United States Department of the Interior

TAKE PRIDE IN AMERICA

BUREAU OF LAND MANAGEMENT
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Ely, Nevada 89301-9408
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In Reply Refer To:
N-84148
2850 (NVL0200)

Dear Reader:

Enclosed for your review and comment is the Draft Environmental Assessment (EA) for the Spring Valley Wind Project, a proposed 150-megawatt wind generation farm that would be constructed on 8,565 acres of the public lands in north Spring Valley, about 30 miles east of Ely. The project would consist of 63-75 wind turbines and electrical substation; and would utilize an existing 230 kilovolt (kV) transmission line for distribution. The proponent is Spring Valley Wind, LLC.

The formal public comment period concludes at 5 p.m., Friday, Jan. 15, 2010. Please address all written comments to the BLM Ely District Office, HC 33 Box 33500, Ely, NV 89301 attn: Project Manager Wells McGiffert. Comments may also be submitted electronically to springvalley@blm.gov. Additional information is available on the BLM website: www.blm.gov/nv/st/en/fo/ely_field_office.html

Two public comment meetings are scheduled in Nevada, from 6 p.m. to 8 p.m. Dates and locations are: Tuesday, Jan. 5, 2010, at the Bristlecone Convention Center, 150 6th Street, in Ely (use Lyons Ave. entrance); and Wednesday, Jan. 6, 2010, at the Great Basin National Park Visitor Center, 53 North Highway 487, in Baker.

All comments received during the public comment period will be fully considered and evaluated for preparation of the Final EA. If you have any questions on this matter, please contact Wells McGiffert, BLM Ely District Renewable Energy Project Manager, at (775) 289-1800 or wells_mcgiffert@nv.blm.gov.

Sincerely,

Mary D'Aversa

Mary D'Aversa
Field Manager
Schell Field Office

U.S. Department of the Interior
Bureau of Land Management

Preliminary Environmental Assessment
DOI-BLM-NV-L020-2010-007-EA
December 16, 2009

Spring Valley Proposed Wind-Generating Facilities Project

Location:
Spring Valley, White Pine County, Nevada

Applicant/Address:
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ACRONYMS AND ABBREVIATIONS

AADT	average annual daily traffic
ACEC	Area of Critical Environmental Concern
AFY	acre-feet per year
AUM	animal unit month
BLM	Bureau of Land Management
BMP	best management practice
BWEC	Bats and Wind Energy Cooperative
CFR	Code of Federal Regulations
CO_2	carbon dioxide
COM	Construction, Operation, and Maintenance
DOE	Department of Energy
EA	Environmental Assessment
EIA	Energy Information Administration
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FONSI	Finding of No Significant Impact
GIS	geographic information system
GPD	gallons per day
GPS	global positioning system
HV	high voltage
IA	Interconnection Application
IM	Instructional Memorandum
KOP	Key Observation Point
kV	kilovolt
MBTA	Migratory Bird Treaty Act
met tower	meterological tower
mph	miles per hour
m/s	meters per second
MV	medium voltage
MVAr	megavolt ampere reactive
MW	megawatt
MWh	megawatt hour

NDOT	Nevada Department of Transportation
NDOW	Nevada Department of Wildlife
NEPA	National Environmental Policy Act
NNHP	Nevada's Natural Heritage Program
NO_x	nitrous oxides
NRS	Nevada Revised Statutes
O&M	operations and maintenance
OHV	off-highway vehicle
PEIS	Programmatic Environmental Impact Statement
POD	Plan of Development
RD	rotor diameters
RMP/FEIS	Resource Management Plan/Final Environmental Impact Statement
ROD	Record of Decision
ROS	Recreation Opportunity Spectrum
ROW	right-of-way
rpm	rotations per minute
RPS	Renewable Portfolio Standard
SCADA	Supervisory Control and Data Acquisition
SMP	suggested management practice
SNWA	Southern Nevada Water Authority
SO_2	sulfur dioxide
SR	State Route
SRMA	Special Recreation Management Area
SVW	Spring Valley Wind LLC
SVWEF	Spring Valley Wind Energy Facility
SWCA	SWCA Environmental Consultants
SWIP	Southwest Intertie Project
TAC	Technical Advisory Committee
TLUA	temporary linear use area
USGS	U.S. Geological Survey
VRM	Visual Resource Management
WTG	wind turbine generator

1.0 INTRODUCTION

This Environmental Assessment (EA) has been prepared to analyze Spring Valley Wind LLC's (SVW's) proposal to construct a wind energy generation facility. The EA is a site-specific analysis of potential impacts that could result from implementation of the Proposed Action. The EA assists the Bureau of Land Management (BLM) in project planning, in ensuring compliance with the National Environmental Policy Act (NEPA), and in making a determination whether any "significant" impacts could result from the analyzed actions. "Significance" is determined by the consideration of context and intensity of the impacts. If there is a Finding of No Significant Impact (FONSI), the context and intensity criteria are listed, along with the rationale for that determination in the FONSI document.

This document is tiered to, and incorporates by reference, both the Ely Proposed Resource Management Plan/Final Environmental Impact Statement (RMP/FEIS), released in November 2007 (BLM 2008b), and the BLM Wind Energy Development Programmatic Environmental Impact Statement (PEIS), released in June 2005 (BLM 2005). Should a determination be made that implementation of the Proposed Action would not result in significant environmental impacts or significant environmental impacts beyond those already disclosed in the existing NEPA documents, a FONSI would be prepared to document that determination and a Record of Decision (ROD) issued that provides a rationale for approving the selected alternative.

1.1 Background

In order to address the growing interest in developing wind energy resources and National Energy Policy recommendations to increase renewable energy production capability, the BLM began evaluating wind energy potential on public lands and developing a wind energy policy. In October 2003, the BLM started preparation of a PEIS to analyze the potential impacts of wind energy development to public lands and to minimize those impacts to natural, cultural, and socioeconomic resources. The PEIS was published in June 2005, and in December 2005 the ROD was signed to implement a comprehensive Wind Energy Development program on BLM-administered lands in the western United States. The program has established policies and best management practices (BMPs) to address the administration of wind energy development actions on BLM lands and identifies the minimum requirements for mitigation measures. The programmatic policies and BMPs of the Wind Energy Development program allow project-specific analysis to focus on the site-specific issues and concerns of individual projects. On August 24, 2006, the BLM Washington Office issued Instruction Memorandum (IM) 2006-216, *Right-of-Way Management, Wind Energy Land Use Plan Amendments, Wind Energy.* The IM provided guidance on issuing Rights-of-Way [ROWs] for Wind Energy Testing, Monitoring and Development. Until then, the BLM had an interim wind energy policy issued in 2002.

In January 2006, Babcock & Brown (since acquired by Pattern Energy), through SVW, applied for a testing and monitoring ROW in Spring Valley, east of Ely, Nevada. Since then, SVW has maintained anemometers to determine the suitability of the project for wind energy development. In October 2007, SVW applied for a wind energy development ROW grant from BLM. The ROW grant would be for the construction, operation, and maintenance of the 149.1-megawatt (MW) Spring Valley Wind Energy Facility (SVWEF) and associated facilities. Additionally, a mineral materials permit would be issued for gravel pits and associated access roads connected to the facility. The wind generation facility would be located on approximately 8,565 acres in the project area (Figure 1.1-1). Facilities for the Proposed Action would consist of wind turbine generators (WTGs), an underground electrical collection system, a substation, a switchyard, an operations and maintenance (O&M) building, and access roads.

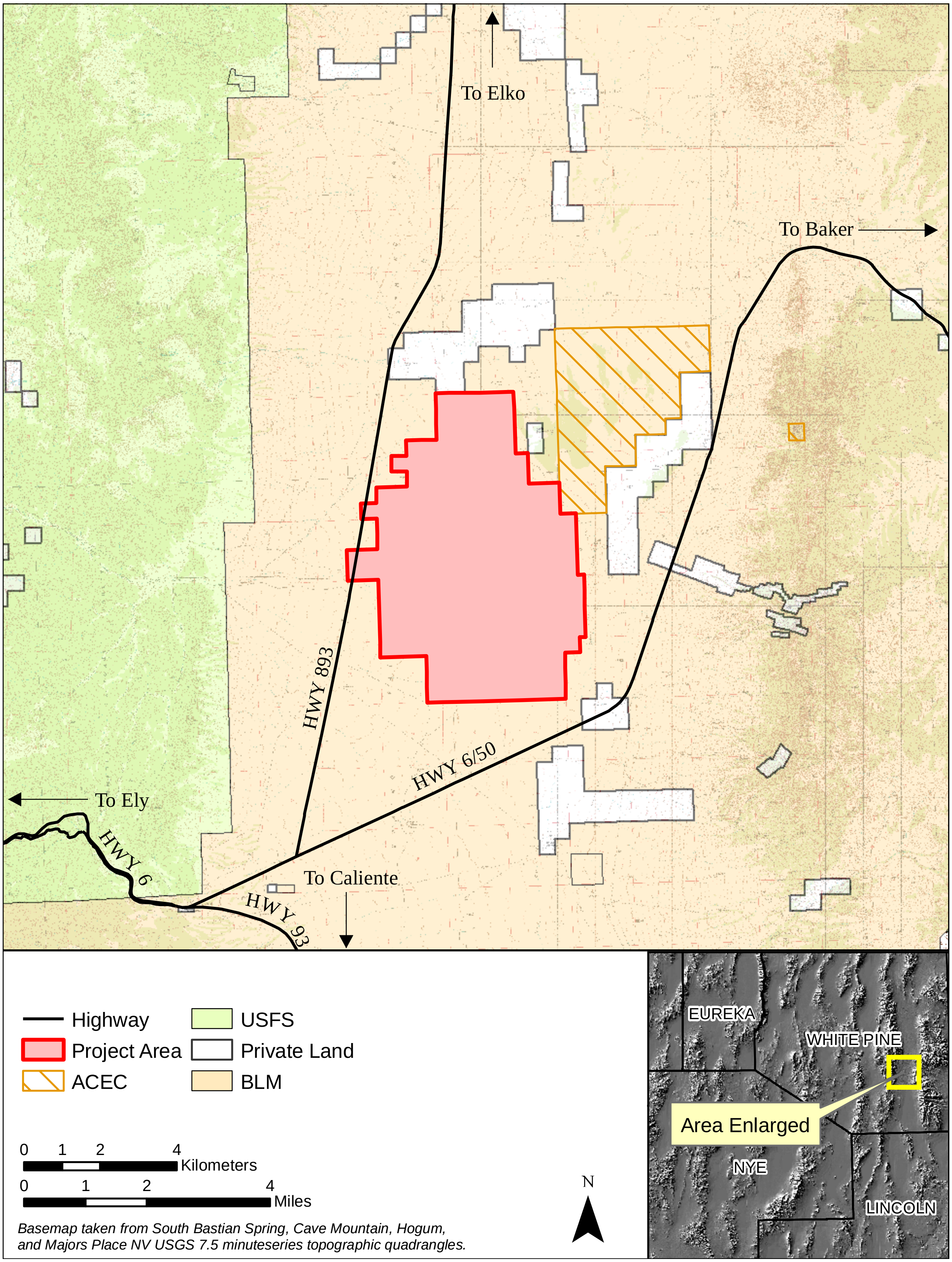

Figure 1.1-1. SVWEF location map.

In 2008, a new IM, 2009-044, was issued to update policy and give further guidance on processing wind energy facilities on BLM-administered lands. SVW updated its Plan of Development (POD) to comply with the new guidance. The POD was tentatively finalized in October 2009, but may change in response to comments on this preliminary EA.

1.2 Purpose

The purpose of the action is to provide appropriate public lands for the development of wind energy generation facilities. Legitimate uses of public lands are those that are authorized under the Federal Lands Management Policy of 1976 or other Public Land Acts and are consistent with guidance such as the BLM comprehensive Wind Energy Development Policy. The uses must meet the proponent's objective while preventing undue and unnecessary degradation to those physical, biological, and social resources present in the project area.

SVW's objective is to develop a wind energy facility on lands that it has determined are suitable for development following three years of wind monitoring. The justification for the project is as follows.

Recent national and regional electrical demand forecasts have predicted that the growing consumption of electrical energy would continue to increase into the foreseeable future and would require development of new resources to satisfy this demand. The Department of Energy (DOE) Energy Information Administration (EIA) has forecasted a 23.0% growth in electricity sales by 2030, including a projected increase of 19.8% in the residential sector, 38.3% in the commercial sector, and 7.1% in the industrial sector. This growth would require an increase in generating capacity of 231 gigawatts (231,000 MW) nationwide by the year 2030 (EIA 2009).

Executive Order (EO) 13212, signed in 2001, states that the production and transmission of energy in a safe and environmentally sound manner is essential to the well-being of the American people. Reports from the DOE postulate that wind power can provide 20% of the nation's electricity by 2030. The DOE report finds that achieving a 20% wind contribution to U.S. electricity supply would

- Reduce carbon dioxide emissions from electricity generation by 25% in 2030.
- Reduce natural gas use by 11%;
- Reduce water consumption associated with electricity generation by 4 trillion gallons by 2030;
- Increase annual revenues to local communities to more than $1.5 billion by 2030; and
- Support roughly 500,000 jobs in the United States, with an average of more than 150,000 workers directly employed by the wind industry.

Additionally, the State of Nevada has recognized the need for new and diverse energy resources, including renewable energy generation options. The Nevada Renewable Portfolio Standard (RPS) (Nevada Revised Statutes [NRS] 704.7821) was revised on July 1, 2009, by Senate Bill 358 to state that by calendar year 2025, no less than 25% of the total amount of electricity sold by NV Energy to its retail customers in Nevada must be from renewable energy resources. NV Energy is expecting to acquire renewable energy from multiple generating facilities to meet, at a minimum, the mandated RPS target of 12% of retail sales coming from renewable resources in 2009–2010, 15% in 2011–2012, 18% in 2013–2014, 20% in 2015–2019, 22% in 2020–2024, and 25% in 2025. As part of meeting the Nevada RPS, NV Energy has agreed to purchase wind energy produced from the SVWEF if it is constructed. U.S. greenhouse gas emissions rose by 17% between 1990 and 2007. Increases can be partially attributed to an increased consumption of fossil fuels to generate electricity (U.S. Environmental Protection Agency [EPA] 2009). Table 1.2-1 describes the emissions offset and natural resources that would be conserved by electric generation from wind generation resulting from the SVWEF Proposed Action, compared with coal, petroleum, and natural gas. This table assumes electric generation of 394,200 MW hours annually.

Table 1.2-1. Environmental Benefits and Emissions Offsets

Power Equivalence*		
Households Powered per Year†	32,850	Homes/Year
Emission Offsets		
Compared with Electric Generation from Coal		
CO_2 (greenhouse gas)[3]	431,949	tons/year
	69,112	cars and trucks/year
CO_2 Emission Equivalent[4]	315,323	acres of pine or fir forest
	493	square miles of pine or fir forest
SO_2 (acid rain)	2,050	tons/year
NO_x (acid rain and smog)	677	tons/year
Compared with Electric Generation from Petroleum		
CO_2 (greenhouse gas)[3]	411,197	tons/year
	65,792	cars and trucks/year
CO_2 emission equivalent[4]	300,174	acres of pine or fir forest
	469	square miles of pine or fir forest
SO_2 (acid rain)	2,083	tons/year
NO_x (acid rain and smog)	784	tons/year
Compared with Electric Generation from Natural Gas		
CO_2 (greenhouse gas)‡	218,949	tons/year
CO_2 emission equivalent¶	35,032	cars and trucks/year
	159,833	acres of pine or fir forest
	250	square miles of pine or fir forest
SO_2 (acid rain)	1.17	tons/year
NO_x (acid rain and smog)	220	tons/year
Natural Resources Preserved		
Coal	197,780	tons/year
Petroleum	656,414	barrels/year
Natural gas	3,258,040	million cubic feet/year
Freshwater§	7,726,997,054	gallons/year
	21,169,855	gallons/day
Freshwater equivalent‖	235,221	number of people supplied by 21,169,855 gallons/day

* Assuming monthly electric usage = 1 megawatt hour (MWh) per household

† Assuming annual net generation and an equivalent amount of power from fossil fuel generation
Source: EIA (www.eia.doe.gov)

‡ 0.16 passenger Cars and Light Trucks produce 1 ton of CO_2 per year
Source: U.S. Climate Technology Gateway (www.usctcgateway.net/tool/)

¶ 0.73 acre of pine or fir forest will store 1 ton of CO_2 per year
Source: U.S. Climate Technology Gateway (www.usctcgateway.net/tool/)

§ Based on 2005 Freshwater Consumption and Withdrawal Average for all Thermoelectric Generation
Source: National Energy Technology Laboratory, "Estimating Freshwater Needs to Meet Future Thermoelectric Generation Requirements," DOE/NETL- 2006/1235 (www.netl.doe.gov)

‖ Based on U.S. Geological Survey (USGS) estimation of 80–100 gallons/day (gpd) per capita water consumption (90 gpd used for this example)
Source: USGS "Water Q&A: Water use at home" (http://ga.water.usgs.gov/edu/qahome.html)

There is a growing interest and support for the development of new wind energy resources in the United States. Wind energy is now second only to natural gas plants in new power generation capacity added between 2005 and 2007. Additionally, up to 7,500 MW of new capacity has been added in 2008, contributing at least 35% of new power generation capacity (American Wind Energy Association 2009).

SVW has submitted an Interconnection Application (IA) with Sierra Pacific, dba NV Energy, totaling 149.1 MW in [January] 2006. For the application, a System Impact Study has been completed (conducted by Sierra Pacific and further confirmed by Nevada Power Transmission Personnel) that indicates the potential to inject up to 149.1 MW into the current Sierra Pacific 230-kV line without any significant upgrades (network or otherwise).

1.3 Need

The need for the action is established by the BLM's responsibility under §501 of the Federal Land Policy and Management Act of 1976 [43 United States Code 1761] to respond to requests to grant, issue, or renew ROWs over, upon, under, or through private lands for systems for generation, transmission, and distribution of electric energy. The need for action is further established by the BLM Wind Energy Development Policy IM No. 2006-216 and updated IM No. 2009-043 regarding ROW Management for Wind Energy. These policies state that the BLM encourages the development of wind energy within acceptable areas, consistent with the Energy Policy Act of 2005 and Energy and Mineral Policy (August 26, 2008).

1.4 Preliminary Issues

Coordination with relevant agencies and stakeholders was conducted in order to identify potential issues of concern relating to the Proposed Action. As a result of a stakeholder meeting conducted on October 20, 2008, and a BLM interdisciplinary scoping meeting conducted on March 9, 2009, with BLM and the Nevada Department of Wildlife (NDOW), the following issues were identified as possibly warranting review.

Areas of Critical Environmental Concern:

- The Proposed Action is adjacent to the Swamp Cedar Area of Critical Environmental Concern (ACEC). Visual impacts may affect the integrity of the historic values.
- Geotechnical studies and excavations for the tower foundations could disrupt the water source for the Swamp Cedars.

Environmental Justice:

- There are no low-income or minority populations in the vicinity that would be directly disproportionately affected by the Proposed Action. However, there is a potential effect on Native American burial sites.

Wildlife:

- The Proposed Action is within habitat for pronghorn antelope.
- Wind projects are known to have impacts to bird and bat species.

Land Use:

- The turbine arrays were required to be located outside the Southwest Intertie Project (SWIP) 500-kilovolt (kV) utility corridor.

Prime and Unique Farmlands:

- The E ½ of Section 12 within the proposed project area has been classified for Desert Land Entry (BLM 2008a).

Rangeland/Grazing:

- At least four towers with associated roads and underground transmission lines would be constructed within a cost-share range restoration project for the Bastian Creek Allotment performed in 2007. In addition, cows would have to be excluded from the restoration area until short-term disturbance areas have re-established vegetation.
- Cattle may need to be temporarily excluded from a portion of the Majors and Bastion Creek Allotments during the rehabilitation of short-term disturbances.

Recreation:

- The project area is within the Highway 50 Special Recreation Management Area (SRMA). There would be potential impacts to hunting and the physical/social setting.

Special-Status Species:

- The project area falls within greater sage-grouse (*Centrocercus urophasianus*) habitat. Also, an active lek exists approximately 2 miles northwest of the project area.
- The Proposed Action may affect pygmy rabbits (*Brachylagus idahoensis*).

Visual Resources:

- The proposed project has the potential to exceed the Visual Resource Management (VRM) objectives designated in the Ely RMP/FEIS.

2.0 PROPOSED ACTION AND ALTERNATIVES

The previous chapter presented the purpose of and need for the proposed project, as well as those elements that could be affected by implementation of the proposed project. To meet the purpose of and need for the proposed project and resolve the issues identified, the BLM has determined that only the Proposed Action, without a No-Action Alternative, is necessary for detailed analysis. The potential environmental consequences from the Proposed Action and No-Action alternatives are analyzed in Chapter 3 for each of the necessary resources and identified issues.

2.1 Proposed Action

SVW proposes to construct, operate, and maintain a 151.8-MW wind generation facility on approximately 8,565 acres in the SVWEF project area. Although the total generation potential of the proposed facility is 151.8 MW, only 149.1 MW would go into the existing system. The Proposed Action consists of the construction, operation, and decommissioning of WTGs and associated facilities necessary to successfully generate up to 149.1 MW allowed under the IA in Spring Valley, located in White Pine County, east of Ely, Nevada.

A more detailed description of the Proposed Action is provided in the SVWEF POD (SVW 2009) and is incorporated by reference. The Proposed Action incorporates the requirements of all applicable federal, state, and local laws, regulations, and permits, as specified in the POD. The Proposed Action also incorporates all applicable management actions prescribed in the BLM RMP/FEIS and Wind Energy PEIS, including BMPs (Section 2.2.3.2 of the PEIS), Standard Operating Procedures, and stipulations. Design measures are included in the Proposed Action to reduce the impacts to sensitive resources. These built-in measures include stormwater pollution prevention measures, weed control, proper waste disposal, and approved revegetation and reclamation methods; these are discussed in the POD and presented as an integral part of the Proposed Action.

2.1.1 Wind Energy Facility Construction

Construction of a wind project would be performed in accordance with applicable codes, laws, and engineering requirements. The actual long-term ground disturbance of the turbines and plant infrastructure (civil and electrical) would be approximately 1% of the total project area. Construction begins with installation of civil improvements, including site laydown areas for turbine and tower deliveries, access roads, underground runs for electrical cabling, turbine foundations, and crane pads for erection of the turbines. The second construction phase, in which some of the works would proceed in parallel with the civil works, includes installation of the electrical hardware (including cabling), construction of the Osceola switchyard, Spring Valley substation and pad-mount transformers, O&M building, and erection of the turbines. The third and final construction phase includes mechanical completion of all WTGs, substation and switchyard, and other facilities, followed by commissioning and testing of each turbine, utility interconnection, testing of the electrical system, and restoration of temporary construction areas, laydown areas, and turbine crane pads. Table 2.1-1 outlines a general construction schedule for the project.

2.1.1.1 WIND ENERGY FACILITY COMPONENTS

The principal components of the SVWEF would consist of WTGs, an underground electrical collection system for collecting the power generated by each WTG, electrical substation and switchyard, access roads, O&M building, temporary laydown and storage areas, concrete batch plant, sand and gravel source, fiber-optic communications, two permanent meteorological (met) towers, and a microwave tower. The short- and long-term disturbance areas for each of these components are described in Tables 2.1-2 and

2.1-3. The project area totals approximately 8,565 acres, all of which are on BLM land that is covered by the requested ROW for the Proposed Action. The total area estimated for use by the wind energy facility (including both short- and long-term disturbance) is approximately 756.2 acres, or approximately 8.8% of the total ROW.

2.1.1.2 PRECONSTRUCTION AND CONSTRUCTION ACTIVITIES

An overview of construction activities necessary for the development of a wind energy project is described in BLM's Wind Energy PEIS (BLM 2005). The following preconstruction and construction activities are specifically relevant to the proposed SVWEF.

2.1.1.2.1 Geotechnical Investigations

Geotechnical investigations have been completed within the project area to confirm constructibility and identify gravel sources. Prior to construction, additional geotechnical investigations would be completed at each turbine location, as needed, for establishing the final turbine layout and designing the final turbine foundations.

Table 2.1-1. Anticipated Project Construction Schedule

Task	Schedule
Engineering work starts	4th quarter 2009
Construction mobilization	3rd quarter 2010
Commence civil works (roads, underground electrical, foundations)	3rd quarter 2010
Turbine deliveries commence	2nd quarter 2011
Turbine deliveries completed	3rd quarter 2011
Main power transformer delivered	2nd quarter 2011
Substation and switchyard completed	2nd quarter 2011
Turbine commissioning, testing, and commercial operation	3rd quarter 2011
Wind energy facility commercial operation date	3rd quarter 2011

Table 2.1-2. SVWEF Components: Maximum Short-Term Disturbance Summary Table, Based on Construction of 75 Turbines

Facility Component	Disturbance Length (feet)	Disturbance Width (feet)	Short-Term Disturbance (acres)	% Project Area
Turbine foundations and crane pads (×75)	400[1]	N/A	216.3	0.03
Laydown, batching plant, and parking area	820	530	10.0	0.001
Temporary linear use area (including roads, collection system, and fiber-optic line)	145,200	200	666.7*	0.08
Gravel source(s) (×2)	660	660	20[‡]	0.002
Footprint Overlap	N/A	N/A	−280.4	−0.04
Total			**632.6**	**0.07**

[1] This measurement represents the diameter of the disturbance area.
* Grading is limited to 292.1 acres for roads (238.9 acres) and collection system (53.2 acres) within the temporary linear use area (TLUA).
[†] Included in TLUA acreage.
[‡] One 10.0-acre gravel source is off-site.

Table 2.1-3. SVWEF Components: Maximum Long-Term Disturbance Summary Table, Based on Construction of 75 Turbines

Facility Component	Disturbance Length (feet)	Disturbance Width (feet)	Long-Term Disturbance (acres)	% Project Area
Turbine foundations and crane pads (×75)	75[1]	N/A	7.6	0.001
Access roads	145,200	28	93.3	0.01
Meteorological towers (×2)	50[1]	N/A	0.1	0.000
Spring Valley substation, Osceola substation, and O&M building	1,080	805	20.0	0.002
Footprint Overlap	N/A	N/A	−2.6	0.0
Total			**123.6**	**0.01**

[1] This measurement represents the diameter of the disturbance area.

2.1.1.2.2 Site Preparation

The centerline and exterior limits of the ROW would be surveyed and clearly marked by stakes and flagging at 200-foot intervals, or closer if necessary to maintain a sight line. Construction activities would be confined to these areas to prevent unnecessarily impacting sensitive areas. Stakes and flagging that are disturbed during construction would be repaired or replaced before construction continues. Stakes and flagging would be removed when construction and restoration are completed.

Vegetation would be removed from permanent facility sites, such as the O&M building and substation and switchyard. Vegetation clearing would be accomplished using bulldozers, road graders, or other standard earth-moving equipment. For the most part, the total area to be cleared of vegetation would be less than temporary work areas requested in order to minimize potential environmental impacts. In all areas of temporary and permanent disturbance where vegetation would be stripped, all possible topsoil would be removed and then bermed around temporary construction areas; stockpiled topsoil would be reused during restoration activities. No restoration would occur until all construction activities are completed. To re-establish healthy vegetation communities, a BLM-approved seed mix would be used and additional restoration measures would be developed as necessary. Grazing allotments within the project area would be temporarily closed to grazing until restoration is successful or 3 years following construction, whichever comes first. To address temporary loss of Animal Unit Months (AUMs) from allotment closures, SVW would compensate each allotment holder through purchase of feed for the removed cattle during the closure period.

