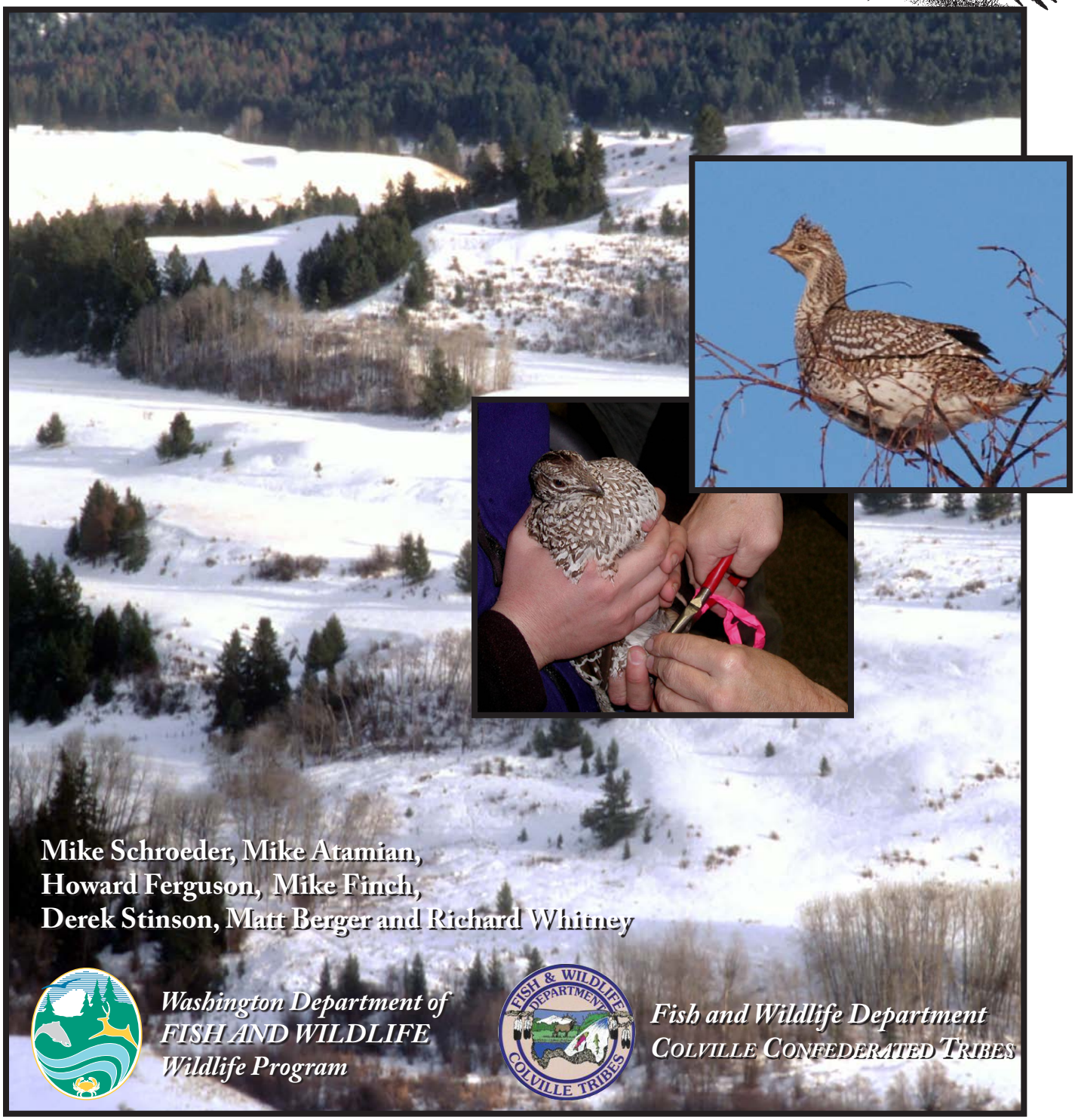
STATE OF WASHINGTON Progress Report, December 2008

Re-establishment of Viable Populations of Columbian Sharp-tailed Grouse in Washington: Progress Report



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SUMMARY

Declining populations and distribution of Columbian sharp-tailed grouse (*Tympanuchus phasianellus columbianus*) in Washington have resulted in serious concerns for their long-term conservation status. Translocations of sharp-tailed grouse from 'healthy' populations outside the state are being conducted to improve the vigor of populations within Washington. The Washington Department of Fish and Wildlife, in cooperation with the Colville Confederated Tribes, translocated 177 Columbian sharp-tailed grouse from central British Columbia, southeastern Idaho, and north-central Utah to Washington State in 2005, 2006, 2007, and 2008. The release sites in Washington included Dyer Hill (south of Brewster in Douglas County), Swanson Lakes (south of Creston in Lincoln County), and Nespelem (east of Nespelem in Okanogan County). Two of the release sites include state-owned public land and the third site is Colville Tribal land; all three are being managed for the benefit of wildlife, and in particular sharp-tailed grouse. In all three release sites, sharp-tailed grouse declined through the year 2005, despite the acquisition and protection of habitat and ongoing habitat restoration efforts. At least one additional year of translocations is needed to complete the plan to translocate 200 birds. Efforts to monitor movement, survival, and productivity of the translocated birds are ongoing. It is too early in the process to determine whether the augmentation should be considered a success.

ACKNOWLEDGEMENTS

This project would not have been possible without the cooperation of the wildlife agencies in Idaho, Utah, and British Columbia; we'd especially like to thank Randy Smith, Ron Greer, and Doug Jury. Capture efforts in Idaho and Utah were done cooperatively with Oregon Department of Fish and Wildlife who were obtaining birds for release in northeastern Oregon. Funding for this project came from the States Wildlife Grants program administered by the U.S. Fish and Wildlife Service. Mike Finch and Jim Bauer at Swanson Lakes WLA built the settling boxes for the release of birds. Numerous people assisted in capture, including Bill Burkett, Christian Hagan, Ron Greer, Randy Smith, Juli Anderson, Thom Woodruff, Jeff Heinlein, Scott Fitkin, Dave Hays, Dan Peterson, Donovan Antoine, Rick DeSotel, Eric Krausz, Kristin Mansfield, Dave Volson, Paul Wik, Luke Mallon, Kurt Merg, Mike Livingston, Ella Rowan, Glenn Paulson, and Rose Gerlinger. Monitoring included efforts by personnel from Colville Confederated Tribes, Bureau of Land Management, WDFW, and volunteers Monica McFadden, Nick Hobart, Jason Lowe, Nancy Williams, and Abbey Shuster. Apologies to those that we've forgotten to mention. ……

Photo and art credits: Background photo in Chesaw area by Mike Schroeder, sharptail held by Jason Lowe (BLM), being banded by Howard Ferguson (WDFW) by Glenn Paulson (BLM); sharptail hen (#4.216) in bush on 31 Decmeber 2008 at West Foster Creek by Marc Hallet (WDFW); pen and ink illustrations by Darrell Pruett.

Re-establishment of Viable Populations of Columbian Sharp-tailed Grouse in Washington: December 2008 Progress Report

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INTRODUCTION

Columbian sharp-tailed grouse were historically found in many of the shrub-grass habitats of central and southeastern Washington (Yocom 1952, Aldrich 1963). Surveys have indicated that sharp-tailed grouse are virtually extinct everywhere except Okanogan, Douglas, and Lincoln counties (Fig. 1) (Hays et al. 1998, Schroeder et al. 2000). Remaining populations are small and localized within isolated areas of relatively intact habitat including shrub steppe, meadow steppe, steppe, and riparian shrub, as well as Conservation Reserve Program fields (CRP). The total population in Washington was estimated to be about 782 birds in 2008 (Fig. 2).

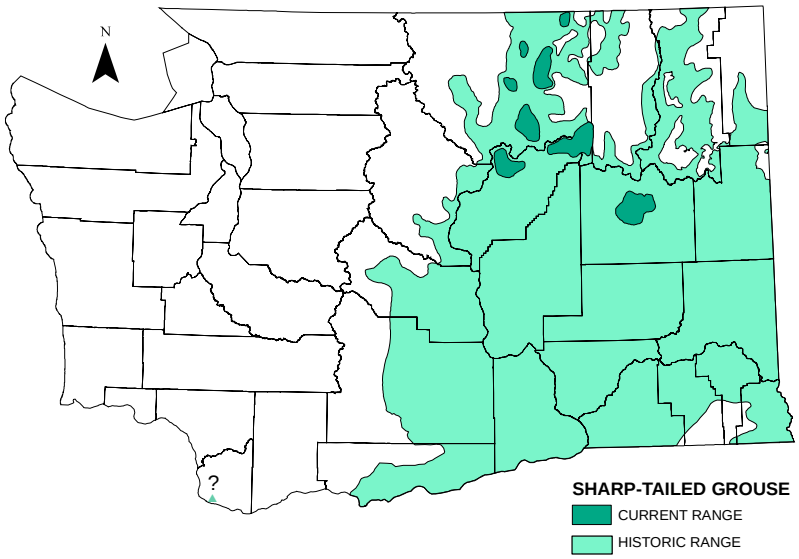

Figure. 1. Distribution of sharp-tailed grouse in Washington based on Schroeder et al. (2000).

