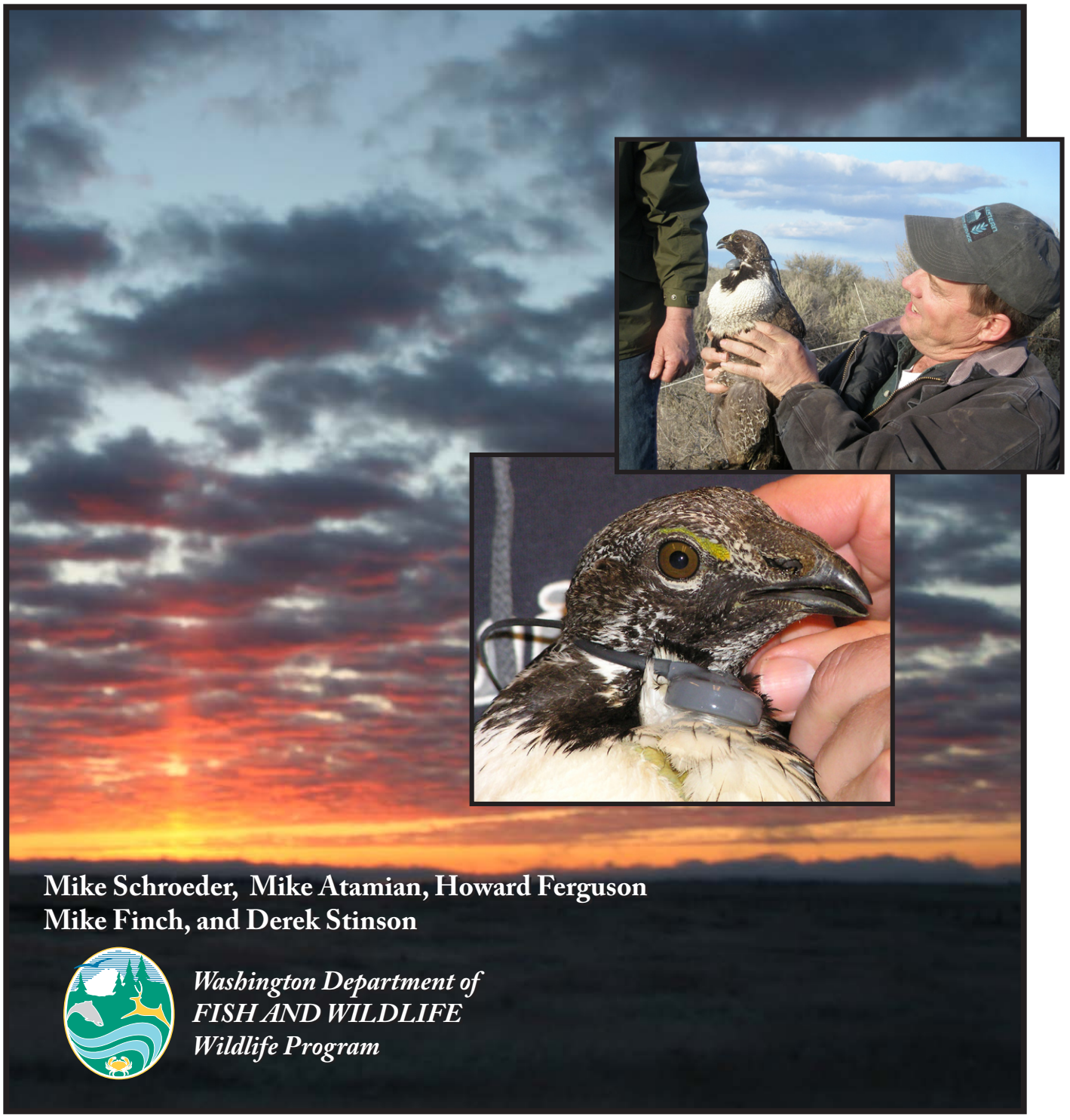
Re-introduction of Sage-grouse to Lincoln County, Washington: Progress Report



Mike Schroeder, Mike Atamian, Howard Ferguson
Mike Finch, and Derek Stinson

Washington Department of
FISH AND WILDLIFE
Wildlife Program

ABSTRACT

Washington Department of Fish and Wildlife, in cooperation with the U.S. Bureau of Land Management, proposes to reintroduce greater sage-grouse in Lincoln County, Washington. The project will establish a third population in the state in an area with large blocks of shrub-steppe and grassland on public lands. The combined ownership of WDFW and BLM totals over 50,000 ac. There have been several sage-grouse sightings in the area, and these may have been birds dispersing from the closest population in Douglas County. We released 17 birds in spring, and 24 birds in fall 2008. All the birds were equipped with radio transmitters and the movements and survival of released birds were monitored. We hope to release up to 40 birds in each of 3 subsequent years, assuming grouse can be obtained from cooperating states. The release location may be adjusted based on the movements and pattern of mortality of birds during 2008.

ACKNOWLEDGEMENTS

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On the cover: Background photo by Howard Ferguson; Mike Finch holding grouse before release by Juli Anderson; grouse with radio by Derek Stinson.

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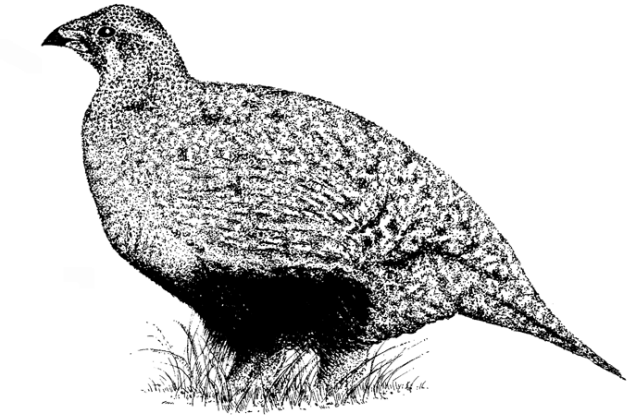
RE-INTRODUCTION OF GREATER SAGE-GROUSE TO LINCOLN COUNTY, WASHINGTON: PROGRESS REPORT



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Washington Department of Fish and Wildlife

Michael A. Schroeder, P.O. Box 1077, Bridgeport, WA 98813
Michael Atamian, 2315 North Discovery Place, Spokane Valley, WA 99216
Howard Ferguson, 2315 North Discovery Place, Spokane Valley, WA 99216
Mike Finch, Swanson Lakes Wildlife Area, Creston, WA 99117
Derek W. Stinson, 600 Capitol Way North, Olympia, WA 98501

Contact information: Michael A. Schroeder, 509-686-2692, **schromas@dfw.wa.gov**

Washington Department of FISH and WILDLIFE

Introduction

Greater sage-grouse (*Centrocercus urophasianus*) have declined dramatically in both distribution and population size in Washington. Of 69 lek complexes documented since 1960, 68% are currently vacant (Schroeder 2006*a*). Many of these vacant lek complexes (55%) are in areas where sage-grouse have been extirpated since 1960. The current range is about 8% of the historic range, occurring in two relatively isolated areas; one primarily on the U.S. Army's Yakima Training Center (YTC) in southern Washington and the other centered in the Moses Coulee area of northern Washington (Schroeder et al. 2000, Fig. 1). Based on changes in number of males counted on lek complexes, the sage-grouse population size in Washington declined by 60% from 1970 to 2006 (Schroeder 2006*a*, Fig. 2). The 2008 spring population was estimated to be about 632 birds, with 187 in the southern population and 445 in the northern population. These observed declines in populations and distribution were consistent with the observations of rapid loss of genetic heterogeneity in northern Washington by Oyler-McCance et al. (2005).