2.1.1.2.3 Wind Turbine Layout, Installation, and Construction Processes

Since wind turbine technology is continually improving and the cost and availability of specific types of turbines vary from year to year, a representative range of turbine types that are most likely to be used for the project, including 2.3-MW 101 Siemens, 1.8-MW Vestas V90, and 2.0-MW RePOWER Wind Turbines, is being considered. Specifications for these three turbines are presented in Table 2.1-4. Based on wind energy potential in Spring Valley, 85 potential turbine sites have been identified; of these, 75 are identified as preferred turbine locations, and 10 are identified as alternate locations. Depending on the type of turbine used for the project, a range of 66 to 75 locations would make up the final layout. Figure 2.1-1 presents the site layout for all 85 locations. The final layout would be based on the type of wind turbine selected, with the total number of turbines generating no more than the 149.1 MW allowed under the IA. Additionally, the turbine sites selected would be those with the most energy potential (i.e., best wind resource) that minimize environmental impacts. The final site layout would be in accordance with industry standards, safety measures, and appropriate guidance as stated in the BLM’s Wind Energy PEIS/ROD. The final layout would ideally use the preferred 75 turbine sites but may include any configuration of the 85 potential locations in order to avoid potential significant impacts identified from analysis.

Table 2.1-4. Wind Turbine Specifications

Turbine	Hub Height	Rotor Diameter	Total Height	Rated Capacity Wind Speed	Rotor Speed	Tower Base Diameter
2.3-MW Siemens	80 m	101 m	130.5 m	12–13 m/s	6–16 rpm	14.76 feet (4.5 m)
1.8-MW V90 Vestas	80 m	90–100 m	125 m	12 m/s	9–14.9 rpm	< 15 feet
2.0MW Gamesa G90	80 m	90 m	125 m	15 m/s	9-19 rpm	13ft (4m)
RePower 2.0	80 m	92.5 m	126 m	12 m/s	9–18 rpm	13 feet (4.0 m)

Notes: m/s = meters per second; rmp = rotations per minute.

Turbines would be placed in a series of east-west-oriented rows (or arrays) to best use Spring Valley's north-south wind flows. Turbines within each array would be connected by gravel surface access roads and underground 34.5-kV collection circuits. To minimize downwind array losses, spacing between turbine rows would be at least 10× rotor diameters (RD) (1,010 m) and 3.0 to 3.5 RD (285−332.5 m) for in-row spacing. Turbine towers and foundations would be designed to survive a gust of wind more than 133.1 miles per hour (mph) with the blades pitched in their safest position. Turbine foundations would be approximately 8 feet deep, with a projection of approximately 6 inches above final grade, and would use approximately 350 cubic yards of concrete. Each tubular steel tower would have a maximum 15-foot-diameter (4.5-m-diameter) base.

Three to five WTGs can be erected weekly. Construction is expected to commence in the later part of 2010, with the final mechanical completion, commissioning, and testing expected to be completed by the 3rd quarter of 2011.

Turbine crane pads would be constructed for each wind turbine. Each turbine would require a 400-foot-diameter (2.9-acre) temporary construction area and a permanent 75-foot-diameter (0.3-acre) area for the tower within the temporary construction area. Clearing and grading would be accomplished using bulldozers, backhoes, and road graders.

The temporary work area for each site would be used for the crane pad, equipment laydown, and other construction-related needs. Within the area of temporary disturbance, an area of 75 × 150 feet with a maximum slope of 1% is required to support the crane used in lifting and erecting the turbine components. The crane pad would not be surfaced with concrete but would be compacted to provide a stable base for safe operation of cranes. To meet the necessary compaction standards as determined by geotechnical studies, it may be necessary for heavy weights to be dropped on the pad, and graders and bulldozers may be used to achieve the required levels and grades.

Within the temporary construction area, permanent foundations are excavated, compacted, and constructed of structural steel and reinforced concrete designed to meet turbine supplier and geotechnical engineer's recommendations. The WTGs' freestanding tubular towers would be connected by anchor bolts to the concrete foundation at the pedestal. The towers would have a maximum 15-foot-diameter (4.5-m-diameter) base. The area immediately surrounding the concrete pedestal would be covered with a gravel ring, followed by roads to provide a stable surface for future maintenance vehicles accessing the turbine and as required by electrical codes. After construction, all temporary disturbances associated with the turbine installation would be reclaimed.

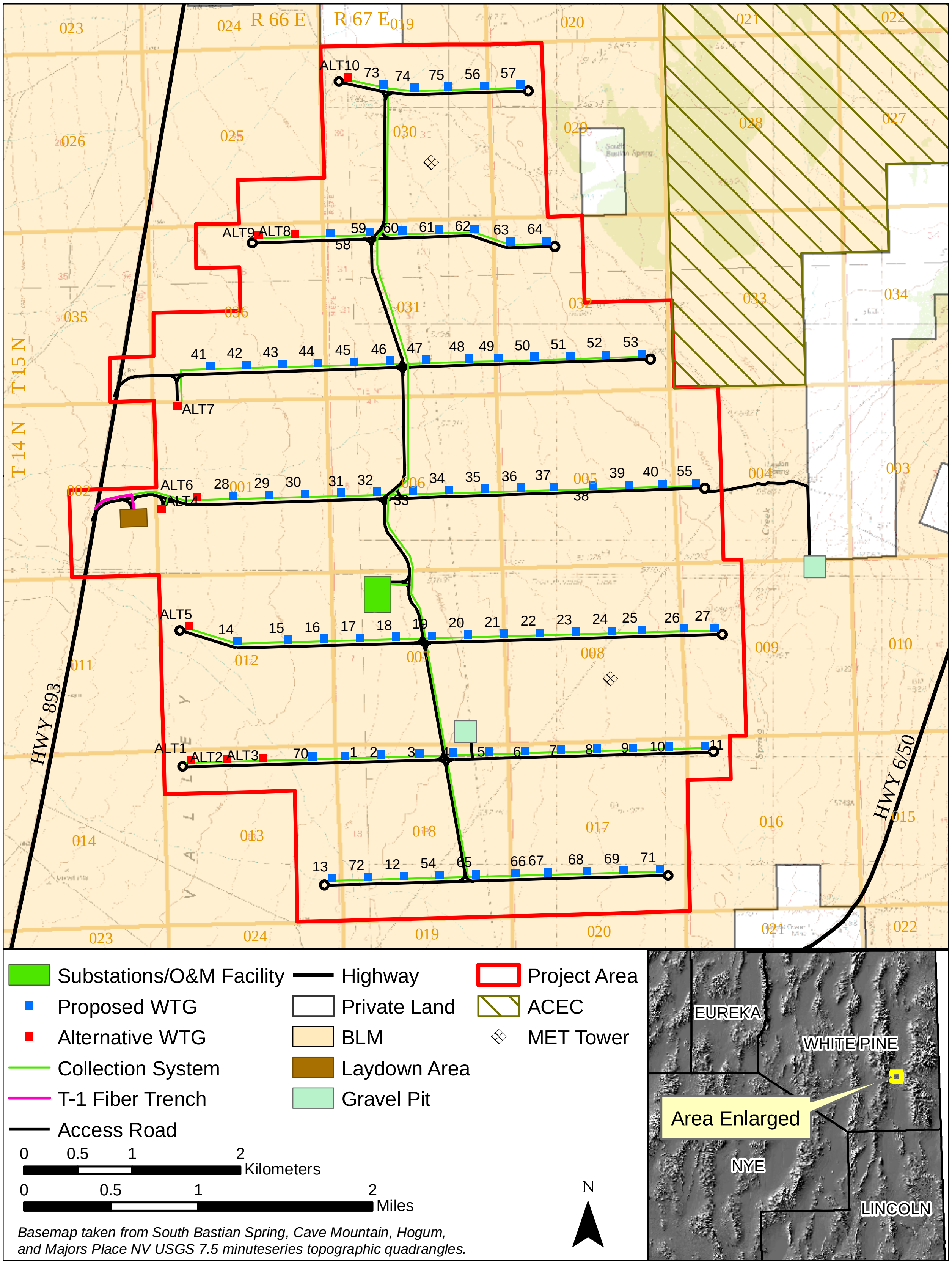

Figure 2.1-1. Site layout.

2.1.1.2.4 Wind Turbine Components and Assembly

WTGs consist of three main components: the turbine tower, the nacelle, and the rotor, which consists of the hub and the blades. The nacelle is the portion of the wind turbine mounted at the top of the tower, and it houses the generator, converter, gearbox, and electronic control systems. Turbine hub heights and RD for the potential turbines may vary but for purposes of analysis would not exceed the 2.3-MW turbine specifications.

The towers would be a tapered tubular steel structure manufactured in three or four sections, depending on the tower height, and approximately 15 feet (4.5 m) in diameter at the base. The towers would be painted an off-white matte color to be visually less obtrusive. A service platform at the top of each section would allow for access to the tower's connecting bolts for routine inspection. A ladder inside the structure would ascend to the nacelle to provide access for maintenance. The tower would be equipped with interior lighting and a safety glide cable alongside the ladder. The towers would be fabricated and erected in sections.

The nacelle steel-reinforced fiberglass shell houses the main mechanical components of the WTG; the drive train, gearbox, and generator control the electronics and cables. The nacelle would be equipped with an anemometer that signals wind speed and direction information to an electronic controller. A mechanism would use electric motors to rotate (yaw) the nacelle and rotor to keep the turbine pointed into the wind to maximize energy capture.

Modern wind turbines have three-bladed rotors. The diameter of the circle swept by the blades would be no more than 323 feet (101 m). If the maximum number of 75 turbines were constructed, a total rotor-swept area of 600,584.3 m^2 (148.4 acres) would be used. Generally, larger WTGs have slower rotating blades, but the specific rotation-per-minute (rpm) values depend on aerodynamic design and vary between machines. Based on the turbines considered, the blades would turn at no more than 18 rpm.

Each turbine is equipped with a state-of-the-art control system to monitor variables such as wind speed and direction, air and machine temperatures, electrical voltages, currents, vibrations, blade pitch, and yaw (side-to-side) angles.

Power generation controlled at the bus cabinet inside the base of the tower include operation of the main breakers to synchronize the generator with the grid as well as control of ancillary breakers and systems. The control system would always operate to ensure that the machines operate efficiently and safely.

Each turbine would be connected to a central Supervisory Control and Data Acquisition (SCADA) system. The SCADA system allows for controlling and monitoring individual turbines and the wind energy facility as a whole from a central host computer or a remote personal computer. The SCADA system transmits critical information from the turbine via fiber optics to a central control server located in the O&M building and to all other locations as required. The SCADA system would also send signals to a fax, pager, or cell phone to alert operations staff.

Turbines would be equipped with a braking system to stop or release the rotor. The braking system is designed to bring the rotor to a halt under all foreseeable conditions. The turbines also would be equipped with a parking brake used to keep the rotor stationary during maintenance or inspection.

2.1.1.2.5 Temporary Construction Workspace, Yards, Materials Storage, and Staging Areas

One 10-acre temporary laydown area with a batch plant and parking area would be required to stage and store construction equipment and materials, to prepare concrete, and for construction staff parking (see

Figure 2.1-1). During construction, the laydown area would be fenced and gated to control access. The laydown area may be graveled, depending on the soil conditions and project needs. After construction, all temporary disturbances associated with the laydown area would be reclaimed.

A temporary linear use area (TLUA) would be designated to accommodate roads, crane travel paths, and the underground circuits. The TLUA would include a 15-foot buffer off the outside edge of the road and off the outside edge of the collection system, plus the area in between, with a typical total width of 200 feet. Grading and clearing would only occur within the 68-foot-wide road and 20-foot-wide collection system alignments (292.1 acres). The remaining portions of the TLUA would be subject to disturbance from cross-country travel and temporary laydown sites. The total approximate area within the TLUA would be 458.7 acres.

2.1.1.2.6 Access Roads

The project scope would include a network of 28-foot-wide roads that would provide access to each turbine location, the substation, the switchyard, and to the project's O&M building. During the course of construction, access roads would have an additional temporary disturbance of up to 40 feet (68 feet wide total) to facilitate the travel of large trucks and cranes. These disturbed areas would be graded and compacted for use and then decompacted and stabilized at the conclusion of the project. In addition to the crane travel paths, the underground collection system and fiber-optic lines would also parallel the access roads.

Public access roads would incorporate existing BLM standards regarding road design, construction, and maintenance such as those described in the 2005 Wind Energy PEIS/ROD (BLM 2005), BLM Manual 9113 (BLM 1985), and the *Surface Operating Standards for Oil and Gas Exploration and Development* (U.S. Department of the Interior and the U.S. Department of Agriculture 2007) (i.e., the Gold Book). Additionally, any public access roads would conform to all applicable county road regulations, as well as the Nevada State Fire Marshal's fire safety regulations.

A new, approximately 0.3-mile-long, long-term site access road would be constructed approximately 2 miles from the existing transmission line access road; a second permanent access road, approximately 0.4 mile long, would be constructed approximately 1.5 miles north of the primary access road. During the construction phase of the project, site and turbine access roads would be up to 68 feet wide to facilitate the travel of large trucks and heavy equipment, ditching, and topsoil storage. This would be reduced to 28 feet after construction is completed to include the permanent driving surface and ditches, for maintenance access during the operations phase; the remaining 40-foot-wide area of short-term disturbance would be reclaimed. The two long-term site access roads would enable construction and postconstruction operational personnel to easily access the center and northern sections of the project area, including the Spring Valley substation and Osceola switchyard.

There would be up to a total of 27.5 miles of new access roads, including the two site access roads described above and the turbine access roads. All new access roads where a crane walk would be required would be 68 feet wide during the construction phase and 28 feet wide during the operations phase and would include a turnaround at the end of each turbine array to allow for large-vehicle maneuvering. Access roads for gravel pits (1.1 miles) would be along existing roads that would be improved, with a maximum expansion to 28 feet wide. Because the gravel pit access roads already exist, they would not be restored after construction is completed. There would be up to 93.3 acres of total long-term disturbance from new road construction. The TLUA to construct these access roads and the electric collection system would be designed to include the temporary widths for the roads and electrical collections system, plus the area in between. The TLUA would average 200 feet wide to accommodate crane movement and material delivery and would encompass up to 452.3 acres of short-term temporary disturbance. The final long-term roads would be compacted and surfaced with gravel aggregate from BLM-permitted sources.

2.1.1.2.7 Electrical System

The existing NV Energy 230-kV transmission line, which passes from east to west through the project site, would be the primary power transmission line for the SVWEF. A 34.5-kV underground electrical collector system would be installed to connect the turbines to the Spring Valley substation. Power generated at each turbine, approximately 690 volts, would be transmitted to a pad-mounted transformer; there would be a transformer on the ground next to each turbine. The pad-mounted transformer would step up the power from 690 volts to 34.5-kV, which is considered to be medium voltage (MV). Approximately five to 10 pad mount transformers (turbines) would be interconnected, and one MV cable (homerun circuit) would transmit the power from those turbines to the substation. A total of eight such MV circuits are planned. The power from all eight circuits would be stepped up by the main transformer at the Spring Valley substation to 230 kV high voltage (HV). The HV system would then be interconnected to the Osceola switchyard and the grid. Approximately 27 miles of collector cables and fiber-optic cables would be placed underground in trenches that are either adjacent to access roads or, in some cases, run cross-country within the ROW area. Vaults and splice boxes would be placed aboveground at locations as needed. There would be several aboveground junction boxes that would be used in various locations. Junction boxes are approximately 4 feet wide × 6 feet long × 4 feet high.

Spring Valley Substation

A 250 × 480–foot substation would be located adjacent to the O&M building within the 20-acre facility area. The substation would have a radial layout with one 230-kV circuit breaker, one 34.5-/230-kV step-up transformer, and a single 34.5-kV bus-bar, where the collection circuits would be connected by means of 34.5-kV circuit breakers. Each line terminal would consist of one dedicated circuit breaker and one shared circuit breaker, along with any associated relays, switches, and lightning arrestors. A 230-kV aboveground connector transmission line would connect the Spring Valley substation to the Osceola switching station, which would then connect to the NV Energy 230-kV transmission line. No disturbance outside the 20-acre facility area is expected. Construction of this substation would last approximately 4 to 6 months and would involve two primary stages: 1) site preparation; and 2) structural and electrical construction.

Construction of the substation would begin with clearing of vegetation and organic material from the site. The site would then be graded to subgrade elevation; exporting and importing of suitable materials may be necessary. Structural footings and underground utilities, along with electrical conduit and grounding grid, would be installed, followed by aboveground structures and equipment. A chain-link fence would be constructed around the new substation for security and to restrict unauthorized persons and wildlife from entering the substation. The site would be finish graded and gravel surfaced, and reclamation would be completed to minimize the visual appearance of the substation.

Control buildings would be added to the substation and would more than likely be constructed of prefabricated material. Major equipment to be installed inside the control buildings would consist of relay and control panels, alternating current and direct current load centers to provide power to equipment inside and outside the control building, a battery bank to provide a back-up power supply, a heating/cooling system to prevent equipment failure, and communications equipment for remote control and monitoring of essential equipment.

Steel structures would be erected on concrete footings to support switches, electrical buswork, instrument transformers, lightning arrestors, and other equipment, as well as termination structures for incoming and outgoing transmission lines. Structures would be fabricated from tubular steel and galvanized or painted a BLM-approved color to blend in with predominant vegetation and soil types. Structures would be grounded by thermally welding one or more ground wires to each structure.

Major equipment would be set by crane and either bolted or welded to the foundations to resist seismic forces. Oil spill containment basins would be installed around major oil-filled transformers and other equipment. Smaller equipment, including air switches, current and voltage instrument transformers, insulators, electrical buswork, and conductors would be mounted on the steel structures.

Control cables would be pulled from panels in the control building, through the underground conduits and concrete trench system, to the appropriate equipment. After the cables are connected, the controls would be set to the proper settings, and all equipment would be tested before the transmission line is energized.

Osceola Switchyard

The Osceola switchyard, operated by NV Energy, would be constructed adjacent to the Spring Valley substation within the 20-acre facility area. This switchyard would be 510 × 360 feet. Construction of the Osceola switchyard and components within it would include a 5 breaker and a breaker-and-a-half substation with three 230-kV line terminals, one of which would also have a 230-kV, 25-megavolt ampere reactive (MVAr) line reactor. Each line terminal would consist of one dedicated circuit breaker and one shared circuit breaker, along with any associated relays, switches, and lightning arrestors. This switchyard would connect to the existing NV Energy 230-kV line and would not be decommissioned with the rest of the project. Construction of this switchyard would last approximately 7 to 10 months and would involve the same two primary stages (site preparation and structural and electrical construction) as were previously described for the Spring Valley Substation; however, reclamation is not anticipated for this site.

2.1.1.2.8 Communications System Requirements (Microwave, Fiber Optics, Hard Wire, Wireless)

Fiber-optic cable for communications would also be necessary. Approximately 21.7 miles of fiber-optic cables and collector cables would be placed underground in trenches adjacent to access roads. Additionally, approximately 0.3 mile of T-1 fiber-optic cable for communications would be placed underground, running from the O&M building to State Route (SR) 893. Within the 200-foot-wide TLUA, trenches would be excavated up to 20 feet wide (to accommodate multiple circuits) and 3 to 5 feet deep. The cables would then be placed in the trench. Placement of 0.3 mile of T-1 fiber-optic line would require temporary disturbance to 0.6 acre of land. Following placement of the cables, the trench would be backfilled, any topsoil set aside during excavation would be placed on top, and the area would be restored.

A 100-foot-tall microwave tower would be located within the Osceola switchyard area. The tower would be placed where it has a direct line of site, and WTGs would not interfere with it. Fiber-optic cable would also be placed on NV Energy’s 230-kV line structures from the Osceola switching station, stretching west to the east side of SR 893, where a box would be placed to intercept existing conduit.

2.1.1.2.9 O&M Building

An O&M building within the 20-acre facility area would be located in the southern portion of the project area (see Figure 2.1-1). The O&M building and yard would be constructed to store critical spare parts and provide a building for the operations and maintenance services. A concrete foundation would be required for the maintenance facility, and the area immediately surrounding the building would be covered with gravel for vehicle parking. Any area within the fence not covered by concrete would be covered with gravel to minimize erosion and surface runoff. A permanent 7-foot-high security fence surrounding the O&M facility and directional lighting would be installed. For communications, a T-1 fiber-optic line would be installed from the O&M facility and trenched approximately 0.3 mile underground to connect to a local communication company ROW along SR 893 (see Section 2.1.2.1.12 below).

2.1.1.2.10 Gravel, Aggregate, Concrete Needs, and Sources

Construction of access roads, facility foundations, and temporary laydown areas associated with the Proposed Action would require access to sand and gravel. Up to 14,875 cubic yards of sand, 152,562 cubic yards of gravel, and 7,500 cubic yards of cement are expected to be used during the course of construction. Sand and gravel sources within and adjacent to the project area have been identified by a construction contractor and would be permitted through a mineral materials permit issued by the BLM.

Gravel and concrete aggregate would come from two 10-acre locations—one within the project area and one outside the project area (see Figure 2.1-1). Some rock materials for making concrete would be purchased from an existing stockpile location. The materials would be trucked to the batching plant and placed into stockpiles. Access to the site outside the project area would be along an existing road. Cement would be delivered on trucks from a source to be identified and stored in two to five silos on-site. Approximately 250 tons of sand per foundation, 400 tons of gravel per foundation, and 120 tons of cement per foundation would be needed for each turbine site. Based on a maximum of 75 turbines installed and the additional needs for construction of the substation and switchyard and O&M building, 20,400 tons of sand, 32,000 tons of gravel, and 9,600 tons of cement would be used.

2.1.1.2.11 Concrete Batch Plant

A 5-acre site within the laydown area would be allocated to install a batch plant for preparing and mixing the concrete used for the WTG foundations, transformer, and equipment foundations at the substation and switchyard, O&M building foundation and floor slab, and other project facilities (see Figure 2.1-1). Prior to installation of the batch plant facilities, a portion of the area would be covered with gravel. The batch plant complex would consist of a mixing plant, areas for sand and gravel stockpiles, and truck load-out and turnaround areas. The batch plant itself would consist of cement storage silos, water and mixture tanks, gravel hoppers, and conveyors to deliver different materials. During construction, materials would be taken from stockpiles and dumped into hoppers with front-end loaders, where they would be mixed together in the mixing plant and then loaded into ready-mix trucks in the truck loading area. The concrete would be delivered to each turbine site, the substation and switchyard, the O&M building, and other locations as needed using ready-mix trucks. Concrete ready-mix trucks would be washed out at designated locations that have been designed for that purpose. At those locations, all effluent would be contained, and refuse concrete would be reclaimed. Following completion of construction, all components of the batch plant would be demobilized, and the site would be reclaimed.

2.1.1.2.12 Water Usage, Amounts, Source

Because no new water rights in Spring Valley are available, SVW would not drill a new well as part of the proposed project. All necessary water would be obtained through a temporary lease with an existing water rights holder in Spring Valley north of the project area, trucked to the site, and put to immediate use or held in tanks within the laydown area. A final agreement has been reached between SVW and the Church of Jesus Christ of Latter-Day Saints, an existing water rights holder in Spring Valley. The peak usage is estimated to be approximately 200,000 gallons per day. An elevated 30,000-gallon storage tank would be used at the water source. All water would be delivered by truck from the existing source to the batch plant and project area. Up to 2,000 vehicle trips would be required for water delivery.

The largest needs for water are batching concrete for turbine foundations and dust suppression. Water would also be used for washing equipment, road maintenance, and potable water. The quantity of water needed by SVW Project during the construction period will vary from approximately 5 million gallons (15.3 acre-feet) under normal conditions to approximately 10 million gallons (30.7 acre-feet) under the worst-case scenario of excessive drought and dry land. In order to achieve proper compaction of backfill at foundations, collection trenches, and road base material, water must be added. The amount of water necessary to reach an optimal value for compaction is variable and will depend on moisture conditions at the time of construction. The large range of water use is necessary to account for the potential conditions.

In normal conditions, a total of about 20,000 gallons of water per turbine would be needed for batching concrete; however, Pattern Energy may need to increase the moisture content by as much as 10%. Based on the maximum of 75 turbines, a total of 3,300,000 gallons of water would be needed for turbines. Of the remaining 6,700,000 gallons, 60%–70% would be used for dust suppression, and the balance (5,280 gallons a week) would be necessary for potable uses thoroughout the construction period.

2.1.1.2.13 Aviation Lighting (Wind Turbines)

Turbines would be lit as required by the Federal Aviation Administration (FAA). Based on the FAA Obstruction Marking and Lighting Advisory Circular (AC70/7460-1K), no structural markings or alternative colors are proposed for the WTGs. For nighttime visibility, two flashing red beacons would be mounted on the nacelle. Lights would not be placed on all turbines; only those turbines at each end of the array would have lights to mark the extent of the facility. A detailed Lighting Plan would be prepared as part of the Construction, Operation, and Maintenance (COM) Plan for the project.

2.1.1.2.14 Site Stabilization, Protection, and Reclamation Practices

All restoration for the project would follow the guidance in the Restoration Plan, prepared as part of the COM Plan for the project. Upon completion of the construction aspect of the project, all soils disturbed by short-term access roads and facilities would be reclaimed by stabilization and rehabilitation. Reseeding and fertilization would take place in accordance with specifications provided by BLM, and access to ROWs would be limited to the public, using gates and signs where necessary to allow for the germination and establishment of replanted sites. After construction activities are complete, SVW would restore temporary disturbance areas. In areas with potential seed-bearing soils, all available topsoil recovered during construction activities would be set aside and reapplied to temporary surface disturbances during restoration. To re-establish healthy vegetation communities, a BLM-approved seed mix would be used.

2.1.1.2.15 Construction Workforce Numbers, Needs, and Vehicles

Up to 175 workers would be employed during a 9- to 12-month construction period. There are several trailer parks nearby (Majors Junction is the closest) that could provide temporary living facilities for construction personnel; there is also housing in Ely and Baker, Nevada. During construction, potable water and sanitary facilities at the site would be necessary to support the construction crews. Potable water during construction would consist of bottled water (5-gallon reusable containers); there would be a small non-potable water storage tank for restroom facilities. A temporary septic holding tank would be installed to support the restroom use at the laydown area.

Temporary facilities would be available at the laydown area, and permanent facilities would be available at the O&M building. No more than 225 employee vehicles are anticipated to be on-site at any one time.

2.1.1.2.16 Construction Materials and Components Transportation

Trucks transporting turbines, towers, and other construction materials would travel along U.S. Highways 50 and 93, accessing the project area directly from SR 893. Most of the materials and components would be delivered from the south along U.S. Highway 93.

