An Approach for Implementing Mitigation Measures to Minimize the Effects of Construction and Operation of the Keystone XL Pipeline Project on Greater Sage-Grouse.

August 2010

Prepared for:

Trow Engineering Consultants
1300 Metropolitan Blvd
Tallahassee, FL 32308-7761

Prepared by:

Patrick Farmer and John Beaver

WESTECH Environmental Services, Inc.
P.O. Box 6045
Helena, MT 59604

Table of Contents

1.0 INTRODUCTION

Due to declines in numbers and distribution throughout much of its historical range, the greater sage-grouse (*Centrocercus urophasianus*, sage-grouse) is a Bureau of Land Management (BLM) "sensitive species," a Montana Department of Fish, Wildlife and Parks (MFWP) "species of concern," a South Dakota Department of Game, Fish and Parks (SDGFP) "species of greatest conservation need" and in early 2010 the U.S. Fish and Wildlife Service (USFWS) identified the sage-grouse as a "candidate" species under the Endangered Species Act of 1973, as amended (ESA). Sage-grouse occur along the Keystone XL Pipeline Project (Project) route through Montana and northwest South Dakota. This report presents an approach to minimize and mitigate the potential effects of construction and operation of the Project on sage-grouse.

Section 2.0 of this report lists mitigation measures that were recommended in the Keystone XL Oil Pipeline Project Draft Environmental Impact Statement (DEIS; U.S. Department of State (DOS) 2010), along with the Project's responses and/or plans to address each measure. Section 3.0 compares potential impacts to sage-grouse from the Project with more intensive types of energy development, while Section 4.0 presents a strategy to minimize potential impacts from the Project to sage-grouse using site-specific information including the location of the Project compared to active, known sage-grouse lek locations, suitable nesting habitat, and topography. This strategy is based on methodology developed by the Wyoming State Office of the BLM for construction in sage-grouse Core Areas (BLM 2010a).

2.0 DEIS PROPOSED SAGE-GROUSE MITIGATION MEASURES

Mitigation measures that were recommended on pages 3.8-11 and 3.8-12 of the DEIS (DOS 2010) are:

- ***Conduct surveys of greater sage-grouse leks prior to construction using appropriate methods to detect leks within 4 miles of the edge of the construction ROW.***

  Response:

  Aerial surveys for sage-grouse leks were flown in April 2010 within four miles of the construction right-of-way (ROW), following protocols that were reviewed and approved by MFWP, BLM, USFWS and SDGF. Further surveys of sage-grouse lek activity will be conducted prior to construction.

- ***Avoid construction within 4 miles of active greater sage-grouse leks from March 1 to June 15.***

  Response:

  State and federal wildlife and land management agencies have incorporated sage-grouse in their management plans and strategies for many years, particularly in regard to energy development, grazing and fire management. The primary management policy for energy development has been employment of temporal and spatial constraints on development activity in important sage-grouse habitats including breeding, nesting, brood-rearing and winter habitat.

  Temporal and spatial constraints are habitat oriented and both usually specify distances (i.e., buffers) within which development is eliminated or curtailed. Constraints are either permanent or temporary. For the purposes of this paper, a permanent constraint is called "No Surface Occupancy" (NSO) and is in place throughout the year. A "seasonal restriction" is in place only during specified time frames that overlap sage-grouse use of a particular habitat, e.g., breeding or nesting.

The 4-mile seasonal no-construction buffer recommended in the DEIS (DOS 2010) appears to be based on studies of the effects of intensive oil, gas, wind and coalbed natural gas (CBNG) development on sage-grouse (please see Appendix A for a discussion of the evolution of sage-grouse buffers recommended by the BLM, MFWP, USFWS and SDGFP). The DEIS acknowledges that the Keystone XL Pipeline Project is different from these types of development and states that "…although similar types of impacts would be expected to result from construction of the Project, the magnitude would be expected to be different" (DOS 2010). These differences are clarified in Section 3.0 of this report. Based on these differences, the Project proposes a 3-mile buffer that would be adjusted for each active lek in response to parameters such as existing land use, distance between Project-related disturbances and the lek, kind and distribution of habitat affected by the Project, and topography/line-of-sight between the Project and the lek. This approach is explained in greater detail in Section 4.0 of this report.