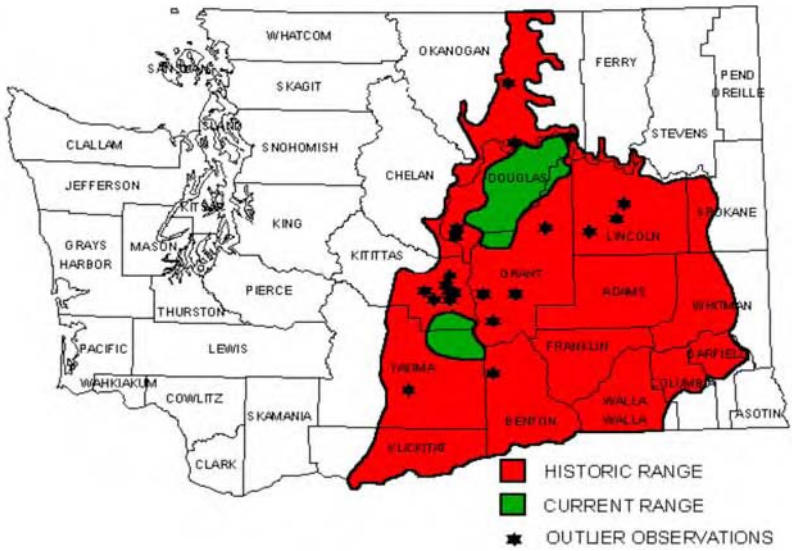

Fig. 1. Estimated historic and current range of greater sage-grouse in Washington (Schroeder et al. 2000).

These long-term declines in distribution and abundance of greater sage-grouse are the primary reasons why the Washington Department of Fish and Wildlife (WDFW) listed sage-grouse as 'threatened' in Washington (Hays et al. 1998). These declines and the isolated nature of these populations were also used by the U.S. Fish and Wildlife Service to determine that sage-grouse in Washington and northern Oregon represented a distinct population segment and that the population warranted a federal 'threatened' listing, though listing was precluded by higher listing priorities (U.S. Fish and Wildlife Service 2001).

Historic and recent declines of greater sage-grouse in Washington are linked to conversion of native habitat for production of crops and degradation of the remaining native habitat (WDFW 1995, Hays et al. 1998, Stinson et al. 2004). In the population centered in Douglas County (Fig. 1), sage-grouse occupy a mosaic of mostly private lands that are used for dryland farming (mostly wheat), enrolled in the federal Conservation Reserve Program (CRP), or with high-quality shrubsteppe (Table 1). In contrast, the population in Yakima and Kittitas counties occupies the Yakima Training Center which is one of the largest about (1,300 km^2), high-quality shrubsteppe sites remaining in the state. Good habitat quality on the YTC is largely due to its complex topography, isolated nature, and historic low intensity livestock-

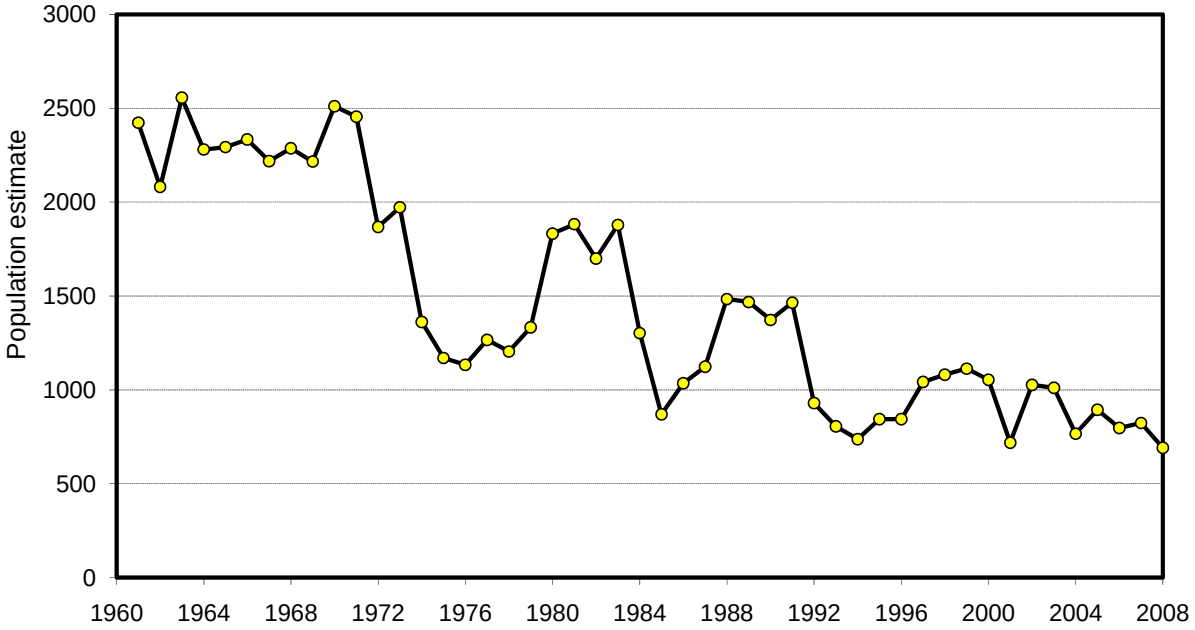

Fig. 2. Estimated population size for greater sage-grouse in Washington, 1960-2008 (Schroeder 2006a).

grazing program. Grazing by livestock was completely eliminated in 1995. Military training and wildfires pose the greatest threats to habitat security. Cross-country maneuvers with military vehicles decrease habitat quality through sagebrush mortality (Cadwell et al. 1996, Stephan et al. 1996) and disturbance to understory communities (Cadwell et al. 2001). Training may also ignite wildfires that pose a significant threat to the existing habitat.

Table 1. Estimated habitat quantity in relation to current and historic range of sage grouse in Washington, and the Crab Creek Management Unit (Schroeder et al. 2000, Stinson et al. 2004).

Range or population	Proportion of area dominated by each habitat (%)				Total area (km^2)
	Shrubsteppe	Cropland	CRP	Other	
Northern population	44.3	35.1	16.7	3.9	3,529
Southern population	95.6	0.5	1.9	1.9	1,154
Occupied range	57.0	26.6	13.0	3.4	4,683
Unoccupied range	42.3	42.8	5.5	9.4	53,058
Crab Creek Unit[a]	80.5	2.5	14.9	2.1	2, 084
Historic range	43.5	41.5	6.1	8.9	57,741

[a]Does not include recent changes resulting from restoring fields to steppe vegetation.

Isolation poses a significant threat to the viability of remaining populations (Stinson et al. 2004). Westemeier et al. (1998) described the reduction in genetic diversity and in population fitness over a 35-

year period in a small, declining greater prairie chicken (*Tympanuchus cupido*) population in Illinois.They reported that declines in fertility and egg hatchability correlated with a population decline from 2000 individuals in 1962 to less than 50 by 1994. Bouzat et al. (1998) genetically compared the same population with larger populations in Kansas, Nebraska, and Minnesota and found that it had approximately 2/3 the allelic diversity of the other populations. Bellinger et al. (2003) found a similar reduction in genetic variation, though not in reproductive success, in greater prairie chickens in Wisconsin. Their comparison of samples collected in 1951 with those collected from 1996 through 1999 revealed a 29% allelic loss.