2.1.1.2.17 Waste and Hazardous Materials Management

All construction-related waste would be transported to and stored within the temporary use area until collected for transport to a final landfill destination by a licensed hauler. Materials that can be recycled would be stored and transported separately. SVW will coordinate with the Ely landfill prior to the start of construction. Hazardous materials are typically limited for a project of this nature. However, the following materials are anticipated to be used or produced during construction and operation of the Proposed Action:

- Fuel (diesel and unleaded) for construction equipment and vehicles
- Lubricants and mineral oils
- Cleaners
- Industrial material

These substances will be transported, stored, and, when necessary, disposed of in accordance with local, state, and federal regulations.

Fuel, grease, and oil for equipment and vehicles would be stored at the temporary use area. If any spillage occurs, the area would be cleaned up in accordance with the requirement of the hazardous materials plan and applicable permit requirements. Use of turbine lube oil will be handled in accordance with any necessary permit requirements or hazardous materials plan. Any concrete left over would be buried (if approved by BLM) or would be hauled and disposed of at a permitted site. Sanitary waste would be handled by a licensed sanitary waste vendor. For postconstruction operations, a septic system will be installed for the O&M building.

2.1.2 Wind Energy Facility Operation

2.1.2.1 OPERATIONS, WORKFORCE, EQUIPMENT, AND FACILITY MAINTENANCE NEEDS

Once the project has been constructed, the SVWEF would be monitored and operated year-round by SVW and would have a permanent staff of 10 to 12 full-time technicians. Each year, prior to the onset of the migratory bird breeding season (March 15 to July 30), raptor nests within 0.5 mile of a turbine would be checked to ensure there are no nesting raptors using these nests. If a nest is found to be in use, the Technical Advisory Committee (TAC) would determine necessary action based on the Wildlife Mitigation and Monitoring Plan (Appendix A).

The computer control system for each turbine would perform self-diagnostic tests, allowing a remote operator to ensure that each turbine is functioning at peak performance. Routine maintenance activities, consisting of visual inspections, oil changes, and gearbox lubrication, would result in regular truck traffic on project access roads throughout the year. Project access roads would be graded as necessary to facilitate operations and maintenance.

Annual maintenance activities that require the shutdown of turbines would be coordinated to occur during periods of little or no wind to minimize the impact to the amount of overall energy generation. Annual maintenance procedures would consist of inspecting WTG components and fasteners.

2.1.2.2 MAINTENANCE ACTIVITIES, INCLUDING ROAD MAINTENANCE

All equipment used in the operation of this project would be maintained and inspected regularly by authorized and trained facility staff. A complete schedule would be established before the start of operations.

The access roads built and used during the construction phase would be maintained throughout commercial operations. During operations, all project access roads would be evaluated and graded as necessary to facilitate operations and maintenance. In addition to grading, the application of new gravel may be necessary to maintain road surfaces.

2.1.3 Wind Energy Facility Decommissioning

Decommissioning involves the removal and disposal of infrastructure and facilities associated with a wind energy facility. SVW anticipates that the SVWEF would have a usable lifespan, after which continued operation would not be cost-effective. This is expected to occur after approximately 30 years of operation. Once the usable lifespan of the wind energy facility has been reached, the goal is to return the site to as close to preconstruction conditions as is possible. Prior to decommissioning, a detailed plan would be prepared to address specific needs of the project consistent with the BLM policy and would be approved by the BLM. The BMPs and stipulations that have been developed for construction activities would be applied to similar activities completed during decommissioning.

Generally, decommissioning involves disassembling WTGs and associated infrastructure and salvaging any valuable materials such as steel and copper. Unsalvageable materials would be disposed of at authorized locations. Following removal of facilities, turbine foundations would be partially removed to below grade, and pads and access roads would be recontoured and reseeded. Ground disturbance and impacts associated with decommissioning would be similar to those associated with construction activities.

2.1.4 Design Criteria (Mitigation Measures) Included in the Proposed Action

2.1.4.1 FACILITY COMMITMENTS

- <u>Alternate Turbine Locations</u> – 85 potential turbine locations would be analyzed, but a range of 66 to 75 sites would be developed, allowing selection of the best wind sites and avoidance of environmentally sensitive areas.
- <u>Use of Tubular Conical Steel Turbine Towers</u> – Tubular towers do not provide locations for raptors to perch, which decreases the risk of collisions with turbine blades.
- <u>Underground Collection System</u> – Reduces the visual impact of overhead transmission as well as the potential impact to avian and bat species from collisions.
- <u>Setbacks</u> – Turbines would be set back from public roads at least 1.1× total turbine height and would be set back 1.5× total turbine height from any property lines and ROW boundary.

2.1.4.2 CONSTRUCTION COMMITMENTS

- <u>Best management practices</u> – For example, construction vehicle movement within the project boundary would be restricted to predesignated access, contractor-required access, and public roads. In construction areas where ground disturbance is unavoidable, surface restoration would consist of returning disturbed areas back to their natural contours (if feasible) and reseeding with native seed mix. A full list of BMPs would be developed and included in the project's COM Plan.

- A Transportation Plan shall be developed, particularly for the transport of turbine components, main assembly cranes, and other large pieces of equipment. The plan shall consider specific object sizes, weights, origin, destination, and unique handling requirements and shall evaluate alternative transportation approaches. In addition, the process to be used to comply with unique state requirements and to obtain all necessary permits shall be clearly identified.
- A Traffic Management Plan shall be prepared as part of the Transportation Plan for the site access roads to ensure that no hazards would result from the increased truck traffic and that traffic flow would not be adversely impacted. This plan shall incorporate measures such as informational signs, flaggers when equipment may result in blocked throughways, and traffic cones to identify any necessary changes in temporary lane configuration. Additionally, SVW would consult with local planning authorities regarding increased traffic during the construction phase, including an assessment of the number of vehicles per day and their size and type. Specific issues of concern (e.g., location of school bus routes and stops) shall be identified and addressed in the Traffic Management Plan.

2.1.4.3 RESOURCE CONSERVATION MEASURES

- Direct avoidance of any eligible cultural resources.
- Monitoring by a BLM-approved archaeologist would be required during excavation and earth-moving activities associated with the construction phase.
- Any measures determined through Native American consultation will be implemented.
- Wildlife Mitigation and Monitoring Plan – A wildlife mitigation and monitoring plan has been prepared and is available in Appendix A. The plan describes postconstruction monitoring requirements, initial mitigation requirements, and an adaptive mitigation strategy. The plan uses a tiered approach that would result in different levels of mitigation being implemented based on the findings of postconstruction monitoring.
- Facilities shall be designed to discourage their use as perching or nesting substrates by birds. For example, power lines and poles shall be configured to minimize raptor electrocutions and discourage raptor and raven nesting and perching.
- Migratory birds – If construction is planned between March 15 and July 30, migratory bird clearance surveys would be conducted. Evidence of active nests or nesting would be reported immediately to the BLM to determine appropriate minimization measures (i.e., avoidance buffer would be established until birds have fledged the nest) on a case-by-case basis.
- Where appropriate, permitted activities would be restricted from March 1 through May 15 within 2 miles of an active greater sage-grouse lek.
- Where appropriate, permitted activities would be restricted from November 1 through May 15 within greater sage-grouse winter range. If activities must occur during that time, a survey would occur prior to work to determine whether greater sage-grouse are present. If individuals are not present, work may commence; if individuals are present, the BLM would determine necessary action such as restricted work areas until sage grouse have left the project area.
- Develop a Stormwater Management Plan for the site to ensure compliance with applicable regulations and prevent off-site migration of contaminated stormwater or increased soil erosion.
- Restoration Plan – A plan would be prepared as part of the COM Plan. The plan would describe restoration methods and requirements for temporary disturbance areas.

- For soil-disturbing actions that would require reclamation, salvage and stockpile all available growth medium prior to surface disturbances. Seed stock piles if they are to be left for more than one growing season. Recontour all disturbance areas to blend as closely as possible with the natural topography prior to revegetation. Rip all compacted portions of the disturbance to an appropriate depth based on site characteristics. Establish an adequate seed bed to provide good seed to soil contact.
- Do not allow bristlecone pine, limber pine, or swamp cedar to be harvested except for education, scientific, and research purposes.
- Develop a plan for control of noxious weeds and invasive species, which could occur as a result of new surface disturbance activities at the site. The plan shall address monitoring, education of personnel on weed identification, the manner in which weeds spread, and methods for treating infestations. The use of certified weed-free mulching shall be required. If trucks and construction equipment are arriving from locations with known invasive vegetation problems, a controlled inspection and cleaning area shall be established to visually inspect construction equipment arriving at the project area and to remove and collect seeds that may be adhering to tires and other equipment surfaces.
- If pesticides are used on the site, an integrated pest management plan shall be developed to ensure that applications would be conducted within the framework of BLM and U.S. Department of the Interior policies and entail only the use of EPA-registered pesticides. Pesticide use shall be limited to non-persistent, immobile pesticides and shall only be applied in accordance with label and application permit directions and stipulations for terrestrial and aquatic applications.
- All straw, hay, straw/hay, or other organic products used for reclamation or stabilization activities must be certified that all materials are free of plant species listed on the Nevada noxious weed list or specifically identified by the Ely District Office. Inspections would be conducted by a weed scientist or qualified biologist.
- Where appropriate, vehicles and heavy equipment used for the completion, maintenance, inspection, or monitoring of ground-disturbing activities; for emergency fire suppression; or for authorized off-road driving would be free of soil and debris capable of transporting weed propagules. Vehicles and equipment would be cleaned with power or high-pressure equipment prior to entering or leaving the work site or project area. Vehicles used for emergency fire suppression would be cleaned as a part of check-in and demobilization procedures. Cleaning efforts would concentrate on tracks, feet, or tires and on the undercarriage. Special emphasis would be applied to axles, frames, cross members, motor mounts, on and underneath steps, running boards, and front bumper/brush guard assemblies. Vehicle cabs would be swept out, and refuse would be disposed of in waste receptacles. Cleaning sites would be recorded using global positioning systems (GPS) or other mutually acceptable equipment and provided to the Ely District Office Weed Coordinator or designated contact person.
- Prior to the entry of vehicles and equipment to a planned disturbance area, a weed scientist or qualified biologist would identify and flag areas containing weeds. The flagging would alert personnel or participants to avoid areas of concern whenever possible.
- To minimize the transport of soil-borne noxious weed seeds, roots, or rhizomes, infested soils or materials would not be moved and redistributed on weed-free or relatively weed-free areas. In areas where infestations are identified or noted and infested soils, rock, or overburden must be moved, these materials would be salvaged and stockpiled adjacent to the area from which they were stripped. Appropriate measures would be taken to minimize wind and water erosion of these stockpiles. During reclamation, the materials would be returned to the area from which they were stripped.

2.2 No-Action Alternative

Under the No-Action Alternative, the BLM would not issue a ROW grant for the construction and operation of WTG facilities in the project area. Wind resources in Spring Valley would remain undeveloped, and a project contributing to the Nevada state and federal RPS would not occur.

2.3 Alternatives Considered but Eliminated from Detailed Analysis

During the period of additional data collection and preparation of the POD, SVW coordinated with the BLM to consider a variety of project layouts that would meet both the BLM's purpose and need and SVW's objective while avoiding or minimizing impacts to resources of concern identified by stakeholders and the BLM interdisciplinary team. The following two alternatives were considered but eliminated from detailed analysis.

2.3.1 Alternate Project Area One

SVW considered an alternative location directly north of the Proposed Action area that included some proposed development on private lands. Through ongoing studies of the wind resource in Spring Valley, SVW determined that the wind resource in this area is not an economically viable option at this time. In addition, there was a greater potential to affect sensitive cultural resources, and the WTGs associated with this area would have been clearly visible from private residences on Sacramento Pass and campsites in the Cleve Creek Recreation Area.

2.3.2 Alternate Project Area Two

SVW considered a location north and east of the Proposed Action area, including lands within and directly adjacent to the Swamp Cedar ACEC. Because of the greater potential to affect sensitive cultural resources and wildlife use associated with the ACEC, this project area was eliminated from further detailed analysis.

2.4 Conformance with BLM Land Use Plan

The Proposed Action is in conformance with Management Action RE-1 identified in the Ely RMP, which directs the BLM to "Review proposed renewable energy developments on a project-specific basis, considering potential resource conflicts and mitigation measures. Areas of high potential for wind and solar energy development are identified but no specific areas are designated for such development" (BLM 2008b). Additionally, the Proposed Action is in conformance with the following BLM goals and objectives for renewable energy:

- "provide opportunities for development of renewable energy sources such as wind, solar, biomass, and other alternative energy sources while minimizing adverse impacts to other resources" (BLM 2008b); and
- "be responsive to applications for renewable energy sites and associated rights of way, as encouraged by current BLM policy" (BLM 2008b).

2.5 Relationship to Statutes, Regulations, or Other Plans

The issuance of a ROW for the Proposed Action is consistent with the terms, conditions, and decisions of the White Pine County Public Lands Policy Plan as adopted by the White Pine County Board of County Commissioners (Public Land User Advisory Committee 2007). Although the plan does not include specific policies related to renewable energy development, the Proposed Action is consistent with Policy 11-2: "All energy proposals should attain the lowest feasible emissions, the highest feasible efficiencies and the highest possible standards using Best Available Control Technology."

This EA also complies with the *BLM Final Wind Energy Development Policy* (IM No. 2009-043).

The issuance of a ROW for the Proposed Action is also consistent with all relevant federal, state, and local statutes, regulations, and plans. The known federal, state, and local agencies' approvals, reviews, and permitting requirements that are anticipated to be needed for these new electrical facilities are described in detail in the SVW POD (SVW 2009).

3.0 AFFECTED ENVIRONMENT/ENVIRONMENTAL IMPACTS

3.1 Introduction

This chapter presents the potentially affected existing environment (i.e., the physical, biological, social, and economic values and resources) of the impact area.

While many issues may arise during scoping, not all of the issues raised warrant detailed analysis. Issues raised through scoping are analyzed if

- Analysis of the issue is necessary in order to make a reasoned choice between alternatives;
- The issue is significant (an issue associated with a significant direct, indirect, or cumulative impact, or where necessary to determine the significance of impacts); or
- There is a disagreement about the best way to use a resource or resolve an unwanted resource condition or potentially significant effects of a Proposed Action or alternative.

Potential impacts to the following resources/concerns were evaluated in accordance with criteria listed above to determine whether detailed analysis was required. Consideration of some of these items occurs in order to ensure compliance with laws, statutes, or EOs that impose certain requirements on all federal actions. Other items are relevant to the management of public lands in general or to the Ely District BLM in particular.

In response to the preliminary issues identified, further surveys/studies were conducted and reports prepared. The following reports were completed and used in preparation of the analysis of this document:

- *Spring Valley Wind Biological Resources Report* (SWCA Environmental Consultants [SWCA] 2009a)
- *Spring Valley Wind Power Generating Facility Final Preconstruction Survey Results Report for Birds and Bats* (SWCA 2009b)
- *A Study on the Use of Rose Guano Cave, Nevada, by Mexican Free-Tailed Bats* (Tadarida brasiliensis) (Sherwin 2009)
- *Class III Cultural Resources Inventory of the Spring Valley Wind Facility in White Pine County, Nevada* (SWCA 2009c)
- *Ethnographic Investigations for the Spring Valley Wind Facility in White Pine County, Nevada* (SWCA 2009d)
- *Spring Valley Wind Visual Resource Assessment* (SWCA 2009e)
- *Inventory of Historic Architectural Resources within 5 Miles of the Spring Valley Wind Facility in White Pine County, Nevada* (SWCA 2009f)
- *Preliminary Geotechnical Engineering Evaluation Report: Proposed Spring Valley Wind Farm, White Pine County, Nevada* (Kleinfelder 2009a)
- *Borrow Study Investigation and Thermal Resistivity Testing Letter Report: Spring Valley Wind Farm Project, White Pine County, Nevada* (Kleinfelder 2009b)

Many times, a project would have some degree of effect on a resource or concern, but that effect does not approach any threshold of significance, nor does it increase cumulative impacts by a measurable increment. Such effects are described as negligible in the rationale for dismissal from analysis. Table 3.1-1 documents the evaluation and rationale for dismissal from analysis for each resource/concern.

Table 3.1-1. Resource/Concern Evaluation

Resource	Analysis Required		Rationale for Dismissal from Detailed Analysis or Issue(s) Requiring Detailed Analysis
	Yes	No	
Air Resources			
Air Quality*		√	Impacts to air quality from a typical wind energy facility are discussed in Section 5.4 of the PEIS. Site-specific evaluation did not indicate any additional impacts than those already disclosed. There may be temporary increased particulate matter (dust) and heavy machinery emissions resulting from construction activities. The affected area is not within an area of non-attainment or areas where total suspended particulates or other criteria pollutants exceed Nevada air quality standards. BMPs from Section 2.2.3.2 of the PEIS are incorporated by reference and are adequate for controlling particulates and criteria pollutants. Direct, indirect, and cumulative impacts would not likely approach a level of significance. Detailed analysis is not required.
Water Resources			
Water Quality Drinking/Ground*		√	Impacts to water quality from a typical wind energy facility are discussed in Section 5.3 of the PEIS. Site-specific evaluation did not indicate that any additional impacts other than those already disclosed would occur as a result of the Proposed Action. BMPs from Section 2.2.3.2 of the PEIS are incorporated by reference and are adequate. Detailed analysis is not required.
Water Resources (Water Rights)		√	Impacts to water resources from a typical wind energy facility are discussed in Section 5.3 of the PEIS. Site-specific evaluation did not indicate any additional impacts than those already disclosed would occur as a result of the Proposed Action. BMPs from Section 2.2.3.2 of the PEIS are incorporated by reference and are adequate. Detailed analysis is not required.
Soil Resources			
Farmlands, Prime and Unique*		√	Potential impacts to geological resources from a typical wind farm are discussed in Section 5.10.1 of the Wind Energy PEIS and are consistent with impacts to prime and unique farmlands anticipated for this project. Within the project area, two soil associations exist that qualify portions of the project area for prime farmland status as well as for desert land entry. No unique farmland or land of state or nationwide importance occurs within the project area. The E ½ of Section 12 has been classified for Desert Land Entry. Because prime farmlands within the project area are not currently being used and require the removal of excess salts and irrigation in order to be used, impacts are considered negligible and detailed analysis is not required.
Vegetation Resources			
Forest Health*		√	Forest Resources occur at negligible levels within the project area and will not be affected by the Proposed Action.
Rangeland Standards and Guidelines*		√	This is not a grazing or restoration action.
Wetlands/Riparian Zones *		√	The project has been designed to avoid riparian and wetland areas.
Vegetation		√	Impacts to vegetation are discussed in Sections 5.9.2.1, 5.9.3.1, and 5.9.3.1.3 of the PEIS. Site-specific evaluation did not indicate any additional impacts that would occur as a result of the Proposed Action. BMPs from Section 2.2.3.2 of the PEIS are incorporated by reference and are adequate. Detailed analysis is not required.

Table 3.1-1. Resource/Concern Evaluation (Continued)

Resource	Analysis Required		Rationale for Dismissal from Detailed Analysis or Issue(s) Requiring Detailed Analysis
	Yes	No	
Fish and Wildlife			
Fish and Wildlife	√		In early scoping, the NDOW presented the issue that the project area is important habitat for pronghorn antelope. The Ely RMP/FEIS defines “priority” habitat for pronghorn as crucial winter habitat. Geographic information system (GIS) overlays of the project area on crucial winter range for pronghorn revealed that there would be no effect on priority habitat for the species. Section 4.6 (pages 4.6-9 through 10) of the RMP/FEIS (incorporated by reference) discloses impacts to terrestrial wildlife from renewable energy. Impacts to pronghorn, big-game species, and other terrestrial wildlife species are anticipated to be negligible because habitat in this area is not critical to any of the species. Impacts to wildlife from a typical wind farm operation are also discussed in Section 5.9 of the Wind Energy PEIS. BMPs for the protection of wildlife species are listed in Section 2.2.3.2 of the PEIS and Section 3 of the Ely RMP.
Migratory Birds*	√		Site-specific analysis is incuded to disclose the impacts from the Proposed Action to migratory birds.
Special-Status Species			
U.S. Fish and Wildlife Listed, Threatened, or Endangered Species or Critical Habitat*		√	No listed, threatened, or endangered species or critical habitat occurs in the project area.
Special-Status Animal Species	√		Impacts from renewable energy projects in general to the bald eagle and other sensitive species are discussed in Section 4.7 (pages 4.7-21 and 4.7-22) of the RMP/FEIS (incorporated by reference). Impacts to wildlife from a typical wind farm operation are discussed in Section 5.9 (incorporated by reference) of the Wind Energy PEIS. Sage-grouse and bats are specifically discussed in Section 5.9.3.2 (incorporated by reference). BMPs for the protection of special-status species were developed in Section 2.2.3.2 of the PEIS and Section 3 of the Ely RMP/FEIS. In addition, design features of the Proposed Action, as well as a bat/bird monitoring and mitigation plan committed to by the proponent, would reduce impacts to special-status species. However, additional analysis should be conducted to disclose the residual impacts from the Proposed Action to greater sage-grouse, bats that use the Rose Guano Cave, and pygmy rabbits.
Special-Status Plant Species	√		Although no potential habitat for Parish phacelia was identified in the project area, analysis should be conducted to disclose the potential impacts from the Proposed Action.
Wild Horses			
Wild Horses		√	Not present. There are no herd management areas within the area of analysis.
Cultural Resources			
Cultural Resources*		√	Impacts to cultural resources from a typical wind energy facility are discussed in Section 5.12 of the PEIS. A Class III intensive cultural resource inventory was conducted on all portions of the project area that might be subject to ground-disturbing actions. All known cultural resource sites eligible for the National Register of Historic Places would be avoided. If any cultural resource sites were discovered during implementation of this project, all work would cease within 100 yards of the site and the BLM Archaeologist would be contacted immediately.
Heritage Special Designations		√	The only heritage special designation potentially affected by the Proposed Action is the Pony Express Trail. The Proposed Action is located 50 miles south of the Pony Express Trail and is not in the viewshed. Detailed analysis is not required.

Table 3.1-1. Resource/Concern Evaluation (Continued)

Resource	Analysis Required		Rationale for Dismissal from Detailed Analysis or Issue(s) Requiring Detailed Analysis
	Yes	No	
Paleontological Resources			
Paleontological Resources		√	Impacts to paleontological resources from a typical wind energy facility are discussed in Section 5.2 of the PEIS. After evaluation of the geological and sedimentary context of the project area, it has been determined unlikely that paleontological resources exist, and no surveys or additional research is necessary. If any resources were discovered during implementation of this project, all work in the vicinity would cease and the BLM Archaeologist/ Paleontologist would be contacted immediately.
Visual Resources			
Visual Resources	√		Impacts to visual resources in Spring Valley would occur from the introduction of large WTGs and associated facilities to a predominantly undeveloped landscape.
Land and Realty/Renewable Energy			
Land Uses		√	A Case Recordation Geo report with customer search was conducted on November 4, 2009, using BLM's GeoCommunicator and LR 2000 database. Six authorized ROW grants are located within the project area. The project has been designed to avoid impacts to existing ROWs, and further analysis is not required.
Travel Management			
Transportation/Access	√		The Proposed Action calls for new roads to be constructed through the project area.
Recreation			
Recreation Uses, including Backcountry Byways, Caves, and Rockhounding Areas	√		The project area is within the U.S. 50 SRMA. There is a potential for impacts to hunting, as well as a change in the physical and social setting of the project area.
Livestock Grazing			
Grazing Uses/Forage (Bastian Creek Allotment and Majors Allotment)	√		At least four towers with associated roads and underground transmission lines would be constructed within a cost-share range restoration project that was performed in fall 2007. In addition, cows would have to be excluded from the project area until short-term disturbance areas have re-established vegetation.
Forest and Woodland Products			
Forest/Woodland and other vegetative products (Native seeds, yucca and cactus plants)		√	No forest/woodland products of concern are present in project area.
Geology and Mineral Extraction			
Mineral Resources		√	Impacts to mineral resources from a typical wind energy facility are discussed in Section 5.1 of the PEIS. Site-specific evaluation did not indicate any additional impacts that would occur as a result of the Proposed Action. BMPs from Section 2.2.3.2 of the PEIS are incorporated by reference and are adequate. Detailed analysis is not required.
Watershed			
Soils/Watershed		√	Impacts to soil resources from a typical wind energy facility are discussed in Section 5.1 of the PEIS. Impacts to vegetation are discussed in Sections 5.9.2.1, 5.9.3.1, and 5.9.3.1.3. Site-specific evaluation did not indicate any additional impacts that would occur as a result of the Proposed Action. BMPs from Section 2.2.3.2 of the PEIS are incorporated by reference and are adequate. Detailed analysis is not required.
Floodplains*		√	Although there are low-lying areas where water can pool, there are no floodplains in the project area.

Table 3.1-1. Resource/Concern Evaluation (Continued)

Resource	Analysis Required Yes	Analysis Required No	Rationale for Dismissal from Detailed Analysis or Issue(s) Requiring Detailed Analysis
Fire			
Fuels		√	No fuels projects are planned for the project area.
Emergency Stabilization and Rehabilitation		√	No emergency stabilization and rehabilitation projects occur within the project area.
Noxious and Invasive Weeds			
Non-native Invasive and Noxious Species*		√	A Weed Risk Assessment was completed by the BLM for the Proposed Action in March 2009. The risk rating for this project was determined to be moderate, and preventive measures for noxious and invasive weeds are necessary. The project could potentially increase and introduce non-native invasive and noxious species to the area. With the implementation of preventive measures identified in the Weed Risk Assessment, and BMPs referenced in the Proposed Action (Section 2.1.4 above), the effect would be negligible, and detailed analysis is not required.
Special Designations			
ACECs*		√	Concerns were raised about the potential for construction activities to excavate or drill to levels that may puncture the perched water table, which supports the rare vegetation found in the Swamp Cedar ACEC. Geotechnical evaluations would be done for each WTG site, and foundations would be engineered to eliminate the risk of puncturing the water table. Effects would be negligible, and a detailed analysis is not required.
Wilderness/WSA*		√	Not present.
Wild and Scenic Rivers		√	Not present.
Other Concerns			
Human Health and Safety*		√	Herbicides may be used for noxious weed control. With proper use of herbicides and implementation of safety measures and BMPs referenced in the Proposed Action (Section 2.1.4 above), the effect on human health would be negligible, and detailed analysis is not required.
Noise		√	Noise impacts from a typical wind energy facility are discussed in Section 5.5 of the PEIS. During operations, sources of noise would consist of mechanical and aerodynamic noise of WTGs; transformer and switchgear noise from the substation and switching yard; corona noise from transmission lines; vehicular traffic noise, and noise from the O&M building. These sources are not expected to contribute more than a negligible amount to the ambient noise level in the project area, and a detailed analysis is not required.
ACECs designated for cultural resources, Native American Religious Concerns		√	The only ACEC for cultural resources potentially affected by the Proposed Action is the Swamp Cedar ACEC. In early scoping, concerns were raised about Native American burials in the ACEC and in the vicinity of the affected area. An ethnographic report was prepared, and an avoidance area was delineated that included the ACEC. The Proposed Action was modified to address these concerns, and a detailed analysis is not required. Further consultation revealed no additional concerns from tribes with ancestral ties to the area.
Wastes, Hazardous or Solid*		√	Impacts from hazardous wastes associated with a typical wind energy facility are discussed in Sections 5.6, 5.9.2.1.3, 5.9.2.2.7, 5.9.2.3.4, 5.9.3.1, and 5.9.3.2.5 of the PEIS. No hazardous or solid wastes have been observed or are known to occur in the project area. BMPs from Section 2.2.3.2 of the PEIS are incorporated by reference and are adequate. Detailed analysis is not required.
Public Safety		√	The project could potentially result in increased public safety issues during the construction phase. With the implementation of safety measures and BMPs referenced in the Proposed Action (Section 2.1.4 above), the effect on public safety would be negligible, and detailed analysis is not required.
Environmental Justice*		√	No minority or low-income groups would be disproportionately affected by health or environmental effects.