- ***Contact BLM, MFWP or SDGFP to determine what mitigation measures are needed for a lek found within the construction ROW.***

  Response:

  There are no known leks within the proposed construction ROW as it is presently configured. If a lek is found within the construction ROW in the future, the appropriate agencies will be notified.

- ***Implement reclamation measures (i.e., application of mulch or compaction of soil after broadcast seeding, and reduced seed rates for non-native grasses and forbs) that favor the establishment of big sagebrush in disturbed areas where compatible with the surrounding land use and habitats.***

  Response:

  Keystone has developed a Sagebrush Construction/Reclamation (Con/Rec) Unit to reclaim sagebrush habitat on the ROW (Appendix B). This Con/Rec unit has been reviewed and approved by the BLM and the Montana and South Dakota offices of the Natural Resource Conservation Service (NRCS). Primary elements of the Sagebrush Con/Rec unit include mulching, low seeding rates of native perennial grasses, high seeding rates of silver sagebrush and/or Wyoming big sagebrush, inclusion of native forbs that are palatable to sage-grouse, and mowing sagebrush prior to construction on the spoil side of the ROW where topography allows.

- ***Prior to construction, conduct studies along the route to identify areas that support stands of big sagebrush and silver sagebrush and incorporate these data into reclamation activities to prioritize reestablishment of sagebrush communities.***

  Response:

  In 2009 Keystone surveyed all native habitat where access was available and compiled data on sagebrush species, average canopy cover and height within a stand, and the extent of each sagebrush stand along the route. Keystone completed similar surveys on proposed re-routes in 2010. Keystone will implement the Sagebrush Con/Rec Unit to reestablish sagebrush communities within the ROW at these sites.

- ***Monitor establishment of sagebrush on reclaimed areas annually for at least 4 years to ensure that sagebrush plants become established at densities similar to densities in adjacent sagebrush communities and implement additional seeding or plantings of sagebrush if necessary.***

  Response:

  Keystone will monitor sagebrush establishment and density on the ROW. A protocol to evaluate sagebrush density is included as part of overall MFSA required revegetation monitoring (Appendix C).

- ***Establish criteria to determine when reclamation of sagebrush communities has been successful based on reference communities that provide suitable habitat for greater sage-grouse with optimum sagebrush densities greater than 4,000 plants per hectare (as recommended in Pyke 2009).***

  Response:

  Pyke (2009) stated "…the key for overall sage-grouse population sustainability and improvement, especially for successful reproduction and winter survival, is expanses of big sagebrush or silver sagebrush >4,000 ha" (Pyke 2009). Pyke's (2009) statement was in regards to sagebrush habitat at the landscape level, Pyke did <u>not</u> recommend a density standard of "4,000 plants per hectare". Regardless, numerical criteria to assess shrub density success are difficult to implement or accurately measure on long linear projects like pipelines due to the wide variety of slopes, soils, community types and precipitation zones that are crossed (Beaver *In press*). More importantly, the intent of this mitigation measure is to "provide suitable habitat" for sage-grouse. Suitable sage-grouse habitat north of the Milk River often has overall shrub cover of 15 percent, of which sagebrush may comprise less than half (Tack 2009). In fact, sagebrush is sometimes completely absent around sage-grouse leks north of the Milk River (BLM 2010b). South of the Milk River, sage-grouse nesting habitat is considered to be habitat with 15-31 percent sagebrush cover (Montana Sage Grouse Work Group 2005). This comparison clearly demonstrates that there is great variability in sagebrush density within "suitable sage-grouse habitat" along the Project. Furthermore, a mosaic of habitats is seasonally important to sage-grouse; dense sagebrush are most important in winter while more open stands of sagebrush mixed with herbaceous vegetation, and even hay meadows, are important in summer (Braun et al. 2002). The proposed sagebrush monitoring protocol (Appendix C) will determine if sagebrush on the revegetated ROW has established at densities similar to adjacent land.

