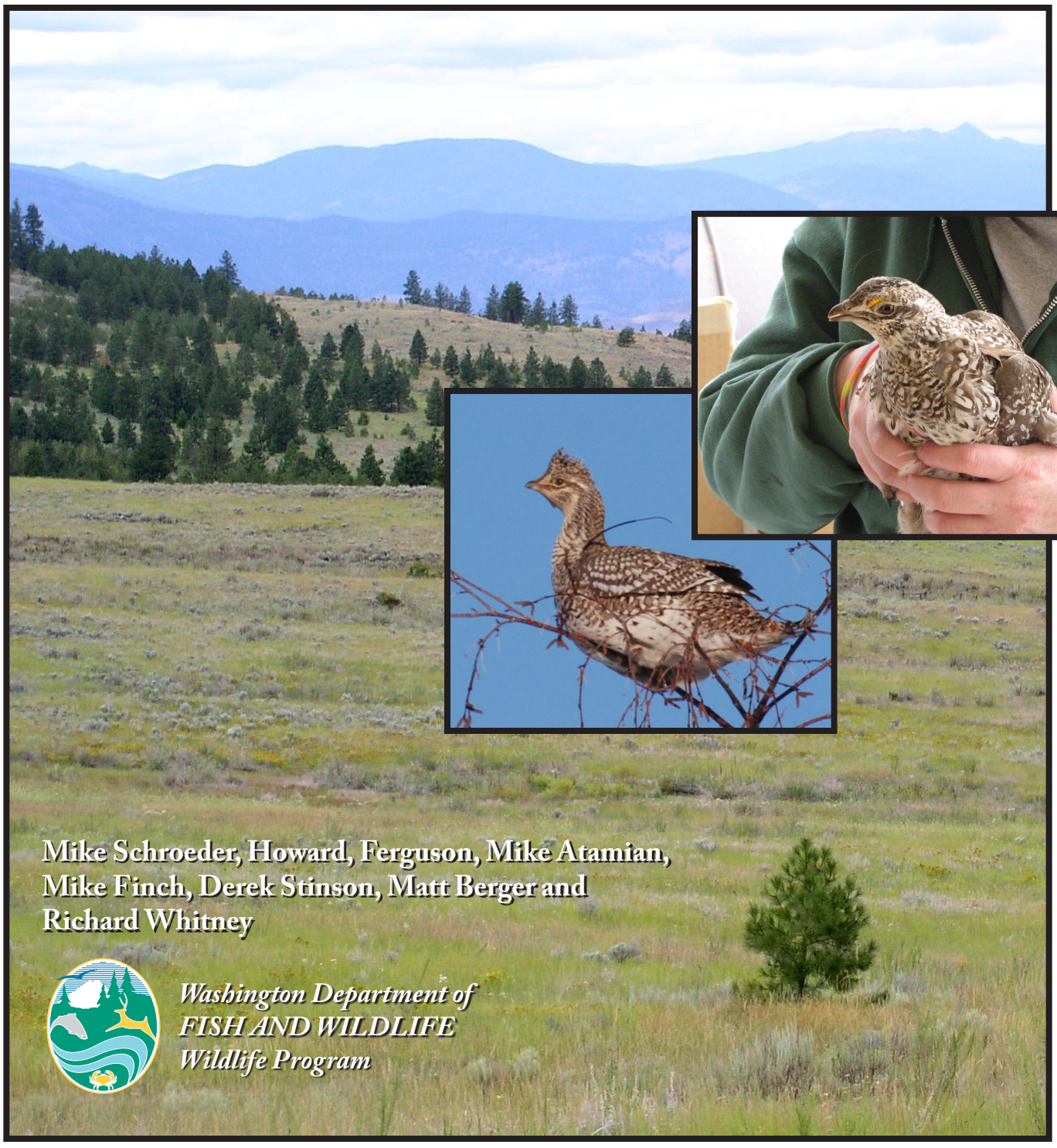
STATE OF WASHINGTON Progress Report December 2010

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



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Washington Department of
FISH AND WILDLIFE
Wildlife Program

ABSTRACT

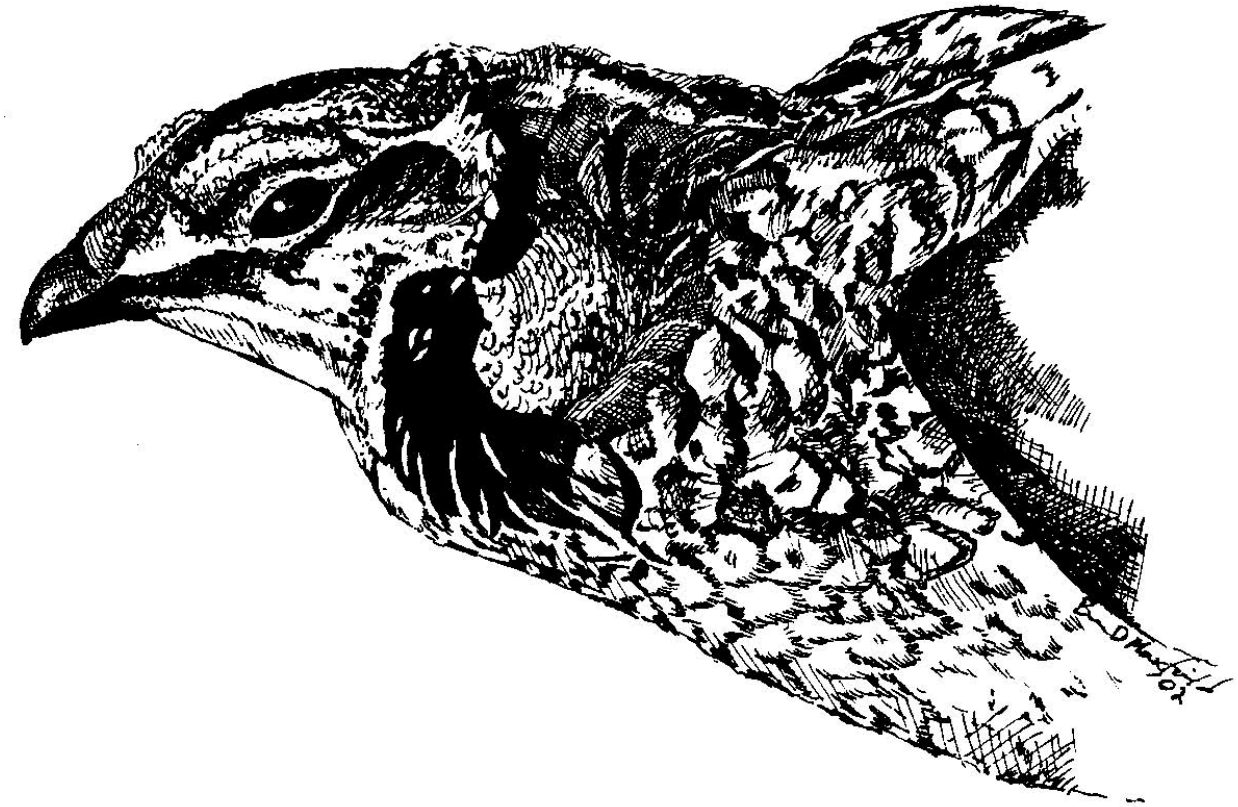
Declining populations and distribution of Columbian sharp-tailed grouse (*Tympanuchus phasianellus columbianus*) in Washington have resulted in serious concerns for their long-term conservation status. Translocations of sharp-tailed grouse from 'healthy' populations outside the state are being conducted to improve the genetic health of populations within Washington. The Washington Department of Fish and Wildlife, in cooperation with the Colville Confederated Tribes, translocated 264 Columbian sharp-tailed grouse from central British Columbia, southeastern Idaho, and north-central Utah to Washington State in spring 2005-2010. 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. Efforts to monitor movement, survival, and productivity of the translocated birds are ongoing. Although it is too early in the process to determine whether the augmentations should be considered a success, the results to date have been promising.

ACKNOWLEDGEMENTS

This project would not have been possible without the cooperation of 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, Megan Schwender, Harriet Allen, Chris Sato, 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. Jason Lowe with BLM has been a great supporter and sought additional funds to improve this project. Lisa Shipley and Todd McLaughlin at Washington State University and graduate students Kevin White and Kourtney Stonehouse added a strong research component to this project. Monitoring included efforts by personnel from Colville Confederated Tribes, Bureau of Land Management, WDFW, and volunteers Monica McFadden, Nick Hobart, Jason Lowe, Nancy Williams, Abbey Shuster, Aliina K. Lahti, Dick Rivers, Gary Ostby, Harvey Morrison, Kevin White, Luke Lillquist, Kim Thorburn, and Craig Cortner. Apologies to those that we have forgotten to mention.