Table 3.1-1. Resource/Concern Evaluation (Continued)

Resource	Analysis Required		Rationale for Dismissal from Detailed Analysis or Issue(s) Requiring Detailed Analysis
	Yes	No	
Socioeconomics	√		Impacts from a long-term increase in employment opportunities, as well as long-term beneficial impacts from an increase in property tax and indirect long-term beneficial impacts from an increase in sales and income tax from operation of a typical wind energy facility, are discussed in Section 5.13.1 of the Wind Energy PEIS. Additional analysis should be conducted to disclose the site-specific impacts from the Proposed Action to local socioeconomic conditions.

* Nevada Supplemental Authority.

3.2 Resources /Concerns Analyzed

3.2.1 Fish and Wildlife

Wildlife found in the project area are those species typically associated with Inter-Mountain Basins Mixed Salt Desert Scrub (mixed salt desert scrub), Inter-Mountain Basins Big Sagebrush Shrubland (big sagebrush shrubland), and Great Basin Xeric Mixed Sagebrush Shrubland (mixed sagebrush shrubland), which account for 99% of the project area (U.S. Geological Survey [USGS] 2004). These plant communities provide habitat for a variety of wildlife species ranging from common reptiles, birds, and mammals, to species of management concern, such as migratory birds or special-status species. This section discusses specific wildlife of concern that have the potential to occur within Spring Valley. A detailed discussion of migratory birds and special-status species is included below in Section 3.2.3, Migratory Birds, and Section 3.2.4, Special-Status Species. A detailed analysis of all biological resources of concern within and in the vicinity of the project area can be found in the *Spring Valley Wind Biological Resources Report* (SWCA 2009a).

General wildlife observations were made by SWCA biologists throughout the course of approximately 2 years of bird and bat surveys conducted at the SVW project area. Throughout these surveys, biologists noted all general wildlife species that were observed. The observed general wildlife species are listed in Table 3.2-1 below; however, bird and bat species have been excluded, as they are discussed in greater detail below.

Table 3.2-1. General Wildlife Observed in Project Area

Common Name	Scientific Name
Amphibians	
Great Basin spadefoot toad	*Spea intermontana*
Reptiles	
Great Basin rattlesnake	*Crotalus lutosus*
Striped whipsnake	*Masticophis taeniatus*
Gophersnake	*Pituophis catenifer*
Sagebrush lizard	*Sceloporus graciosus*
Western fence lizard	*Sceloporus occidentalis*
Northern side-blotched lizard	*Uta stansburiana*

Table 3.2-1. General Wildlife Observed in Project Area (Continued)

Common Name	Scientific Name
Mammals	
White-tailed antelope ground squirrel	*Ammospermophilus leucurus*
Pronghorn antelope	*Antilocapra americana*
Mule deer	*Odocoileus hemionus*
Coyote	*Canis latrans*
Black-tailed jackrabbit	*Lepus californicus*
Desert woodrat	*Neotoma lepida*
Cottontail	*Sylvilagus audubonii*

3.2.1.1 BIRDS

SWCA conducted approximately 2 years of preconstruction bird studies in the project area. Ninety-two species of bird were observed during surveys, including 12 species of raptors. Of these species, only the European starling (*Sturnus vulgaris*) is not protected under the Migratory Bird Treaty Act (MBTA). The remaining 91 bird species are discussed in Section 3.2.3, Migratory Birds, below.

3.2.1.2 BATS

Extensive acoustic bat surveys of the project area were initiated July 2007 and continued through December 2008 using AnaBat acoustic detectors. AnaBat detectors were placed within different habitat types and near water resources which were expected to attract high numbers of bats. Both perennial and ephemeral water resources typically have concentrated bat activity and can generate substantial volumes of data (O'Farrell and Gannon 1999), which can be useful for creating a complete species inventory.

Acoustic surveys identified 12 of the 23 bat species, from the Verspertilionidae and Molossidae families, known to occur in Nevada. However, survey results indicate that approximately 91% of all recorded activity could be attributed to four bat species: western small-footed myotis (*Myotis ciliolabrum*), long-eared myotis (*Myotis evotis*), little brown bat (*Myotis lucifugus*), and Brazilian free-tailed bat (*Tadarida brasiliensis*). The high activity levels associated with these four species indicate that they are relatively common within the project area, at least seasonally. Of the 12 species observed, the Brazilian free-tailed bat, the little brown bat, big-brown bat (*Eptesicus fuscus*), silver-haired (*Lasionycteris nocitvagans*), hoary (*Lasiurus cinereus*), and western red bat (*Lasiurus blossevilli*) have been documented as mortalities at other wind energy facilities in the western United States (BLM 2005; Kerlinger et Al. 2006) and therefore should be considered to be at increased risk of mortality.

Variation in bat activity levels between AnaBat monitoring stations indicates that bat use of the project area is not homogeneous and that higher activity occurs near water sources and areas in close proximity to Rocky Mountain juniper (*Juniperus scopulorum*) (SWCA 2009a). However, bats may be found throughout the project area on any particular night. Additionally, bat activity varied greatly between different seasons, with total activity peaking during summer months. A detailed examination of these study results is presented in SWCA (2009a).

3.2.1.3 PROPOSED ACTION

3.2.1.3.1 Site Construction

Potential impacts to wildlife from a typical wind energy facility are described in Section 5.9.2.2 of the Wind Energy PEIS. The impacts to wildlife associated with construction of wind energy facilities would occur from 1) habitat reduction, alteration, or fragmentation; 2) introduction of invasive vegetation; 3) injury or mortality of wildlife; 4) decrease in water quality from erosion and runoff; 5) fugitive dust; 6) noise; 7) exposure to contaminants; and 8) interference with behavioral activities. Site-specific impacts associated with the Proposed Action are described below.

Birds

Impacts to birds would be the same as those described for migratory birds, presented in Section 3.2.3.1.1 below.

Bats

Construction activities associated with the Proposed Action would result in 632.6 acres of temporary habitat disturbance (7.4% of the project area). All areas of temporary habitat disturbance would be reclaimed after construction activities. Construction activities are expected to last 9 to 12 months and impacts are anticipated to be low. Measures identified as part of the Proposed Action in Section 2.1.4 above would further reduce any impacts.

3.2.1.3.2 Site Operation

Potential impacts to wildlife from the operation and maintenance of a typical wind energy facility are described in Section 5.9.3.2, Operational Effects on Wildlife, of the Wind Energy PEIS. The impacts to wildlife associated with the operation and maintenance of wind energy facilities would occur from 1) electrocution from transmission lines; 2) noise; 3) the presence of, or collision with, turbines, met towers, and transmission lines; 4) site maintenance activities; 5) exposure to contaminants; 6) disturbance associated with activities of the wind energy project workforce; 7) interference with migratory behavior; and 8) increased potential for fire. Site-specific impacts associated with the Proposed Action are described below.

Birds

Impacts to birds would be the same as those described for migratory birds, presented in Section 3.2.3.1.2 below.

Bats

Implementation of the Proposed Action would also include long-term removal of 123.6 acres of potential habitat as a result of construction of wind turbines and associated infrastructure. Specifically, operations located near water sources and in close proximity to Rocky Mountain juniper would result in moderate interference to bat behavior, as these are areas of greater activity (SWCA 2009b). Loss of juniper habitat would lead to a reduction in foraging and roosting areas for tree roosting species. This could lead to increased competition between bats and a subsequent decrease in fitness of individuals.

Indirect impacts are also described in the Wind Energy PEIS. Indirect impacts of specific concern to bats are covered in the PEIS in Section 5.9.3.2.3, Collisions with Turbines, Meteorological Towers, and Transmission Lines, and Section 5.9.3.2.7, Interference with Migratory Behavior. Wind energy development and effects on bats are further discussed on pages 5-70 and 5-71 of the Wind Energy PEIS.

Adverse impacts to bats would result from implementation of the Proposed Action. Results from postconstruction mortality studies conducted in western states at generation facilities similar to that proposed for Spring Valley were used to estimate impacts to bats as a result of the Proposed Action. Because 91% of bat activity on-site is attributed to four bat species (western small-footed myotis, long-eared myotis, little brown bat, and Brazilian free-tailed bat) and only two of those species (little brown bat, and Brazilian free-tailed bat) have been recorded as mortalities associated with other wind projects (SWCA 2009b), those species are considered to be most susceptible to mortality from this project. Mitigation measures identified as part of the Proposed Action, including those from the wind energy PEIS, would address impacts to most of the bat species observed on-site and keep impacts to low levels. To further address impacts to bats, the wildlife mitigation plan developed for the project (see Appendix A) provides measures to adaptively manage impacts as they are determined through monitoring. Based on those measures, impacts to bats would not exceed 179 individuals per year without additional mitigation measures being implemented to further reduce impacts. Mitigation measures would continue to be implemented until annual mortality levels were reduced to acceptable levels. The short-term impacts to bats may reach numbers exceeding the regional average; however, through this adaptive management process, long-term impacts would be minor and should not result in substantial impacts to populations. Additionally, over the long term, no substantial impacts to local and migratory populations are expected.

3.2.1.4 NO-ACTION ALTERNATIVE

Under the No-Action Alternative, the wind generation facility would not be constructed. Wildlife in the area would continue to be subject to existing conditions and local trends.

3.2.2 Migratory Birds

Based on existing data and preconstruction surveys (SWCA 2009b), the SVWEF does not occur within a major migration corridor. The regulatory framework for protecting birds includes the Endangered Species Act (ESA), the MBTA (which includes any part, nest, or egg), the Golden Eagle Protection Act of 1940, and EO 13186. The Wind Energy PEIS discusses the ESA in Section 4.6.5.1, and other regulations stated above are discussed in Section 4.6.2.2.6 of the PEIS.

SWCA conducted 2 years of preconstruction bird surveys in the proposed project area. Nearly all the birds that were observed within the project area are considered to be migratory birds. A total of 92 different bird species were identified during these surveys, including 12 species of diurnal raptors. Many of these species have already been recorded as mortalities at other wind energy–generating facilities in the western United States, including some of the most common mortalities, like horned lark (*Eremophila alpestris*), sparrows (family Emberizidae), and blackbirds (family Icteridae). During surveys, breeding bird point-counts identified 29 bird species. While direct evidence of breeding was not observed for all of these species, breeding bird point-counts were performed during the middle of the breeding season, and it is suspected that most or all of these species were breeding in or near the project area. In total, including incidental sightings, there were 11 species of birds confirmed to be breeding in the project area. In addition, a total of seven raptor nests were determined to be active during helicopter surveys of the project area in 2007 and 2008. The common raven, ferruginous hawk, and Swainson's hawk were the only identified species nesting during these surveys. Although the common raven is not a raptor, a buteo may later occupy a nest that a raven had used in the past. For an in-depth examination of the results of bird surveys in the project area, refer to the *Spring Valley Wind Power Generating Facility Final Pre-construction Survey Results Report* (SWCA 2009b).

Many species of migratory birds can be found within the proposed project area. To minimize unintentional take as defined by EO 13186, the BLM has issued IM No. 2008-050, Migratory Bird Treaty Act – Interim Management Guidance, to provide interim guidance to meet the BLM responsibilities under the MBTA. This provides the BLM with a consistent approach for addressing migratory bird populations and habitats. The IM includes management actions for Species of Conservation Concern and management of habitat used by Species of Conservation Concern. Bird Species of Conservation Concern that were observed during avian surveys, or incidentally while biologists were in the project area, are listed in Table 3.2-2. Eight of these birds were observed during SWCA breeding bird point-count surveys (SWCA 2009b). These included Brewer's sparrow, ferruginous hawk, long-billed curlew, loggerhead shrike, northern harrier, pinyon jay, sage sparrow, and Swainson's hawk. Because of the timing of surveys, which were performed during the middle of the breeding season, it is assumed that most or all of the species observed during surveys were breeding in the general area. The results of these surveys are presented by SWCA (2009b).

Table 3.2-2. Avian Species of Conservation Concern Observed in the Project Area

Common Name	Scientific Name
Brewer's sparrow	*Spizella breweri*
Western burrowing owl	*Athene cunicularia hypugaea*
Ferruginous hawk	*Buteo regalis*
Golden eagle	*Aquila chrysaetos*
Long-billed curlew	*Numenius minutes*
Loggerhead shrike	*Lanius ludovicianus*
Northern harrier	*Circus cyaneus*
Pinyon jay	*Gymnorhinus cyanocephalus*
Prairie falcon	*Falco mexicanus*
Red-naped sapsucker	*Sphyrapicus nuchalis*
Sage sparrow	*Amphispiza belli*
Swainson's hawk	*Buteo swainsoni*
Willet	*Catoptrophorus semipalmatus*

3.2.2.1 PROPOSED ACTION

3.2.2.1.1 Site Construction

Potential impacts to wildlife from construction associated with a typical wind energy facility are described in Section 5.9.2.2 of the Wind Energy PEIS. Impacts would consist of injury or mortality, noise, interference with behavioral activities, and habitat disturbance. For this project, construction is only expected to last 9 to 12 months, and impacts are anticipated to be minimal. Measures identified as part of the Proposed Action in Section 2.1.4 above would further reduce any impacts.

There are many species of migratory birds known to nest in the project area, including four documented active and inactive raptor nests. In particular, turbines 58–61, 73–75, Alt 8, and Alt 10 are within 0.5 mile of known raptor nests and could increase the potential for temporary displacement during construction. However, the Proposed Action (Section 2.1.4 above) includes a measure to address potential impacts during nesting season that would reduce these impacts to low levels. Additionally, other migratory birds could nest in any of the vegetation communities found within the project area. During construction, there would be short-term disturbance to 632.6 acres of habitat lasting up to five years, which is 7.4% of total habitat within the project area. Temporary use areas would be reclaimed after construction and would result in negligible impacts. Long-term disturbance areas would include wind turbine pads, O&M

building, access road footprints, and associated infrastructure. Total long-term disturbance would include 123.6 acres of habitat, or 1.4% of the project area, for the life of the project. To reduce impacts associated with direct mortality and displacement of nesting birds during construction, construction activities should be restricted during nesting season, as identified in Section 5.9.5.3.2 of the Wind Energy PEIS.

There were 13 species of birds of Conservation Concern observed during avian studies (see Table 3.2-2), and 10 of these could nest in the project area. While the impacts discussed for all migratory birds would be the same as those for birds of Conservation Concern, their association with specific habitat types means they would realize differing levels of long-term impacts from the loss of their preferred habitat. Four of these birds of Conservation Concern (ferruginous hawk, pinyon jay, red-naped sapsucker, and Swainson's hawk) prefer nesting in pinyon-juniper habitat, and 0.1 acre would be removed upon implementation of the Proposed Action. Based on conservation measures in the Proposed Action, no Rocky mountain juniper (swamp cedar) trees will be removed. Brewer's sparrow, loggerhead shrike, and sage sparrow prefer big sagebrush habitat, and there would be 47.7 acres of long-term habitat loss for these species; in contrast, northern harrier would most likely be found near water, where there would be no long-term habitat disturbance. Long-billed curlew prefers to nest in short grasses and would also have no habitat loss. Western burrowing owl could potentially use all habitats within the project area to nest, which would total 123.6 acres of long-term disturbance.

3.2.2.1.2 Site Operation

Adverse impacts to birds as a result of wind-generation facility operations and maintenance would be consistent with those described for a typical wind energy facility in Section 5.9.3.2, Operational Effects on Wildlife, of the Wind Energy PEIS. Those impacts of particular concern to migratory birds consist of Electrocution (Section 5.9.3.2.1), Noise (Section 5.9.3.2.2), Collisions with Turbines, Meteorological Towers, and Transmission Lines (Section 5.9.3.2.3), and Interference with Migratory Behavior (Section 5.9.3.2.7). Impacts to raptors are specifically discussed in the text box titled Compatibility of a Wind Energy Development Project and Raptors, beginning on page 5-64 of the Wind Energy PEIS. In addition, those turbines located near known nest locations (58–61, 73–75, Alt 8, and Alt 10) would have potential increased impacts to raptors as a result of the increased potential for turbine strikes. If these turbines are selected, measures listed in the Proposed Action (Section 2.1.4 of this document) and mitigation measure 1 in Section 5.1.3 of the PEIS would be implemented to reduce impacts to moderate levels. Turbines installed near water sites (58–60, 73, 74, and Alt 10) would also have an increased potential for bird strikes; however, measures listed as part of the Proposed Action (Section 2.1.4 of this document) would ensure that impacts do not exceed moderate levels.

Adverse impacts to individual birds would result from implementation of the Proposed Action. However, while it is anticipated that most impacts to individual birds would be low, those specific turbines identified above would have potential moderate impacts to individual birds. Results from postconstruction mortality studies conducted in western states at generation facilities with similar habitat, abundance and diversity of bird species, and types of turbines proposed were used to estimate mortality levels for the Proposed Action. Because the project is not within a major migratory bird corridor (SWCA 2009b) and mitigation measures identified as part of the Proposed Action, including those from the wind energy PEIS, would address impacts to most of the bird species observed on-site, impacts are anticipated to be low. To further address impacts to birds, the wildlife mitigation plan developed for the project (see Appendix A) provides measures to adaptively manage impacts as they are determined through monitoring. Based on those measures, impacts to birds would not exceed 302 individuals per year, and that would be without additional mitigation measures being implemented to further reduce impacts. Mitigation measures would continue to be implemented until annual mortality levels were reduced to acceptable levels. The short-term impacts to birds may reach numbers exceeding the regional average; however, through this adaptive management process, long-term impacts would be minor and should not result in substantial impacts to populations. Additionally, over the long term, no substantial impacts to local and migratory populations are expected.

3.2.2.2 NO-ACTION ALTERNATIVE

Under the No-Action Alternative, the wind generation facility would not be constructed, and special-status species in the area would continue to be subject to existing conditions and local trends.

3.2.3 Special-Status Species (Plant and Animal)

Species included on the protected species list for the state of Nevada, which is maintained by the Nevada Natural Heritage Program (NNHP), are protected under Nevada Revised Statutes (NRS) 501. Those native taxa that are neither federally listed, proposed, or candidate species under the ESA nor listed as protected by the State of Nevada yet meet the criteria provided in BLM Manual 6840.06 E are also considered sensitive species by the Nevada BLM (BLM 1998). There are no federally listed species that are known to occur in the project area. One plant species and several wildlife species listed as BLM Sensitive (Sensitive) occur or have the potential to occur in the project area.

3.2.3.1 SPECIAL-STATUS PLANT SPECIES

Parish phacelia (*Phacelia parishii*) is an annual plant that blooms from April to July. This plant is typically found in clay or alkaline soils of dry lake margins or creosote bush scrub (BLM 2009a). NNHP (2007) describes Parish phacelia habitat as salt-crusted silty-clay soils on valley bottoms, lake deposits, and playa edges, often near seepage and spring areas and surrounded by saltbush scrub vegetation. Based on field reconnaissance surveys and review of geographic information system (GIS) data, potential habitat for parish phacelia can be found in the project area within 250 feet of a spring site in the northern part of the project area. However, there is currently no record of species occurrence in the project area. Additionally, it should be noted that no individuals were observed during field reconnaissance surveys in spring 2009, a particularly wet season that would have promoted germination of these plants (personal communication, Paul Podborny, Ely BLM Wildlife Biologist, with SWCA, August 3, 2009).

3.2.3.2 SPECIAL-STATUS WILDLIFE SPECIES

Sensitive passerine and gruine bird species known to occur within the project area include juniper titmouse (*Baeolophus ridgwayi*), pinyon jay (*Gymnorhinus cyanocephalus*), loggerhead shrike (*Lanius ludovicianus*), long-billed curlew (*Numenius minutus*), vesper sparrow (*Pooecetes gramineus*), red-naped sapsucker (*Sphyrapicus nuchalis*), and greater sandhill crane (*Grus canadensis tabida*). Further description of sensitive bird species' habitat and density in the project area can be found in Section 3.2.3, Migratory Birds, above and in the *Spring Valley Wind Power Generating Facility Final Pre-construction Survey Results Report for Birds and Bats* (SWCA 2009b).

Sensitive raptors found in the project area include golden eagle (*Aquila chrysaetos*), long-eared owl (*Asio otus*), western burrowing owl (*Athene cunicularia hypugaea*), ferruginous hawk (*Buteo regalis*), Swainson's hawk (*Buteo swainsoni*), prairie falcon (*Falco mexicanus*), and bald eagle (*Haliaeetus leucocephalus*). Description of habitat used by these species within the project area is found in Section 3.2.3, Migratory Birds, above.

Greater sage-grouse (*Centrocercus urophasianus*) are sagebrush obligates that depend on sagebrush habitats for successful reproduction and winter survival (Connelly et al. 2004). There is a total of 3,643.2 acres of greater sage-grouse habitat within the project area. Additionally, greater sage-grouse habitat is common throughout the southern part of Spring Valley. A detailed discussion of greater sage-grouse habitat and life history can be found in the *Spring Valley Wind Biological Resources Report* (SWCA 2009a).

No active or inactive leks occur with the project area and no individuals were observed during preconstruction avian surveys, although greater sage-grouse specific surveys were not conducted (SWCA 2009b). Recent data provided by the NDOW on greater sage-grouse indicates that the lek system in Spring Valley consists of 38 leks supporting 256 birds, most situated north of the project area (NDOW 2009). The closest lek, the Bastian Creek lek, is located approximately 2 miles west-northwest of the nearest proposed turbine. NDOW data for this lek indicate that it is regularly used and has averaged three birds per year for the past 10 years. Therefore, based on known greater sage-grouse activity, the project area is situated in a lower use area, compared with other sage-grouse breeding activity in Spring Valley.

Sensitive bats known to occur within the project area include pallid bat, Townsend's big-eared bat, big brown bat, silver-haired bat, western red bat, hoary bat, western small-footed myotis, long-eared myotis, little brown bat, long-legged myotis, Yuma myotis, and Brazilian free-tailed bat. See SWCA (2009a, 2009b) for discussion of bat habitat and density within the project area.

Pygmy rabbits use areas of tall, dense sagebrush, which provide both food and shelter. During pygmy rabbit surveys conducted for this project, both active and inactive burrows were located. Active burrows were identified by the presence of fairly fresh pellets and/or signs of recent use. Additionally, at least three individual pygmy rabbits were seen within three separate habitat patches, verifying that some of the sagebrush identified as potential habitat is in fact occupied by pygmy rabbits. Up to 3,553.6 acres of potential habitat was identified through GIS analysis of sagebrush vegetation communities. Additionally, 89.6 acres were identified as good habitat, 61.0 acres of which were considered occupied pygmy rabbit habitat based on the observation of pygmy rabbits or active burrow systems (SWCA 2009a). Based on the results of these surveys, pygmy rabbits are estimated to exist in low numbers in the project area. A more detailed description of survey results and the status of pygmy rabbit in the project area can be found in SWCA (2009a).

3.2.3.3 PROPOSED ACTION

3.2.3.3.1 Site Construction

Special-Status Plant Species

Impacts to vegetation, as well as to special-status plant species, from a typical wind farm construction are discussed in Sections 5.9.2.1 and 5.9.2.4 of the Wind Energy PEIS (incorporated by reference) and are consistent with those anticipated for this project. Those impacts from construction include injury or mortality of vegetation, fugitive dust, exposure to contaminants, and introduction of invasive vegetation. No special-status plant species have been identified in the project area, but turbines 59 and 73 are within 250 feet of a wetland area that provides potential habitat for parish phacelia. As a result of the limited potential for special-status plants in the project area, impacts to special-status plant species are anticipated to be negligible. Measures identified as part of the Proposed Action in Section 2.1.4 above would further reduce any impacts.

Special-Status Wildlife Species

Anticipated impacts to sensitive raptor, passerine, and gruine bird species within the project area would be similar to those impacts to birds and sensitive species from typical wind farm construction activities and are discussed in Sections 5.9.2.2 and 5.9.2.4 of the Wind Energy PEIS (incorporated by reference). Those impacts from construction described in the PEIS are consistent with those anticipated for this project and include injury or mortality, noise, interference with behavioral activities, and habitat disturbance (reduction, alteration, or fragmentation). For this project, construction is only expected to last 9 to 12 months; therefore, the impacts are anticipated to be minimal. Measures identified as part of the Proposed Action in Section 2.1.4 above would further reduce any impacts.

The project area contains habitat for the greater sage-grouse but does not support any active or inactive leks and no individuals were observed in the project area during preconstruction surveys. Of the total approximately 310,409 acres of greater sage-grouse habitat in Spring Valley (based on ReGap sagebrush community data (USGS 2004, which does not consider loss of habitat as a result of recent fires) only 3,244.4 acres (1%) occur in the project area and would be disturbed either directly or indirectly. Of the approximately 416,988 acres of available winter range (BLM 2008b) in Spring Valley, only 8,058 acres (2%) occur in the project area and would be disturbed either directly or indirectly. This amounts of disturbance would be a minor impact to greater sage-grouse habitat, relative to the overall available habitat. Therefore, typical impacts to greater sage-grouse from construction of wind facilities (described in Sections 5.9.2.2 and 5.9.2.4 of the Wind Energy PEIS and incorporated by reference) would occur at only low levels. Additionally, long-term removal of up to 322.9 acres (8.8 %) of potential greater sage-grouse habitat would occur. Of the 322.9 acres, 275.2 acres (7.5 %) would be reclaimed following construction but would remain a long-term impact because of the time required for recovery of the habitat. The remaining 47.7 acres (1.3%) would undergo long-term removal for facility components such as turbines and maintenance roads. This would have a negligible impact to greater sage-grouse because it represents only 0.8% of the total greater sage-grouse habitat within the project area and it would occur outside any active lek sites. Three alternative turbine sites (Alt 8, Alt 9, and Alt 10) are proposed within 2 miles of an active lek, which could increase the potential for temporary displacement during construction. Because of the small number of birds at the lek, the project's distance from the lek, and the bisection of the lek and project area by SR 893 and a transmission corridor, impacts from displacement are anticipated to be minor. The Wind Energy PEIS specifically includes suggested management practices (SMPs) for wind energy development, the conservation of sagebrush habitat, and management of sage-grouse (found in the text box titled Compatibility of a Wind Energy Development Project and Gallinaceous Birds, beginning on page 5-73) that would substantially reduce impacts. Additionally, measures in the Proposed Action (Section 2.1.4 above) and mitigation measure 1 in Section 5.1.3 below would be implemented to further reduce the potential for impacts.

Impacts to special-status bat species during construction activities would be the same as those described in the bat impacts assessment in the wildlife section (Section 3.2.2.1.1 above).