The Washington Department of Fish and Wildlife (WDFW) has a goal to recover threatened populations of sharp-tailed grouse in Washington. The state has listed the species as threatened, acquired over 15,000 hectares of sharp-tailed grouse habitat, developed management strategies to improve their habitat, (Anderson 2006, Hallet 2006, Olson 2006, Peterson 2006), initiated research on their life history requirements (McDonald 1998), conducted detailed analyses of population genetics throughout the sharp-tail grouse range (Spaulding et al. 2006), and begun experimental translocations to increase and expand populations (Schroeder 2008). The Colville Confederated Tribes (CCT) have pursued a similar strategy of acquisition and restoration (Berger et al. 2005, Gerlinger 2005). The BLM lists the sharp-tailed grouse on their Sensitive list with the goal of minimizing or eliminating threats and improving the condition of the species habitat. The primary management strategy for the WDFW, BLM, and CCT has been to improve habitat on publicly-owned lands that are currently, or were historically, occupied by sharp-tailed grouse. Habitat improvements include the reduction of grazing pressure, transition of cropland (mostly wheat) to grass-dominated habitats (such as in the federally-funded Conservation Reserve Program [CRP]), restoration of native habitat, and planting of key components such as trees and shrubs.

A secondary management strategy is to translocate sharp-tailed grouse into areas of Washington where their populations have been reduced near the brink of extinction. Experimental translocations in 1998, 1999, and 2000 were successful in augmenting one population of sharp-tailed grouse in Washington at the Scotch Creek Wildlife Area, northwest of Omak. Birds for this translocation were obtained from Rockland area in southeastern Idaho (51 birds) and the Colville Indian Reservation in Washington (12 birds). Prior to the translocation, surveys indicated that the Scotch Creek population had declined to 1 lek with 4 grouse displaying on it. This population increased to an estimated 108 birds in 2008 after translocating the birds over three years (Fig. 3).

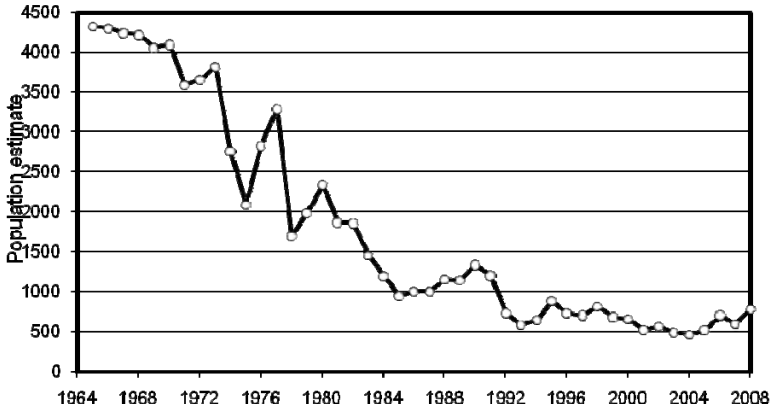

Figure 2. Estimated population of sharp-tailed grouse in Washington between 1965 and 2008

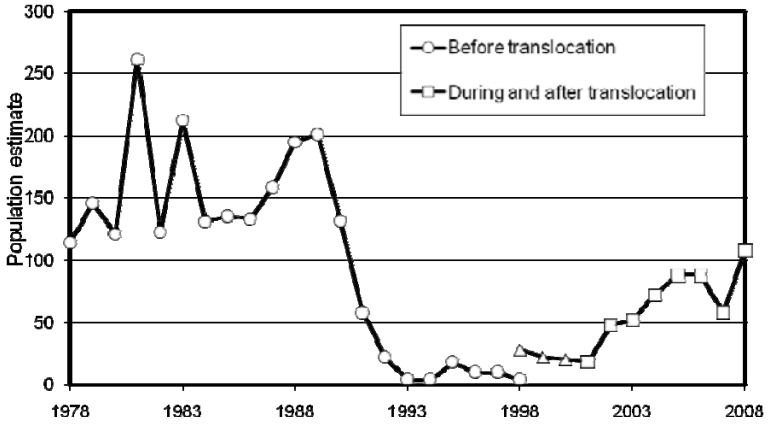

Figure. 3. Population estimates for the Scotch Creek Wildlife Area before, during, and following the augmentation of 63 sharp-tailed grouse in 1998, 1999, and 2000.

Transplants of sharp-tailed grouse include four basic stages in order to maximize the opportunities for successful re-establishment or augmentation efforts (similar to Griffith et al. 1989). The first stage is to identify potential release sites based on quantity and quality of habitat on, and near, the sites. In addition, the historic presence and current status of sharp-tailed grouse near the release sites needs to be determined. The second stage is to identify source populations for translocation to the proposed release sites. This effort includes genetic analyses, which have been completed and are summarized here. The third stage is to conduct the translocation as efficiently as possible in a way that minimizes the length of captivity and maximizes survival. The fourth stage is to monitor the movement, survival, and productivity of the released birds and evaluate the success or failure of the re-establishment or augmentation effort.

RELEASE SITES

Because of the declines in sharp-tailed grouse throughout the state of Washington and the isolation and small size of the remaining populations, several locations were considered for translocation efforts. Three primary sites were identified based upon assessments of their size, quality, and management potential

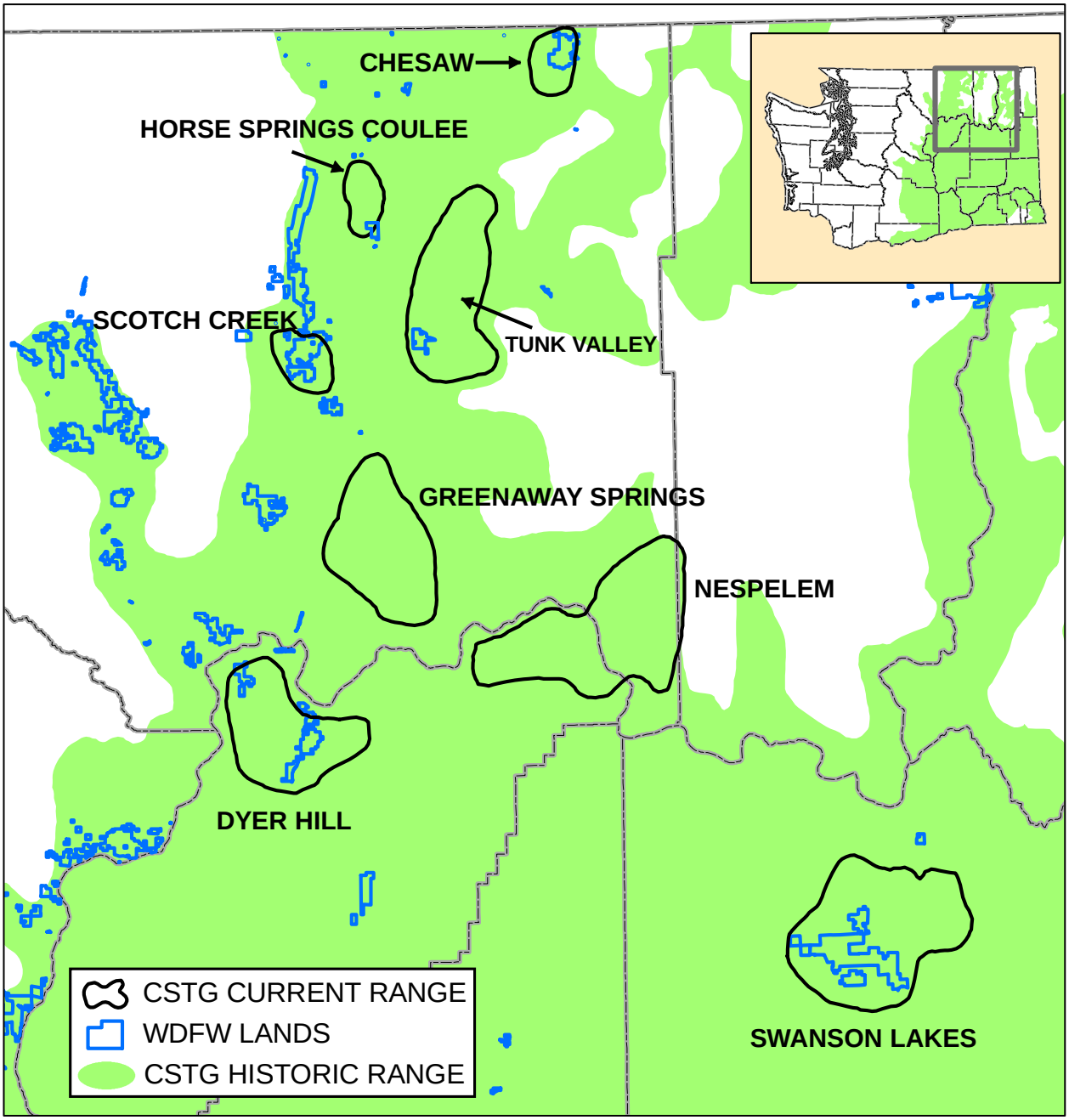

Figure. 4. WDFW lands and current range, including recent release sites of Columbian sharp-tailed grouse in Washington.

(Fig. 4): Dyer Hill (south of Brewster in Douglas County), Swanson Lakes (southeast of Wilbur in Lincoln County), and Nespelem (east of Nespelem in Okanogan County). Two of the release sites include state and federally-owned public land and the third site is Colville Tribal land; all three are being managed for the benefit of wildlife. The Dyer Hill site also was recommended by McDonald and Reese (1998) as the primary target for improvements in the statewide sharp-tailed grouse population.

The historic presence of sharp-tailed grouse throughout most of eastern Washington has been well-established (Yocom 1952, Aldrich 1963). The current distribution of sharp-tailed grouse has also been documented with the aid of thorough state-wide surveys (Hays et al. 1998, Schroeder et al. 2000). The release sites are clearly within the historic range of sharp-tailed grouse and until recently have had healthy populations of sharp-tailed grouse. Dyer Hill is near the Central Ferry Canyon and West Foster Creek wildlife areas in Douglas County. These state-owned areas include approximately 4,000 hectares of potential sharp-tailed grouse habitat with a matrix of tens of thousands of additional hectares of private land, also with potential to support sharp-tailed grouse. It currently has a remnant population of about 10-20 birds.