- ***Use locally adapted sagebrush seed, collected within 100 miles of the areas to be reclaimed.***

  Response:

  Locally adapted sagebrush seed from the appropriate species or subspecies (e.g., *Artemisia cana* and *Artemisia tridentata spp. wyomingensis*) will be used for revegetation. Seed will be collected as close to the Project as practicable but may be collected more than 100 miles away as determined by regional seed production and availability prior to construction.

- ***Where facilities would permanently remove sagebrush communities, implement compensatory mitigation nearby to restore, enhance and preserve sagebrush communities for greater sage-grouse and other sagebrush-obligate species.***

Response:

Four aboveground facilities (two valves, MLV-07 and MLV-15; and two pump stations, PS-15 and PS-16) will be located in sagebrush habitat. Each valve requires about 0.03 acre, PS-15 requires about nine acres and PS-16 requires about eight acres. All four sites are located along existing roads so that potential sage-grouse habitat is already somewhat affected. Sagebrush cover at each site is variable and relatively low. Silver sagebrush cover at MLV-07 varies from 10 to 20 percent; Wyoming big sagebrush cover at MLV-15 varies from 5 to 15 percent. Wyoming big sagebrush cover at PS-15 varies from 5 to 20 percent, and from 10 to 15 percent at PS-16. Keystone will consider measures to restore, enhance and preserve sagebrush communities in the vicinity of each site, within the context of the amount of disturbance and existing habitat quality at each site.

- ***Monitor densities of native forbs and perennial grasses on reclaimed areas and reseed with native forbs and grasses where densities are not comparable to adjacent communities.***

Response:

All classes of vegetation, including native forbs and perennial grasses, will be monitored on the ROW in accordance with the protocol presented in Appendix C. Canopy cover, rather than plant density, will be monitored to address the MFSA success standard. Remediation may occur at areas that do not meet the MFSA success criteria.

- ***Restrict or appropriately manage livestock grazing of reclaimed areas until successful reclamation of sagebrush communities has been achieved as described above (i.e., at least 4 years of restrictions).***

Response:

Sagebrush has long been considered an “increaser” under grazing pressure (Clements 1928), and grazing removes sagebrush only under extreme conditions (Beetle 1960). Grazing reduces competition with grasses thereby opening niches for sagebrush establishment and growth (Fisser 1984, Stevens 1984, Owens and Norton 1990). Restricting livestock access to the ROW would not promote sagebrush establishment on the ROW, but instead could retard establishment and canopy growth. In addition, restricting livestock access to the ROW could disrupt management of the surrounding pasture, which would be burdensome for landowners.

- ***Implement measures to prevent colonization of reclaimed areas by noxious weeds and invasive annual grasses such as cheatgrass.***

Response:

Keystone will prepare noxious weed management plans for each state crossed by the Project. These plans will be reviewed by weed specialists in each county crossed by the Project, as well as agencies that manage public lands affected by the Project.

3.0 COMPARISON OF THE EFFECTS ON SAGE-GROUSE OF CONSTRUCTION AND OPERATION OF A SOLITARY BURIED PIPELINE TO OTHER FORMS OF ENERGY DEVELOPMENT

Cross-country large-diameter buried pipelines like the Keystone XL Pipeline Project share some characteristics with other kinds of energy development such as CBNG, oil and gas wells, wind power and electric transmission lines, while other characteristics are different. For example, CBNG development usually requires the creation of many small ponds to accept water pumped from wells, which have been shown to create conditions favorable to mosquitoes that vector West Nile virus to sage-grouse (e.g., MFWP 2007); buried pipelines do not require ponds.

Intensive CBNG development may result in a comparatively dense array of well pads distributed over the landscape, each with an access road, electrical transmission line, small-diameter gathering pipeline, etc., resulting in considerable habitat impact. For example, Naugle et al. (*In press*) reported that in the Powder River Basin near Decker, Montana (an area of about 9,100 km^2), almost 70 percent of the sagebrush landscape would be within 200 m of a road, power line, well, or man-made pond. Many of these features were the result of CBNG development. In fact, areas with CBNG development contained twice the density of roads and powerlines, and five times as many ponds as areas where ranching was the primary landuse (Naugle *In press*). This level of development has been shown to result in a decline sage-grouse numbers and lek attendance over several years (Naegle *In press*, Holloran 2005).