Anticipated construction-related impacts to pygmy rabbit resulting from implementation of the Proposed Action would be similar to those impacts to small mammals and sensitive species from construction of a typical wind farm, which are discussed in Sections 5.9.2.2 and 5.9.2.4 of the Wind Energy PEIS, respectively (incorporated by reference). Three turbine locations (13, 59, and 60) and associated infrastructure under the Proposed Action occur in good or occupied pygmy rabbit habitat. Construction of those turbines would result in the removal of 26.6 acres (30.0%) of good or occupied pygmy rabbit habitat. Additionally, long-term removal of up to 322.9 acres (8.8 %) of potential pygmy rabbit habitat would occur. Of the 322.9 acres, 275.2 acres (7.5 %) would be reclaimed following construction but would still remain a long-term impact due to the time required for recovery of the habitat. Reclamation would be less effective for pygmy rabbits because they prefer tall, decadent stands of sage, but it would provide some cover and forage. Impacts to the species from habitat removal would be negligible because the species is mobile and can use other available habitat in the area and because measures identified as part of the Proposed Action (Section 2.1.4 above) would be implemented to reduce impacts. In particular, if turbines were constructed in occupied habitat, mitigation measure 2, described in Section 5.1.3 below would be implemented to reduce the potential for impacts to low levels. Incidentally, some of the SMPs in the Wind Energy PEIS that describe management efforts for the conservation of sagebrush habitat would also be beneficial to pygmy rabbits.

3.2.3.3.2 Site Operation

Special-Status Plant Species

Sections 5.9.3.1 and 5.9.3.4 of the Wind Energy PEIS (incorporated by reference) describe expected impacts to plant species, including special-status plants, resulting from operation and maintenance of a typical wind generation facility. Although potential habitat for Parish phacelia exists in the project area, it is unlikely that this habitat supports a population of these plants. If plants do occur, the potential habitat is outside the project's operational footprint. Therefore, operation and maintenance activities would not impact the species.

Special-Status Wildlife Species

Anticipated impacts to sensitive raptor, passerine, and gruine bird species within the project area during the operations and maintenance phase of the project would be similar to impacts to avian and sensitive species from typical wind farm construction activities and are discussed in Sections 5.9.3.2 and 5.9.3.4 of the Wind Energy PEIS (incorporated by reference). These impacts consist of injury or mortality, noise, interference with behavioral activities, and habitat disturbance (reduction, alteration, or fragmentation). These impacts would be minimized through the application of BMPs identified in Section 2.2.3.2.4 of the Wind Energy PEIS, as well as mitigation measures described in the wildlife mitigation plan developed for the project (see Appendix A).

The operations phase of the Proposed Action would have potential impacts to sage-grouse as described in Section 5.9.3.2 of the Wind Energy PEIS (incorporated by reference) for a typical wind energy project in sage-grouse habitat. These impacts include increased predation and interference with behavioral activities. Although impacts would occur, they would be negligible because the project area is situated in a lower use area, compared with other greater sage-grouse breeding and wintering activity in Spring Valley. If selected, turbine sites Alt 8 and Alt 10 would be located within 2 miles of an active lek, and if installed, there would be an increased potential to disturb sage-grouse and cause a decrease in lek success or even lek abandonment. However, there is currently a road and distribution line between the lek and the project area, and additional impacts from the project may be negligible as a result of the existing disturbance. The SMPs in the Wind Energy PEIS that describe management efforts for the conservation of sagebrush habitat would also help reduce impacts to sage-grouse during operation. Also, measures identified as part of the Proposed Action (Section 2.1.4 above) and mitigation measure 1 in Section 5.1.3 below would reduce impacts to sage-grouse, in particular those that would result from turbine placement. It is anticipated that overall impacts to sage-grouse from site operation would be low.

Impacts to special-status bat species during operation of the proposed facility would be the same as those described in the bat impacts assessment in the wildlife section (Section 3.2.2.2 above).

Expected impacts to pygmy rabbit would be similar to those described in the Wind Energy PEIS (Section 5.9.3.2) for a typical wind energy project in small-mammal habitat and are incorporated by reference. Those impacts include noise, increased predation, and interference with behavioral activities. However, it is anticipated that impacts to pygmy rabbit during operations of the proposed facility would be low because the species is mobile and would be able to move away to avoid most mortality associated with daily operations such as crushing by vehicles. The SMPs in the Wind Energy PEIS that describe management efforts for the conservation of sagebrush habitat would also help reduce impacts to pygmy rabbit during operation. Furthermore, measures identified as part of the Proposed Action (Section 2.1.4 above) and mitigation measure 2 in Section 5.1.3 below would further reduce impacts to pygmy rabbit during operations.

3.2.3.4 NO-ACTION ALTERNATIVE

Under the No-Action Alternative, the wind generation facility would not be constructed, and special-status species in the area would continue to be subject to existing conditions and local trends.

3.2.4 Visual Resources

The BLM uses a VRM system to inventory and manage visual resources on public lands. The primary objective of VRM is to maintain the existing visual quality of BLM-administered public lands and to protect unique and fragile visual resources. The VRM system uses four classes to describe different degrees of modification allowed to the landscape. VRM classes are visual ratings that describe an area in terms of visual or scenic quality and viewer sensitivity to the landscape (the degree of public concern for an area's scenic quality). Once an area has been assigned a VRM class, the management objectives of that class can be used to analyze and determine visual impacts of proposed activities and to gauge the amount of disturbance an area can tolerate before it exceeds the visual management objectives of its VRM class (BLM 1980).

The BLM has designated lands in the project area as VRM Class III (BLM 2008a). The Class III management objective "is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention, but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape" (BLM 1980).

VRM class designations are based on the area's visual sensitivity and are the result of a combination of factors, including the degree of visitor interest in and public concern for the area's visual resources, the area's public visibility, the level of use by the public, and the type of visitor use the area receives (BLM 1992).

3.2.4.1 VISUAL CHARACTER

The dominant landscape characteristic within and surrounding the proposed project area is typical of the basin and range, with the broad valley floor extending north and south to the horizons flanked by the steep, rugged Schell Creek Range to the west and the Snake Range to the east, defining and containing the views. Vegetation typical of the Great Basin environment occurs throughout the project area. Sagebrush is interspersed with greasewood, shadscale, rabbitbrush, and other shrubs and grasses that contribute to the scenic quality of the area. Naturally exposed white, buff, and tan-colored soils also add scenic contrasts and scenic quality to the area. Additional vegetation consists of the darker green rocky mountain juniper or swamp cedars present on the valley floor. The existing landscape has been only somewhat modified through past and current human habitation, highway and road development, ranching and mining activities, and transmission lines.

3.2.4.2 KEY OBSERVATION POINTS

The primary public views of the Proposed Action would be from two travel routes, U.S. 50 and SR 893. Five Key Observation Points (KOPs) were selected to represent effects of the project as seen from public areas that permit a high degree of visibility of the project area (SWCA 2009e). Other potential KOPs that were considered included the campground at Cleve Creek, the private property at Sacramento Pass, and Wheeler Peak within Great Basin National Park. After evaluation of the three points, it was determined that the Proposed Action would be visible from Wheeler Peak but not from Sacramento Pass or Cleve Creek. For that reason, the KOPs at Sacramento Pass and Cleve Creek were dropped from further evaluation.

3.2.4.3 PROPOSED ACTION

3.2.4.3.1 Site Construction

Potential impacts to visual resources from a typical wind energy facility are described in Section 5.11.2 of the Wind Energy PEIS and are consistent with this project. Impacts to visual resources associated with construction activities would result from new road development and other ground-disturbing actions. New roads would introduce linear contrasts in the landscape. In addition, construction equipment, vehicles, and associated project activities, including restoration, would be temporarily visible during construction activities. All areas of temporary disturbance would be reclaimed after construction activities are completed. Construction activities are expected to last 9 to 12 months, and temporary impacts to visual resources would be minimal.

3.2.4.3.2 Site Operation

Potential impacts to visual resources from typical wind energy facility operations are described in Section 5.11.3 of the Wind Energy PEIS and are consistent with this project. Impacts to visual resources associated with operation of a wind energy facility would result from the introduction of large WTGs into a largely undeveloped and natural setting. The visual evidence of the proposed WTGs in Spring Valley cannot be reduced or concealed as a result of their size and exposed location.

A visual resource assessment was completed for the Proposed Action, including visual simulations and visual contrast ratings from each of the five KOPs (SWCA 2009e). Although there are visible contrasts apparent from each of the KOPs, four of the KOPs occur along high-speed travel routes and contrasts would be visible for only limited periods of time, no more than 10 minutes. KOP 4 is representative of those locations. KOP 4 is located on SR 893, just south of the Southern Nevada Water Authority ranch property. From this location, the view is to the southeast and looks out over the wide open valley floor. Low shrubs and grasses cover the valley floor, interspersed with patches of darker green juniper. The rugged horizon line of the Snake Range occurs in the middle ground and background. A strong linear contrast would result from the Proposed Action. Additionally, moderate contrasts in form and color would occur. From this section of SR 893, the project would be in view for approximately 8 miles against the backdrop of the Schell Creek Range. Viewers traveling at the 50 mph posted speed limit would view the project for no more than 16 minutes.

Wheeler Peak is located approximately 11 miles southeast of the project area. Views of the project area from Wheeler Peak include the valley floor, covered in vegetation and crisscrossed with roads and transmission lines. The rugged horizon line of the Schell Creek Range occurs in the background. The visual assessment indicated that the turbines would be faintly visible (SWCA 2009e). The apparent visual contrast would be minor as a result of the distance (11 miles) and the higher angle of observation. At this distance, the turbines would appear as points on the valley floor connected by the faint linear lines of the access roads. Additionally, the valley floor is not the dominant view from the summit. Views to the south, east, and north of the rugged Snake Range are more scenic to visitors at the summit.

Implementation of the project would result in moderate contrasts to the existing landscape and would attract the attention of viewers traveling through Spring Valley in a manner consistent with Class III management objectives.

3.2.4.4 NO-ACTION ALTERNATIVE

Under the No-Action Alternative, the wind-generation facility would not be constructed, and there would be no impact to visual resources.

3.2.5 Transportation and Access

Numerous roads, tracks, and paths for motorized travel occur within or near the project area. These include SR 893, a north-south-trending, two-lane highway located immediately west of the project area that crosses the project boundary at two locations along the far west end, for a combined approximate length of 0.75 mile. U.S. 6/50 is located approximately 0.5 mile to the south and east of the project area and provides access to Great Basin National Park, Rose Guano Cave, and Sacramento Pass and serves as a connector route between the towns of Ely and Baker, Nevada. Additionally, approximately 20 miles of existing roads and tracks are located within the project area boundary. These consist primarily of an unpaved road network associated with an existing transmission line, along with various unimproved roads and tracks used for ranching and dispersed recreation activities. Average annual daily traffic (AADT) volume within the project vicinity is low (Nevada Department of Transportation [NDOT] 2009). An AADT of 40 vehicles was measured along SR 893, 0.2 mile north of U.S. 6/50.

3.2.5.1 PROPOSED ACTION

3.2.5.1.1 Site Construction

Impacts to transportation associated with a typical wind farm construction are identified in Section 5.6.2 of the Wind Energy PEIS and are consistent with those anticipated for this project. Under the Proposed Action, approximately 27.5 miles of new roads would be constructed within the project area to provide construction and delivery personnel with access to turbine sites and associated project facilities. Site construction activities would involve vehicular traffic associated with turbine erection, turbine and ancillary facility construction, and access road construction.

Short-term adverse impacts associated with project construction would consist of increased traffic volume along SR 893 and U.S. 6/50, possibly impeding access for travelers in the area. However, existing traffic volumes within the project location are generally low (NDOT 2009), and these impacts would only occur periodically during the construction phase. BMPs for general construction activities, and specifically for roads and ground transportation, are outlined in Section 2.2.3.2.3 of the Wind Energy PEIS, and their incorporation into the Proposed Action would minimize impacts. Additionally, measures identified as part of the Proposed Action (Section 2.1.4 above) and mitigation measure 1 in Section 5.1.5 below would further reduce adverse impacts.

3.2.5.1.2 Site Operation

Impacts to transportation associated with a typical wind farm operation and maintenance are identified in Section 5.6.3 of the Wind Energy PEIS and are consistent with those anticipated for this project. The access roads built and used during the construction phase would be maintained throughout commercial operations. Some access roads would be redundant with existing tracks and routes through the project area. Long-term adverse impacts to transportation during project operation would be negligible. BMPs outlined in Section 2.2.3.2.4 of the Wind Energy PEIS for general operations activities, and specifically those for roads and ground transportation, would minimize impacts. Moreover, measures identified as part of the Proposed Action in Section 2.1.4 would further reduce impacts. As a result, project implementation would not result in long-term adverse impacts to transportation resources within or near the project area.

3.2.5.2 NO-ACTION ALTERNATIVE

Under the No-Action Alternative, the Proposed Action would not be constructed, and there would be no impacts to transportation within or near the project area.

3.2.6 Recreation Uses

3.2.6.1 SPECIAL RECREATION MANAGEMENT AREA

The BLM manages recreation on public lands by identifying SRMAs. SRMAs have a distinct recreation market and corresponding management strategy. BLM-managed public lands not delineated as SRMAs are managed as extensive recreation management areas and do not require a specific management strategy or activity-level planning. Recreation on public lands is also managed through the Recreation Opportunity Spectrum (ROS). The ROS is the framework used for planning and managing recreational experiences and the recreation setting. The BLM Ely District Office has identified the project area as within the Loneliest Highway SRMA managed for a broad ROS to ensure a balance of recreation experiences (BLM 2008a). The Loneliest Highway SRMA extends north of U.S. 50 to the Elko County Line and encompasses 675,123 total acres. A site-specific recreation area management plan for the Loneliest Highway SRMA has not been prepared.

3.2.6.2 DEVELOPED RECREATION SITES

There are currently two BLM developed recreation sites near the project area: Cleve Creek campground and Sacramento Pass. Cleve Creek campground is located approximately 6 miles northwest of the project area on the east side of the Schell Creek Range. The campground has both individual and group camping sites. There are opportunities for hunting, fishing, horseback riding, hiking, and off-highway vehicle (OHV) riding on existing roads and trails. Sacramento Pass is located approximately 7 miles east of the project area along U.S. 50. There is a small pond stocked with fish, and there are several camping and picnic areas. There are opportunities for horseback riding, mountain biking, hiking, and wildlife observation.

3.2.6.3 DISPERSED RECREATION

Roads and trails in the project area are used for dispersed recreation on a limited basis. Dispersed recreation can occur on undeveloped BLM land that is open to the public for camping and general recreation. These areas do not include any developed amenities or recreation facilities.

SWCA observed evidence of recreation activities in the project area consisting of spent shotgun shells and multiple OHV tracks.

3.2.6.4 HUNTING

The project area occurs within NDOW Hunt Unit 111. Within this unit, elk (*Cervus canadensis*), mule deer (*Odocoileus hemionus*), and pronghorn antelope (*Antilocapra americana*) are hunted by permit. Hunts for these game species occur in the fall; elk hunts occur from November to December, mule deer hunts occur from August to November, and pronghorn hunts occur from late August to early September. Spring Valley is a recommended hunting area for pronghorn antelope. While a considerable number of elk are harvested from Hunt Unit 111, Spring Valley was not included in the recommended hunting area for the species (NDOW 2009).

3.2.6.5 GREAT BASIN NATIONAL PARK

Great Basin National Park, which encompasses 77,180 acres, is located approximately 12 miles southeast of the project area in the Snake Range. Within the park, recreation opportunities include interpretive programs at the visitor center, tours of Lehman Caves, overnight camping at six established campgrounds, and more than 60 miles of trails for hiking. Other recreation opportunities include biking, bird watching, caving, fishing, horseback riding, picnicking, and pine nut gathering (National Park Service 2007). These recreation opportunities are primarily located on the east side of the Snake Range. However, there are outstanding opportunities for dispersed recreation on the west side of the Snake Range.

3.2.6.6 PROPOSED ACTION

3.2.6.6.1 Site Construction

Potential impacts to recreational users from a typical wind energy facility are described in Section 5.10.4 of the PEIS and are consistent with this project. Recreation uses would be adversely impacted in the short term as a result of construction activities specific to the Proposed Action. Impacts would consist of a loss of public access and dispersed recreational opportunities within a portion of the Loneliest Highway SRMA, displaced hunters, and temporary impeded access to Cleve Creek. The majority of construction impacts would be minor and would not result in any long-term changes to recreation sites, uses, experiences, or opportunities. Additionally, the short-term impacts of construction activities are not expected to result in the permanent displacement of recreation user groups to other recreation sites or areas. BMPs identified in Section 2.2.3.2.3 of the PEIS for minimizing resource impacts during the construction phase would also reduce impacts specific to recreation and would be implemented during development of the Proposed Action.

3.2.6.6.2 Site Operation

Recreation uses would also be adversely impacted in the long term as a result of operation of the proposed wind energy facility. The introduction of large WTGs would result in decreased scenic quality, affecting recreation opportunities within this portion of the Loneliest Highway SRMA. The project area is visible from the west side of the Snake Range, Wheeler Peak, and portions of Wheeler Peak Trail, although distance and angle of observation minimize the amount of potential contrast that would be apparent from the Proposed Action. Visual resource impacts are further discussed in Section 3.2.5.1.2 above. Due to the low level of permanent disturbance anticipated from operation and maintenance of the proposed facility, long-term adverse impacts to hunting or dispersed recreation activities within or near the project area would be negligible.

Indirect beneficial impacts to recreation that would result from the Proposed Action consist of improved motorized access for dispersed recreational activities across Spring Valley. There would be 27.5 miles of new roads constructed and maintained through the project area.

While short- and long-term adverse impacts to recreation would occur under the Proposed Action, a permanent loss of developed recreation facilities or displacement of recreation users would not occur.

3.2.6.7 NO-ACTION ALTERNATIVE

Under the No-Action Alternative, the wind generation facility would not be constructed, and there would be no impacts to recreation.

3.2.7 Grazing Uses

Livestock grazing and production is the dominant land use in and around the project area (Estep Environmental 2007). Spring Valley has primarily been used as a rangeland, both historically and presently, for cattle and sheep grazing. Rangelands are divided into allotments for management purposes. The proposed project area would be constructed within two existing grazing allotments, the Majors Allotment and the Bastian Creek Allotment. Grazing use for both of these allotments must be in accordance with the *Fundamentals of Rangeland Health and Standards and Guidelines for Grazing for*

Nevada's Northeastern Great Basin Area (Title 43 Code of Federal Regulations [CFR] 4180, Appendix C: Northeastern RAC Standards and Guidelines).

The Majors Allotment (Allotment No. 10126) totals 104,861 acres. This allotment contains 99,193 acres of BLM land and 5,668 acres of private land (BLM 2009b). There are 12,535 permitted and active AUMs on this allotment, which is grazed by both cattle and sheep (BLM 2009b). This allotment occurs in the western portion of the project area. Approximately 2,552 acres (less than 3%) of the Majors Allotment occurs in the project area. Forage within this area includes Inter-Mountain Basin big sagebrush shrubland (98.6 acres) and Great Basin Xeric mixed sagebrush shrubland (484.6 acres), which make up 22.8% of the allotment within the project area. The remaining vegetation is Great Basin Pinyon-Juniper Woodland (1.8 acres), Inter-Mountain Basin Greasewood Flat (5.0 acres), and Inter-Mountain Basins mixed salt desert scrub (1,962.1 acres).

The Bastian Creek Allotment (Allotment No. 10121) totals 13,527 acres on public land (BLM 2009b). There are 1,778 permitted and active AUMs within this allotment, which is grazed by cattle (BLM 2009b). Approximately 6,012 acres, or 44% of the allotment, occurs within the eastern portion of the project area. Forage within this area includes Inter-Mountain Basin big sagebrush shrubland (2,628.6 acres) and Great Basin Xeric mixed sagebrush shrubland (431.3 acres), which make up 50.9% of the allotment within the project area. The remaining vegetation is Great Basin Pinyon-Juniper Woodland (6.0 acres), Inter-Mountain Basin Greasewood Flat (12.5 acres), and Inter-Mountain Basin mixed salt desert scrub (2,934.0 acres). A 575.9-acre treatment area developed to provide better forage is also present within this allotment.

3.2.7.1 PROPOSED ACTION

3.2.7.1.1 Site Construction

Impacts to vegetation and land uses from construction activities associated with a typical wind farm facility are described in Sections 5.9.2.1 and 5.9.10 of the Wind Energy PEIS and are consistent with impacts to grazing uses anticipated for this project. Impacts would consist of loss of forage, increased fugitive dust, exposure to contaminants, introduction of invasive and/or poisonous vegetation, and temporary removal of livestock from the project area. Short-term disturbances to forage would total 195.4 acres within the Majors Allotment. This would temporarily reduce forage in the allotment by 7.6 %. Short-term disturbances within the Bastian Creek Allotment would total 437.3 acres. This would temporarily reduce forage in the allotment by 7.3 %. Of this disturbance, 41.1 acres would occur within the Bastian Creek treatment area. There is a higher potential for the introduction of new and spread of existing noxious and invasive species from construction activities within the Bastian Creek treatement area, than in the overall grazing allotment. Mitigation measure 1 in Section 5.1.7 below would address the temporary loss of vegetation in treatment area. All short-term disturbances would be reclaimed after construction. Implementation of construction-phase BMPs for ecological resources, as outlined in Section 2.2.3.2.3 of the Wind Energy PEIS, would further reduce adverse impacts, including those from the spread of noxious and invasive species. Additionally, mitigation measures to reduce impacts to ecological resources listed in Sections 5.9.5.3, 5.9.5.4, and 5.9.5.5 of the Wind Energy PEIS would also reduce impacts to grazing uses. Additional management decisions from the Ely RMP would also protect rangeland resources. Implementation of these measures would reduce impacts to low levels.

Short-term availability of rangeland would decrease during project construction due to temporary closures, as described in Section 5.10.1 of the Wind Energy PEIS. This would result in a loss of AUMs available in the allotment in the short term. However, construction is projected to last 9 to 12 months, and only small, active construction areas would be restricted. Additionally, as described in the proposed action, SVW would compensate allotment holders for loss of AUMs and reduce impacts to negligible levels.

3.2.7.1.2 Site Operation

Sections 5.9.3.1 and 5.10.1 of the Wind Energy PEIS (incorporated by reference) describe the expected long-term, indirect adverse impacts to vegetation and land use resulting from operation and maintenance of a typical wind generation facility; these are consistent with impacts to grazing uses. Development of WTGs and associated facilities would directly remove 63.3 acres of rangeland from grazing use. Specifically, 29.8 acres within the Majors Allotment would be removed. This would result in a long-term reduction in forage by 1.2 % within the Majors Allotment. A total of 93.8 acres within the Bastian Creek Allotment would be removed. This would result in a long-term reduction in forage by 1.6 % within the Bastian Creek Allotment. Of this disturbance, 6.6 acres would occur within the Bastian Creek treatment area. Mitigation measure 3 in Section 5.1.8 below would address the long-term loss of vegetation in treatment area. This would represent 1.2 % of the entire restoration area and would result in a minor impact to the restoration efforts within this allotment. Overall, the long-term removal of vegetation would be limited to a very small amount of the available forage within these allotments. Measures listed in the Wind Energy PEIS and Ely RMP for construction would also reduce impacts during operation.

In conclusion, impacts from implementation of the Proposed Action would not lead to a long-term reduction in AUMs for the allotments in the project area once elements of the Proposed Action and mitigation measure 1 in Section 5.1.7 below are implemented. Impacts would be further reduced by the implementation of operations-phase BMPs for ecological resources as outlined in Section 2.2.3.2.4 of the Wind Energy PEIS.

3.2.7.2 NO-ACTION ALTERNATIVE

Under the No-Action Alternative, SVWEF would not be constructed, and rangeland resources in the area would continue to be subject to existing conditions and local trends.

3.2.8 Socioeconomics

With a population of 9,181, the primary industries in White Pine County are government services, mining, agriculture, and tourism (U.S. Census Bureau 2000; White Pine County Tourism and Recreation Board 2008). White Pine County contains nearly 400 businesses offering a variety of products and services, including restaurants, hotels, and construction services (White Pine County Tourism and Recreation Board 2008). The median household income in the county is $36,688. While the project area itself does not contain any residential areas, residences do occur as near as 8 miles, in Sacramento Pass. There are 4,439 housing units within White Pine County. Of these units, 2,515 are owner occupied, 767 are renter occupied, and 1,157 are vacant. The U.S. Census Bureau reports the median value of an owner-occupied home in White Pine County to be $70,000 (U.S. Census Bureau 2000).

White Pine County relies on revenues from a variety of taxes to fund essential services. Real property and personal property taxes levied at the county level include taxes on personal property, residential, commercial, and industrial property. In 2008, the projected White Pine County government expenditures totaled $60,698,361 (Nevada Department of Taxation 2009).

Located approximately 25 miles (40 km) from the project area and containing approximately 45% of the population of White Pine County, the town of Ely, Nevada, has a population of 4,041. The median household income in Ely is $36,408. With 2,025 housing units within the town of Ely, 46% of the county's housing units are located here. Of these units, 1,229 units are owner occupied, 498 units are renter occupied, and 478 are vacant. The median value of an owner-occupied home in Ely is $71,300 (U.S. Census Bureau 2000).

While the U.S. Census Bureau does not provide data for the town of Baker, Nevada, which occurs 30 miles from the project area, it does provide data for the zip code in which Baker is located. In the year 2000, this zip code (89311) had a population of 160 people, which is 1.7% of the population of White Pine County. Here, the median household income was $26,875. Within this zip code, there are 139 housing units, which equates to 3.1% of the county's housing units. Of these units, 54 are owner occupied, 27 are renter occupied, and 58 are vacant. The median value of an owner-occupied home in this zip code is $151,000 (U.S. Census Bureau 2000).

3.2.8.1 PROPOSED ACTION

Impacts to socioeconomics are consistent with impacts from a typical wind farm facility, as described in Section 5.13.1 of the Wind Energy PEIS. Impacts to socioeconomics associated with construction and operation of a wind energy facility would occur from changes in employment, income, tax revenues, ROW rental receipts, and changes to property values.

3.2.8.1.1 Site Construction

Construction activities associated with the Proposed Action would result in the addition of up to 150 new construction-related jobs in the area. It is assumed that a portion of construction staff would be hired from outside White Pine County. Because of the short-term nature of the construction activities, it is assumed that workers from out of the area would not relocate with their families. This short-term increase in population would result in an increased demand for hotel rooms, rental properties, and local services (restaurants, grocery stores, etc.). Because workers would not be accompanied by families, there would be minimal impacts to community facilities and services (schools, hospitals, etc.).

3.2.8.1.2 Site Operation

The impacts to socioeconomics associated with the operation and maintenance of a wind energy facility would occur from changes in the local economy. Activities that would result in impacts to the local economy consist of increased local employment, increased purchase of materials and supplies from local vendors, increased expenditures by workers for lodging, restaurants, and recreation, and increased property tax revenue to White Pine County.

Employment associated with the operation of the proposed wind energy facility would total 12 new long-term jobs. This would be a minor beneficial impact. Impacts to employment, housing, population, community facilities, and services would be minor during operations.