The Swanson Lakes Wildlife Area includes 8,094 ha, with an additional 518 ha lease of Washington Department of Natural Resources land. In addition, the BLM purchased about 9,000 ha adjacent to the wildlife area, providing an opportunity to secure connectivity of habitats among various agencies. The 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. Low cliff habitat (6-10') and rock outcrops are present throughout the parcel with higher (50-100') and more extensive cliffs in the southern part of the parcel (Bob's Lake area). Management of the area has focused on supporting wildlife habitat, seasonal livestock grazing, and wildlife-based recreational opportunities. Twin Lakes is 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. Taller cliffs surround the eponymous Twin Lakes, which are about 120 acres in size. 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. The lake is largely surrounded by cliffs and rocky outcrops. WDFW is actively managing habitat at Swanson Lakes for sharp-tailed grouse; nevertheless, the grouse population in the area has declined substantially over the past 10 years. Gene diversity and allelic richness are significantly lower in the Swanson Lake population than in populations in Utah and Idaho (Warheit and Schroeder 2003). Some of this lack of genetic diversity appears to be due to the isolation of Swanson Lakes from other occupied areas. Approximately 40-80 birds remain in this population (Fig. 5).

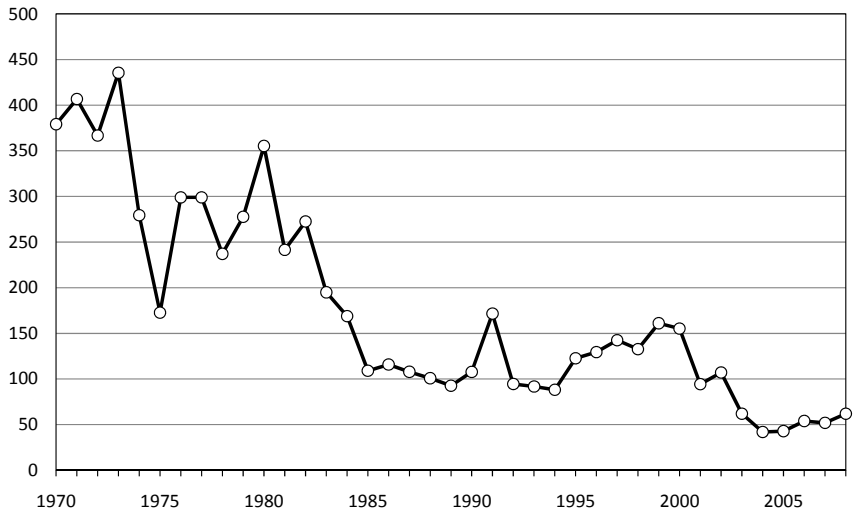

Figure. 5. Population estimates sharp-tailed grouse on the Swanson Lakes Wildlife Area.

The CCT is acquiring and actively managing habitat east of Nespelem on the Colville Indian Reservation in Okanogan County. Although the Nespelem population of sharp-tailed grouse is the largest in the state (perhaps 100-200 birds), it has been declining for many years (Schroeder et al. 2000). All three of

these potential release sites (Dyer Hill, Swanson Lakes, Nespelem) appear to be isolated populations with an inevitable future of extirpation without intervention.

Why have populations of sharp-tailed grouse been reduced or eliminated on the prospective release sites? Has subsequent management on the prospective release sites adequately addressed the explanations for previous declines in numbers of sharp-tailed grouse? There are numerous possible reasons for the sharp-tailed grouse population declines on the potential release sites. These include historic declines in habitat quantity and quality, potential increases in densities of predators such as common ravens (*Corvus corax*) and great-horned owls (*Bubo virginianus*), and isolation of remnant populations due to the lack of dispersal corridors between adjacent populations of sharp-tailed grouse. Some of the explanations for the declines have been directly addressed with management activities, in particular, habitat restoration. All the potential release sites have management objectives to conduct habitat restoration activities focused on sharp tailed grouse habitat needs. These include replacement of poor-quality non-native grass/forb habitats with native shrub-steppe vegetation for spring and summer habitat, and establishment of shrubs and trees necessary for improvement of wintering habitat. CRP also has resulted in the conversion of large areas of cropland to potential sharp-tailed grouse habitat since the mid-1980's, although early CRP plantings have become monocultures of exotic grasses that need to be reseeded with native seed mix. However, because some of the remaining populations have endured severe 'bottlenecks' in abundance, we believe some of these populations have lost some of their intrinsic ability to respond positively to habitat improvements due to their reduced genetic diversity (Westemeier et al. 1998, Bellinger et al. 2003, Johnson et al. 2003). This possibility was consistent with the positive results for the 1998-2000 translocations at the Scotch Creek Wildlife Area (Fig. 3).

SOURCE POPULATIONS

The sharp-tailed grouse is currently divided into six subspecies (Aldrich 1963, Fig. 6). Sharp-tailed grouse in Washington are within the range of the Columbian subspecies, which is somewhat distinguishable from other subspecies by the following characteristics: grayer in color; slightly smaller in size; and found in relatively dry shrub-steppe and mountain shrub habitat of the intermountain region. However, the taxonomic differentiation of each of the subspecies has been somewhat arbitrary and ambiguous. Recent genetic analyses indicate that sharp-tailed grouse in Utah, British Columbia, Idaho, and Washington are more similar to each other than to any other region, and appear to constitute a monophyletic group (Spaulding et al. 2006). As such, the Columbian sharp-tailed grouse occurring in Utah, British Columbia, Idaho, and Washington are not an arbitrary collection of birds, but are a true evolutionary group. Genetic differentiation among the populations of Columbian sharp-tailed grouse is not as definitive as between the Columbian and each of the other so-called

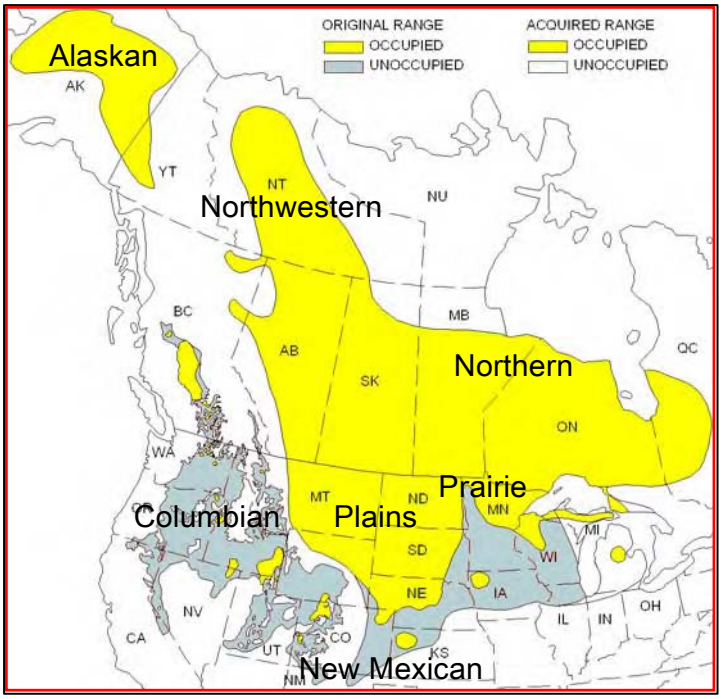

Figure 6. Distribution of subspecies of sharp-tailed grouse in North America (based on Aldrich 1963).

subspecies of sharp-tailed grouse. There appears to be little genetic differentiation among all populations of Columbian sharp-tailed grouse (Warheit and Schroeder 2003, Spaulding et al. 2006) suggesting that any Columbian sharp-tailed grouse population, but perhaps not birds from Colorado, would be an appropriate source population for translocated birds.

Based on genetic sampling of sharp-tailed grouse from Utah, British Columbia, Idaho, and Washington, any population within these areas appears to be a genetically appropriate source population for translocation into Washington. The common sharp-tailed grouse populations in British Columbia, southeastern Idaho and north-central Utah are appropriate populations from which we could translocate birds into Washington – based on population health and habitat similarity (Fig. 7).

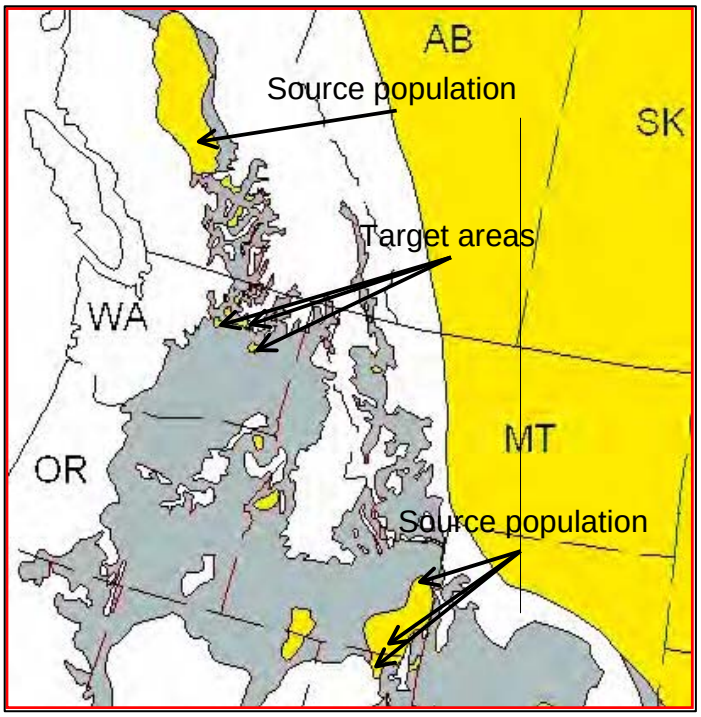

Figure 7. Location of source populations and target areas in relation to the distribution of Columbian sharp-tailed grouse in North America.