In contrast to CBNG-associated facilities, cross-country large-diameter pipelines are buried and require relatively few aboveground features and infrequent vehicle access. Access to most aboveground facilities is along existing roads, only occasional, short spur roads may need to be constructed between an existing road and a facility. For example, pump stations, the largest permanent disturbance associated with the Project, will require about 5-10 acres each and will be spaced 48-50 miles apart; thus there will be six pump stations in Montana and two in northwest South Dakota over approximately 330 miles of pipeline that traverse the distribution of sage-grouse in the two states. Mainline valves require about 0.03 acre each and are located within the permanent ROW; access will be on existing roads. There will be 14 mainline valves in Montana and two valves in South Dakota over approximately 330 miles of pipeline that traverse the distribution of sage-grouse in the two states.

Pump stations and remotely operated valves will require electric power lines. Pump stations will need either 69kV or 115kV power supply, while remotely operated valves will use smaller distribution lines. Third party providers will build these power lines along existing roads or section lines. The power providers will obtain their own permits to construct and operate these facilities.

Development and maintenance of energy facilities such as CBNG often require comparatively high volumes of vehicle traffic year-round for several years. Such prolonged activity and disturbance can negatively affect sage-grouse. For example, Holloran et al. (2007) and Walker et al. (2007) documented that it required 3-4 years for sage-grouse leks to become inactive after the onset of intensive, persistent energy development such as CBNG due to high site fidelity by mature birds (i.e., adult sage-grouse continued to return to leks that were in use prior to energy development). Lek decline was probably a function of lek avoidance by younger birds over time that were not committed to the site. In contrast, cross-country large-diameter pipelines are usually constructed in 6-7 months and have short-term effects from construction activity. After construction, there is very little surface activity along an operating pipeline, and most of that activity is associated with pump stations and periodic valve maintenance from pre-existing roads. Pipeline ROW inspection is usually conducted about every 2 weeks by aircraft; thus long reaches of the ROW have no roads and receive no vehicle traffic. It is likely that mature birds will continue to return to, and that juvenile birds will not avoid, leks in the vicinity of the Project after construction because there will be minimal to no activity on the ROW.

Finally, cross-country pipelines are reclaimed following construction to vegetation communities similar to those that were present prior to construction. A specific seed mix emphasizing sagebrush and forbs has been developed for those portions of the ROW identified as sagebrush habitat. While it is recognized that sagebrush regeneration on disturbed lands is often slower than native perennial grass regeneration, sagebrush density on many portions of a 100-foot pipeline ROW has been found to be similar to that adjacent within one to eight years (Westech 2004, Westech 2010). Further, revegetating disturbances with a seed mix that is similar to what is proposed for the Project has been shown to result in at least 1 shrub per square meter within five years (Hild et al. 2006). In the time between construction and shrub establishment the ROW will resemble a rarely used dirt road that is dominated by herbaceous species. Walker et al. (2007) did not detect negative impacts to lek persistence from rarely used dirt roads.

In summary, cross-country large-diameter buried pipelines like the Keystone XL Pipeline Project would be expected to have fewer and/or less severe effects to sage-grouse than do more intensive energy developments. In contrast to the standardized buffer constraints and seasonal restrictions that may be applicable for other energy developments, the short duration of pipeline construction combined with its narrow linear footprint relative to the surrounding landscape provides an opportunity to customize temporal and spatial construction constraints to protect individual leks and nesting habitat based on site-specific information.

4.0 STRATEGY TO MINIMIZE POTENTIAL IMPACTS TO SAGE-GROUSE FROM THE KEYSTONE XL PIPELINE PROJECT

A proposed strategy to implement measures to minimize and mitigate the impact of construction and operation of the Keystone XL Pipeline Project is described below. This strategy is similar to methodology developed by the Wyoming State Office of the BLM for minimizing development impacts to sage-grouse in Core Areas (BLM 2010a). Key assumptions of the proposed strategy include:

- Pipeline construction will occur over a 6-7 month time frame from spring through autumn.