Nevada assesses property taxes on WTGs based on the WTGs' being personal and not real property. Annual personal property tax revenues would accrue to White Pine County. A typical turbine costs $3,500,000 installed (Windustry 2009). Based on a maximum of 75 turbines installed, the project would have an approximate value of $260,000,000. The current tax rate is 3.66% of the assessed project value × 35%. In addition, there is a 50% tax abatement in place for wind projects. Accordingly, if the project was assessed at $260 million, the first year's personal property taxes would be $1,655,300 ($260,000,000 × 3.66% × 35% × 0.5 = $1,655,300) (personal communication, George Hardie, SVW, November 4, 2009). These tax revenues would decline each year as the value of the facility components depreciate.

Studies of the indirect impacts to property values of areas surrounding and nearby the typical wind farm operation are described in Section 5.13.2 of the Wind Energy PEIS. The studies described concluded no adverse impacts to property values for the majority of wind projects considered. Only two parcels of private property lie adjacent to the project area, and a decline in property values is not expected to occur as a result of the Proposed Action.

3.2.8.2 NO-ACTION ALTERNATIVE

Under the No-Action Alternative, the wind generation facility would not be constructed, and socioeconomic conditions in the vicinity of the project area would continue to be subject to existing conditions and local trends.

4.0 CUMULATIVE IMPACTS

As required under NEPA and the regulations implementing NEPA, this section analyzes potential cumulative impacts from past, present, and reasonably foreseeable future actions, combined with the Proposed Action within the area analyzed for impacts in Chapter 3 specific to the resources for which cumulative impacts may be anticipated. A cumulative impact is defined as “the impact which results from the incremental impact of the action, decision, or project when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time” (40 CFR 1508.7). The resource values analyzed for the SVW facility, which may involve a cumulative impact with other past, present, and reasonably foreseeable future actions, consist of prime and unique farmlands, fish and wildlife, migratory birds, special-status species, visual resources, transportation, recreation, grazing uses, and socioeconomics.

The geographic area of cumulative impacts analysis is generally based on the natural boundaries of the resource affected. For all resources analyzed, a review of past, present, and reasonably foreseeable future actions was completed within the Spring Valley watershed boundary, an approximately 7,167-acre area in Spring Valley between the Schell Creek Range to the west and the Snake Range to the east. Spring Valley was determined to be a large enough geographic area to encompass all affected resources considered for cumulative impacts. The cumulative impact analysis area is primarily undeveloped and used for grazing, recreation, roads, and transmission corridors.

Table 4.0-1 summarizes past, present, and reasonably foreseeable future actions. Past actions are considered those that have occurred within the past 50 years. Present actions are considered those occurring at the time of this evaluation and during implementation of this Proposed Action. Future actions are those that are in planning stages with a reasonable expectation of occurring over the anticipated life of the project, or the next 30 years. These actions were identified through correspondence with the Ely BLM District Office. There are several other wind energy project areas identified within the Schell Field Office area. However, no applications or PODs have been submitted for development; therefore, these projects are not considered reasonably foreseeable and would not contribute to cumulative impacts. Should those projects move forward, SVWEF would be considered as part of those projects’ cumulative impact analyses.

4.1 Fish and Wildlife

The cumulative impacts to wildlife, particularly birds and bats, from the construction and operation of wind energy facilities are an issue. The types of impacts that are of particular concern include direct mortality from collisions with WTGs, loss of habitat, and displacement. Past and present actions have contributed to injury, mortality, loss of habitat, habitat fragmentation, avoidance, and displacement. In particular, aerial features such as transmission lines crossing Spring Valley have likely contributed to collisions and increased injury and mortality of bird and bat species. Similar types of impacts can be expected from the Spring Valley lateral pipeline.

The incremental impacts of the Proposed Action, when added to these other actions, consist of injury and mortality, loss of habitat, habitat fragmentation, and displacement of wildlife species. Impacts from the Proposed Action would contribute to additional injury and mortality of bird and bat species resulting from collisions with WTGs and associated facilities. Wind energy has the lowest overall risk to wildlife when considering resource extraction through decommissioning, compared with all other electricity generation methods (Newman et al. 2009). Additionally, research regarding avian mortalities associated with WTGs estimates that between 0.01% and 0.02% of total avian mortalities resulting from collisions with human structures can be attributed to WTGs (Erickson et al. 2001). Therefore the addition of the Proposed

Action is expected to result in only a small percent increase in cumulative avian mortality. Cumulative impacts to bats are anticipated to be similar to those described for birds; however, because of the proximity to Rose Guano Bat cave, there is the potential for a somewhat larger percent increase in mortality to Brazilian free-tailed bats.

Table 4.0-1. Past, Present and Reasonably Foreseeable Future Actions Considered for Cumulative Impact Analyses

Action	Description	Resources Affected	Area of Impact (acres)[1]
Past Actions			
Grazing	Grazing has occurred throughout the cumulative impacts area on both BLM and private lands. Grazing can result in impacts to vegetation and soils.	Wildlife and special-status species	204,054
Power transmission and distribution lines	There are several transmission lines crossing the project area, including the SWIP corridor.	Visual resources, migratory birds, wildlife, and special-status species	242 (estimated)
Present Actions			
Southern Nevada Water Authority (SNWA) – Water Rights	In 2007, the State Engineer granted SNWA 60,000 acre-feet per year (AFY) of groundwater from Spring Valley, the pumping of which is limited to 40,000 AFY for the first 10 years. SNWA began acquiring various properties in Spring Valley in 2006. In addition to land holdings, SNWA acquired surface and groundwater rights associated with the properties. To date, SNWA has acquired approximately 34,000 AFY of surface water rights, 6,000 AFY of groundwater rights, and 24,000 AFY of supplemental water rights (SNWA 2009).	All	7,167 (Spring Valley Watershed)
Grazing	Grazing is currently occurring throughout the cumulative impacts area on both BLM and private lands. Grazing can result in impacts to vegetation and soils.	Wildlife and special-status species	Same as past actions
Reasonably Foreseeable Future Actions			
SNWA – Spring Valley Lateral Pipeline	The Spring Valley lateral pipeline would be located on the west side of SR 893. The lateral pipeline would end approximately 1 mile north of Bastian Creek. The Spring Valley lateral pipeline permanent ROW that would be needed is approximately 38 miles long × 100 feet wide. The temporary ROW would be the same (SNWA 2008).	All	462

The area of direct wildlife habitat disturbance from past, present, and reasonably foreseeable future actions is approximately 704 acres. The area of indirect wildlife habitat disturbance from past, present, and reasonably foreseeable future actions is approximately 211,221 acres. The Proposed Action would contribute 756.2 acres (short term and long term) of ground disturbance to the cumulative direct habitat disturbance in Spring Valley. In addition, past and present actions have contributed to declining habitat quality in Spring Valley from the introduction of aerial features (i.e., transmission structures) and habitat fragmentation. Similar types of impacts to habitat quality can be expected from the Spring Valley lateral pipeline. The incremental impacts of the Proposed Action, when added to these other actions, consist of habitat fragmentation and displacement of individual animals.

4.2 Migratory Birds

Cumulative impacts to migratory birds would be similar to those described for fish and wildlife in Section 4.1.2 above.

4.3 Special-Status Species (Plant and Animal)

Cumulative impacts to special-status species would be similar to those described for fish and wildlife in Section 4.1 above.

4.4 Visual Resources

BLM lands in the cumulative impacts area are designated VRM Class III. Past and present actions have contributed to visual contrasts on the landscape from the addition of linear roads, transmission lines and support towers, and associated building and structures. The Spring Valley lateral pipeline can be expected to result in visual contrasts similar to those caused by roads and other linear surface disturbances such as allotment fence lines.

The incremental impacts of the Proposed Action, when added to these other actions, consist of contrasts to the form, line, and texture of the natural landscape. The installation of up to 75 WTGs and associated facilities as part of the Proposed Action would contribute moderate contrasts to the cumulative visual contrasts in Spring Valley.

4.5 Transportation and Access

Past and present actions have contributed to the existing road network within Spring Valley. The Spring Valley lateral pipeline can be expected to include a parallel dirt surface access road that would further contribute to the existing road network. The Proposed Action would contribute 27 miles of new improved access roads to the existing road network, resulting in a minor cumulative increase in the road network in Spring Valley.

4.6 Recreation Uses

Past and present actions have contributed to the short-term displacement of dispersed recreation opportunities from within the Loneliest Highway SRMA and impacts to the natural landscape and scenery enjoyed by visitors to the SRMA and Great Basin National Park. Similar impacts can be expected from reasonably foreseeable actions. The Proposed Action would contribute to visual contrasts with the natural landscape as described in Section 4.4 above. Additionally, the Proposed Action would contribute to the displacement of dispersed recreation opportunities (i.e., hunting, OHV touring) in Spring Valley.

4.7 Grazing Uses

Past and present actions have contributed to the loss of forage in both the Majors and Bastian Creek Allotments from direct removal during construction activities, fugitive dust, and increased erosion. Similar impacts can be expected from the reasonably foreseeable action. The long-term incremental impacts of the Proposed Action, when added to these other actions, consist of a direct loss of forage. The Proposed Action would contribute to the direct loss of 29.8 acres of forage in the Majors Allotment and 93.8 acres of forage in the Bastian Creek allotment. This represents a 1.4 % loss of acreage from both allotments; therefore, the Proposed Action would result in a negligible contribution to the cumulative loss of forage.

4.8 Socioeconomics

Past and present actions have resulted in a minor number of additional jobs and tax revenue to the county, contributing to cumulative beneficial impacts to local economic conditions. There are currently no large employers located within Spring Valley, although in 2008 the total employment in White Pine County was 4,009 (Nevada Department of Taxation 2009). Similar beneficial impacts can be expected from reasonably foreseeable future actions. The Proposed Action would contribute 12 to 15 permanent positions to the local workforce, which would be a minor impact to the cumulative employment numbers in White Pine County. In addition, the Proposed Action would result in a substantial contribution to White Pine County personal property tax revenue over the life of the project.

5.0 MITIGATION MEASURES

5.1 Resource Measures

Numerous mitigation and conservation measures are included as part of the Proposed Action (Section 2.1.4). Additionally, all relevant BMPs and mitigation measures listed in the Wind Energy PEIS (BLM 2005) and Ely RMP/FEIS (BLM 2008b) are incorporated by reference. Therefore, most potential impacts are addressed as part of the Proposed Action and do not require additional mitigation. A third-party construction monitor will be employed to ensure compliance with all BMPs, mitigation, and conservation measures identified in this EA. The measures below were developed to mitigate impacts resulting from the Proposed Action that were not addressed as part of construction or operation design. If implemented, these measures would reduce all impacts to acceptable levels.

5.1.1 Fish and Wildlife

Mitigation measures presented in Section 5.1.3 for special-status species would incidentally also provide mitigation for fish and wildlife. No other mitigation measures are needed.

5.1.2 Migratory Birds

No mitigation measures are needed for Migratory Birds beyond those described in the Proposed Action.

5.1.3 Special-Status Species (Plant and Animal)

1. If turbines Alt 8, Alt 9, and/or Alt 10 are selected, construction activities should not occur during sage-grouse breeding season between March 1 and May 15 (BLM 2008b).
2. If turbines 13, 59, and/or 60 are selected, clearance surveys for pygmy rabbit at those locations would be conducted prior to any ground-breaking activities, and on-site monitoring would be performed during construction.

5.1.4 Visual Resources

No mitigation measures are needed for visual resources.

5.1.5 Transportation and Access

1. New roads constructed as part of the Proposed Action may be reclaimed upon decommissioning, including the use of scarifying and reseeding with a BLM-approved seed mix, and would be consistent with the Transportation Planning requirements identified in the BLM Ely RMP/FEIS (BLM 2008b).

5.1.6 Recreation Uses

No mitigation measures are needed for recreation uses.

5.1.7 Grazing Uses

1. Turbines 48–51 and 61–64 occur within the restoration area and require additional mitigation. If these turbines and associated roads are constructed, a new restoration area will be prepared at a ratio of 2:1 for acreage removed, as required on page 40, SS10, of the Ely RMP/FEIS under Special Species Habitat.

5.1.8 Socioeconomics

No mitigation measures are needed for socioeconomics.

6.0 CONSULTATION AND COORDINATION

6.1 Introduction

The issue identification section of Chapter 1 provides the rationale for issues that were considered but not analyzed further and identifies those issues analyzed in detail in Chapter 3. The issues were identified through the public and agency involvement process described in Section 6.3 below.

6.2 Persons, Groups, and Agencies Consulted

- White Pine County
- Nevada Department of Wildlife
- Great Basin National Park
- Southern Nevada Water Authority
- Delamar Valley Cattle
- Cave Valley Cattle
- Goshute Tribe

6.3 Summary of Public Participation

On Monday, October 20, 2008, the BLM Ely District staff facilitated a stakeholder meeting. The purpose of the meeting was to provide the project proponent, SVW, the opportunity to present information on the proposed SVW project to stakeholders identified by the BLM, and for those stakeholders to get information, ask questions and better understand the proposed project, what tasks have been completed, and what tasks remain to be completed.

Meeting materials included a PowerPoint presentation by SVW, stationary displays describing biological and cultural resource studies completed to date, a map of the project area and proposed developments, a diagram of wind turbine technology, and a visual simulation of proposed developments displayed as a video in Google Earth.

Stakeholders were given 15 minutes at the beginning of the meeting to review meeting materials and stationary displays posted in the conference room. Following an introduction by the BLM, SVW gave a brief presentation on the company, wind energy, and the proposed Spring Valley project. Following the presentation, stakeholders had the opportunity to ask questions of the BLM and the proponent related to the project proposal and process. At the conclusion of the meeting, stakeholders were given additional time to review the meeting materials and stationary displays. During that time, BLM staff and SVW staff remained available to answer further questions.

6.4 List of Preparers/Reviewers

Name	Title	Affiliation	Responsibility
BLM			
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Dave Jacobson	Wilderness Specialist	BLM	ACECs
Shawn Gibson	Archaeologist	BLM	Cultural and Paleontological Resource, Native American Concerns, and Environmental Justice
Paul Podborny	Wildlife Biologist	BLM	Wildlife and Special-Status Species
Elvis Wall	Native American Coordinator	BLM	Native American Concerns and Environmental Justice
Elizabeth Townley	Outdoor Recreation Planner	BLM	Recreation and Visual Resources
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Non-BLM Preparers			
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Steve Leslie	Assistant Project Manager	SWCA	Chapters 1 and 2, Visual Resources, Recreation, Socioeconomics and Environmental Justice
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Lesley Hanson	Environmental Specialist/Biologist	SWCA	Wildlife, Special-Status Wildlife Species
Michael Swink	Environmental Planner	SWCA	Prime and Unique Farmlands, ACECs, Transportation and Access
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Camille Ensle	Publication Specialist	SWCA	Formatting of Document
Heidi Orcutt-Gachiri	Technical Editor	SWCA	Technical Editing of Document

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APPENDIX A

Proposed Wildlife BMPs, Monitoring, and Mitigation for the Spring Valley Wind Project

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Siting Guidance

- Where possible, do not install wind turbines in areas within 2 miles of an active sage-grouse lek.
- Where possible, do not construct new roads within 2 miles of an active sage-grouse lek.
- Avoid or minimize habitat fragmentation and habitat disturbance by minimizing construction of new roads, power lines, and fences.
- Locate material stockpile sites, turnaround areas, and staging areas in previously disturbed areas to the greatest extent feasible.

Best Management Practices during Construction

- If construction occurs during the migratory bird breeding/nesting period, the area of proposed disturbance shall be surveyed for breeding and nesting activity. If breeding/nesting activity is found, the construction activity would be delayed until the birds have fledged or moved to another site within the project area where there is no breeding/nesting activity.
- All areas to be disturbed will have boundaries flagged before beginning the activity, and all disturbances will be confined to the flagged areas. All project personnel will be instructed that their activities must be confined to locations within the flagged areas. Disturbance beyond the actual construction zone is prohibited without site-specific surveys.
- If disturbance must occur outside of the flagged areas, a BLM-approved biologist must survey the area to be impacted prior to disturbance. If sensitive wildlife is found within the area to be disturbed, a BLM representative must be notified prior to disturbance.
- Cross-country travel and travel outside construction zones is prohibited.
- Where possible, install power lines underground.
- Spray water or an approved dust suppressant on the surface of dirt roads, turnaround areas, and construction sites within the ROW.
- Maintain a maximum speed limit of 25 mph while traveling in construction areas.
- Trash and food items will be disposed of promptly in containers with resealing lids, and waste will be removed from the area and disposed of in an approved off-site landfill. Construction waste including, but not limited to, broken parts, wrapping material, cords, cables, wire, rope, strapping, twine, buckets, metal or plastic containers, boxes, and welding rods will be removed from the site regularly and disposed of properly.
- Ensure that any fences built meet BLM specifications to allow safe passage for wildlife.
- Avoid lighting that attracts birds or bats.

Postconstruction Monitoring

Prior to project operations, a monitoring plan will be developed by the proponent, in cooperation with a TAC set up for the project that includes at a minimum, a representative from the BLM, NDOW, U.S. Fish and Wildlife Service, and the proponent and the proponent’s consultant. The TAC will also invite at least one representative from a university or other technical expert group such as Bat Conservation International or Hawkwatch International. Reasonable efforts will be made to ensure participation by the above parties, not withstanding failure of any of these representatives to respond or agree to participate; the TAC shall be formed prior to project operations.The postconstruction monitoring plan will include procedures for mortality surveys/carcass counts or other procedures as recommended by the TAC. The plan will identify the number, size, and location of mortality plots; frequency of monitoring; and methods for enhancing searcher efficiency. Minimum standards to be included in the plan shall be as follows:

- Mortality surveys will follow the currently accepted protocols recommended by the Bats and Wind Energy Cooperative (BWEC).
- Mortality survey will be conducted from April through November for at least the first two consecutive years of operation, and if mortality thresholds are exceeded, the TAC will determine future reasonable mortality survey requirements and mitigation measures.
- At a minimum, mortality monitoring plots will be established for at least one-third of the number of turbines, including those on the extremities of the project.
- At a minimum, plots will have a radius at least as large as the length of the turbine blades.
- Scavenger removal rates will be determined prior to the start of the mortality surveys, and will be determined for the different seasons and for the different habitat types found within the project area. Once scavenger removal rates are determined, the frequency of mortality surveys will be established.
- Data to be collected in the field during mortality surveys will include date of survey, weather, vegetation type, species killed (if identification is possible), estimated time since death, cause of injury (if known), distance to nearest turbine or other structure, and UTM coordinate. Remains will be photodocumented.
- Carcasses will be removed from the site (to avoid attracting golden eagles, other raptors, or any scavengers), identified to species (if possible), placed in cold storage, and transferred to a location specified by the TAC.
- Searcher efficiency trials shall be conducted twice within the first year of operation and yearly thereafter, or in the event of employee turnover, to establish searcher-carcass detection rates.
- The number of carcasses/kW/year and carcasses/turbine/year shall be calculated to estimate rate of kill while accounting for searcher efficiency and scavenger removal rates. This information shall be included in an annual report to the TAC.

Mitigation

Mortality Threshold Standard for Bats and Birds. If any of the criteria below are met, the TAC will meet to determine what mitigation, if any, should be recommended for implementation. In some cases, mitigation may not yet be warranted or very specific measures may be needed. Therefore, the TAC shall consider species impacted, timing of impacts, and other pertinent information collected during mortality surveys as part of their mitigation determination. The TAC should also utilize the phased mitigation approach described below. The mitigation criteria include:

- Average mortality across all turbines in the wind generation facility exceeds 2.70 birds per turbine per year (fatality number is based on a regional average from 11 currently operating projects in similar habitats [Table A1]).
- Average mortality across all turbines in the wind generation facility exceeds 1.48 bats per turbine per year (fatality number is based on a regional average from 11 currently operating projects in similar habitats [Table A1]).
- Mortality at any single wind turbine exceeds 10.0 bats and/or birds per year.

If any of the criteria below are met, mitigation will be required and the TAC will meet to determine the appropriate measure to take.

- Average mortality across all turbines in the wind generation facility exceeds one standard deviation above the regional average for bird mortality per turbine per year (4.03).
- Average mortality across all turbines in the wind generation facility exceeds one standard deviation above the regional average for bat mortality per turbine per year (2.38).
- A species detected in the project area becomes listed as Threatened or Endangered under the Endangered Species Act.

After each successive year of mortality surveys, impacts will be analyzed and the necessity for additional mitigation will be evaluated by the TAC. In the event that mortality levels exceed established thresholds, the TAC will determine if further mitigation requirements are needed. Additionally, the TAC will review current data and determine if threshold numbers need to be adjusted for subsequent surveys. To the extent practicable, decisions by the TAC will be made using best available science as determined by the TAC. In the event that decisions cannot be made by consensus, decisions of the TAC will be made my simple majority vote. Prior to making any decision based on TAC recommendations, the BLM shall review the recommendations of, or any other information provided by, any of its voting members.

Table A.1. Comparison of 11 Operating Wind Projects with Habitat Types Similar to Spring Valley

Reference	WGF Study Area Location	Dates of Study	Turbines in WGF	Turbine/ Project MW	Mortality per Turbine per year	
					Avian	**Bats**
Young et al. (2003)	Foote Creek Rim, WY	11/98–6/02	69	600 kW / 41.4 MW	1.50	1.34
Erickson et al. (2003)	Nine Canyon, WA	09/02–08/03	37	Bonus 1.3 MW / 48.1 MW	3.59	3.21
Erickson et al. (2004)	Stateline, OR/WA	01/02–12/03	454	Vestas 660 kW / 299.64 MW	1.93	1.12
Johnson et al. (2003)	Klondike, OR	02/02–02/03	16	Enron 1.5 MW / 24 MW	1.42	1.16
Erickson et al. (2000)	Vansycle, OR	01/99–12/99	38	Vestas 660 kW / 24.9 MW	0.63	0.74
TRC (2008)	Judith Gap, MT	Fall 06–Spring 07	90	GE 1.5SLE / 135 MW	4.52	13.40*
NWC and WEST (2007)	Klondike II, OR	2006	50	GE / 75 MW	4.71	0.63
Young et al. (2006)	Combine Hills, OR	02/04–02/05	41	Mitsubishi MWT-1000A /41 MW	2.56	1.88
Kronner et al. (2008)	Big Horn, WA	2006–2007	133	GE / 199.5 MW	3.81	2.86
Erickson et al. (2008)	Wild Horse, WA	01/08–12/08	127	V80 / 229 MW	2.79	0.71
Young et al. (2007)	Hopkins Ridge, WA	01/06–12/06	83	Vestas / 150 MW	2.21	1.13
				Average	**2.70**	**1.48**

*13.40 is a statistical outlier and is not included in the average calculation.

Phase 1 Mitigation. If mitigation is required after one year of mortality surveys, then one of the following measures may be implemented, as decided upon by the TAC. In place of the listed mitigation measures, other measures of similar type (i.e. cost, level of effort, utility) may also be implemented at the discretion of the TAC.

- Implement seasonal changes to cut-in speeds to reduce bat and/or bird mortality.
- Implement periodic feathering of wind turbines on low wind nights to reduce bat and/or bird mortality.
- Implement technological improvements, and/or initiate research studies to examine the efficacy of other methods for reducing or eliminating bat and/or bird mortality. For example: The use of high-intensity ultrasound deterrent devices (Szewczak & Arnett 2008), if they become proven as acceptable deterrents.

Avian and/or bat population studies for Spring Valley should also be considered by the TAC to better determine thresholds and understand implications of impacts from the wind facility.

Phase 2 Mitigation. If additional mitigation is required after one year of mortality surveys, and Phase 1 mitigation has already been initiated, one of the following measures may be implemented as decided on by the TAC. In place of the listed mitigation measures, other measures of similar type (i.e. cost, level of effort, utility) may also be implemented at the discretion of the TAC. Additionally, uninitiated mitigation measures from previous levels may be employed.

- Implement diurnal or time of day shutdowns of specific “problem” turbines on a nightly or hourly (i.e. near sunset) basis to reduce mortality.
- Implement seasonal, diurnal or time of day changes to the cut-in speed of wind turbines. The turbine(s) shall be feathered or locked in place whenever ambient wind speeds are below 6 mps (13.5 mph) or other standard determined by the TAC, and during periods of maintenance. (Arnett et al. 2009).
- If appropriate, the proponent shall have the option to develop an off-site mitigation plan in coordination with the TAC.

Phase 3 Mitigation. If additional mitigation is required after one year of mortality surveys, and Phase 1 and 2 mitigation measures have already been initiated, one of the following measures may be implemented as decided on by the TAC. In place of the listed mitigation measures, other measures of similar type (i.e. cost, level of effort, utility) may also be implemented at the discretion of the TAC. Additionally, uninitiated mitigation measures from previous levels may be initiated.

- Implement seasonal shutdowns of one or more turbines to reduce bat mortality. If any single turbine within a two-week period exhibits a mortality rate greater than 10 bats and/or birds, the turbine shall be locked during specific hours each day. Turbine shutdowns would be limited to the actual hours of each day during which time the targeted wildlife is active or was previously impacted at the wind development site. Shutdown not to exceed 15% of total number of turbines.
- The proponent shall develop an off-site mitigation plan in coordination with the TAC.