Genetic work by Benedict et al. (2003) and Oyler-McCance indicated that the two Washington sage-grouse populations might have experienced a similar loss of genetic diversity. They based their conclusions on diversity and divergence of mitochondrial and molecular DNA. Samples were collected from more than 1000 greater sage-grouse from 45 populations throughout the range. The YTC population had only 1 of 38 haplotypes and the Moses Coulee population had 3 of 38 haplotypes present (Benedict et al. 2003). This is in comparison to an average of 6.4 haplotypes across 16 study populations. Microsatellite variation in Washington illustrated similar trends suggesting a need for immediate conservation action (Oyler-McCance et al. 2005).

In 2004 Washington published its greater sage-grouse recovery plan, which states as its primary goal "to establish a viable population of sage-grouse in a substantial portion of the species' historic range in Washington" (Stinson et al. 2004:57). Enhancement of existing populations and re-establishment of additional populations were identified as high priorities in the recovery plan (Stinson et al. 2004). To aid in the identification of and to focus the implementation of management actions for the sage-grouse, the recovery plan established 14 management units (Fig. 4). Four of these management units were considered for translocation efforts.

The top two priorities include augmentation of the YTC population, which was initiated in 2004, and re-introduction on the Yakama Indian Reservation, which was initiated in 2006. Although successful breeding has been documented for the 109 translocated sage-grouse in southern Washington, a rebound in the population has not been observed to date. However, these results are preliminary and additional work is currently underway to evaluate movement, survival, and productivity of the released birds, as well as analysis of genetic samples to determine if there was successful introduction of new genetic material into the population. A similar project involving translocation of 63 sharp-tailed grouse (*Tympanuchus phasianellus*) onto the Scotch Creek Wildlife Area in north-central Washington revealed that a positive response might be delayed a few years following the translocation effort (Fig. 3, Schroeder 2006*b*). Consequently, it is essential that translocation efforts be supported with a multi-year commitment by the respective agencies and individuals involved.

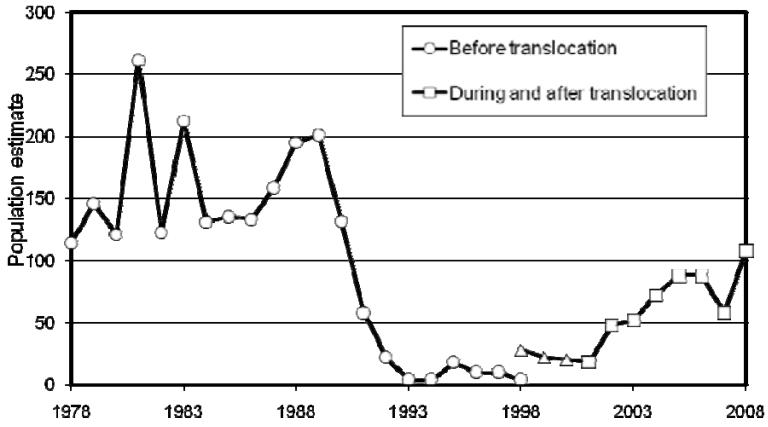

Figure 3. Population estimates for the Scotch Creek Wildlife Area before, during (triangles), and following (squares) the augmentation of 63 sharp-tailed grouse in 1998, 1999, and 2000.

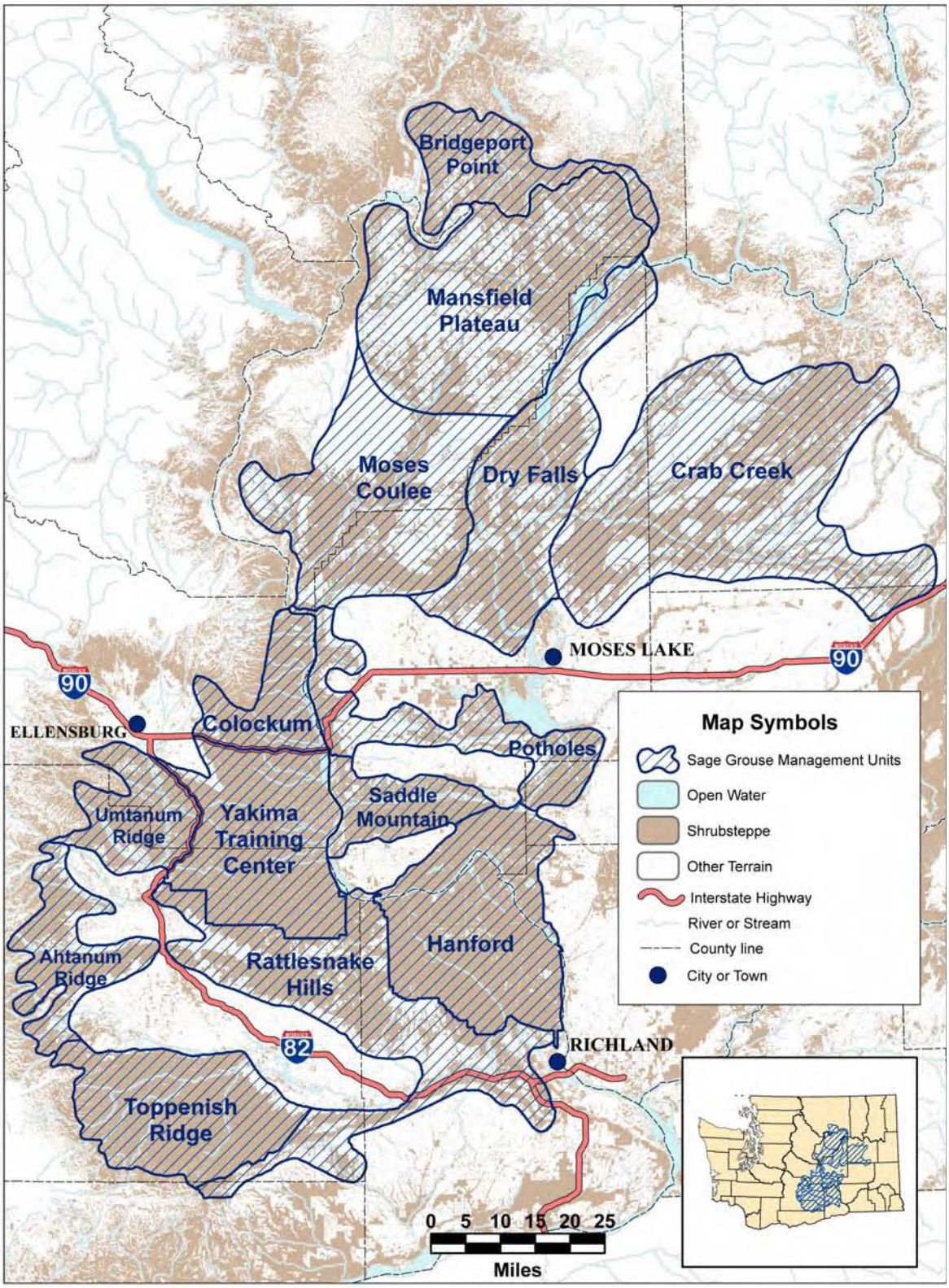

Figure 4. Greater sage-grouse Management Units in relation to shrubsteppe cover types in Washington (Stinson et al. 2004).