On the cover: Background and sharp-tailed grouse (in hand) photos by Michael A. Schroeder; radio-marked sharp-tailed grouse hen in water birch on 31 December 2008 at West Foster Creek by Marc Hallet; line drawing on page 2 by Brian Maxfield; and line drawing on back page by Darrell Pruett

RE-ESTABLISHMENT OF VIABLE POPULATIONS OF SHARP-TAILED GROUSE IN WASHINGTON: PROGRESS REPORT



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Washington Department of Fish and Wildlife

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BACKGROUND

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) (Table 1). The total population in Washington was estimated to be about 956 birds in 2010.

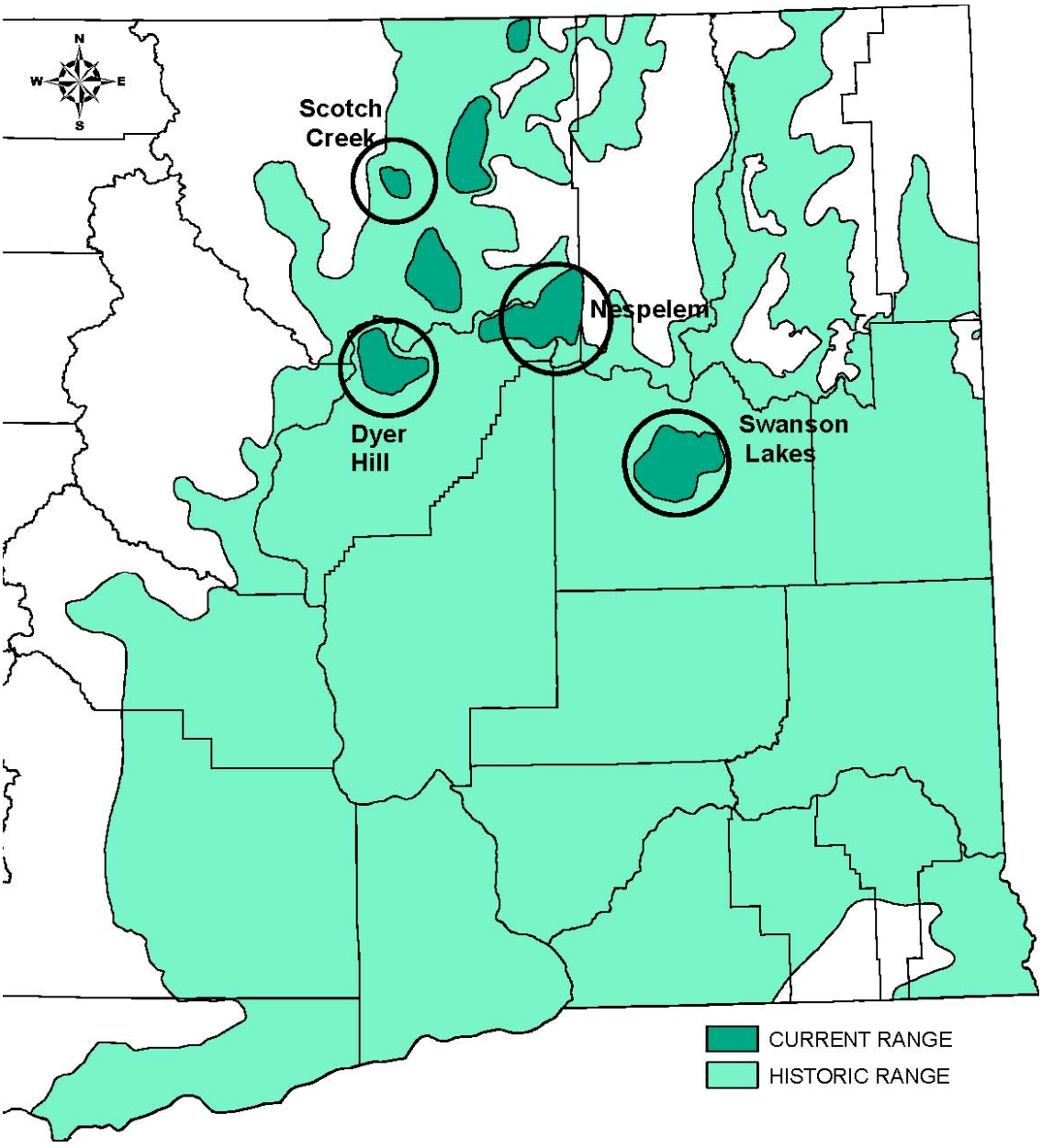

Fig. 1. Estimated historic and current range of sharp-tailed grouse in Washington (Schroeder et al. 2000). The populations discussed in this report are circled.

Table 1. Distribution of habitats (1993 Thematic Mapper) in Washington in relation to sharp-tailed grouse populations (adapted from Schroeder et al. 2000).

Range or population	Proportion of area (%)					Total area (km^2)
	Shrubsteppe[a]	Cropland	CRP	Forest-shrub	Other	
Total population	67.2	11.6	5.2	14.5	1.5	2,173
Tunk/Siwash Valleys	69.6	1.5	1.2	27.5	0.2	342
Greenaway Spring	78.7	3.6	2.1	14.5	1.2	340
Chesaw	46.0	0.0	3.9	49.9	0.2	70
Scotch Creek	69.3	4.7	0.9	23.7	1.4	79
Dyer Hill	42.0	44.5	12.0	0.7	0.8	308
Nespelem	65.7	5.1	6.9	19.6	2.7	513
Swanson Lakes	77.0	13.0	5.6	2.4	2.0	521
Unoccupied range	36.5	37.9	4.4	17.7	3.4	77,692
Total historical range	37.3	37.3	4.4	17.6	3.4	79,865

[a]Shrubsteppe includes shrubsteppe, meadow-steppe, and steppe habitats described by Daubenmire (1970).

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-tailed grouse range (Spaulding et al. 2006), and begun experimental translocations to increase and expand populations. The Colville Confederated Tribes (CCT) has 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 a goal of minimizing or eliminating threats and improving the condition of 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 riparian trees and shrubs.

Isolation poses a significant threat to the viability of remaining populations. 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.

A population augmentation effort was initiated to address genetic issues associated with populations (e.g., lack of heterogeneity and small population size). In addition, by translocating birds from 'healthy' populations, a basic hypothesis can be tested. Specifically, is habitat limiting the growth and/or expansion of existing populations or is the problem related to the intrinsic 'health' of the birds? An increasing population trend following augmentation would support the hypothesis that a population 'health' problem existed. If the population size remains the same or continues to decline, and monitoring indicates that the translocated birds remained in the area and survived to attempt reproduction, data will support the conclusion that habitat quality and/or quantity is limiting population growth.

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 2 males displaying on it. This population increased after three years of translocation (Fig. 2).