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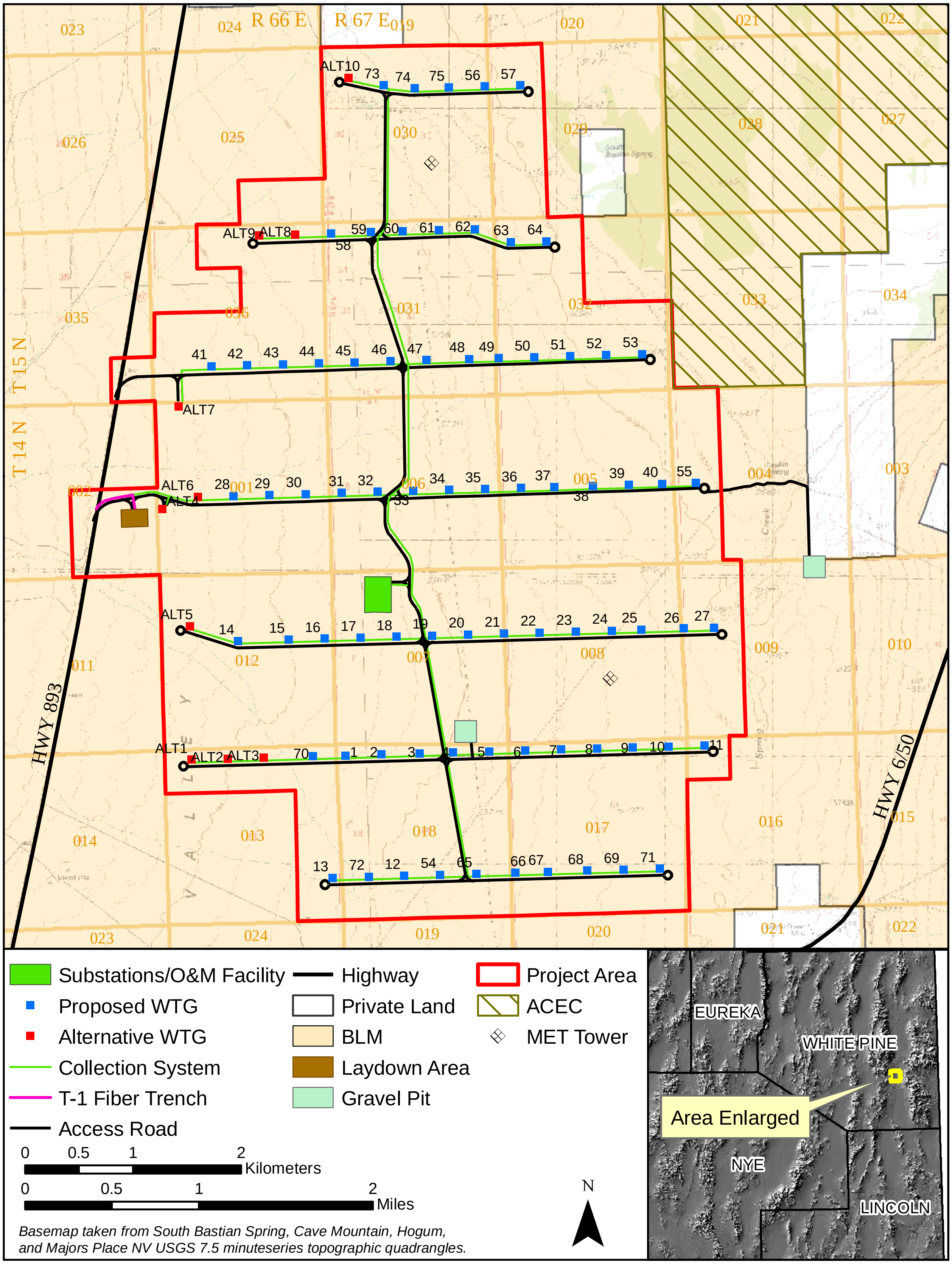

Spring Valley Wind Energy Faciltiy Project Map

SPRING VALLEY WIND FACILITY

PLAN OF DEVELOPMENT

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December 2009

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LIST OF ACRONYMS

BLM	Bureau of Land Management
BMP	best management practice
CFR	Code of Federal Regulations
COD	Commercial Operation Date
COM	Construction Operation and Maintenance
CWA	Clean Water Act
DOE	Department of Energy
EA	Environmental Assessment
EIA	Energy Information Administration
ERMA	extensive recreation management areas
ESA	Environmental Screening Analysis
FAA	Federal Aviation Administration
FLPMA	Federal Land Policy and Management Act
HAZMAT	Hazardous Materials Management
HV	high voltage
IA	Interconnection Agreement
KOP	Key Observation Point
met	meteorological tower
m/s	meters per second
MV	medium voltage
MW	megawatt
NA	not applicable
NAC	Nevada Administrative Code
NDEP	Nevada Division of Environmental Protection
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NRS	Nevada Revised Statutes
O&M	operations and maintenance
PEIS	Programmatic Environmental Impact Statement
PL	Public Law
POD	Plan of Development
RD	rotor diameter(s)
RMP	Resource Management Plan
ROD	Record of Decision

ROS	Recreation Opportunity Spectrum
ROW	right-of-way
rpm	rotations per minute
SCADA	Supervisory Control and Data Acquisition
SHPO	State Historic Preservation Office
SRMA	special recreation management area
SVW	Spring Valley Wind LLC
SWCA	SWCA Environmental Consultants
TBC	to be completed
TBD	to be determined
TLUA	temporary linear use area
USC	United States Code
USDA	U.S. Department of Agriculture
USDI	U.S. Department of Interior
USFWS	U.S. Fish and Wildlife Service
VRI	Visual Resource Inventory
VRM	Visual Resource Management
WTG	wind turbine generator

1.0 PROJECT DESCRIPTION

1.1 INTRODUCTION

1.1.1 TYPE OF FACILITY AND GENERATION CAPACITY (FEDERAL AND NON-FEDERAL LANDS)

Pattern Energy, through Spring Valley Wind LLC (SVW), proposes to construct, operate, and maintain a 151.8-megawatt (MW) wind generation facility on approximately 8,565 acres in the Spring Valley Wind project area (Figure 1.1-1). The proposed action consists of the construction, operation, and decommissioning of wind turbine generators and associated facilities necessary to successfully generate up to 149.1 MW allowed under the Interconnection Agreement (IA) in Spring Valley, located in White Pine County east of Ely, Nevada.

1.1.2 PROPOSED SCHEDULE FOR PROJECT (INCLUDING ANTICIPATED TIMELINES FOR PERMITTING, CONSTRUCTION AND OPERATION, AND ANY PHASED DEVELOPMENT AS APPROPRIATE)

- Draft Environmental Assessment (EA) – 4th quarter 2009
- Final Decision – 4th quarter 2009/1st quarter 2010
- Engineering work starts – 1st quarter 2010
- Construction mobilization – 3rd quarter 2010
- Commence civil works (roads, underground electrical, foundations) – 3rd quarter 2010
- Turbine deliveries commence – 3rd quarter 2010
- Turbine delivery completed – 2nd quarter 2011
- Main Power Transformer delivered – 1st quarter 2011
- Substation and Switchyard completed – 2nd quarter 2011
- Turbine commissioning, testing, and commercial operation – 3rd quarter 2011
- Wind Farm Commercial Operation Date (COD) – 3rd quarter 2011
- Decommissioning – 2041 (with the exception of Osceola Substation)

1.2 PROPONENT'S OBJECTIVE AND JUSTIFICATION FOR THE PROJECT

Recent national and regional electrical demand forecasts predict that the growing consumption of electrical energy will continue to increase into the foreseeable future and will require development of new resources to satisfy this demand. The Department of Energy (DOE) Energy Information Administration (EIA) has forecasted a 23.0% growth in electricity sales by 2030, including a projected increase of 19.8% in the residential sector, 38.3% in the commercial sector, and 7.1% in the industrial sector. This growth will require an increase in generating capacity of 231 gigawatts (231,000 MW) nationwide by the year 2030 (EIA 2009).

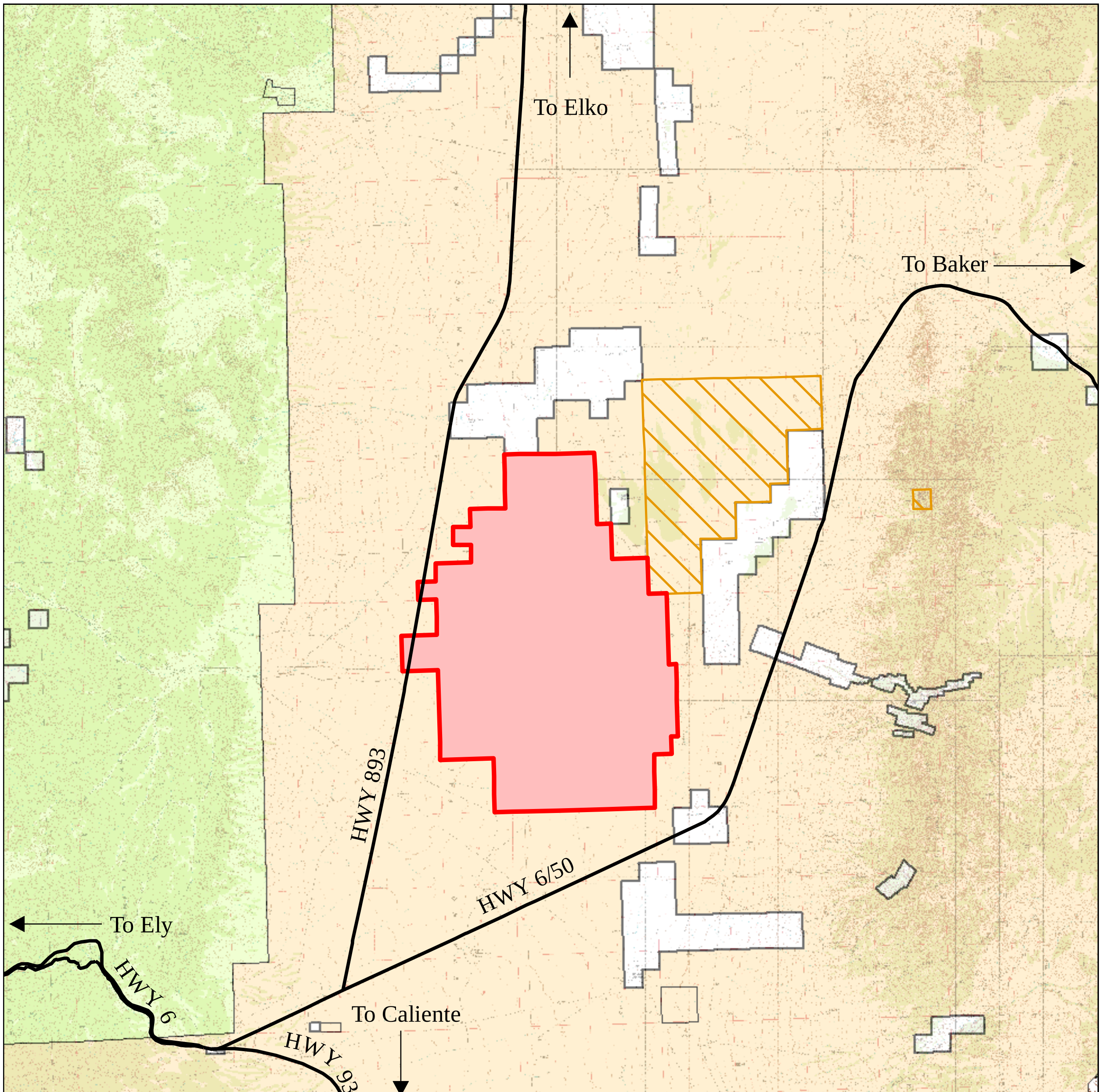
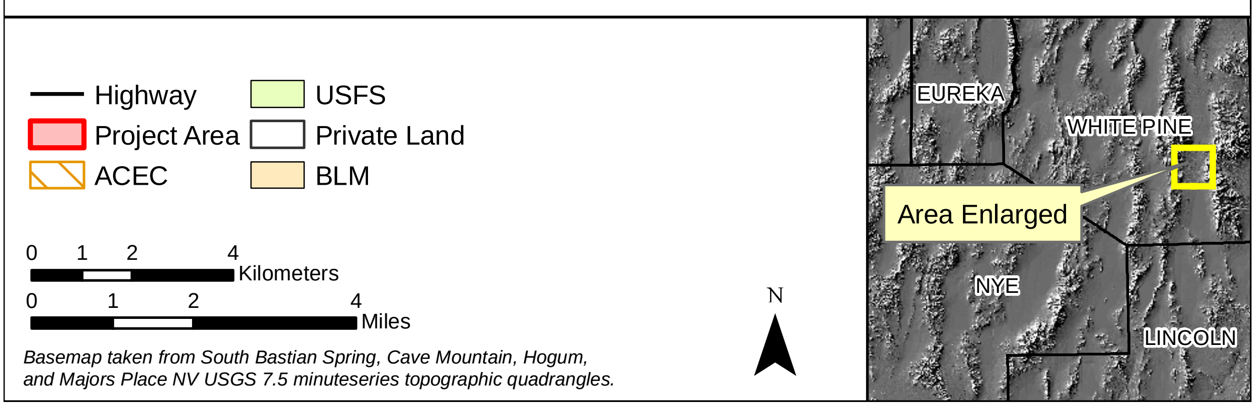


Figure 1.1-1. Project location map.



Executive Order 13212, signed in 2001, states that the production and transmission of energy in a safe and environmentally sound manner is essential to the well-being of the American people. Reports from the DOE postulate that wind power can provide 20% of the nation's electricity by 2030. The DOE report finds that achieving a 20% wind contribution to U.S. electricity supply would:

- Reduce carbon dioxide emissions from electricity generation by 25% in 2030.
- Reduce natural gas use by 11%;
- Reduce water consumption associated with electricity generation by 4 trillion gallons by 2030;
- Increase annual revenues to local communities to more than $1.5 billion by 2030; and
- Support roughly 500,000 jobs in the U.S., with an average of more than 150,000 workers directly employed by the wind industry.

In response to National Energy Policy recommendations on renewable energy and increased interest in wind energy development, the Bureau of Land Management (BLM) prepared a Programmatic Environmental Impact Statement (PEIS) to analyze the potential impacts of wind energy development on public lands. The PEIS was published in June 2005, and the Record of Decision (ROD) to implement a comprehensive Wind Energy Development Program was signed in December 2005. As stated in the PEIS/ROD (BLM 2005), the BLM is responsible for the development of energy resources on BLM-administered lands in an environmentally sound manner in accordance with the requirements of the Federal Land Policy and Management Act of 1976 (FLPMA) (43 United States Code [USC] 1701 *et seq*.).

Additionally, the State of Nevada has recognized the need for new and diverse energy resources including renewable energy generation options. The Nevada Renewable Portfolio Standard (Nevada Revised Statutes [NRS] 704.7821) was revised on July 1, 2009, by Senate Bill 358 to state that by calendar year 2025, no less than 25% of the total amount of electricity sold by NV Energy to its retail customers in Nevada must be from renewable energy resources. NV Energy is expecting to acquire renewable energy from multiple generating facilities to meet, at a minimum, the mandated Renewable Portfolio Standard target of 12% of retail sales coming from renewable resources in 2009–2010, 15% in 2011–2012, 18% in 2013–2014, 20% in 2015–2019, 22% in 2020–2024, and 25% by 2025. As part of meeting the Nevada Renewable Portfolio Standard, NV Energy has agreed to purchase wind energy produced from the Spring Valley project if it is constructed.

1.3 GENERAL FACILITY DESCRIPTION, DESIGN, AND OPERATION

1.3.1 PROJECT LOCATION, LAND OWNERSHIP, AND JURISDICTION

The proposed wind energy project is located entirely on BLM-administered land in the southern section of Spring Valley within White Pine County, approximately 30 miles east of Ely. The portion of Spring Valley identified for this project has been designated in the Ely BLM Resource Management Plan (RMP) as an area that has high wind energy development potential (BLM 2008).

1.3.2 LEGAL LAND DESCRIPTION OF FACILITY (FEDERAL AND NON-FEDERAL LANDS)

A legal description of the Spring Valley Wind Project right-of-way (ROW) is provided in Appendix A. Additionally, Appendix A contains a legal description for the gravel pit and associated road that lies outside of the project ROW.

1.3.3 TOTAL ACREAGE AND GENERAL DIMENSIONS OF ALL FACILITIES AND COMPONENTS

Facilities for the proposed action will consist of wind turbine generators, an underground electrical collection system for collecting the power generated by each wind turbine generator (WTG), electrical substation and switchyard, access roads, and an operations and maintenance (O&M) building. The project area totals approximately 8,565 acres, all of which are on BLM land that is covered by the requested ROW for the proposed action. The total area estimated for use by the wind farm (including short-term disturbance) is approximately 756.2 acres, or approximately 8.8% of the total ROW. The permanent footprint of the wind farm is shown in Figure 6.1-1 and will only occupy approximately 123.6 acres, or 1.4 % of the total ROW.

1.3.4 NUMBER AND SIZE OF WIND TURBINES (FEDERAL AND NON-FEDERAL LANDS)

Figure 6.1-1 presents the site layout and shows 85 potential turbine locations. Based on wind energy potential in Spring Valley, 75 of the 85 sites are identified as preferred turbine locations, and 10 are identified as alternate locations. Since wind turbine technology is continually improving and the cost and availability of specific types of turbines vary from year to year, a representative range of turbine types that are most likely to be used for the project, including 2.3 MW 101 Siemens, 1.8 MW Vestas V90, and the 2.0 MW RePOWER Wind Turbines, is being considered. Depending on the type of turbine used for the project, a range of 66 to 75 locations will make up the final layout. The final layout will ideally utilize the preferred 75 turbine sites but may include any configuration of the 85 potential locations in order to avoid impacts identified during the National Environmental Policy Act (NEPA) process. For additional details, please refer to Section 2.10.

1.3.5 WIND TURBINE CONFIGURATION AND LAYOUT (FEDERAL AND NON-FEDERAL LANDS)

The final site selection will be based on the type of wind turbine selected, with the total number of turbines generating not more than the 149.1 MW allowed under the IA. Additionally, the turbine sites selected will be those with the most energy potential (i.e., best wind resource) that do not lead to significant environmental impacts. Appendix B provides an overview of potential environmental impacts for each proposed turbine location. The final site layout will be in accordance with industry standards, safety measures and appropriate guidance as stated in the BLM's Wind Energy PEIS/ROD.

1.3.6 SUBSTATION, SWITCHYARD, TRANSMISSION LINES, ACCESS ROADS, BUILDINGS, PARKING AREAS

The proposed action will include the following permanent facility components: WTGs, access roads, underground electrical collection system, T-1 fiber-optic line, meteorological towers, microwave tower, substation and switchyard, transmission lines, and an O&M building. During construction, a laydown area with batch plant and parking area will also be needed. These are discussed in further detail in Section 2.

1.3.7 ANCILLARY FACILITIES (ADMINISTRATIVE AND MAINTENANCE FACILITIES AND STORAGE SITES)

Ancillary facilities will include an O&M building, a temporary linear use area (TLUA), and one or more sand and gravel sources, to be used during construction. Gravel and concrete aggregate will come from two locations (see Figure 6.1-1). Each borrow area will be up to 10 acres in size. One gravel source is within an undisturbed portion of the project area, and the second is just outside the project area at a location that was historically used as a gravel source. The site within the project area will be reclaimed upon completion of the construction phase. The site outside the project area will not be reclaimed because it is currently a disturbed site.

1.3.8 TEMPORARY CONSTRUCTION WORKSPACE, YARDS, AND STAGING AREAS

One 10-acre temporary laydown area with a batch plant and parking area will be required to stage and store construction equipment and materials, to prepare concrete, and for construction staff parking (see Figure 6.1-1). During construction, the laydown area will be fenced and gated to control access. The laydown area may be graveled, depending on the soil conditions and project needs. A 5-acre site within the laydown area will be allocated to install a batch plant for preparing and mixing the concrete used for the WTG foundations, transformer and equipment foundations at the substation and switchyard, O&M building foundation and floor slab, and other project facilities. Prior to installation of the batch plant facilities, a portion of the area will be covered with gravel. The batch plant complex will consist of a mixing plant, areas for sand and gravel stockpiles, and truck load-out and turnaround areas. The batch plant itself will consist of cement storage silos, water and mixture tanks, gravel hoppers, and conveyors to deliver different materials. During construction, materials will be taken from stockpiles and dumped into hoppers with front-end loaders, where they will be mixed together in the mixing plant and then loaded into ready-mix trucks in the truck loading area. The concrete will be delivered to each turbine site, substation and switchyard and O&M building, and other locations as needed using ready-mix trucks. Concrete ready-mix trucks will be washed out at designated locations designed for that purpose. At those locations, all effluent will be contained and refuse concrete will be reclaimed. Following completion of construction, all components of the batch plant will be demobilized and the site will be reclaimed. After construction, all temporary disturbances associated with the laydown area will be reclaimed.

The project scope will include a network of 28-foot-wide roads that will provide access to each turbine location, the substation, the switching station, and to the project's O&M building. During the course of construction, access roads will have an additional temporary disturbance of up to 40 feet (68 feet wide total) to facilitate the travel of large trucks and cranes. Any public access roads will conform to all applicable county road regulations, as well as the Nevada State Fire Marshal's fire safety regulations. These disturbed areas will be graded and compacted for use and then decompacted and stabilized at the conclusion of the project. In addition to the crane travel paths, the underground collection system and fiber-optic lines will also parallel the access roads. A T-1 fiber-optic cable for communications will extend 0.31 mile from the O&M facility along the access road within the TLUA and end at Highway 893 where it will connect into a local communication company ROW. A TLUA will be designated to accommodate roads, crane travel paths, and the underground circuits. The TLUA will include a 30-foot buffer off the centerline of the road and off the centerline of the collection system, plus the area in between, with a typical total width of 200 feet (Figure 6.1-2). Grading and clearing will only occur within the 68-foot-wide road and 20-foot-wide collection system alignments (292.1 acres). The remaining portions of the TLUA will be subject to disturbance from cross-country travel and temporary laydown sites. The total approximate area within the TLUA is 452.3 acres. Temporary disturbance for the 1.2 miles of T-1 fiber-optic line would account for 2.9 acres. Additionally, there will be a 400-foot-diameter (2.9-acre) temporary work area for each turbine site that will be used for the crane pad, equipment laydown, and other construction related needs. Within the turbine temporary work area, an area of 75 × 150 feet with a maximum slope of 1% is required to support the crane used during erection and lifting the turbine components into place. The crane pad will not be surfaced with concrete but will be compacted to provide a stable and safe operation area for the cranes. To meet the necessary compaction standards (determined by geotechnical studies), it may be necessary for heavy weights to be systematically dropped on the pad and graders and bulldozers used to achieve the required levels and grades. The total area for the temporary turbine work areas (75 turbines) is 138 acres, which takes into account overlap with the TLUA (see Figure 6.1-2).

1.3.9 Water usage, amounts, sources (during construction and operations)

Because no new water rights in Spring Valley are available, SVW would not drill a new well as part of the proposed project. All necessary water would be obtained through a temporary lease with an existing water rights holder in Spring Valley north of the project area, trucked to the site, and put to immediate use or held in tanks within the laydown area. A final agreement has been reached between SVW and the Church of Jesus Christ of Latter-Day Saints, an existing water rights holder in Spring Valley. The peak usage is estimated to be approximately 200,000 gallons per day. An elevated 30,000-gallon storage tank would be used at the water source. All water would be delivered by truck from the existing source to the batch plant and project area. Up to 2,000 vehicle trips would be required for water delivery.

The largest needs for water are batching concrete for turbine foundations and dust suppression. Water would also be used for washing equipment, road maintenance, and potable water. The quantity of water needed by SVW Project during the construction period will vary from approximately five (5) million gallons (15.3 acre feet) under normal conditions to approximately ten (10) million gallons (30.7 acre feet) under the worst case scenario of excessive drought and dry land. In order to achieve proper compaction of backfill at foundations, collection trenches, and road base material, water must be added. The amount of water necessary to reach an optimal value for compaction is variable and will depend on moisture conditions at the time of construction. The large range of water use is necessary to account for the potential conditions.

In normal conditions, a total of about 20,000 gallons of water per turbine would be needed for batching concrete; however, Pattern may need to increase the moisture content by as much as 10%. Based on the maximum of 75 turbines, a total of 3,300,000 gallons of water would be needed for turbines. Of the remaining 6,700,000 gallons, 60-70% would be used for dust suppression and the balance (5,280 gallons a week) would be necessary for potable uses throughout the construction period.

1.3.10 Erosion control and stormwater drainage

Erosion and sediment control measures would be implemented during construction. These would include stabilization measures for disturbed areas and structural controls to properly manage runoff. Prior to construction, a Storm Water Pollution Prevention Plan will be developed and implemented as part of the COM Plan.

1.3.11 Vegetation treatment, weed management, and any proposed use of herbicides

During construction, SVW will abide by noxious weed control procedures as developed in cooperation with the BLM and White Pine County. The establishment of noxious/invasive vegetation could be limited by early detection and eradication. SVW will work with the BLM and White Pine County to develop procedures to control the spread of noxious weeds and invasive plants. Specific control measures may include

- Cleaning vehicles that are required to go off designated roadways and enter areas known to contain noxious weeds;
- Reseeding of temporarily disturbed areas (e.g., portions of access roads, trenches for the underground collection system, turbine work areas) with an agency-certified weed-free mixture of native grasses, forbs, and shrubs at the conclusion of the project;
- Prohibiting the transfer of backfill materials from sites identified to have noxious weeds.
- Limiting the import of backfill materials to sources that have been identified as being free of noxious weeds;

- Annual post-construction monitoring and treatment of access roads and turbine sites for a designated period following construction;
- Limiting storage of equipment, materials, and vehicles to specified work areas or construction yards; and
- Confining personal vehicles, sanitary facilities, and staging areas to a limited number of specified weed-free locations.

1.3.12 WASTE AND HAZARDOUS MATERIALS MANAGEMENT

All construction-related waste will be transported to and stored within the temporary use area until it is collected for transport to a final landfill destination by a licensed hauler. Fuel, grease and oil for equipment and vehicles will be stored for use at the temporary use area. If any spillage occurs, the area will be cleaned up per the requirement of the hazardous materials plan and applicable permit requirements. Use of turbine lube oil will be handled in accordance with any necessary permit requirements or hazardous materials plan. Any concrete left over will be buried (if approved by BLM) or will be hauled and disposed of at a permitted site. Sanitary waste will be handled by Porter Can, the sanitary contractor, or other licensed vendor. For post-construction operations, a septic system will be installed for the O&M building.

Materials that can be recycled will be stored and transported separately. SVW will coordinate with the Ely landfill prior to the start of construction. Hazardous materials are typically limited for a project of this nature. However, the following materials are anticipated to be used or produced during construction and operation of the proposed action:

- Fuel (diesel and unleaded) for construction equipment and vehicles
- Lubricants and mineral oils
- Cleaners, industrial material

These substances will be transported and stored and, when necessary, disposed of in accordance with local, state, and federal regulations. In addition, SVW will work with the BLM and other appropriate agencies to implement the following actions:

- Develop a Hazardous Materials Management (HAZMAT) Plan addressing storage, use, transportation, and disposal of each hazardous material anticipated to be used at the site. The plan shall identify all hazardous materials that will be used, stored, or transported at the site. It shall establish inspection procedures, storage requirements, storage quantity, inventory control, non-hazardous product substitutes, and disposition of excess materials. The plan shall also identify requirements for notices to federal and local emergency response authorities and include emergency response plans. The HAZMAT Plan will be completed as part of the COM plan.
- Develop a Waste Management Plan that identifies the waste streams that are expected to be generated at the site and that addresses hazardous waste determination procedures, waste storage locations, waste-specific management and disposal requirements, inspection procedures, and waste minimization procedures. This plan shall address all solid and liquid wastes that may be generated at the site. The Waste Management Plan will be prepared as part of the COM Plan.

1.3.13 FIRE PROTECTION

The potential exists for on-site, anthropogenically caused fires to occur during the construction period due to exhaust fumes, storage of flammable liquids, fueling practices, and smoking. All workers will be trained in fire emergencies and to deal with fires quickly and effectively if they do occur. Crews will carry fire prevention equipment and consult with the BLM Ely District during high fire danger. A comprehensive Fire Management Plan will be developed and implemented prior to construction as part of the COM Plan.

1.3.14 SITE SECURITY AND FENCING PROPOSED (DURING CONSTRUCTION AND OPERATIONS)

The security fence surrounding the substation and switchyard, and the O&M building will be the only permanent fencing associated with the proposed wind farm. During the construction phase, access roads may have gates or signs installed, as necessary, to control public access to the site for safety reasons. However, access will be preserved for private land and other BLM-permitted uses.

1.3.15 ELECTRICAL COMPONENTS, NEW EQUIPMENT AND EXISTING SYSTEM UPGRADES

The proposed facility will connect to the existing NV Energy 230-kV transmission line that is currently in place and intersects the project area. A new 230-kV substation (Osceola substation) will be built adjacent to the existing line and will be folded into the new line by replacing one line structure with two dead-end structures and adding two short spans into the new substation. Fiber-optic cable will be strung on the 230-kV structures from the Osceola substation, east to the west side of Highway 6, where a vault to tie into existing conduit will be constructed by NV Energy. Section 3.2.2 discusses the Osceola substation in further detail. A new 230-kV/34.5-kV substation (Spring Valley substation), electrical collection system, pad-mount transformer vaults (if used), and aboveground junction boxes will be installed. A new 230-kV line will connect the Osceola substation to the Spring Valley substation. Section 2.11 discusses these electrical components in further detail.