- Seasonal restrictions and buffers will be employed around leks that are active in the spring of construction (DOS 2010).

- The <u>size</u> and <u>life</u> of the disturbances associated with construction and operation of facilities will be considered when specifying minimization measures (Montana Sage Grouse Work Group 2005).

- Topography may buffer impacts of construction on sage-grouse activities (Montana Sage Grouse Work Group 2005).

- Analysis of the effects of development and appropriate minimization measures will be determined on a case-by-case basis consistent with the type of habitat affected and scope of disturbance. The distribution and amount of suitable habitat relative to the project will be a criterion for determining minimization measures (BLM 2010a). Suitable habitat will be reviewed at different scales including the landscape level (e.g. sage-grouse core areas (FWP 2010)); local level (e.g. land cover vegetation mapping (Redmond 1998)); and at the Project level (e.g., community type mapping (WESTECH 2009 and 2010a)).

- Construction activity will be minimized during the times of day when breeding sage-grouse are most active (Connelly et al. 2000). Avoiding development activity during key times of day will minimize impacts to sage-grouse (Holloran 2005).

- Construction disturbances will be promptly reclaimed, in accordance with the Keystone XL Pipeline Project's Construction, Mitigation and Reclamation Plan (CMRP), as well as its Plan of Development (POD) for BLM-administered land.

- Construction will be constrained within a modified 3-mile buffer around active sage-grouse leks. A 3-mile buffer will be used because it has been recently authorized by the BLM for other Montana projects that are characterized by less intensive levels of development (BLM 2009) and it has been authorized for another cross-country pipeline in Montana (FERC 2009). The BLM has commented that a 2-mile buffer would be appropriate for the Keystone XL Pipeline Project (BLM 2010c). A 2-mile buffer (approximately 12.6 mi^2) has been shown to protect over 60 percent of sage-grouse nests (Wallestad 1975; Holloran and Anderson 2005). However, the MFWP currently recommends 4-mile buffers (Appendix A) and has done so for the Project (DOS 2010). A 4-mile buffer (about 50.2 mi^2) protects a minimum of 70 percent of sage-grouse nests (MFWP 2007). A 3-mile buffer would increase the protected area to about 28.3 mi^2 (i.e., more than twice the area protected by a 2-mile buffer and over half the area protected by a 4-mile buffer). Given that the Keystone XL Pipeline Project will have a short-term disturbance of only about 12-14 acres per linear mile, a 3-mile buffer that incorporates site-specific information on habitat, topography, existing land uses, and line-of-sight between the Project and an active lek will prevent declines in lek attendance and minimize the loss of nests.

Based on these assumptions, Keystone will implement a modified 3-mile buffer between March 1 and June 15 around sage-grouse leks that are active in the spring of construction. The buffer will be modified on a lek-by-lek basis to account for differences in topography, habitat, existing land uses, proximity of the Project to the lek, and line-of-sight between the Project and each lek. The primary constraints and mitigation measures to minimize impacts to sage-grouse from pipeline construction and operation are described below. These measures are additive, that is more than one measure could be employed within 3 miles of a given lek. The measures also represent different levels of restriction, from no construction between March 1 and June 15, to no construction only in the mornings between the same dates. Finally mitigation to restore sage-grouse habitat and monitoring to prevent lek abandonment is also prescribed.

CONSTRAINT I: No construction from March 1 through June 15 around sage-grouse leks that are active in the year of construction if:

- The Project is within 1 mile of a lek;
- The Project is within 3 miles of a lek *and* within the line-of-sight of the lek; or
- The Project is within 3 miles of a lek *and* affects suitable nesting habitat.

CONSTRAINT II: No construction from ½ hour before sunrise to 2 hours after sunrise from March 1 through June 15 within 3 miles of a sage-grouse lek that is active in the year of construction if:

- The Project does *not* affect suitable nesting habitat.