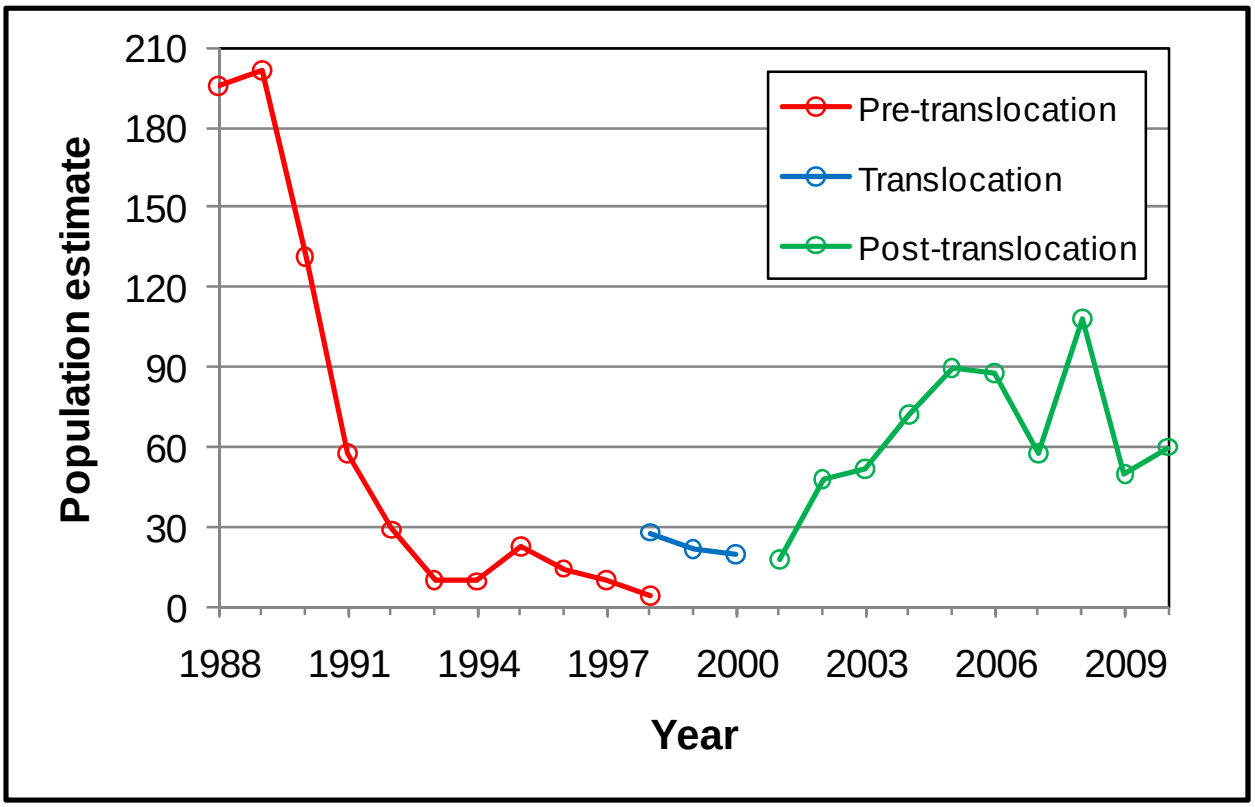

Fig. 2. Estimated population of sharp-tailed grouse on the Scotch Creek Wildlife Area in Washington before and after translocation of 63 sharp-tailed grouse in 1998, 1999, and 2000.

LINCOLN COUNTY TRANSLOCATION PROJECT

The translocation effort was designed to adhere to recommendations outlined by Reese and Connelly (1997). Translocations of sharp-tailed grouse should include four basic stages in order to maximize the opportunities for successful reestablishment 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 greater sage-grouse near the release sites needs to be established. The second stage is to identify source populations for translocation to the proposed release sites. This should include a genetic analysis. The third stage is to conduct the translocation as efficiently as possible in a way that minimizes the length of captivity and maximizes survival and productivity. The fourth stage is to monitor and evaluate the success or failure of the reestablishment or augmentation effort. This fourth stage is particularly important so that all translocation efforts, even those that are unsuccessful, will provide valuable information for future efforts.

STAGE 1: 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 (Fig. 3): 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 relatively 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.

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 5,135 ha parcel located approximately 6 miles north of the town of Odessa in southwest Lincoln County. Management of the area has focused on supporting wildlife habitat, seasonal livestock grazing, and wildlife-based recreational opportunities. Twin Lakes is a 6,201 ha parcel located approximately 16 miles southwest of Davenport in central Lincoln County. Coffeepot Lake is a 377 ha parcel located 12 miles west of Harrington in Lincoln County. 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.

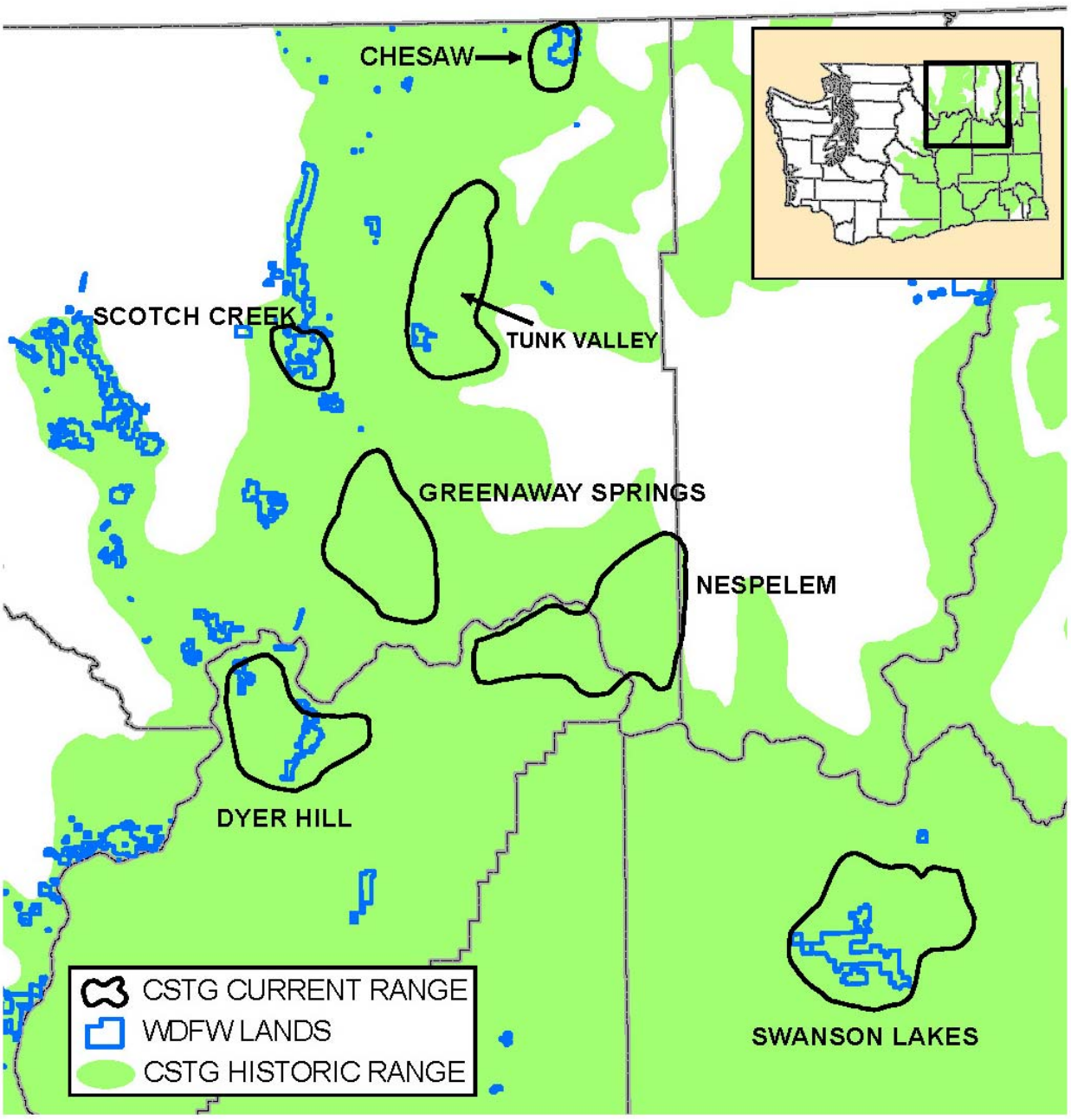

Fig. 3. Washington Department of Fish and Wildlife lands in relation to the current range of sharp-tailed grouse in Washington. The primary release sites include Swanson Lakes, Nespelem, and Dyer Hill. Scotch Creek was a release site in 1998-2000.

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 300 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. 2).

STAGE 2: SOURCE POPULATIONS

The sharp-tailed grouse is currently divided into six extant subspecies (Aldrich 1963, Fig. 4); the New Mexican subspecies is extinct. Sharp-tailed grouse in Washington are within the Columbian subspecies range, somewhat distinguishable by its grayer color; smaller size; and shrubsteppe and mountain shrub habitat. Taxonomic differentiation of 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, (Warheit and Schroeder 2003, Spaulding et al. 2006).

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. 5).