CAPTURE AND TRANSLOCATION

In the spring of 2005, 2006, 2007, and 2008, walk-in traps were used to capture and translocate a total of 177 sharp-tailed grouse. Forty birds were translocated from an area west of Clinton, British Columbia, 20 birds from an area north of St. Anthony, Idaho, 41 birds from an area near Heglar Canyon, Idaho, and 75 birds from north-central Utah. The birds were released in the Haley Creek and Nespelem areas of the Colville Indian Reservation (n = 56), the Swanson Lakes area (n = 60), and the Dyer Hill area (n = 61). Seventy-six (44%) of the translocated birds were females. All birds were weighed, measured, banded with unique numbered bands, and fitted with necklace-mounted, battery-powered radio transmitters. In addition, sex and age was determined (Henderson et al. 1967, Caldwell 1980) and blood samples were collected for subsequent genetic testing. In 2008, birds were held in settling boxes for a minimum of 15-20 minutes prior to release, using a box design modified from those described by Musil (1989). This allowed small group of birds to be held together and allowed to leave the box when it was opened with a cord from a hide to minimize stress during release. All birds were released in the target location the same day they were captured, prior to darkness, or the following morning.

Table 1. Number and release location for Columbian sharp-tailed grouse translocated to Washington, 2005-2008.

Release Location	2005	2006	2007	2008	Total
Swanson Lakes WLA	20	12	14	14	60
Dyer Hill/West Foster Creek	20	12	15	14	61
Colville Indian Reservation	19	11	12	14	56
Totals	59	35	41	42	177

MONITORING AND EVALUATION

The success or failure of the re-establishment effort should be evaluated on and near the release site (Toepfer et al. 1990). The specific objectives should include evaluations of movement, habitat use, productivity, survival, and population size. These evaluations help provide essential information to determine whether additional translocations, habitat improvements, release locations, and/or translocation methodologies are necessary. Because these data are currently being collected, the following analysis is brief and incomplete. Nevertheless, it provides some indication of the progress.

Survival

In a sample of the 59 birds released in 2005, 17 disappeared during the first month (12 males and 5 females). Survival information as of November '05 and'06 for birds released at Swanson Lakes is in Table 2. All but 2 males and 1 female were located at least once before their disappearance. Past evidence of reliability with these transmitters suggests that most of these 'lost' birds may have moved far enough away that their signals could not be relocated. Of the remaining 42 birds, 11 radio transmitters were recovered (7 females and 4 males). Ten of these 'recoveries' were clearly predation caused events; one may have been a radio that fell off. The remaining 31 birds were monitored into August, September, and October. At that time many of the remaining birds were 'lost', but lack of aerial tracking time and poor weather reduced our ability to find these birds. Mortality up to this point was not unusually high, but the apparently higher rate of mortality on females versus males in 2005 (47% vs. 15%), 2007 (50% vs. 24%), and 2008 (71% vs. 43%) is troubling. In 2007, 10 of 14 of known mortalities occurred within a month of release, and females outnumbered males 2 to 1 in these early mortalities (Table 3). Past research has suggested that female sharp-tailed grouse suffer a relatively high rate of mortality during the nesting season. Females also exhibit more movements during the pre-nesting season than males (Gratson 1988, Collins 2004), which may expose them to higher risk of predation when in new unfamiliar areas.

Table 2. Status of birds in released at Swanson Lakes in 2005 and 2006.

Release Year/Frequency		Sex	Status in November	Date of last detection
Released in 2005				
	4.242	M	Alive	Mortality, 24 October 2006
	4.516	M	Missing	5 August 2005
	4.267	M	Alive	Mortality, 16 April 2007
	4.288	M	Alive	Mortality, 7 June 2006
	4.318	M	Alive	Mortality, 11 September 2006
	4.391	M	Alive	Mortality, 1 March 2006
	4.421	M	Alive	13 May 2006
	4.540	M	Alive	3 October 2006
	4.679	M	Missing	4 May 2005
	4.719	M	Alive	29 March 2006
	4.830	M	Missing	5 August 2005
	4.919	M	Alive	27 March 2006
	4.141	F	Alive	Lost collar, 27 Mar ch2006
	4.343	F	Missing	26 April 2005
	4.366	F	Alive	25 May 2006
	4.466	F	Missing	17 May 2005
	4.491	F	Alive	10 May 2007
	4.860	F	Missing	26 April 2005
	4.967	F	Alive	11 September 2006
	4.994	F	Missing	4 May 2005
	Known alive		13	9 males, 4 female
	Known dead		0	0 males, 0 females
	Missing/radio failure		7	3 males, 4 females
Released in 2006[a]				
	4.004	M	Missing	8 May 2006
	4.804	M	Alive	Mortality 18 April 2007
	4.822	M	Alive	Mortality 22 January 2008
	4.880	M	Missing	16 August 2006
	5.694	M	Mortality	30 August 2006
	4.030	F	Mortality	8 June 2006
	4.055	F	Mortality	9 May 2006
	4.079	F	Missing	24 October 2006
	5.250	F	Missing	6 September 2006
	5.883	F	Missing	8 May 2006
	Known alive		2	2 males, 0 female
	Known dead		3	1 males, 2 females
	Missing/radio failure		5	2 males, 3 females

[a]Does not include 2 birds released without transmitters.

Table 3. Status of Columbian Sharp-tailed Grouse released in April 2007.

Release Site/Frequency		Sex	Status, November '07	Date of last detection
Swanson Lakes				
	4.016	M	Alive	Mortality 22 January 2009
	4.068	M	Missing	Since release on 9 April
	4.343	M	Missing	Lost radio collar soon after release
	5.127	M	Mortality	20 April 2007
	5.250	M	Alive	Missing 29 Oct 2008
	5.475	M	Mortality	13 November 2007
	5.608	M	Mortality	13 November 2007
	5.944	M	Alive	Mortality 22 January 2008
	4.041	F	Mortality	1 May 2007
	4.660	F	Mortality	14 May 2007
	4.819	F	Mortality	7 May 2007
	5.412	F	Mortality	16 April 2007
	5.638	F	Missing	25 September 2007
	5.700	F	Mortality	25 September 2007
West Foster Creek[a]				
	4.779	M	Missing	30 April 2007
	5.039	M	Mortality	16 April 2007
	5.164	M	Alive	Mortality, 22 January 2008
	5.181	M	Mortality	30 April 2007
	5.465	M	Alive	21 July 2008
	5.854	M	Alive	1 January 2008
	4.699	F	Missing	since release
	5.074	F	Alive	Mortality, 16 Dec 2008
	5.344	F	Mortality	20 July 2007
	5.661	F	Mortality	30 April 2007
	5.734	F	Mortality	30 April 2007
Nespelem area, Colville Reservation				
	5.499	M	Alive	4 September 2008, radio replaced with 5.384
	5.221	M	Missing	16 April 2007
	5.380	M	Alive	4 September 2008
	5.299	M	Alive	4 September 2008
	5.261	M	Alive	22 October 2008
	5.231	M	Alive	8 July 2008
	5.279	M	Mortality	17 April 2007
	5.589	M	Alive	6 May 2008
	5.442	F	Mortality	11 June 2007
	5.893	F	Mortality	25 June 2007
	5.786	F	Alive	Missing, broken collar, 11 June 2008
	5.668	F	Alive	22 January 2008
	Status in November 2007			
	Known alive		15	12 males, 3 female
	Known dead		14	6 males, 10 females
	Missing/radio failure		6	4 males, 3 females

[a]Does not include 4 birds (2 m, 2f) released at West Foster Creek without transmitters.

Table 4. Status of Columbian Sharp-tailed Grouse released in April 2008[a].

Release Site/Frequency		Sex	Status in November	Date of last detection[b]
Swanson Lakes				
	4.242	M	Alive	24 November
	5.266	M	Alive	16 December
	4.566	M	Alive	13 January 2009
	4.719	M	Alive	16 December
	4.879	M	Alive	Mortality 16 December
	5.122	M	Mortality	2 May
	5.240	M	Alive	Mortality, 13 January 2009
	4.366	F	Mortality	15 October
	5.071	F	Mortality	3 July
	5.160	F	Alive	Mortality ,13 January 2009
	5.180	F	Mortality	19 August
	5.182	F	Mortality	19 May
	5.281	F	Missing	15 October
	5.442	F	Missing	4 September
West Foster Creek				
	4.004	M	Alive	16 December
	4.041	M	Alive	16 December
	5.025	M	Alive	16 December
	5.134	M	Missing	5 June
	5.201	M	Alive	16 December
	5.607	M	Mortality	6 May
	4.055	F	Alive	16 December
	4.140	F	Alive	16 December
	4.216	F	Alive	31 December
	5.100	F	Mortality	21 July
	5.219	F	Alive	16 December
	5.300	F	Mortality	21 July
Nespelem				
	4.399	M	Alive	5 November
	4.660	M	Mortality	21 July
	4.703	M	Alive	5 November
	4.941	M	Alive	5 November
	5.105	M	Alive	5 November
	5.305	M	Alive	4 September
	5.546	M	Alive	5 November
	4.020	F	Missing	17 April
	4.030	F	Alive	4 September
	4.286	F	Missing	4 September-mixed signal
	4.288	F	Mortality	4 September
	4.391	F	Missing	5 June
	4.782	F	Collar came off	28 May
	5.849	F	Alive	4 September
Known alive in November 2008			23	16 males, 7 females
Known dead			10	3 males, 7 females
Missing/radio failure			8	2 males, 6 females

[a]These two birds were released in 2007 and still had functional radios into 2008.
[b]All dates 2008, unless otherwise noted; last flight was 16 December for Swanson Lakes, West Foster Creek; September 4 for Nespelem; later dates are from ground-based detections.