MITIGATION I: Mow suitable sage-grouse nesting habitat in the construction ROW between September 1 and November 30 in the year prior to construction and revegetate with the Sagebrush Con/Rec Unit (Appendix B) after construction.

MITIGATION II: A qualified monitor will observe active leks when pipeline construction is within 3 miles of the lek and report each day's observations to a designated Project contact. The Project contact will confer with specified agency biologists daily, if conditions warrant. It is recognized that the number of displaying male sage-grouse at a lek may vary daily (Connelly et al., *In press*). Nevertheless, if the number of displaying male sage-grouse that were present prior to construction declines for three consecutive mornings after construction has approached within three miles, then construction will be halted if it (construction) appears to be the cause for abandonment. Conversely, if male sage-grouse are not present for three consecutive mornings for reasons other than Project construction (e.g., adjacent agricultural activity, presence of predators), pipeline construction will proceed.

Figures 1 through 26 (Appendix D) show every known potentially active sage-grouse lek relative to the Project, the viewshed from the lek, suitable nesting habitat crossed by the Project, other features that may affect sage-grouse use of the vicinity (e.g., roads and highways, transmission lines, facilities, etc.), and recommended constraints and mitigation measures. The rationale for constraints and mitigation at each lek is presented in Appendix E. Map 1 shows all known sage-grouse leks within 4 miles of the Keystone XL Pipeline Project.

4.0 LITERATURE CITED

Beetle, A.A. 1960. A study of sagebrush the section *Tridentatae* of *Artemisia*. University of Wyoming Agricultural Experiment Station Bull. 368. 83 p.

Beaver, J. In press. Right-of-way revegetation performance criteria: challenges, permitting implications and habitat fragmentation. Accepted for publication through: Proceedings: Environmental Concerns in Rights-of-Way Management. Portland OR, USA September 2009.

Braun, C.E. 1998. Sage-grouse declines in western North America: what are the problems? Proceedings of the Western Association of State Fish and Wildlife Agencies 78:139-156 *cited in* ODFW (2009).

Braun, C.E., O. Oedekoven and C.L. Aldridge. 2002. Oil and gas development in western North America: effects on sagebrush-steppe avifauna with particular emphasis on sage-grouse. Transactions of the North American Wildlife and Natural Resources Conference 67:337-349 *cited in* ODFW (2009).

Clements, F.E. 1928. Plant succession and indicators. The H.W. Wilson Company. New York City, New York. P. 453.

Colorado Department of Wildlife, Montana Department of Fish, Wildlife and Parks, North Dakota Game and Fish Department, Utah Division of Wildlife Resources, and Wyoming Game and Fish Department. 2008. Using the Best Available Science to Coordinate Conservation Actions that Benefit Greater Sage-Grouse Across States Affected by Oil &Gas Development in Management Zones I-II (Colorado, Montana, North Dakota, South Dakota, Utah, and Wyoming). Available at http://www.ourpubliclands.org/files/upload/BestScience_2008_sagegrouse_energy.pdf.

Connelly, J.W., M.A. Schroeder, A.R. Sands and C.E. Braun. 2000. Guidelines to manage sage grouse populations and their habitats. Wildlife Society Bulletin 28(4): 967-985.

Connelly, J.W., C.A. Hagen and M.A. Schroeder. In press. Characteristics and dynamics of greater sage-grouse populations. *In* S.T. Knick and J.W. Connelly (eds.). Studies in Avian Biology No. 38. Cooper Ornithological Society. Available at http://sagemap.wr.usgs.gov/Docs/SAB/Chapter05.pdf

Ellis, K.L. 1984. Behavior of lekking sage-grouse in response to a perched golden eagle. Western Birds: 15:37-38 *cited in* ODFW (2009).

Fisser, H.G. 1984. Biology and ecology of sagebrush in Wyoming: II. Grazing, sagebrush control, and forage yield. *In*: Proceedings – symposium on the biology of *Artemisia* and *Chrysothamnus*. Provo, UT. Gen. Tech. Rep. INT-200. P. 303-313.