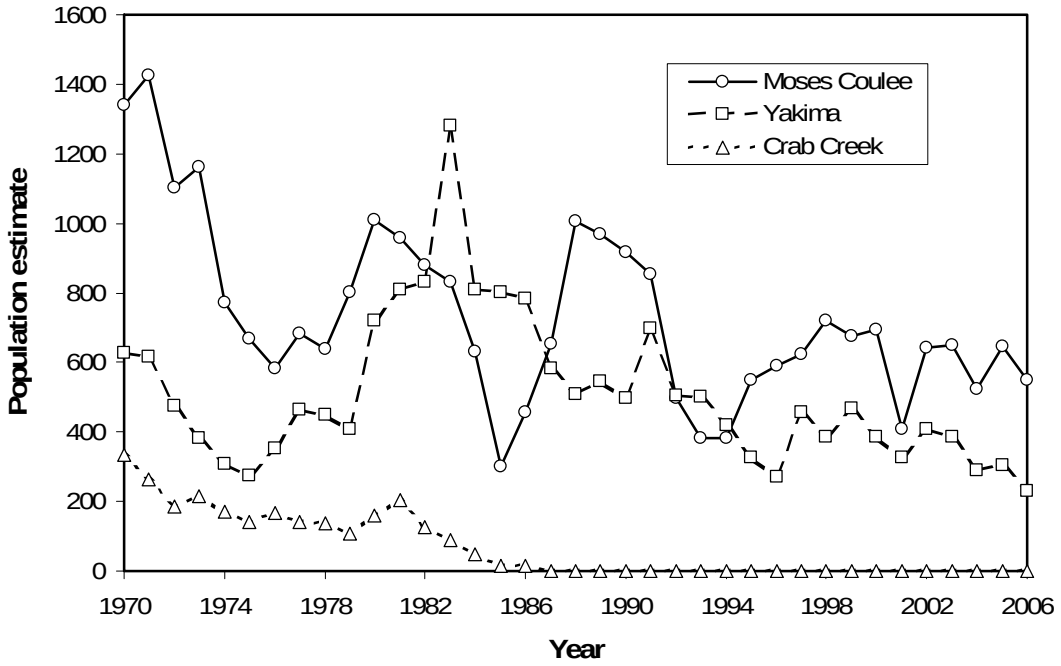

Fig. 5. Estimated population size for greater sage-grouse in different regions of Washington between 1970 and 2000 (Schroeder 2006a).

The third priority was augmentation of the northern population of greater sage-grouse centered in Douglas County. Although this priority is still being considered, it is likely that any translocation effort will be delayed until additional genetic information can be obtained and analyzed. The reason for this caution is that sage-grouse in Douglas County have been documented to have at least one unique haplotype (Benedict et al. 2003) and the importance of this characteristic has yet to be assessed. Furthermore, behavioral information collected for radio-marked birds in north-central Washington has shown that they have the largest average clutch size and the highest rate of nesting and renesting of any studied population in North America (Schroeder 1997). When these factors and population data (Fig. 5), are fully considered, action may be taken. However, the need to augment the population is not believed to be critical at this time.

The fourth priority for translocations is re-introduction of greater sage-grouse to the Crab Creek Management Unit (Fig. 6), primarily in Lincoln County. This area was chosen because out of all the remaining areas, it had the most recently active sage grouse lek (1986--Creston Butte) and although the breeding population appears to have been extirpated in the area, an occasional sage-grouse has been observed, possibly reflecting a small undocumented population or movement from the nearest known population in Douglas County (Fig. 1). Additionally, WDFW purchased about 8,000 hectares in Lincoln County in the early 1990s, which became the Swanson Lakes Wildlife Area, and is actively managing habitat at Swanson Lakes for the benefit of prairie grouse – both sharp-tailed grouse and greater sage-grouse. Modifications in the management practices include elimination of grazing on the wildlife area, re-vegetation of disturbed and non-native pastures, and control of noxious weeds.

In addition, the Bureau of Land Management (BLM) recently purchased about 8,000 hectares adjacent to Swanson Lakes Wildlife Area. The BLM also is considering prairie grouse in their management plans and is involved in the national strategy to "develop the partnerships needed to design and implement

actions to support robust populations of sage-grouse and the landscapes and habitats upon which they depend" (Stiver et al. 2007). Widespread programs such as CRP also have resulted in the conversion of large areas of cropland to potential sage-grouse habitat since the mid-1980s. When the revised patterns of land ownership are considered, along with the relatively large blocks of suitable and/or improving habitats (Fig. 7), it is clear that the management potential for sage-grouse in the Crab Creek Management Unit has improved dramatically since the birds were extirpated in the mid 1980s. In fact, there is a greater proportion of shrubsteppe in the Crab Creek area (Table 2) than there is within the perimeter of the occupied northern population of sage-grouse in Douglas County (Table 1).

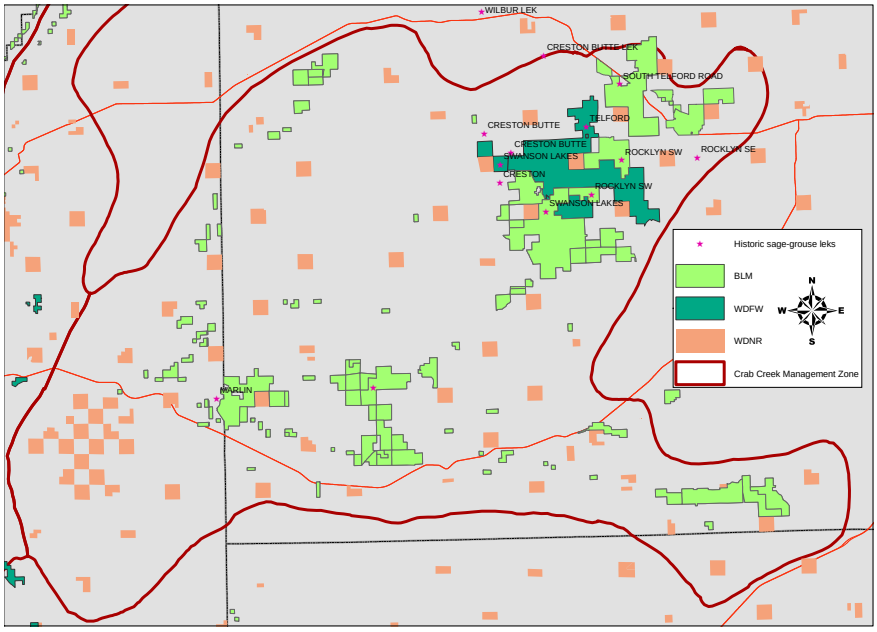

Fig. 6. Crab Creek Management Unit showing the distribution of historic greater sage-grouse leks and major public lands.

Given the factors above, it was decided to attempt to establish another population in Washington State in the Crab Creek Management Unit by releasing 40 sage grouse each year during 2008-2011. The primary goal of the first year's spring release was to use the birds to help identify areas of suitable seasonal habitat, which would therefore enable refinement of the release site in subsequent years, to possibly help locate any existing unknown leks. This information would then be used to improve the following years' releases. The primary goal of fall release was to have more birds settled on the ground for the breeding season of the following year, thus improving their chance of breeding and nesting.

Table 2. Estimated landcover and habitat quantity in relation to land ownership within the Crab Creek Sage-grouse Management Unit.

Ownership	Proportion of area dominated by each habitat (%)				Total area (km^2)
	Shrubsteppe	Cropland	CRP	Other	
WDFW - Swanson Lakes	0.81	0.10	0.06	0.03	77.19
DNR	0.76	0.21	0.02	0.01	141.74
BLM	0.92	0.05	0.01	0.02	204.04[a]
Other government land	0.91	0.07	0.00	0.01	23.27
Private land	0.47	0.40	0.12	0.01	2,829.79
Total for management unit	0.52	0.36	0.11	0.01	3,276.04

[a]Does not include the most recent BLM acquisitions, so this value is somewhat low.