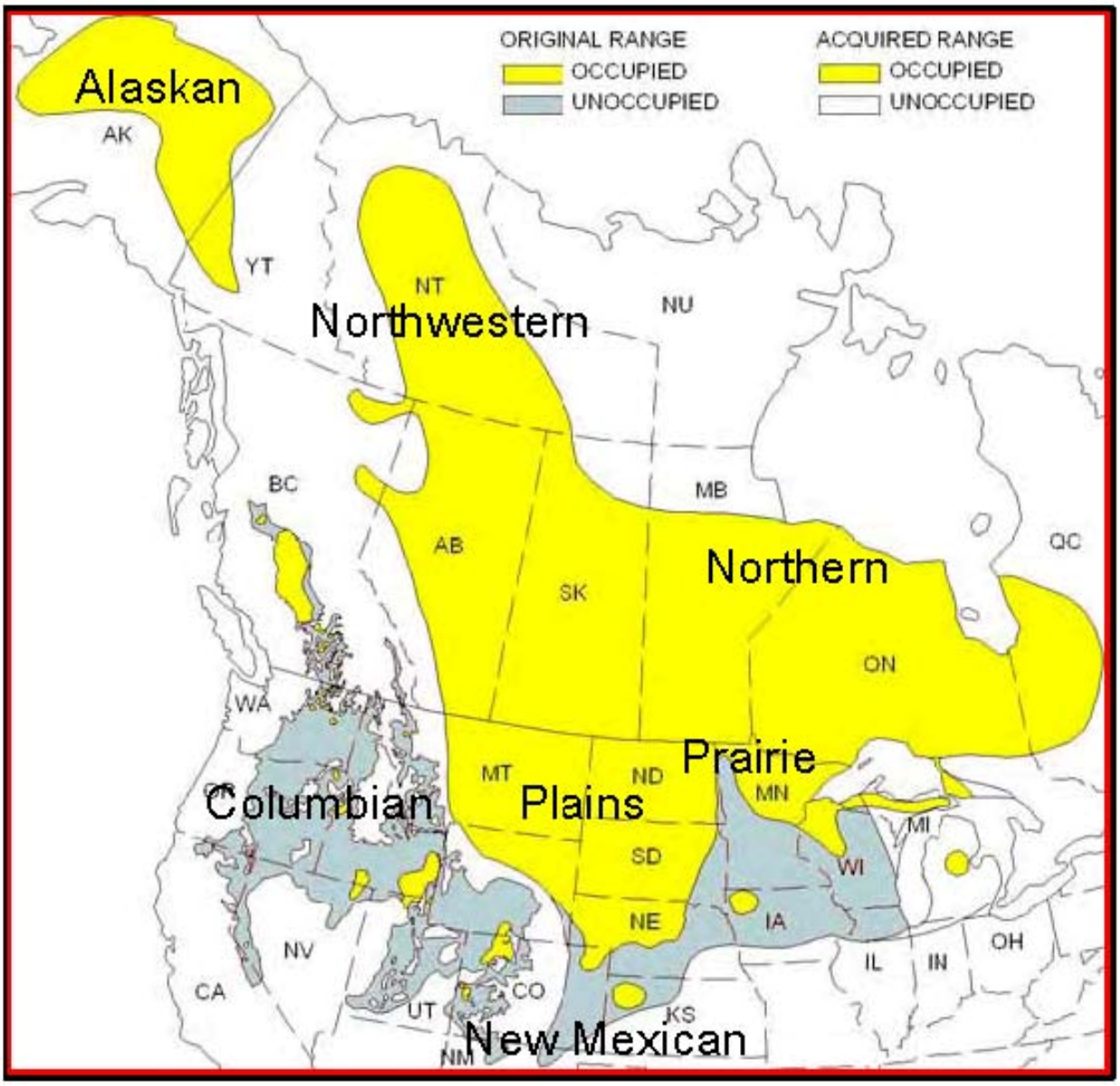

Fig. 4. Distribution of of sharp-tailed grouse subspecies in North America (Aldrich 1963).

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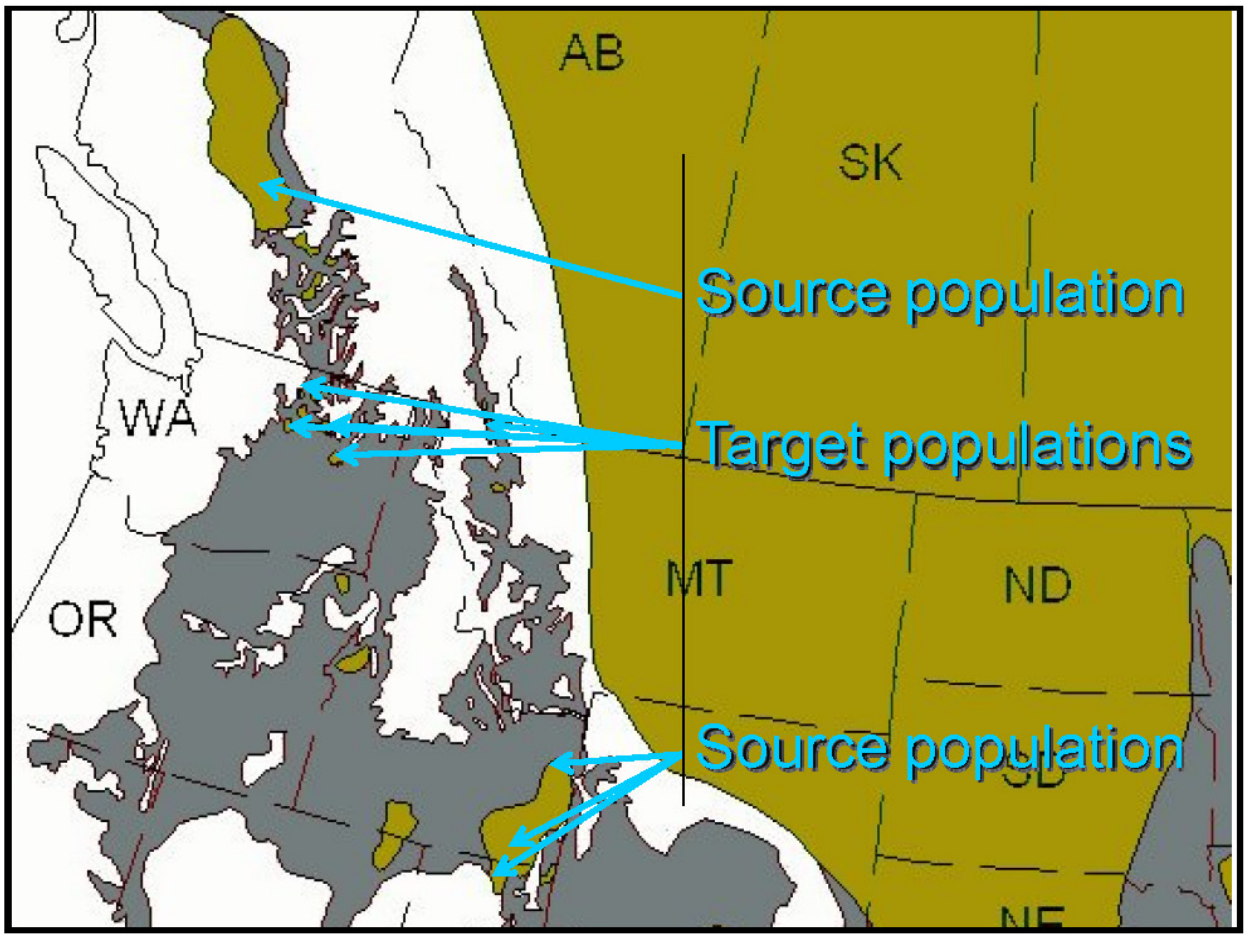

Fig. 5. Location of source populations for translocations within the range of Columbian sharp-tailed grouse in relation to the target populations in Washington.

STAGE 3: CAPTURE AND TRANSLOCATION

Sharp-tailed grouse are generally captured during the spring breeding period (early April) with the aid of walk-in traps on leks. All birds are weighed, measured, banded with unique numbered bands, and fitted with necklace-mounted, battery-powered radio transmitters. In addition, sex and age are determined (Henderson et al. 1967, Caldwell 1980) and blood samples are collected for subsequent genetic testing. Birds are transported by plane or car in an individual box or a portion of a box that is small enough to contain the bird's movement. The bottom of each box is lined with a material to reduce contact between feces and the birds' feet.

Starting in 2008, birds have been 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 allows small groups 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 are released in the target location the same day they were captured, prior to darkness, or the following morning. Prior to 2008, birds were released directly from boxes. All birds destined for translocation receive a health certificate

from a veterinarian that is accredited within the donor state. The US Department of Agriculture maintains a disease list for which all translocated birds are screened.

In the springs of 2005-2010, 264 sharp-tailed grouse were captured in Utah, Idaho, and British Columbia and translocated to Washington (Table 2). Forty birds were translocated from an area west of Clinton, British Columbia, 20 birds from an area north of St. Anthony, Idaho, 129 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 = 66), the Swanson Lakes area (n = 137), and the Dyer Hill area (n = 61). One hundred fourteen (43%) of the translocated birds were females. All disease testing was negative.

Table 2. Summary of birds translocated from British Columbia, Idaho, and Utah to Washington during 2005-2009.

Release location	2005	2006	2007	2008	2009	2010	Total
Swanson Lakes Wildlife Area	20	10	14	14	28	51	137
Dyer Hill	20	12	15	14	0	0	61
Colville Indian Reservation	19	11	12	14	10	0	66
Total	59	33	41	42	38[a]	51	264

[a]Two birds died during transportation.

STAGE 4: MONITORING AND EVALUATION

The success or failure of the re-establishment effort is evaluated on and near the release site (Toepfer et al. 1990). Although radio-marked sharp-tailed grouse have been monitored at all release sites, most of the effort has been focused on and near the Swanson Lakes Wildlife Area. The specific objectives 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.