Federal Energy Regulatory Commission (FERC). 2009. Bison Pipeline Project Final Enviornmental Impact Statement. Office of Energy Projects, Washington, D.C. Available at http://elibrary.ferc.gov/idmws/File_list.asp?document_id=13781037

Hild, A.L., G.E. Schuman, L.E. Vicklund, and M.I. Williams. 2006. Canopy growth and density of Wyoming big sagebrush sown with cool-season perennial grasses. Arid Land Research and Management 20(3): 183-194.

Holloran, M.J. 2005. Greater sage-grouse (Centrocercus urophasianus) population response to natural gas field development in western Wyoming. PhD dissertation submitted to the Department of Zoology and Physiology and the Graduate School of the University of Wyoming. Laramie, Wyoming.

Holloran, M.J. and S.H. Anderson. 2005. Spatial distribution of greater sage-grouse nests in relatively contiguous habitats. Condor 107: 742-752. Abstract available at http://www.jstor.org/pss/4096476

Holloran, M.J., C. Kaiser and W.A. Hubert. 2007. Population response of yearling Greater Sage-Grouse to the infrastructure of natural gas fields in southwestern Wyoming. Completion report, U.S. Geological Survey, Laramie, Wyoming. *Cited in* Naugle et al. (in press).

Knick, S.T. and J.W. Connelly (eds.). In press. Ecology and conservation of greater sage-grouse: a landscape species and its habitats. Studies in Avian Biology No. 38. Cooper Ornithological Society. Available at http://sagemap.wr.usgs.gov/monograph.aspx

Montana Department of Fish, Wildlife, and Parks (MFWP). 2007. Agency Position Paper – Sage Grouse Conservation and Energy Development. Available at http://www.oilandgasbmps.org/viewpub.php?id=78

Montana Department of Fish, Wildlife, and Parks (MFWP). 2010. Crucial areas assessment and planning system. Available at http://fwp.mt.gov/wildthings/conservationInAction/crucialAreas.html

Montana Sage Grouse Work Group. 2005. Management Plan and Conservation Strategies for Sage Grouse in Montana – Final. Available at http://fwpiis.mt.gov/content/getItem.aspx?id=31187

Naugle, D.E., K.E. Doherty, B.L. Walker, M.J. Halloran and H.E. Copeland. In press. Energy development and greater sage-grouse. In S.T. Knick and J.W. Connelly (eds.). Studies in Avian Biology No. 38. Cooper Ornithological Society. Available at http://sagemap.wr.usgs.gov/Docs/SAB/Chapter21.pdf

Owens, M.K. and B.E. Norton. 1990. Survival of juvenile basin big sagebrush under different grazing regimes. Journal of Range Management. 43:132-135.

Oregon Department of Fish and Wildlife (ODFW). 2009. Recommendations for greater sage-grouse habitat classification under Oregon Department of Fish and Wildlife's fish and wildlife habitat mitigation policy (OAR 635-415-0000). Available at http://www.dfw.state.or.us/conservationstrategy/docs/Sage-Grouse_Habitat_Mitigation_Recommendations_FINAL%208-7-9.pdf

Pyke, D.A. . In press. Restoring and rehabilitating sagebrush habitats. *In* S.T. Knick and J.W. Connelly (eds.). Studies in Avian Biology No. 38. Cooper Ornithological Society. Available at http://sagemap.wr.usgs.gov/Docs/SAB/Chapter24.pdf

Redmond, R.L. 1998. Montana 90-meter land cover pixels from the Gap Analysis Project. Wildlife Spatial Analysis Lab, The University of Montana. Available at http://gisportal.msl.mt.gov/GPT9/catalog/main/home.page;jsessionid=C6C806F308730C9FE3049FEC24BFC102

South Dakota Department of Game, Fish and Parks (GFP). 2008. Greater sage-grouse management plan 2008-2014. Wildlife Division. Available at http://gfp.sd.gov/wildlife/docs/sage-grouse-management-plan.pdf

Stevens, R. 1984. Population dynamics of two sagebrush species and rubber rabbitbrush over 22 years of grazing use by three animal classes. *In*: Proceedings – symposium on the biology of *Artemisia* and *Chrysothamnus*. Provo, UT. Gen. Tech. Rep. INT-200. P. 278-285.