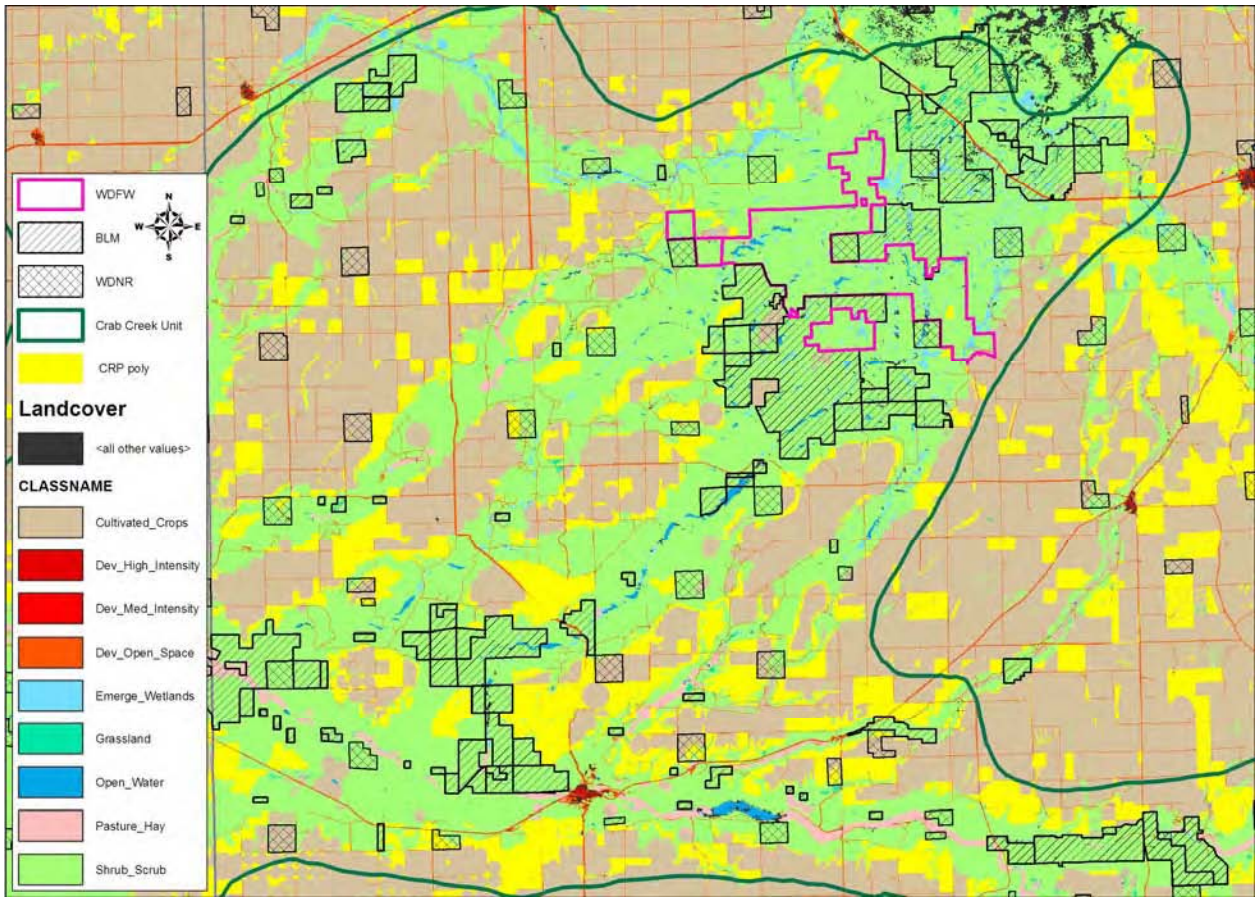

Figure 7. Major public lands and landcover of the sage-grouse reintroduction area in the Crab Creek Sage-grouse Management Unit, Washington.

Project Area

The release will occur within the Swanson Lakes Wildlife Area (WDFW) and Twin Lakes (BLM) complex of public owned lands. Swanson Lakes Wildlife Area is located in east-central Washington. It lies approximately twenty miles west southwest of Davenport, the county seat and population center of Lincoln County; and approximately 60 miles west of Spokane. Lincoln County encompasses a total of 1,475,520 acres. Fifty percent of the county is presently in small grain production, 40% is rangeland, and 10% supports other miscellaneous uses. The majority of remaining shrub-steppe habitat in Lincoln County is used as rangeland. Swanson Lakes Wildlife Area encompasses approximately 21,000 acres in Central Lincoln County, about 10 miles south of Creston. The three main habitat types within the wildlife area are shrub-steppe, riparian/wetlands and old cropland fields. The majority of this area is rangeland, with some old CRP fields, several hundred acres of restored grassland habitat, and a small amount of leased cereal grain fields and hay flat.

The BLM lands in the area include Twin Lakes, a 15,323 acre parcel located approximately 16 miles southwest of Davenport in central Lincoln County. Habitat in Twin Lakes is composed of shrub-steppe and associated riparian habitats with some historically cultivated fields that have since been seeded to grass. Landsat imagery from 1999 shows the following amounts of various habitats within the parcel: 49% grass dominated, 22% shrub dominated, 13% non-forested riparian, 5% upland deciduous, 4%

agricultural, 3% open water, 2% forested riparian, 2% upland conifer. Interspersed throughout the parcel are rocky outcroppings and talus slopes. Twin Lakes are about 120 acres in size. BLM also manages Lakeview Ranch is a 12,690 acre parcel located approximately 6 miles north of the town of Odessa in southwest Lincoln County. Habitat consists of approximately 65% shrub-steppe habitat, 20% grassland, and 15% lentic wetlands and lakes. Management of the area has focused on supporting wildlife habitat, seasonal livestock grazing, and wildlife-based recreational opportunities. Coffeepot Lake is a 932 acre parcel located 12 miles west of Harrington in Lincoln County. Although the parcel is predominately shrub-steppe habitat, it also includes approximately 151 acres of Coffeepot Lake. Additional BLM lands include Telford (≈7,500 ac), Sandygren/Lonepine (2,884 ac), Schneider/Hawk Creek (3,980 ac). BLM now manages 79,383 ac in Lincoln County.

Methods

To maximize the likelihood of a successful sage-grouse translocation, the source population should be relatively close, abundant, and occupy similar habitat (IUCN 1995). All states have had long-term population declines; however, some states have experienced less dramatic declines than others (Connelly and Braun 1997, Connelly et al. 2004). States with populations considered to be relatively secure include Oregon, Nevada, Idaho, Montana, and Wyoming. Despite the differences between Washington sage-grouse and those found elsewhere, Oyler-McCance et al. (2005) recommended augmentation of Washington populations from the geographically closest populations. For the 2008 re-introduction WDFW received permission from ODFW and USFWS to capture and remove birds from Hart Mountain National Antelope Refuge in Lake County, Oregon (Hart Mountain).

Although most projects have used spring captures only, for this re-introduction it was decided to conduct two releases one in spring and one in fall. We conducted a fall release because summer-to-fall releases could have greater potential in helping to establish leks because released birds might be more settled come spring and more inclined to establish a lek than spring-released birds. Additionally capturing 40 birds in one season can be difficult with high staff demands. Sage-grouse were captured using night lighting (Giesen et al. 1982, Wakkinen et al. 1992) on and around active leks during the spring and on open ridges during the fall. Sex and age were determined for captured birds (Beck et al. 1975), and blood samples obtained for genetic analysis. Birds were banded with a unique numbered metal band and necklace-mounted, battery-powered radio transmitters (predicted duration of 24 months) were placed on birds prior to release.

Figure 8. Meta-Musil box used to hold birds before release from a hide.