Movements

In 2005, we examined movement for 51 birds monitored for at least 2 weeks following release. The average maximum distance where birds were observed in relation to their release location was 9.2 km (range of 0.7 to 49.0 km). These data did not include birds that died or disappeared within the first two weeks of release. These observations were comparable to those from the earlier translocation effort at Scotch Creek Wildlife Area, though the maximum distance and the number of lost birds were higher. Movements in subsequent years appear to have been similar distances from the release site (Appendix A, Fig. 9-16).

Sex, age (adult or yearling), source population, and target population (West Foster Creek, Swanson Lake, Nespelem, or Haley Creek) were considered in an analysis of maximum distance from the point of release. Although none of the independent variables was significant in a general linear model, the source population illustrated a trend ($F = 3.47$, $P = 0.069$). Birds captured in British Columbia moved an average maximum distance of 7.4 km from the release location and birds from Idaho moved an average maximum distance of 12.3 km from the release location.

We calculated maximum distance moved from the release site and minimum convex polygon home ranges for 50 (3 or more locations) of the 58 sharp tailed grouse released at Swanson Lakes Wildlife Area from 2005 – 2008. On average males and females did not differ from each other in the maximum distance moved, nor did the grouse release in SLWA differ significantly from the average maximum distance moved for all grouse released in 2005 (Table 5). However, yearlings did move a greater maximum distance on average than adults (21.3 ± 6.7 vs. 7.7 ± 1.3). Home range size did not differ between adults and yearling nor between females and males (Table 6). Home range size has varied between release cohorts, with 2008's cohort having the smallest home ranges on average.

Table 5. Summary statistics for maximum distance (km) moved by sharp-tailed grouse from Swanson Lake Wildlife Area release site (all years combined).*

	All	Female	Male	Adult	Yearling
Average	9.5	10.0	9.2	7.7	21.4
Median	5.8	6.8	5.7	6.1	11.3
Maximum	69.7	47.3	69.7	24.9	69.7

*Individuals with fewer than 3 locations were not included.

Table 6. Minimum convex polygon home range estimates (km^2) of sharp-tailed grouse released on Swanson Lakes Wildlife Area.

			Age at Release		Release Year			
	Female	Male	Adult	Yearling	2005	2006	2007	2008
Average	16.8	17.9	20.6	21.7	18.9	30.3	14.9	8.3
Median	5.7	8.7	8.7	11.1	10.9	8.2	9.0	4.5

Productivity

In 2005, 6 of 19 observed nests were successful; all were first nests. Of the 6 successful nests, three resulted in chicks living at least 40 days after hatch (11 chicks in 2 broods at Dyer Hill and 4 chicks in 1 brood at Swanson Lakes).

Nest success was significantly correlated with distance from the release site in a logistic regression. Nests that were further from the release site were more likely to be successful ($\chi^2 = 5.26$, P = 0.022). It is not clear why this relationship was observed. It is possible that this observation may have been partially related to the source of the birds (Idaho birds tended to move further than British Columbia birds) and/or a potential difference in productivity associated with the source location of the birds (nothing significant detected). It is also possible that movement is in some way related to productivity.

There were no observed nesting attempts in 2006 and 2008 by the newly released sharp-tailed grouse at Swanson Lakes Wildlife Area ; there were two observed nesting attempts by different hens in 2007. However, nest attempts that were predated early in nesting may have been missed in our attempt to minimize disturbance.

Population response

Positive population responses (Fig. 3) and long-term population viability are the ultimate results desired from translocations. In 2007, a concerted effort was made to conduct a thorough survey in the Dyer Hill area. As a result, an apparent increase in the population was detected (Fig. 8). It is believed that this observed increase was real and not an artifact of increased survey intensity for three basic reasons: 1) translocated males were among the displaying individuals; 2) the locations where the 'new' leks were detected had been surveyed in previous years; and 3) an increase in number of birds was also observed during winter in nearby wintering habitats.

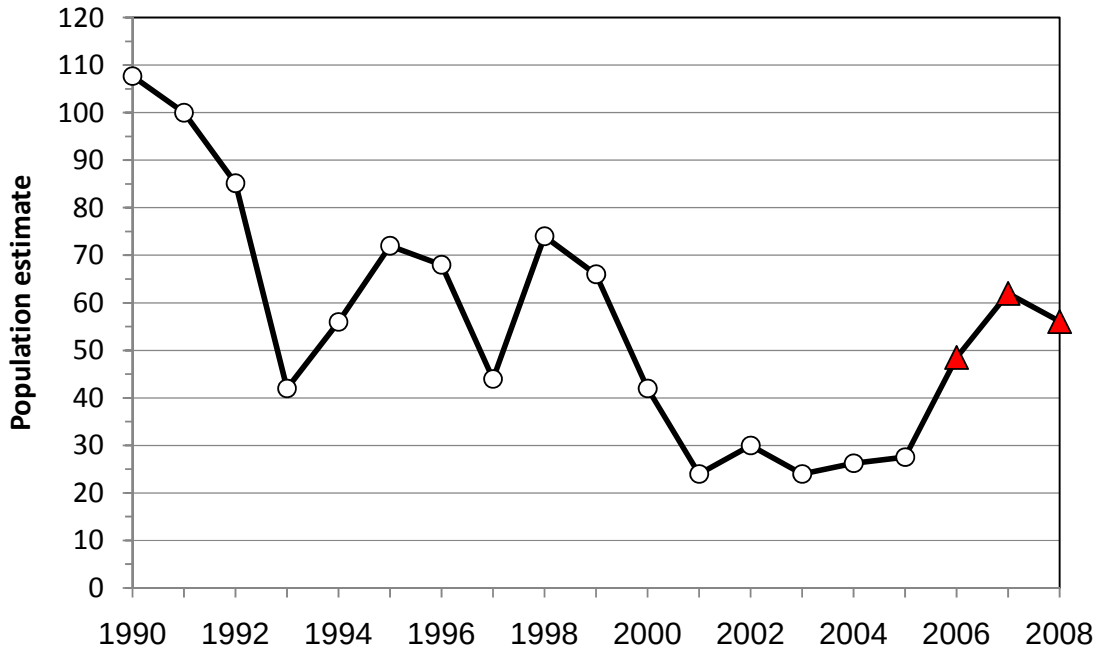

Figure. 8. Population estimates for the Dyer Hill area of Washington before and during the augmentation of 45 sharp-tailed grouse in 2005, 2006, 2007, and 2008.

Future efforts

Although it is still too early in the process to evaluate the success of the augmentations, there are ongoing efforts to monitor movement, survival, and productivity of the translocated birds. In the first few years of translocations to Scotch Creek, observed success was relatively small. It is hoped that the current translocation efforts will begin to show some positive results in 2009. One additional year of translocations is planned to meet the original plan to release 200 birds; however, because releases have been split among 3 sites, additional years are being considered.

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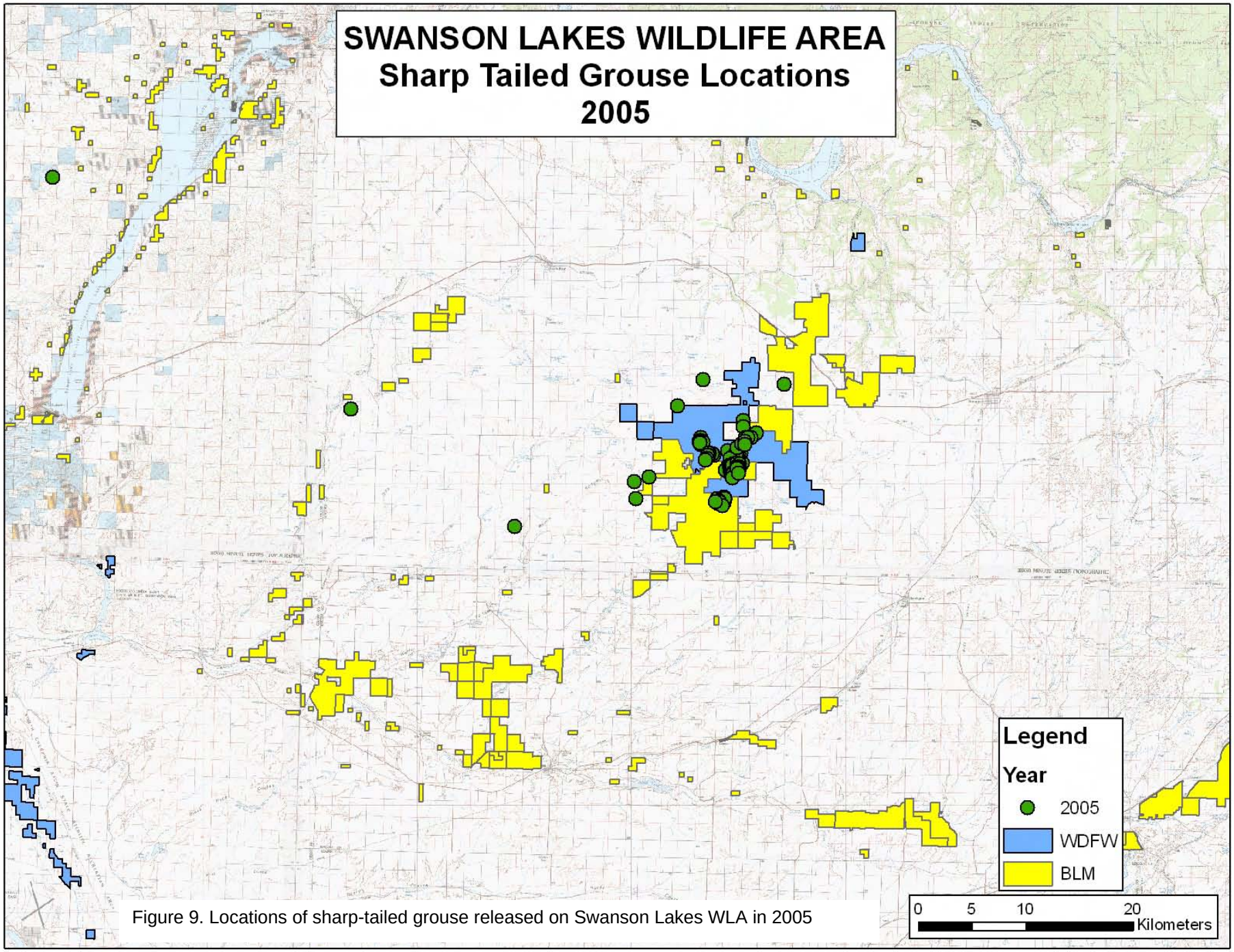