Movement

Radio-marked sharp-tailed grouse are located with the aid of portable receivers and 3-element Yagi antennas. Birds are located daily either visually or with triangulation during the first two weeks following release and at least once each week for the duration of the research, particularly on the Swanson Lakes Wildlife Area. For triangulation, three or more azimuths are obtained, usually within 1.5 km of target transmitters and at angles-of-incidence greater than 35^{o} and less than 145^{o}. Error polygons are used to assess the 'quality' of the estimated locations. All locations are recorded with a GPS unit using Universal Transverse Mercator coordinates to the nearest meter. For visual observations, an attempt is be made to avoid disturbance of birds, particularly at nest sites. Fixed-wing aircraft are used to locate lost birds on a regular basis throughout the year.

At the Swanson Lakes Wildlife Area 137 birds were monitored in 2005 (Fig. 6), 2006 (Fig. 7), 2007 (Fig. 8), 2008 (Fig. 9), 2009 (Fig. 10), and 2010 (Fig. 11). Sex, age, 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. At the Swanson Lakes Wildlife Area, females (11 km, SE = 2 km, n = 54) tended to move farther than males (7 km, SE = 1 km, n = 66) and yearlings (11 km, SE = 2 km, n = 34) farther than adults (8 km, SE = 2 km, n = 86). We calculated minimum convex polygon home ranges for sharp-tailed grouse released at Swanson Lakes Wildlife Area. Home range size did not differ between adults (11 km^2, SE = 2 km^2, n = 79 and yearlings (13 km^2, SE = 3 km^2, n = 31) nor between females (9 km^2, SE = 1 km^2, n = 47) and males (14 km^2, SE = 2 km^2, n = 63).

Habitat use

Habitat use will be evaluated for general categories of vegetation cover such as: 1) CRP; 2) wheat; 3) other crops; 4) riparian; 5) shrubsteppe; and 7) other habitats. Available cover will be examined with satellite imagery (Geographical Information Systems) in three different ways. First, the quantity of each cover type on the study area will be estimated. Second, the quantity of each cover within the perimeter of each bird's home range (minimum convex polygon) will be estimated. Third, the quantity of each cover type within a certain distance of the release site will be estimated; in the case of nest sites, the distance between a female's nest site and the release site will be used. Comparisons of used and available habitat will be conducted with χ^2 contingency tables (Neu et al. 1974, Thomas and Taylor 1990).

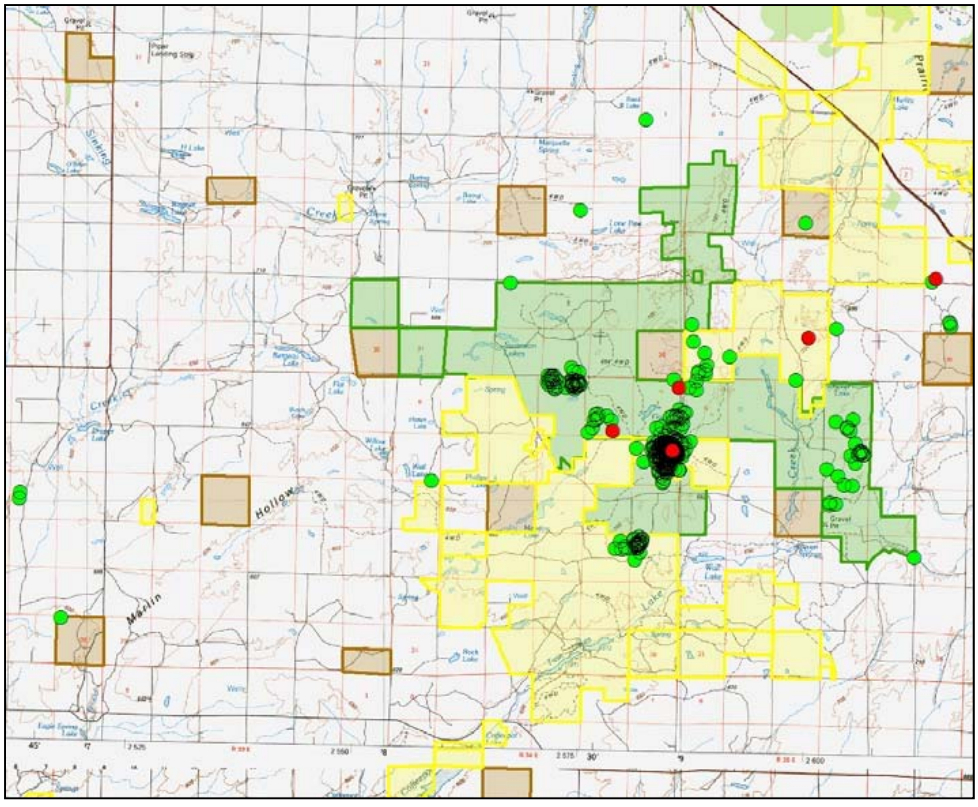

Fig. 6. Locations of radio-marked translocated sharp-tailed grouse in the Swanson Lakes Wildlife Area during 2005 (green circles = live, red circles = dead).

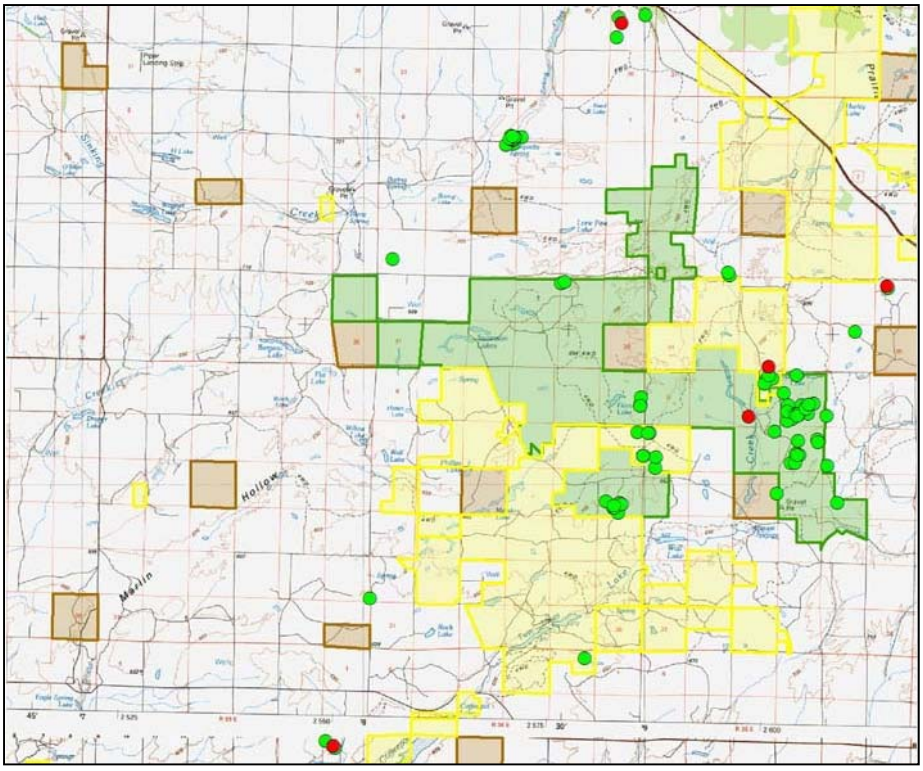

Fig. 7. Locations of radio-marked translocated sharp-tailed grouse in the Swanson Lakes Wildlife Area during 2006 (green circles = live, red circles = dead).

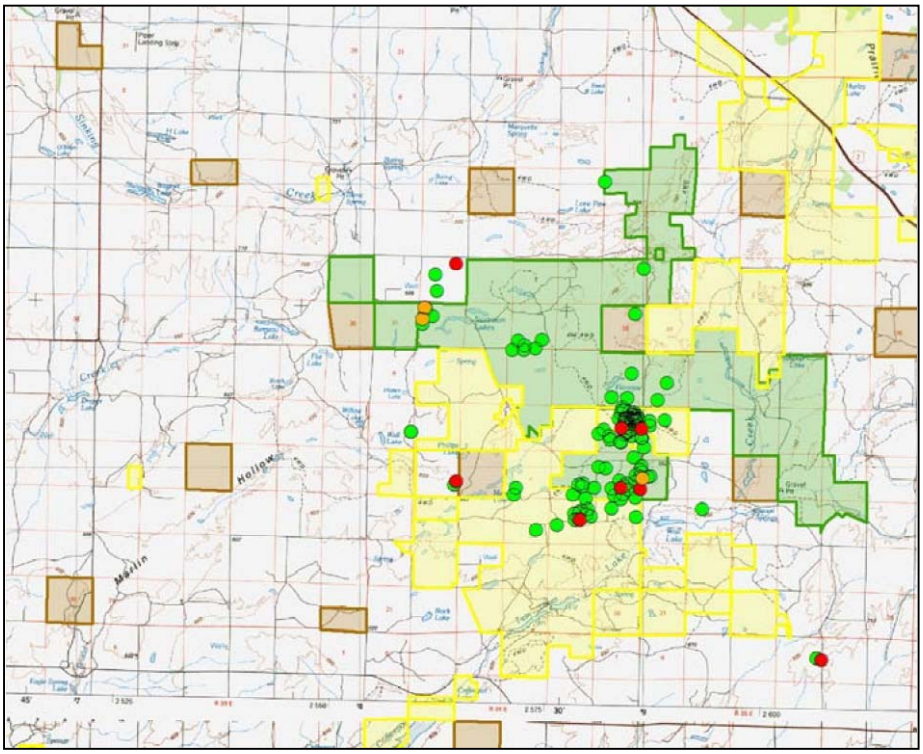

Fig. 8. Locations of radio-marked translocated sharp-tailed grouse in the Swanson Lakes Wildlife Area during 2007 (green circles = live, red circles = dead).