Tack. J.D. 2009. Sage-grouse and the human footprint: implications for conservation of small and declining populations. M.S. thesis, University of Montana, Missoula.

U.S. Department of the Interior, Bureau of Land Management (BLM). 1992. Judith Phillips Valley Resource Management Plan Appendix B, Oil and Gas Leasing and Development. Available at http://www.blm.gov/pgdata/etc/medialib/blm/mt/blm_programs/planning/jvp_rmp.Par.18383.File.dat/Appendix_b_volume1.pdf

U.S. Department of the Interior, Bureau of Land Management (BLM). 1995. Big Dry Resource Management Plan Miles City District. Available at http://www.blm.gov/mt/st/en/prog/planning/big_dry.html

U.S. Department of the Interior, Bureau of Land Management (BLM). 2009. Decision to dismiss protest to withdraw three parcels from competitive oil and gas leasing. Available at http://www.blm.gov/pgdata/etc/medialib/blm/mt/blm_programs/energy/oil_and_gas/leasing/protests/june09.Par.32931.File.dat/dec.pdf

U.S. Department of the Interior, Bureau of Land Management (BLM). 2010a. Greater sage-grouse habitat management policy on Wyoming Bureau of Land Management (BLM) administered public lands including the Federal Mineral Estate. Instruction Memorandum No. WY-2010-012. January 4, 2010.

U.S. Department of the Interior, Bureau of Land Management (BLM). 2010b. Personal communication between John Carlson (Glasgow Field Office BLM) and John Beaver (WESTECH) regarding sage-grouse in the Hi-Line Resource Management Area. April 8, 2010.

U.S. Department of the Interior, Bureau of Land Management (BLM). 2010c. Submission of comments on the Keystone XL Pipeline Project DEIS by Bobby Baker (BLM Wildlife Biologist). Submitted by Jim Stobaugh (BLM National Project Manager) via e-mail July 20, 2010.

U.S. Department of the Interior, Bureau of Land Management (BLM). 2010d. Personal communication between Mary Bloom (Miles City Field Office BLM) and John Beaver (WESTECH) regarding revisions to the Miles City RMP. May 25, 2010.

U.S. Department of the Interior, Fish and Wildlife Service (USFWS). 2009. Spotlight species action plan for greater sage-grouse. Available at http://www.fws.gov/ecos/ajax/docs/action_plans/doc3011.pdf

U.S. Department of the Interior, Fish and Wildlife Service (USFWS). 2010. 12-month findings for petitions to list the greater sage-grouse (Centrocercus urophasianus) as threatened or endangered. Federal Register Notice March 5, 2010. Available at http://www.fws.gov/mountain-prairie/species/birds/sagegrouse/FR03052010.pdf

U.S. Department of State (DOS). 2010. Keystone XL Oil Pipeline Project Draft Environmental Impact Statement. Washington, D.C. April 16, 2010.

Walker, B.L., D.E. Naugle and K.E. Doherty. 2007. Greater sage-grouse population response to energy development and habitat loss. Journal of Wildlife Management 71:2644-2654.

Wallestad, R. 1975. Life history and habitat requirements of sage grouse in central Montana. Montana Department of Fish and Game, Helena, Montana.

Westech Environmental Services, Inc. 2004. Woody plant density evaluation on the Tuscarora Gas Transmission Company right-of-way. Unpublished technical report. Helena, Montana.

Westech Environmental Services, Inc. 2009. Vegetation and reclamation survey for the proposed Keystone XL Pipeline Project. Unpublished technical data. Helena, Montana.

Westech Environmental Services, Inc. 2010. Sagebrush (*Artemisia tridentata spp. tridentata*) density on the reclaimed Fish Springs Water Project right-of-way. Unpublished technical data. Helena, Montana.

Westech Environmental Services, Inc. 2010a. Vegetation and reclamation survey for the proposed Keystone XL Pipeline Project. Unpublished technical data. Helena, Montana