Figure 9. Locations of sharp-tailed grouse released on Swanson Lakes WLA in 2005

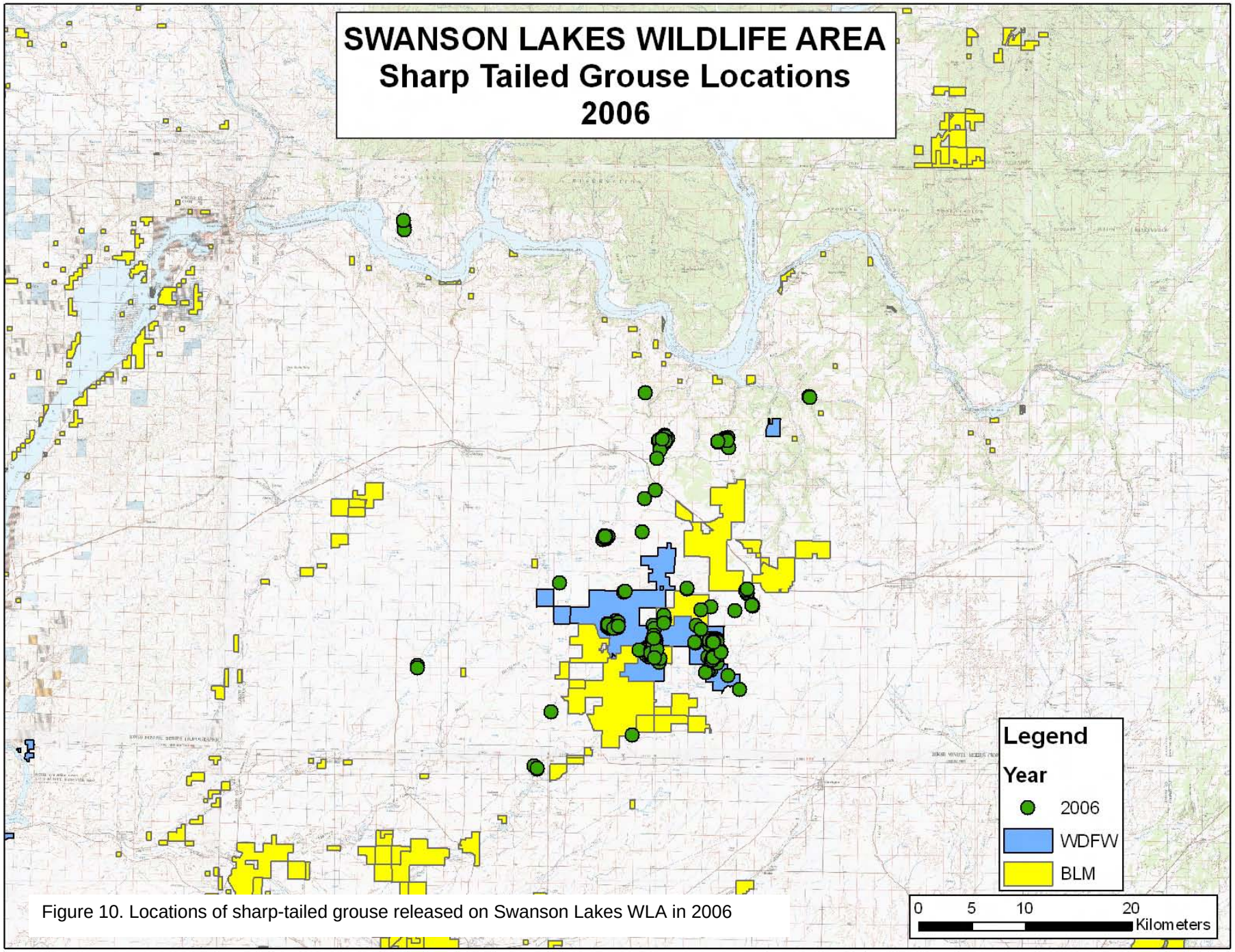

Figure 10. Locations of sharp-tailed grouse released on Swanson Lakes WLA in 2006

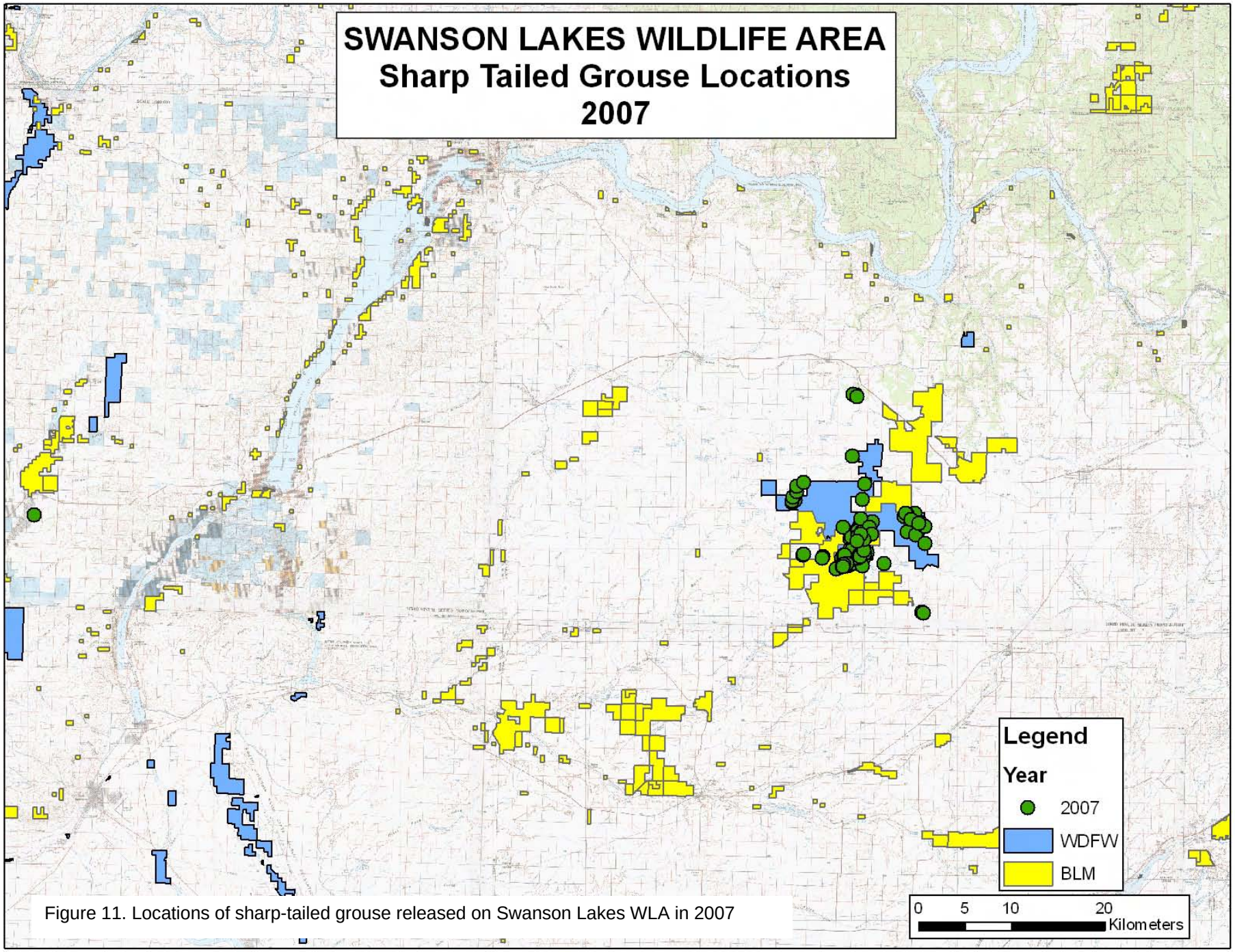

Figure 11. Locations of sharp-tailed grouse released on Swanson Lakes WLA in 2007