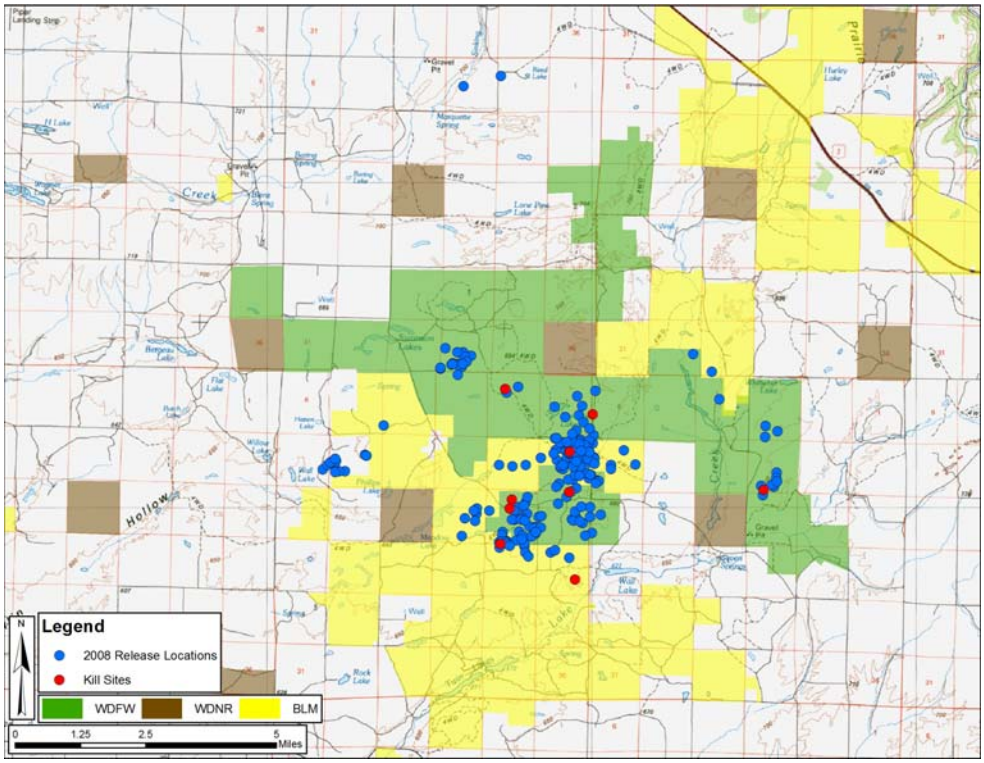

Fig. 9. Locations of radio-marked translocated sharp-tailed grouse in the Swanson Lakes Wildlife Area during 2008 (blue dots = live, red dots = dead).

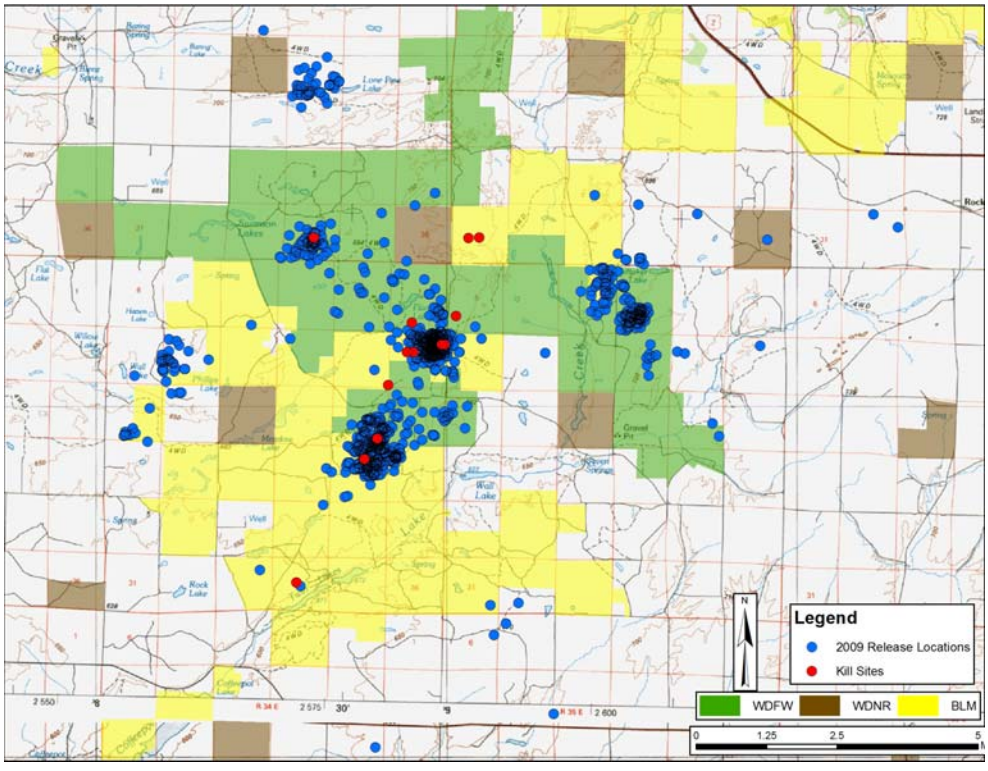

Fig. 10. Locations of radio-marked translocated sharp-tailed grouse in the Swanson Lakes Wildlife Area during 2009 (blue dots = live, red dots = dead).