Birds were transported individually in boxes that were small enough to contain the bird's movement. The bottom of each box was lined with clay cat litter to reduce contact between feces and the birds' feet. Birds were transported by truck to the release site within 24 hours of capture and released the same day; however, if it was already dark upon arrival at the release site, birds were held overnight and released early the following morning. Special settling boxes were constructed to allow the birds some time to

calm down before being released. The boxes (Fig. 8), were a modification of a design described by Musil (1989). Birds were placed in a settling box for at least 20 minutes before the box was opened with a cord from a hide, so the birds would exit on their own. The usefulness of this technique has not been confirmed by controlled studies, but it is hoped that it may minimize stress and the chances of panic flushes that could ultimately result in longer movements away from the release area.

Radio-marked sage-grouse were located with the aid of a portable receiver and 4-element Yagi antenna. For the first two weeks after release we attempted to get daily locations on the birds. After the second week post-release we attempted to get two locations per week for each bird. During the winter months monitoring was reduced to twice monthly due to hazardous weather. Fixed-wing aircraft was used to locate lost birds 10 –12 times a year. All locations were recorded with a GPS unit using Universal Transverse Mercator coordinates. All ground monitoring was done from a distance, when possible, to avoid disturbance of birds, particularly during the nesting season. For calculating maximum distance moved from the release site we used all individuals that were located at least one time post-release. For minimum convex polygon home range calculations, we used all individuals that had three or more re-locations not counting the release site.

Results

In March 2008, seventeen sage-grouse, seven females and ten males, were captured on Hart Mountain NWR with assistance from USFWS, Washington Department of Agriculture, and ODFW personnel during the spring trap (Table 3). These birds were released on the Swanson Lakes WLA March 31st and April 1st. Unfortunately, it was discovered that the entire batch of radio transmitters was defective – post-release. They had a very short effective range (<1 km, line of sight), making aerial detection very difficult, and ground detection nearly impossible except at extremely close range. An attempt was made to relocate birds using bird dogs, in order to recapture and replace the radios, but the attempt was unsuccessful.

Table 3. Status of sage-grouse released in Lincoln County, as of December 2008.

Release	Sex	Alive	Dead	Slipped Collar	Missing	Total
Spring	Female	2		1	4	7
	Male		3	3	4	10
Fall	Female	2	15			17
	Male		7			7
Total		4	25	4	8	41

Four birds, one male and three females, from the spring release have been detected semi-regularly (Fig. 9, Appendix A). In October the male and one of the females appear to have slipped their collars, but had remained in the study area up to this point. The other two collared females remain in the vicinity of the study area. Two additional males appear to have slipped their collars within a week of release. We have documented mortalities of three males, two died in the first week of release, within 4km of the release site. The other male died sometime between June 5 and October 15 and was ~ 25km south of the release. The remaining birds (4 males and 4 females) are unaccounted for but have been detected sporadically on flights (Fig. 9, Appendix A). Two movements of note are a male who was located twice ~ 35km southwest of the release site in BLM's Lakeview property, and a female who was detected ~39km north of the release site on the opposite side of Roosevelt Lake. She later returned to SLWA where she was

picked up two more times before going MIA. No nesting or brood-rearing activity was detected among the females we were able to re-locate.

During the fall trapping, we captured 24 additional birds, seventeen females and seven males, again at Hart Mountain NWR and released them at Swanson Lakes WLA on October 22nd (Table 3). The new collars worked as expected, allowing for successful locations on the ground (Fig. 10, Appendix A). However, these birds – trapped and released in the fall, experienced a very high rate of mortality. Before the end of October eleven birds had died (eight females and three males). By the end of November an additional six females and two males had died and by the mid-December there remained only two live females. Sixteen of 22 fall mortalities were attributed to predation (Fig. 11, Appendix A). In addition to the high predation rate there were six mortality events where whole bodies were found. One of these events was attributed to collision with a fence nearby, another showed all the signs of a high-speed collision, but no man-made structure was near to the site. A third appears to have been plowed into the ground during planting of winter wheat. Two of the remaining three wholebody mortalities are awaiting necropsy. The last mortality found had suffered significant decomposition before retrieval and a necropsy was deemed to be of minimal use.

There were a total of 183 re-locations, 56 from spring release birds and 127 from the fall release, not including the release site. Minimum convex polygon home ranges were calculated for 27 individuals (Table 4). Female's home ranges were on average larger than males, but not significantly so, and their median home range was smaller. Those birds still alive at the end of December had smaller home ranges, but were not significantly smaller than birds that died. The home ranges of the currently live birds indicate that they have remained mostly within WDFW and BLM owned lands (Fig. 12, Appendix A). The average maximum distance moved away from the release site was 9.8 km ± 1.3, with females moving on average 10 km ± 1.7 and males 9.4 km ± 2.1. There was no difference between the distance moved by the currently live birds and those that died (9.5 km ± 2.1 vs. 9.8 km ± 1.4).

Table 4. Area (km^2) of minimum convex polygon home ranges[a].

	Mean area(km^2)	SE	Median	Number of birds
Female	33.9	9.7	15.9	17
Male	23.2	5.7	18.4	10
Live	20.6	8.8	15.6	4
Dead	26.4	6.7	16.9	19
All	29.9	6.5	16.9	27

[a]Only individuals with three or more locations, not including the release site, where used.

Discussion

The primary goal of the spring release was not accomplished due to radio malfunctions. We were unable to locate individuals regularly enough during breeding season to detect formation of new leks, use of historic leks, or joining with local grouse at previously unknown lek sites. With the fall release we had hoped to have birds settled in on the ground come spring for the lekking and nesting season, thereby improving reproductive success and spring-2009 release site selection. However the high mortality rate for the fall release appears to have precluded these benefits. Because of these high rates of mortality, we have decided to only conduct spring releases for the remainder of the project.

No significant difference was found in the movements or home ranges of fall birds that lived versus those that died. An examination of the locations and condition of remains indicated that most of the birds that went north from the release point, to the area along Sinking Creek, often were killed by great horned owls (GHOW). The few birds that went south of the study area or remained within it did not experience an unusual high rate of predation from GHOWs, but still suffered a high mortality rate (Fig. 11, 12: Appendix A). Additionally, three birds (possibly six) died from collisions with man-made objects. Therefore it appears that there is a high density of predators within the study area during the fall, with additional man-made hazards year round.

Management Implications/Future Releases

The high mortality of the fall release suggests that higher populations of predators and migrating raptors may offset the other potential advantages of a fall translocation. Future releases will occur in spring only, to avoid the influx of migrating raptors and newly fledged/whelped young. Releases may also occur somewhat further south to discourage birds from moving north along Sinking Creek and the wheat fields. We hope to translocate about 40 sage-grouse (even sex ratio) each spring of the next three years (2009-2011). If survival and productivity seems to be adequate, the final year of the project, 2012, will be used for continued monitoring of the radio-marked sage-grouse, searching for new lek locations, and final compilation of the results and reports. The project may be extended if the situation warrants.

Projects involving the flagging or removal of fencing and other man-made structures are being considered, as well as, restorations of old CRP and other expired agricultural leases, and new land acquisitions. Raptor surveys throughout the year are also being considered to determine if raptor predations in the fall were due to an increase from migration and fledging or if there is a consistent high density of raptors in the area. Funding is being sought to support a graduate student or seasonal employees in future years of the project to allow for a more detailed study of habitat, predator, and prey interactions.