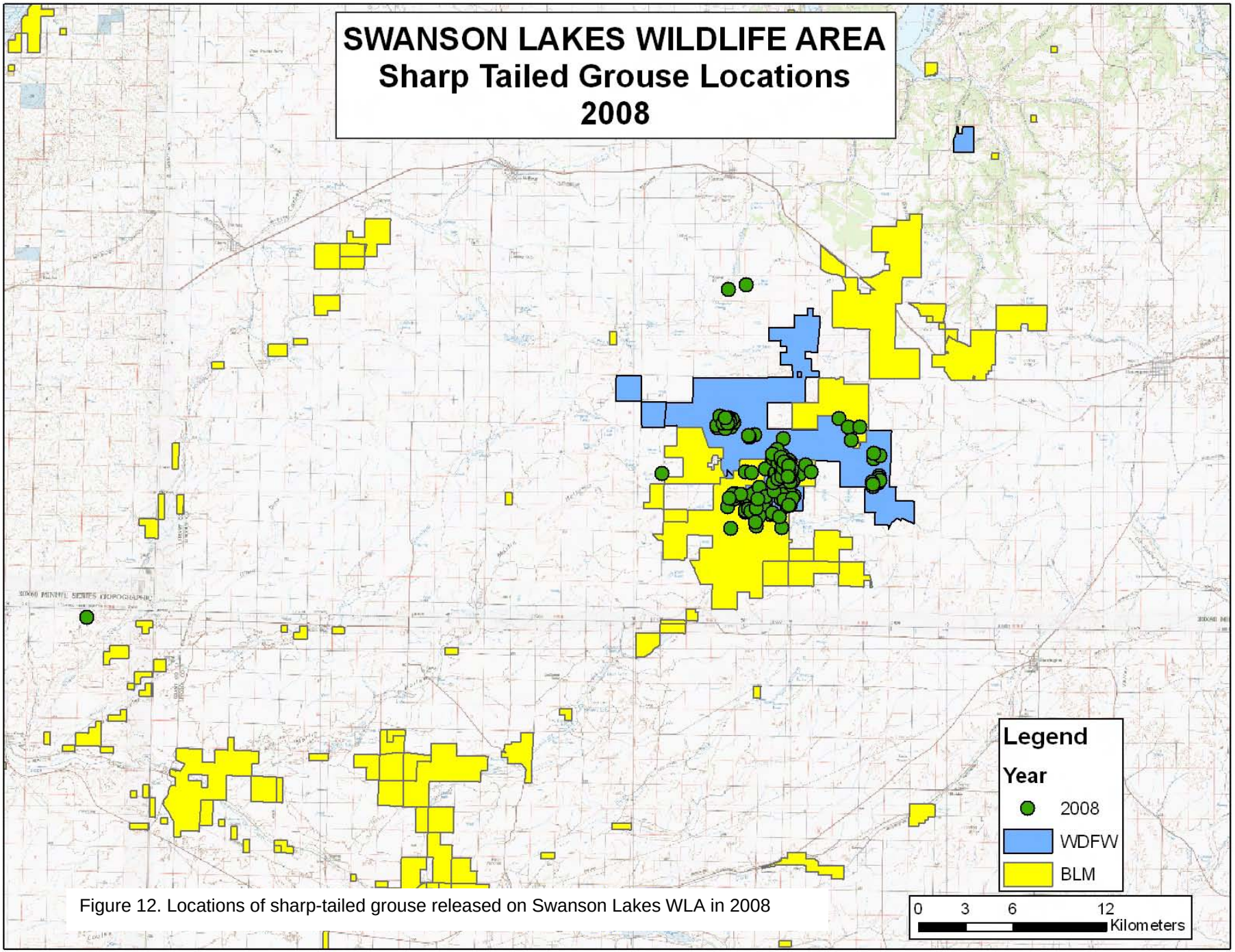

Figure 12. Locations of sharp-tailed grouse released on Swanson Lakes WLA in 2008

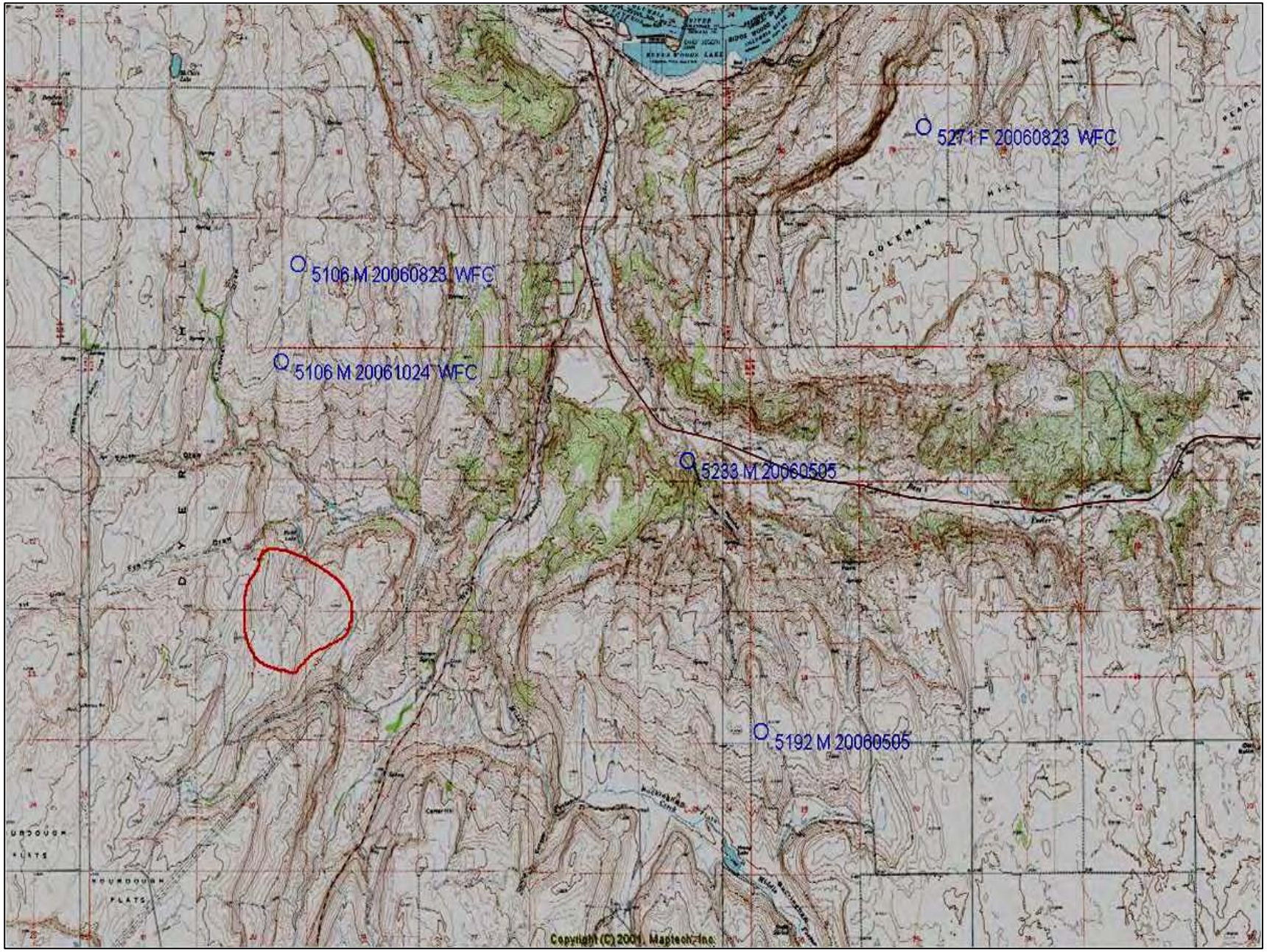

Figure 13. Sharptail locations in West Foster Creek area, 2006 (red polygon indicates vicinity of previous detections).