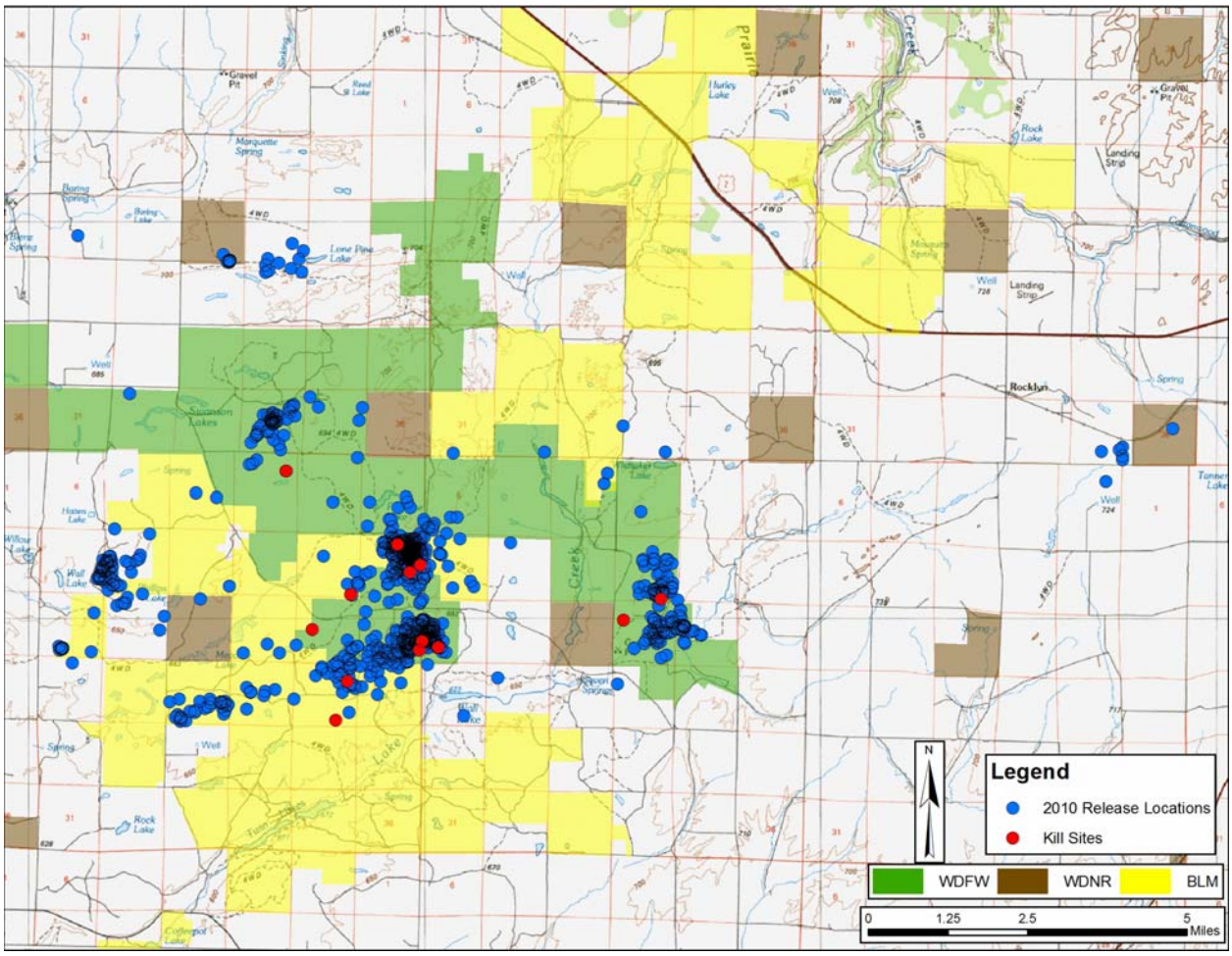

Fig. 11. Locations of radio-marked translocated sharp-tailed grouse in the Swanson Lakes Wildlife Area during 2010 (blue dots = live, red dots = dead).

Productivity

Nest success was examined each breeding season (Schroeder 1997). Nests were considered successful if a minimum of 1 egg hatched. Specific evidence of possible predators was examined at unsuccessful nest sites. Brood success was estimated using radio-marked females that successfully produced broods that survived at least 50 days following hatch (chicks can survive on their own after 50 days). Observations of banded and unbanded birds at leks were used to evaluate the recruitment of new birds into the population as well as the presence of birds that may have been on the release site prior to the first translocation. The latter situation may indicate leks which were previously undiscovered.

In 2009 and 2010 combined, 18 of 44 hens were observed nesting (41%). Eight of 18 nesting females nested successfully (44%). Annual reproductive success was estimated to be 18%. This number was very low because of the large number of females (59%) not observed on nests. Five of eight successfully nesting females retained chicks at 50 days of age (63%).

Survival

Annual survival was estimated for radio-marked sharp-tailed grouse using the Kaplan-Meier product limit estimator (SAS Institute Inc. 1988, White and Garrott 1990). Potential differences in survival between females and males was compared with the log rank test (SAS Institute Inc. 1988, White and Garrott 1990). Specific evidence of possible predators was examined for recoveries of dead birds or radio transmitters (Darrow 1938). Examination of radio-marked birds translocated to the Swanson Lakes Wildlife Area showed that at least 54 of 137 birds were known to have died (39%). Many additional birds are missing, have radio transmitters that are no longer functioning, or were not fitted with radio transmitters so the number of dead birds is likely higher (Table 3). Mortality appeared to be higher for females than males, especially during the summer months (Fig. 12). Know-fate analysis in Program Mark illustrated significant differences in survival by sex and age (Fig. 13).

Table 3. Summary of status of 137 radio-marked translocated sharp-tailed grouse in the Swanson Lakes Wildlife Area, Washington during 2005-2010.

Release	2005	2006	2007	2008	2009	2010	Total
Alive	0	0	0	0	10	20	30
Outlived transmitter	4	0	2	2	0	0	8
Dead	5	5	9	9	13	13	54
Missing	10	5	3	3	4	8	33
Radio fell off	1	0	0	0	1	1	3
No transmitter used	0	0	0	0	0	9	9
Total	20	10	14	14	28	51	137

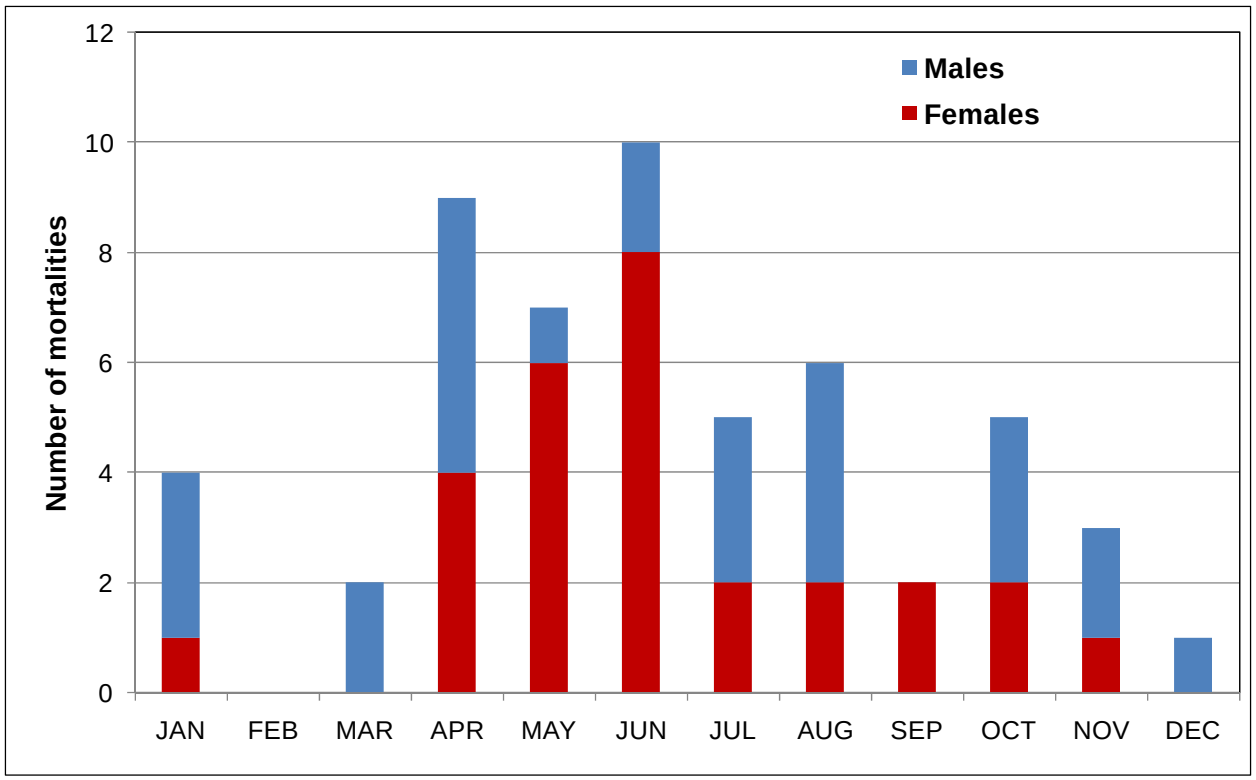

Fig. 12. Distribution of 54 mortalities among 137 translocated sharp-tailed grouse in the Swanson Lakes Wildlife Area, Washington, 2005-2010.