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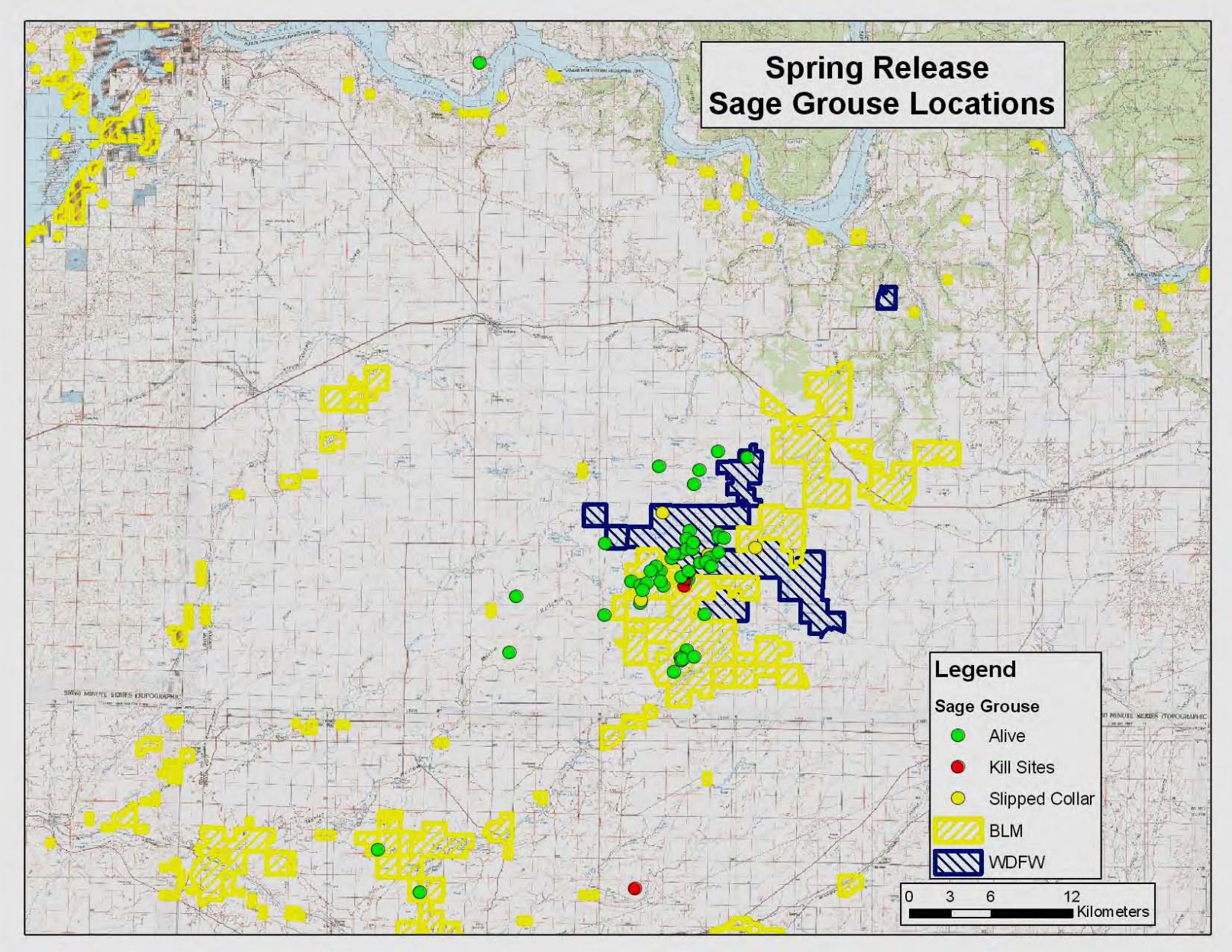

Figure 9. Locations for sage grouse released in the spring of 2008.

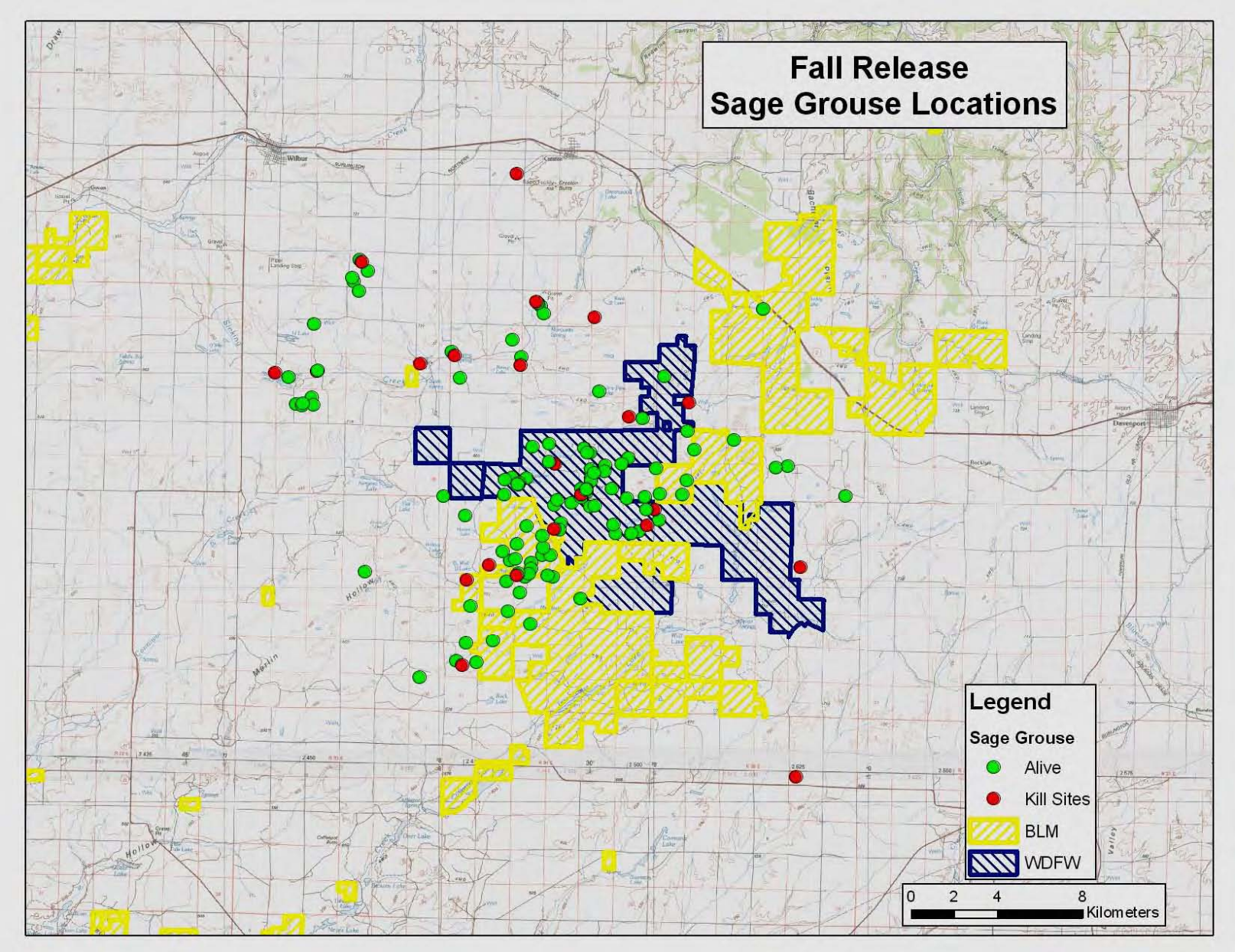

Figure 10. Locations for sage grouse released in the fall of 2008.