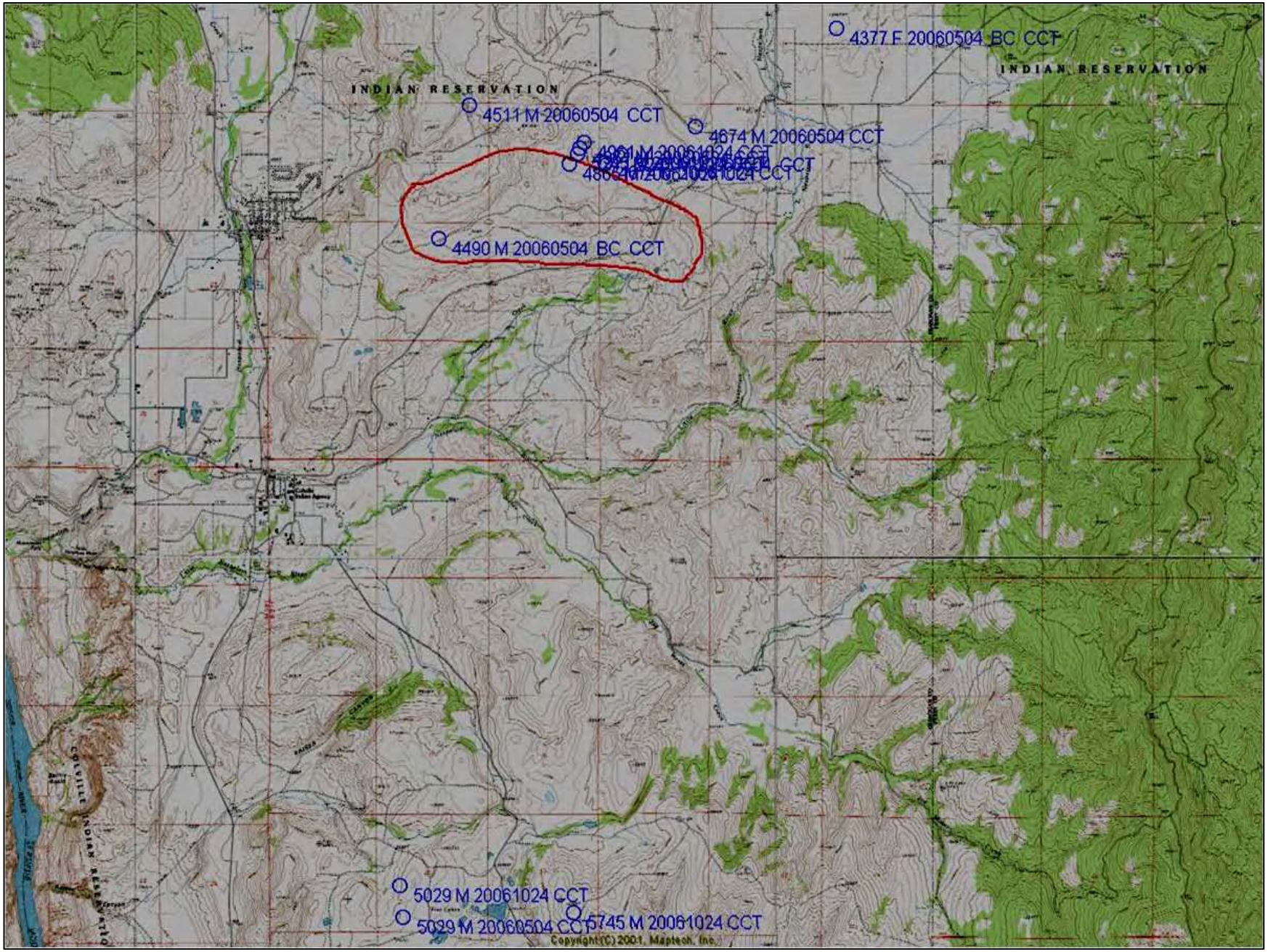

Figure 14. Sharptail locations in Nespelem area, 2006 (red polygon indicates vicinity of previous detections).

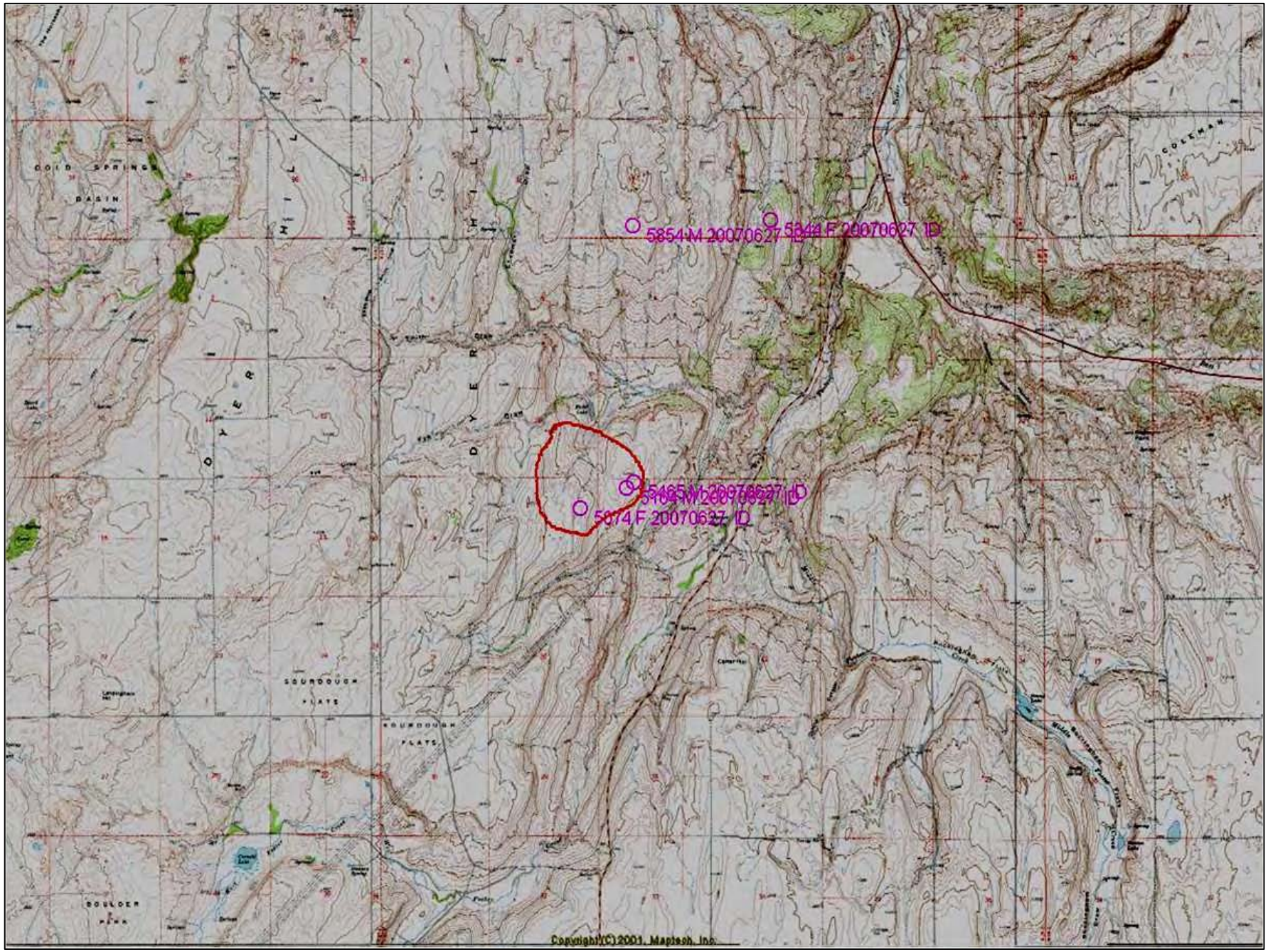

Figure 15. Sharptail locations in West Foster Creek area, June 2007(red polygon indicates vicinity of previous detections).

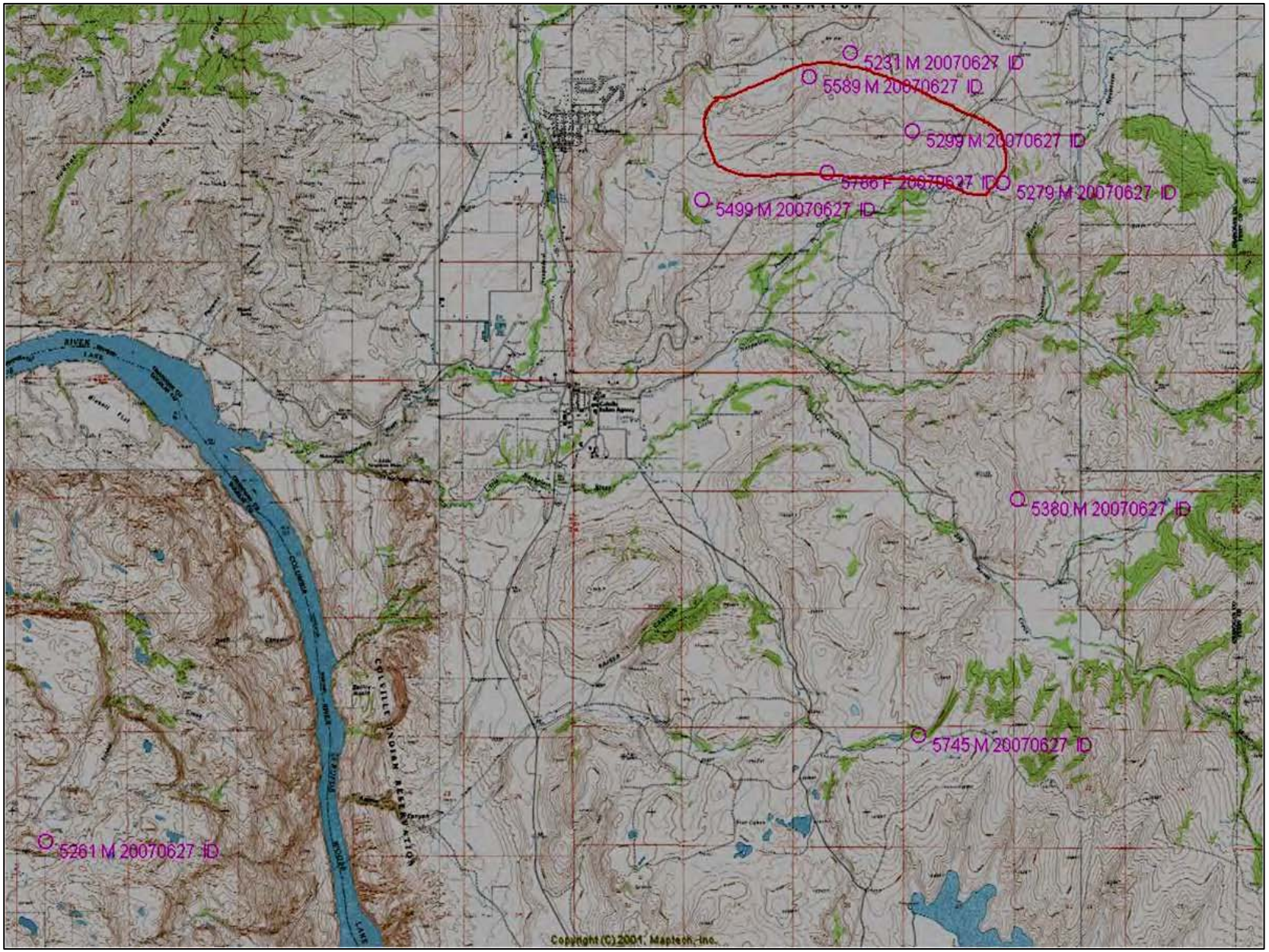

Figure 16. Sharptail locations in Nespelem area, Colville Reservation, June 2007(red polygon indicates vicinity of previous detections).