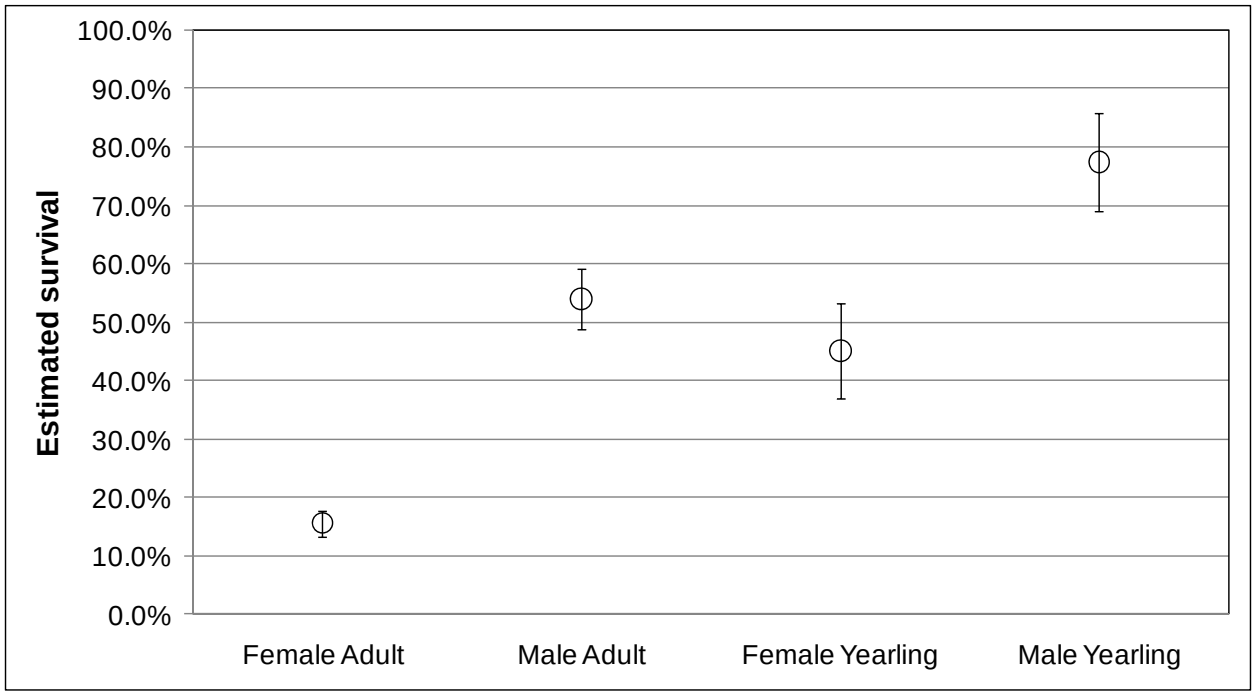

Fig. 13. Know-fate survival analysis using Program Mark on 137 translocated sharp-tailed grouse in the Swanson Lakes Wildlife Area, Washington, 2005-2010.

Population monitoring

Positive population responses and long-term population viability are the ultimate results desired from translocations. Radio-marked males are located during the morning period to determine the locations of temporary and permanent leks. An attempt is made to regularly monitor these leks without disturbing the birds. In addition, all potential sharp-tailed grouse habitat within at least 10 km of the release site is inventoried to estimate lek density and attendance of males (Connelly et al. 2003). Surveys are conducted during March and April of each year.

Concerted efforts were made to conduct surveys in the Dyer Hill (Fig. 14) and Swanson Lakes (Fig. 15) areas. As a result, an apparent increase in the population was detected at each site. It is believed that these observed increases are 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 '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.

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 continue to show positive results in 2010.

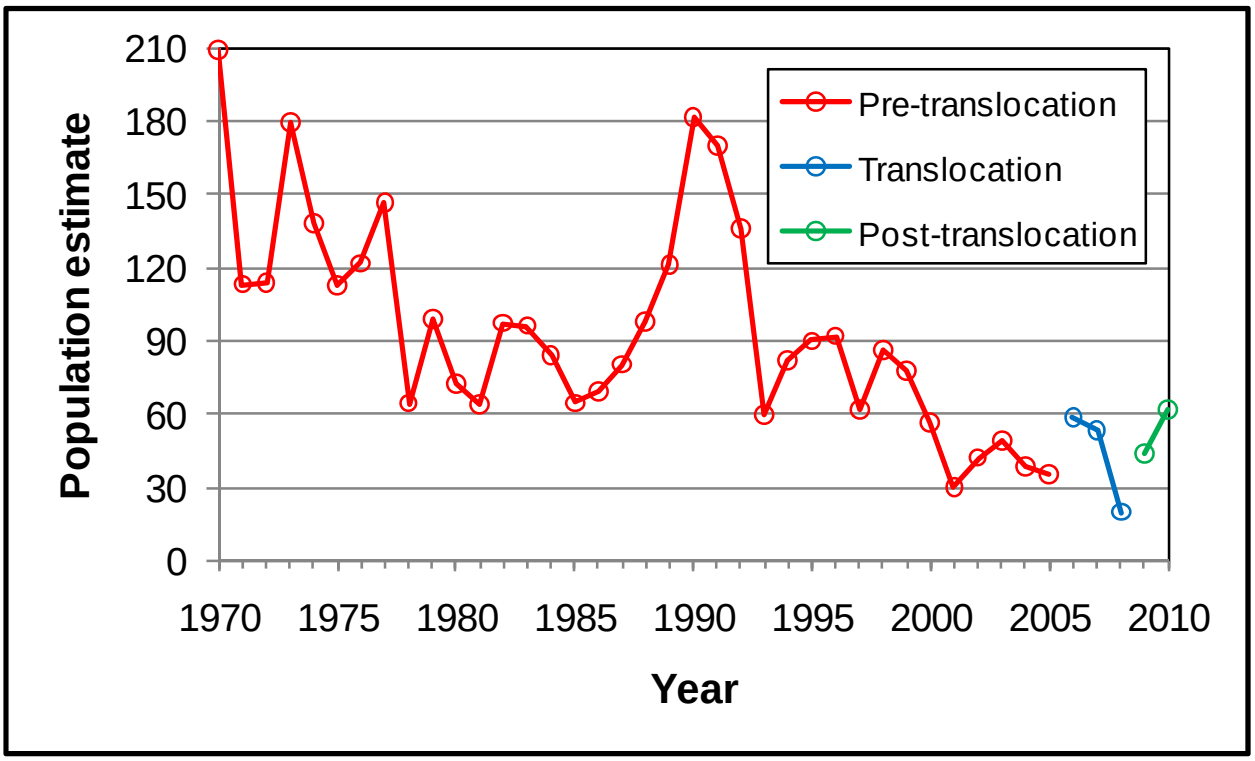

Fig. 14. Estimated population of sharp-tailed grouse on and near the West Foster Creek Wildlife Area in Washington before, during, and after translocation of 61 sharp-tailed grouse in 2005-2008.

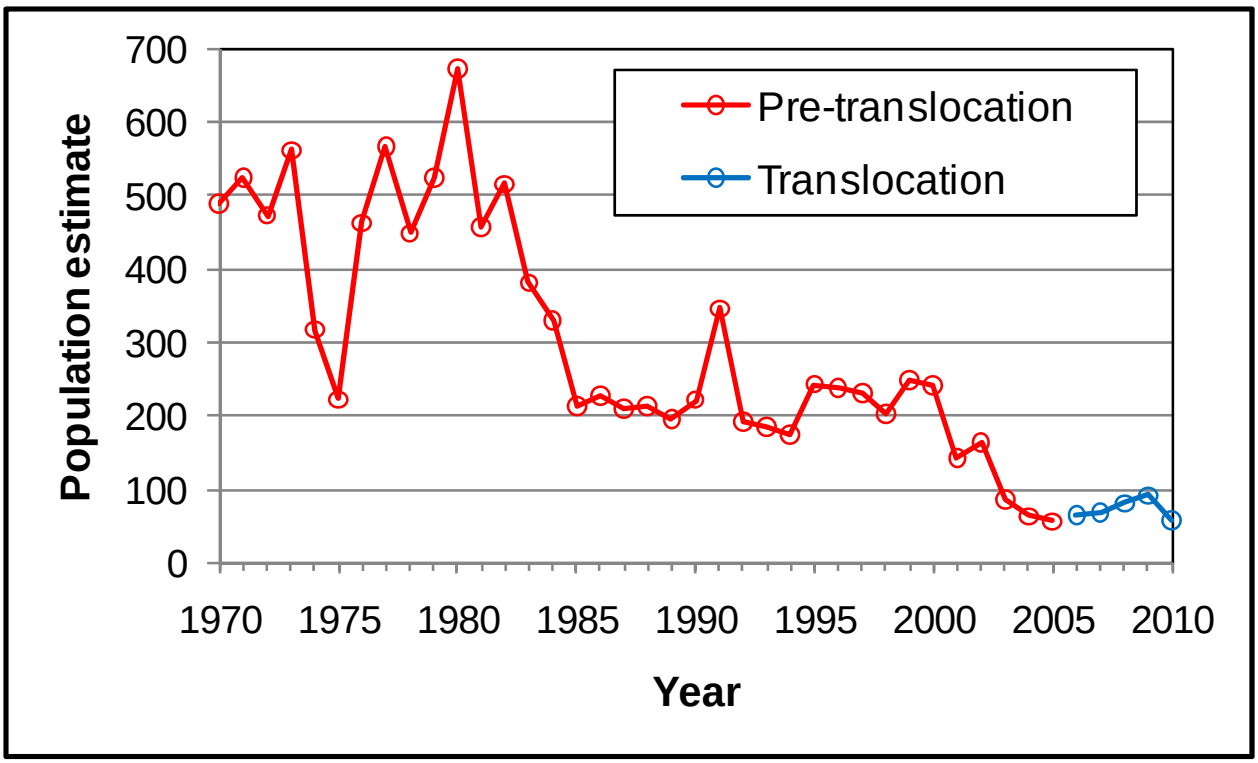

Fig. 15. Estimated population of sharp-tailed grouse on and near the Swanson Lakes Wildlife Area in Washington before and during translocation of 137 sharp-tailed grouse in 2005-2010.

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