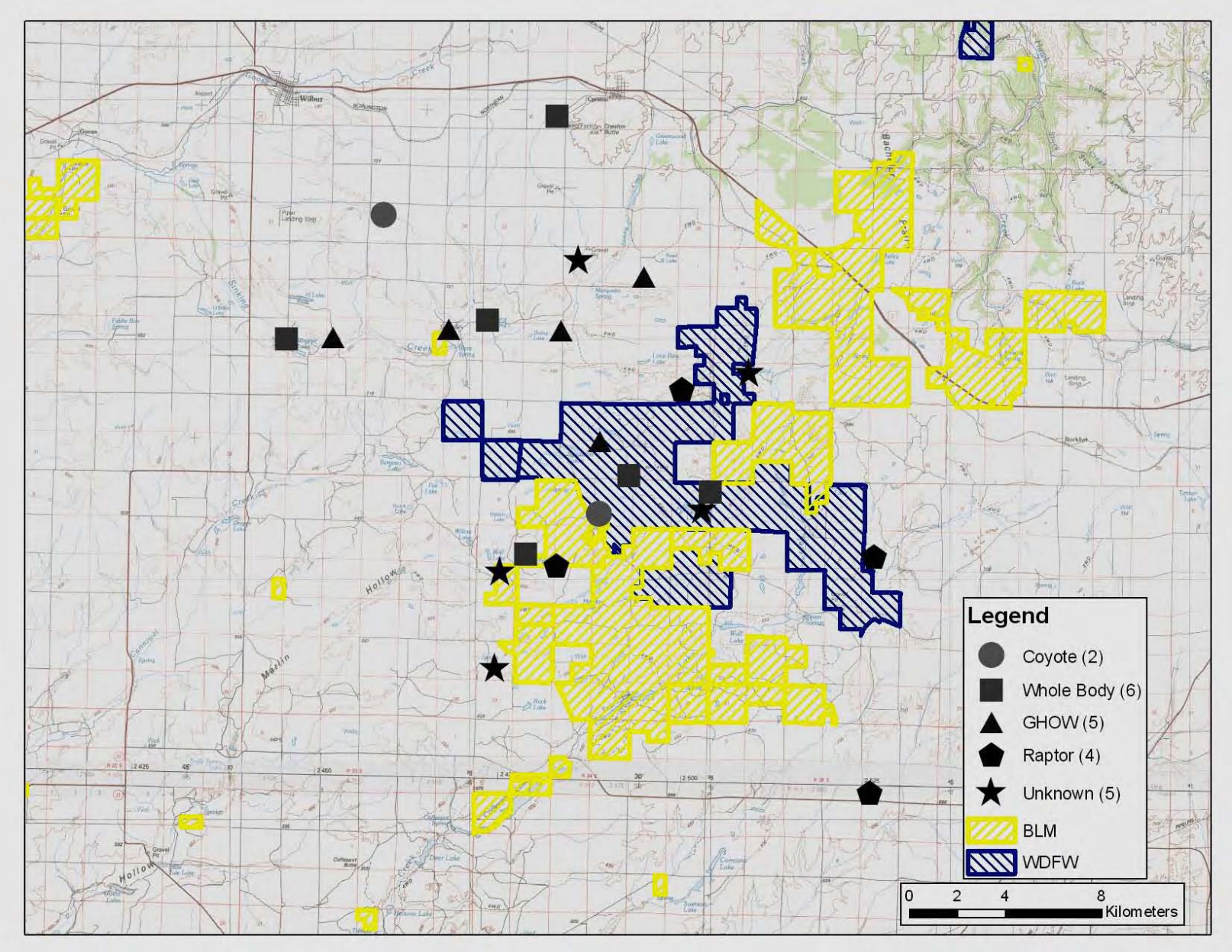

Figure 11. Mortality sites by predator or whole body for fall 2008 release. Unknown sites are predation sites where there was not enough evidence to determine predator type.

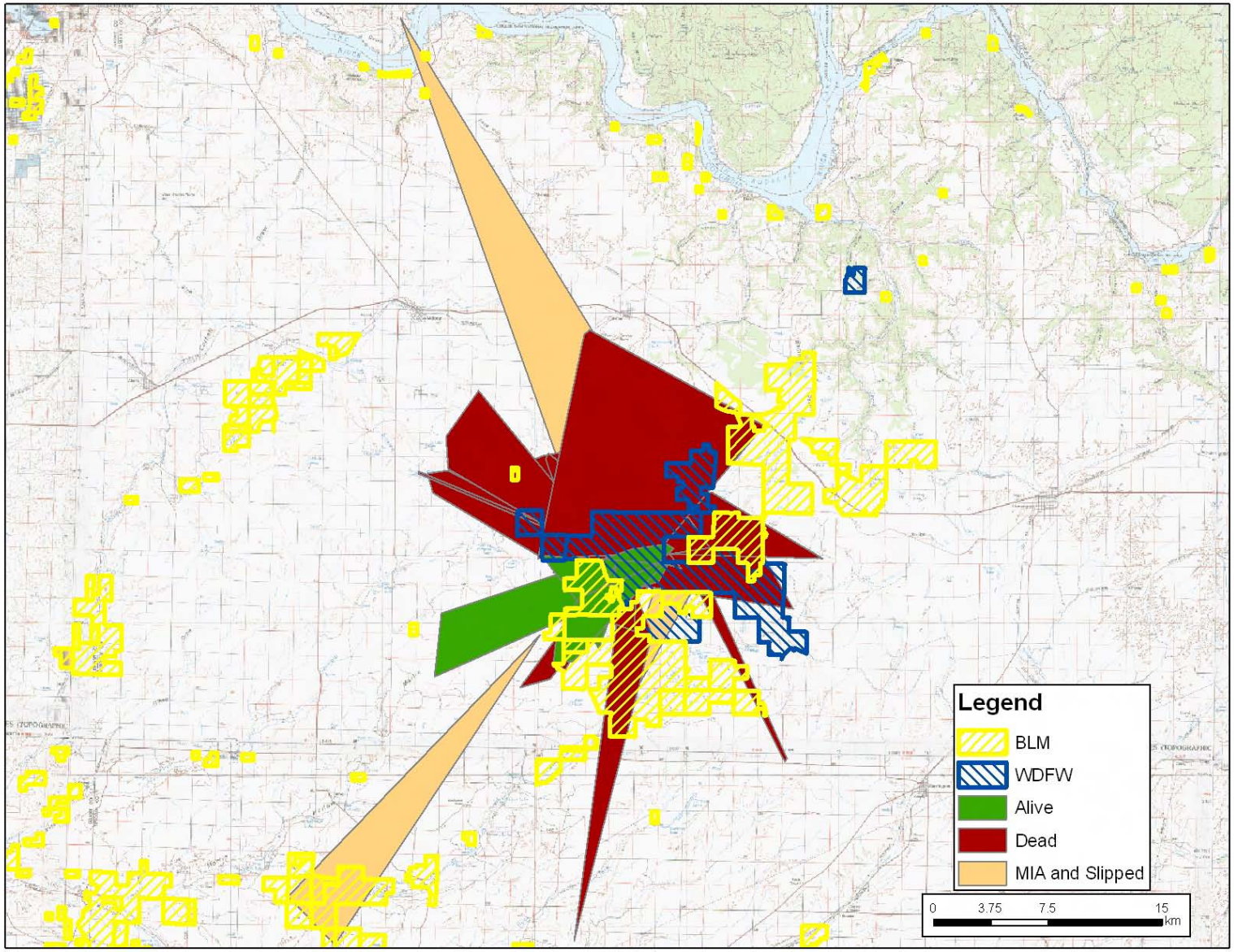

Figure 12. Minimum convex polygon home ranges for individuals that were located three times or more after release.