1.3.16 INTERCONNECTION TO ELECTRICAL GRID

In addition to the turbines, the project will include the construction of 34.5-kV electrical collection system circuits connecting into a new high-voltage (HV) main transformer located at the Spring Valley substation. The Spring Valley substation will be located within the project area, near the existing NV Energy 230-kV line. The collection lines connect a number of turbines together and transmit power from these turbines to the Spring Valley substation. All these collection lines will be buried underground and run generally adjacent to the turbine access roads as noted above. Aboveground components of the collection system will include pad-mounted transformers next to each turbine, the Spring Valley substation, the Osceola substation (which will both be fenced), the tie to the existing 230-kV transmission line at the Osceola substation, and the associated fold into the existing line the new 230-kV transmission line to connect the two new. Backfeed power for the wind farm will be provided by Mt. Wheeler Power.

1.3.17 SPILL PREVENTION AND CONTAINMENT FOR CONSTRUCTION AND OPERATION OF FACILITY

Prior to any hazardous materials being on-site, SVW will prepare a Hazardous Materials Business Plan/Spill Prevention Control and Countermeasures Plan to avoid spills and minimize impacts in the event of a spill. The plan will ensure that adequate containment will be provided to control accidental spills, that adequate spill response equipment and absorbents will be readily available, and that personnel will be properly trained in how to control and clean up any spills.

1.3.18 HEALTH AND SAFETY PROGRAM

A Human Health and Safety Plan will be developed and implemented prior to construction as part of the COM Plan. All personnel assigned to this project will work under strict approved safety guidelines that will be established prior to the start of construction.

Safety is of the utmost importance on the construction site. Numerous hazards exist, both to the workers, and to those traveling through or near the site on public access roads. Therefore, warning signs will be posted along the access roads indicating the dates of construction activities and recommending that the public take alternate routes during that time period. In addition, areas where supplies and equipment will be stored or areas deemed hazardous will also be properly secured (e.g., fenced) to prevent theft, tampering, or injury. Areas with construction in progress will be secured so that no one without proper safety training will be able to access them. WTG access doors will remain locked at all times.

Workers will be trained in health and safety issues as they pertain to the work site as to prevent safety issues from arising and to address those that do. In case of emergency, there will be an emergency response plan in place, and workers will be trained in proper implementation of its protocols with the general construction contractor taking primary responsibility.

1.4 OTHER FEDERAL, STATE, AND LOCAL AGENCY PERMIT REQUIREMENTS

1.4.1 REQUIRED PERMITS (ENTIRE PROJECT AREA ON BOTH FEDERAL AND NON-FEDERAL LANDS)

Potential permits and authorizations that may be required and will be obtained prior to the commencement of construction are listed in Table 1.4-1.

Table 1.4-1. Authorizations Table

Authorization	Agency Authority	Statutory Reference	Status
Federal			
ROW for Land under Federal Management	BLM	FLPMA of 1976 (Public Law [PL] 94-579); 43 USC 1761–1771; 43 Code of Federal Regulations (CFR) Part 2800	To be completed (TBC)
NEPA Compliance to grant ROW (Tiered to Wind Energy Environmental Impact Statement)	BLM	NEPA (PL 91-190, 42 USC 4321−4347, January 1, 1970, as amended by PL 94-52, July 3, 1975, PL 94-83, August 9, 1975, and PL 97-258, §4(b), Sept. 13, 1982)	TBC
Endangered Species Act Compliance	U.S. Fish and Wildlife Service (USFWS)	Endangered Species Act (PL 93-205, as amended by PL 100-478 [16 USC 1531, *et seq*.])	In Progress
Migratory Bird Treaty Act	USFWS	16 USC 703–711; 50 CFR Subchapter B	In Progress
Bald and Golden Eagle Protection Act	USFWS	16 USC 668−668(d)	In Progress
National Historic Preservation Act (NHPA) Compliance	Nevada State Historic Preservation Office (SHPO)	NHPA 106 (PL 89-665; 16 USC 470 *et seq.*)	In Progress
Notice of Proposed Construction or Alteration (Form 7460.1)	Federal Aviation Administration (FAA)	49 USC, 44718 and, if applicable, 14 CFR 77 (2005) to determine whether the structure exceeds obstruction standards or be a hazard to air navigation	TBC
Notice of Actual Construction (Form 7460-2)	FAA	14 CFR Part 77 (2005)	TBC
Clean Water Act (CWA) Section 404 Dredge and Fill Permit	U.S. Army Corps of Engineers	33 USC §1344	NA
Consultation Regarding Military Radar	Department of Homeland Security	NA	6-12-2009

Table 1.4-1. Authorizations Table (Continued)

Authorization	Agency Authority	Statutory Reference	Status
CWA, Section 402 NPDES during Operation	Nevada Division of Environmental Protection (NDEP)	33 USC 1251 *et seq.*	NA
State			
NHPA 106 Determination of Effect Concurrence	Nevada SHPO	16 USC 470 *et seq*., NRS 383	TBC
Utility Environmental Protection Act – Permit to Construct	Nevada Public Utility Commission	NRS 704.820-704.900, Nevada Administrative Code (NAC) 704.9063, NAC 704.9359 – 704.9361	TBC
Rare and Endangered Plant Permit	Nevada Division of Forestry	NRS 527.260–527.300	NA
Native Cacti and Yucca Commercial Salvaging and Transportation Permit	Nevada Division of Forestry	NRS 527.050–527.110	NA
Incidental Take Permit	Nevada Department of Wildlife	NRS 503.584–503.589	NA
Construction Permit	NDEP, Bureau of Air Pollution Control	NAC 445B, 42 USC 7401	TBC
Operating Permit (Clean Air Act, Title V)	NDEP, Bureau of Air Pollution Control	NAC 445B, 42 USC 7401	NA
CWA, Section 401 Permit	NDEP, Bureau of Water Quality Planning	33 USC 1251 *et seq*.	NA
Groundwater Discharge Permit	NDEP, Bureau of Water Pollution	NRS 445A.300−730, NAC 445A.070−348, NAC 445A.810−925	TBC
CWA, Section 402 National Pollutant Discharge Elimination System Notification for Stormwater Management during Construction	NDEP	33 USC 1251 *et seq*.	TBC
Surface Area Disturbance Permit	NDEP	NRS 519A.180 (for small sites), NAC 445B	TBC
ROW Occupancy Permit	Nevada Department of Transportation	NRS 408.423, 408.210, NAC 408	TBC
Over Legal Size/Load Permit	Nevada Department of Transportation	NRS 484.437−775, NAC 484.300−580	TBC
Uniform Permit (for Transportation of Hazardous Materials)	Nevada Department of Public Safety	NAC 459.979	To be determined (TBD)
Assignment of Water Rights	Nevada Division of Water Resources (State Engineer)	NRS 533−534	NA
Dust Control Permit	Nevada Department of Environmental Quality	NAC 445B	TBD
Industrial Artificial Pond Permit	Nevada Department of Wildlife	NRS 502.390	TBD
Well Permit	Nevada Division of Water Resources	NA	TBD
Phase I Environmental Site Assessment	NDEP	Comprehensive Environmental Response, Compensation, and Liability Act, as amended, 42 USC 9601 *et seq.*	TBC
White Pine County / Local			
Special Use Permit or Zoning Change	White Pine County Board of Commissioners City of Ely	White Pine County Zoning Ordinance	TBC
Septic System Permit	White Pine County	White Pine County Permit	TBD

Table 1.4-1. Authorizations Table (Continued)

Authorization	Agency Authority	Statutory Reference	Status
Utility Permit/Easement	Utility owner (Mount Wheeler Power)	White Pine County Permit	TBC
Building Permit	White Pine County	White Pine County Permit	TBC
Variance	White Pine County Board Of Commissioners City of Ely	White Pine County Permit	TBC

1.5 FINANCIAL AND TECHNICAL CAPABILITY OF APPLICANT

Pattern Energy, formerly Babcock & Brown's thriving North American Energy Group, is one the most experienced and best-capitalized renewable energy and transmission development companies in the U.S. This group has successfully developed, financed and placed into operation 2,000 MW of wind power across 11 states. In addition to having a full range of development capabilities, the company provides construction management during the building phase, as well as providing operations management, turbine and Balance of Plant service and maintenance, financial management, and reporting functions.

2.0 CONSTRUCTION OF FACILITIES

2.1 WIND TURBINE DESIGN, LAYOUT, INSTALLATION, AND CONSTRUCTION PROCESSES, INCLUDING TIMETABLE AND SEQUENCE OF CONSTRUCTION

Turbines will be placed in a series of east-west-oriented rows (or arrays) to best use Spring Valley's north-south wind flows. Turbines within each array will be connected by gravel surface access roads and underground 34.5-kV collection circuits. To minimize downwind array losses, spacing between turbine rows will be at least 10× rotor diameters (RD) (1,010 m) and 3.0 to 3.5 RD (285−332.5 m) for in-row spacing. Turbine towers and foundations will be designed to survive a gust of wind more than 133.1 miles per hour (mph) with the blades pitched in their safest position. Turbine foundations will be approximately 8 feet deep, with a projection of approximately 6 inches above final grade, and will use approximately 350 cubic yards of concrete. Each tubular steel tower will have a maximum 15-foot-diameter (4.5-m-diameter) base.

Construction of the wind farm is anticipated to be completed over a period of 9 to 12 months. During construction, up to 175 employees will be required. Power supply for construction will be through the use of diesel generators and purchase of power from Mt. Wheeler Power. A summary of the wind farm components and associated ground disturbance from those components is provided in Table 2.1-1. This section is followed by detailed descriptions of each project component.

Three to five WTGs can be erected weekly. Construction is expected to commence in the later part of 2010, with the final mechanical completion, commissioning, and testing can be expected to be completed by 3rd quarter of 2011.

Turbine crane pads will be constructed for each wind turbine. Each turbine will require a 400-foot-diameter (2.9-acre) temporary construction area and a permanent 75-foot-diameter (0.3-acre) area for the tower within the temporary construction area. Clearing and grading will be accomplished using bulldozers, backhoes, and road graders.

The temporary work area for each site will be used for the crane pad, equipment laydown, and other construction-related needs. Within the area of temporary disturbance, an area of 75 × 150 feet with a maximum slope of 1% is required to support the crane used in lifting and erecting the turbine components. The crane pad will not be surfaced with concrete but will be compacted to provide a stable base for safe operation of cranes. To meet the necessary compaction standards as determined by geotechnical studies, it may be necessary for heavy weights to be dropped on the pad, and graders and bulldozers may be used to achieve the required levels and grades.

Table 2.1-1. SVWEF Components: Maximum Short-Term Disturbance Summary Table, Based on Construction of 75 Turbines

Facility Component	Disturbance Length (feet)	Disturbance Width (feet)	Short-Term Disturbance (acres)	Percent of Project Area
Turbine foundations and crane pads (x75)	400[1]	N/A	216.3	0.03
Laydown, batching plant, and parking area	820	530	10.0	0.001
Temporary linear use area (including roads, collection system, and fiber-optic line)	145,200	200	666.7*	0.08
Gravel source(s) (x2)	660	660	20[‡]	0.002
Footprint Overlap	N/A	N/A	-280.4	-0.04
Total			**632.6**	**0.07**

[1] This measurement represents the diameter of the disturbance area.

* Grading is limited to 292.1 acres for roads (238.9 acres) and collection system (53.2 acres) within the temporary linear use area (TLUA).

[†] Included in TLUA acreage.

[‡] One 10.0-acre gravel source is off-site.

Table 2.1-2. SVWEF Components: Maximum Long-Term Disturbance Summary Table, Based on Construction of 75 Turbines

Facility Component	Disturbance Length (feet)	Disturbance Width (feet)	Long-Term Disturbance (acres)	Percent of Project Area
Turbine foundations and crane pads (x75)	75[1]	N/A	7.6	0.001
Access roads	145,200	16	93.3	0.01
Meteorological towers (x2)	50[1]	N/A	0.1	0.000
Spring Valley substation, Osceola substation, and O&M building	1,080	805	20.0	0.002
Footprint Overlap	N/A	N/A	-2.6	0.0
Total			**123.6**	**0.01**

[1] This measurement represents the diameter of the disturbance area.

Within the temporary construction area, permanent foundations are excavated, compacted, and constructed of structural steel and reinforced concrete designed to meet turbine supplier and geotechnical engineer's recommendations. The wind turbines' freestanding tubular towers will be connected by anchor bolts to the concrete foundation at the pedestal. The towers will have a maximum 15-foot-diameter (4.5-m-diameter) base. The area immediately surrounding the concrete pedestal will be covered with a gravel ring, followed by roads to provide a stable surface for future maintenance vehicles accessing the turbine and as required by electrical codes. After construction, all temporary disturbances associated with the turbine installation will be reclaimed.

2.2 *GEOTECHNICAL STUDIES THAT MAY BE PLANNED*

A preliminary geotechnical analysis of the project area will be conducted to describe soil and geology suitability. Additional site-specific geotechnical studies will be performed as required for use in the final design of the turbine foundations.

2.3 *PHASED PROJECTS; DESCRIBE APPROACH TO CONSTRUCTION AND OPERATIONS*

Construction of a wind project will be performed in accordance with codes, laws, and engineering requirements. The actual ground disturbance of the turbines and plant infrastructure (civil and electrical) typically takes less than 3% of the total project area (American Wind Energy Association 2008). Construction begins with installation of civil improvements, including site laydown areas for turbine and tower deliveries, access roads, underground runs for electrical cabling, turbine foundations, and crane pads for erection of the turbines. The second construction phase, in which some of the works will proceed in parallel with the civil works, includes installation of the electrical hardware (including cabling), Osceola substation, Spring Valley substation and pad-mount transformers, O&M building, and erection of the turbines. The third and final construction phase includes mechanical completion of all WTGs, substation and switchyard, and other facilities followed by commissioning and testing of each turbine, utility interconnection, testing of the electrical system, and restoration of temporary construction areas, laydown areas, and turbine crane pads.

2.4 *ACCESS AND TRANSPORTATION SYSTEM, COMPONENT DELIVERY, WORKER ACCESS*

A new, approximately 0.3-mile-long, long-term site access road will be constructed approximately 2 miles from the existing transmission line access road; a second permanent access road, approximately 0.4 mile long, will be constructed approximately 1.5 miles north of the primary access road. During the construction phase of the project, site and turbine access roads will be up to 68 feet wide. This will be reduced to 28 feet after construction is completed, for maintenance access during the operations phase; the remaining 40-foot-wide area of short-term disturbance will be reclaimed. The two long-term site access roads will enable construction and post-construction operational personnel to easily access the center and northern sections of the project area, including the Spring Valley substation and Osceola switchyard.

There will be up a total of 27.5 miles of new access roads, including the two site access roads described above and the turbine access roads. All new access roads where a crane walk will be required will be 68 feet wide during the construction phase and 28 feet wide during the operations phase and will include a turn-around at the end of each turbine array to allow for large vehicle maneuvering. Access roads for gravel pits (1.1 miles) will primarily be along existing roads that will be improved with a maximum expansion to 16 feed wide. Because gravel pit access roads are existing, they will not be restored after construction is completed. There will be up to 93.3 acres total long-term disturbance from new road construction. The TLUA to construct these access roads and the electric collection system will be designated to include the temporary widths for the roads and collections system, plus the area in between. The TLUA will average 200 feet wide to accommodate crane movement and material delivery and will be up to 666.7 acres of short-term temporary disturbance. The final long-term roads will be compacted and surfaced with gravel aggregate from BLM-permitted sources.

Any public access roads will incorporate existing BLM standards regarding road design, construction, and maintenance such as those described in the 2005 Wind Energy PEIS/ROD (BLM 2005), BLM 9113

Manual (BLM 1985), and the *Surface Operating Standards for Oil and Gas Exploration and Development* (USDI and USDA 2007) (i.e., the Gold Book). A typical road cross section is shown in figure 2.4-1.

2.5 CONSTRUCTION WORKFORCE NUMBERS, VEHICLES, EQUIPMENT, TIME FRAMES

Up to 175 workers will be employed during a 9- to 12-month construction period. There are several trailer parks nearby (Majors Junction is the closest) that could provide temporary living facilities for construction personnel, as well as housing in Ely and Baker, Nevada. During construction, potable water and sanitary facilities at the site will be necessary to support the construction crews. Potable water during construction will use bottled water (5-gallon reusable containers) and a small non-potable water storage tank for restroom facilities. A temporary septic holding tank will be installed to support the restroom use at the laydown area.

Temporary facilities will be available at the laydown area, and permanent facilities will be available at the O&M building. The EA for this project will require a Transportation Plan as part of the COM Plan, which will be developed and implemented prior to construction. It is anticipated that employee carpooling will be used to minimize vehicle traffic to and from the site and the area necessary for construction phase parking. No more than 225 employee vehicles are anticipated on the site at any one time.

2.5.1 MAJOR FACILITIES (INCLUDING VEHICLES AND NUMBER OF TONS AND LOADS)

- Wind turbine generators – Due to continued advancement in wind turbine technology and the continued decrease in cost, the availability of specific turbines varies from year to year. Therefore, a representative range of turbine types that are most likely to be used for the project is being considered.
- Access roads – The Spring Valley project area currently has existing access via Highway 6/50 to the south and/or Highway 893 to the immediate west. Two permanent access roads will be constructed. These roads will enable construction personnel to access the center and southern sections of the project area more easily. There will be up to 25.7 miles of additional permanent interior turbine access roads.
- Electrical collection and connection – The project will include the construction of approximately eight 34.5-kV circuits (homeruns) connecting into a step-up main 230-kV transformer at the Spring Valley substation. The Spring Valley substation is located within the south half of the project area adjacent to the existing NV Energy 230-kV line. The Osceola substation and associated tie-in and short 230-kV transmission line will be located near the Spring Valley substation within the 20-acre substation area. The collection circuits and lines (excluding the 230 kV lines) will be buried underground and adjacent to the turbine access roads.
- Construction equipment will consist of items such as graders, bulldozers, backhoes, cranes, concrete ready-mix trucks, delivery trucks, semi trucks, and welding rigs. Construction will require an average of 10 truck trips on area highways for each turbine and associated components. The anticipated travel route for delivery of construction materials will be determined and included as part of the COM Plan.

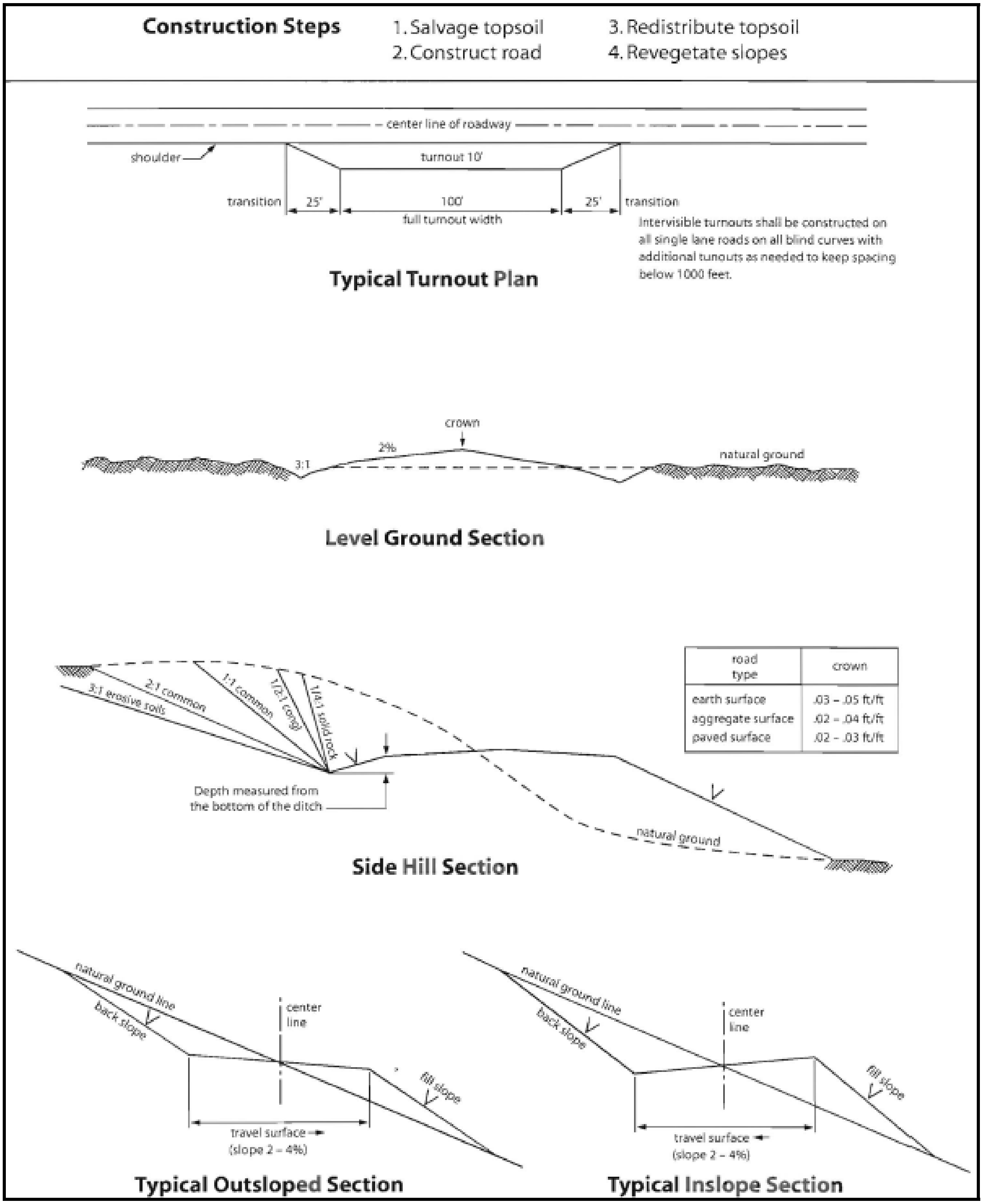


Figure 2.4-1. Cross-sections and plans for typical road sections representative of BLM resource or FS local and higher-class roads (USDI and USDA 2007).

2.5.2 Ancillary Facilities (including vehicles and number of tons and loads)

- Operations and maintenance facility (3 acres within substation allotment)
- Spring Valley substation and Osceola switching station (20 acres)
- Parking and storage (4 acres)
- Batching plant (5 acres)
- Sand and gravel sources (20 acres)
- Permanent meteorological (met) tower – SVW will install two permanent met towers within the project area.
- Microwave tower – NV Energy will require a microwave tower within the 20-acre substation area for supervisory communications with and control of the Osceola substation.
- The same types of vehicles used during the construction of major facilities will also be used in construction of ancillary facilities.

2.5.3 Milestones

- Engineering work starts – 4th quarter 2009
- Construction mobilization – 3rd quarter 2010
- Commence civil works (roads, underground electrical, foundations) – 3rd quarter 2010
- Turbine deliveries commence – 3rd quarter 2010
- Turbine delivery completed – 2nd quarter 2011
- Main power transformer delivered – 1st quarter 2011
- Substation and switchyard completed – 2nd quarter 2011
- Turbine commissioning, testing, and commercial operation – 3rd quarter 2011
- Wind Farm COD – 3rd quarter 2011.

2.6 Site Preparation, Surveying, and Staking

The centerline and exterior limits of the ROW will be surveyed and clearly marked by stakes and flagging at 200-foot intervals, or more closely if necessary to maintain a sight line. All construction activities will be confined to these areas to prevent unnecessarily impacting sensitive areas. Stakes and flagging that are disturbed during construction will be repaired or replaced before construction continues. Stakes and flagging will be removed when construction and restoration are completed.

2.7 Site Preparation, Vegetation Removal, and Treatment

Vegetation will be removed from permanent facility sites, such as the O&M building and substation and switchyard. Vegetation will be stripped and topsoil will be bermed around temporary construction areas; stockpiled topsoil will be reused during restoration activities. No restoration would occur until all construction activities are completed. Temporary disturbance sites will be reclaimed as described in the Restoration Plan developed as part of the COM Plan. To reestablish healthy vegetation communities, a BLM-approved seed mix will be used and additional restoration measures will be developed as necessary. Further restoration plans are described in Section 2.13.

2.8 SITE CLEARING, GRADING, AND EXCAVATION

Clearing and grubbing will be necessary for the new access roads, turbine pads, O&M building, substation and switchyard, batch plant, and temporary laydown area. Clearing and grubbing will be accomplished using bulldozers, road graders, or other standard earth-moving equipment. For the most part, the total area to be cleared of vegetation would be less than temporary work areas requested to in order minimize potential environmental impacts.

2.9 GRAVEL, AGGREGATE, CONCRETE NEEDS AND SOURCES

Construction of access roads, facility foundations, and temporary laydown areas associated with the proposed action will require access to sand and gravel. Up to 14,875 cubic yards of sand, 152,562 cubic yards of gravel, and 7,500 cubic yards of cement are expected to be used during the course of construction. Appropriate sources of sand and gravel in proximity to the project area will be identified by a construction contractor and permitted through the BLM. Any sand and gravel source will require biological and cultural resource clearance prior to use.

Gravel and concrete aggregate will come from two 10-acre locations, one within the project area and one outside the project area (see Figure 6.1-1). Some rock materials for making concrete will be purchased from an existing stockpile location. The materials will be trucked to the batching plant and placed into stockpiles. Access to the site outside the project will be along an existing road. Cement will be delivered on trucks from a source to be identified and stored in two to five silos on-site. Approximately 250 tons of sand per foundation, 400 tons of gravel per foundation, and 120 tons of cement per foundation will be needed for each turbine site. Based on a maximum of 75 turbines installed and the additional needs for construction of the substation and switchyard, and O&M building, 20,400 tons of sand, 32,000 tons of gravel, and 9,600 tons of cement will be used.

2.10 WIND TURBINE ASSEMBLY AND CONSTRUCTION

Wind turbines consist of three main components: the turbine tower, the nacelle, and the rotor, which consists of the hub and the blades (Figure 2.10-1). The nacelle is the portion of the wind turbine mounted at the top of the tower, and it houses the generator, converter, gearbox, and electronic control systems. Turbine hub heights and RD for the potential turbines may vary, but for purposes of analysis will not exceed the 2.3-MW turbine specifications.

The towers will be a tapered tubular steel structure manufactured in three or four sections, depending on the tower height, and approximately 15 feet (4.5 m) in diameter at the base. The towers will be painted an off-white matte color to be visually less obtrusive. A service platform at the top of each section will allow for access to the tower’s connecting bolts for routine inspection. A ladder inside the structure will ascend to the nacelle to provide access for maintenance. The tower will be equipped with interior lighting and a safety glide cable alongside the ladder. The towers will be fabricated and erected in sections.

The nacelle steel-reinforced fiberglass shell houses the main mechanical components of the WTG; the drive train, gearbox, and generator control the electronics and cables. The nacelle will be equipped with an anemometer that signals wind speed and direction information to an electronic controller. A mechanism will use electric motors to rotate (yaw) the nacelle and rotor to keep the turbine pointed into the wind to maximize energy capture.

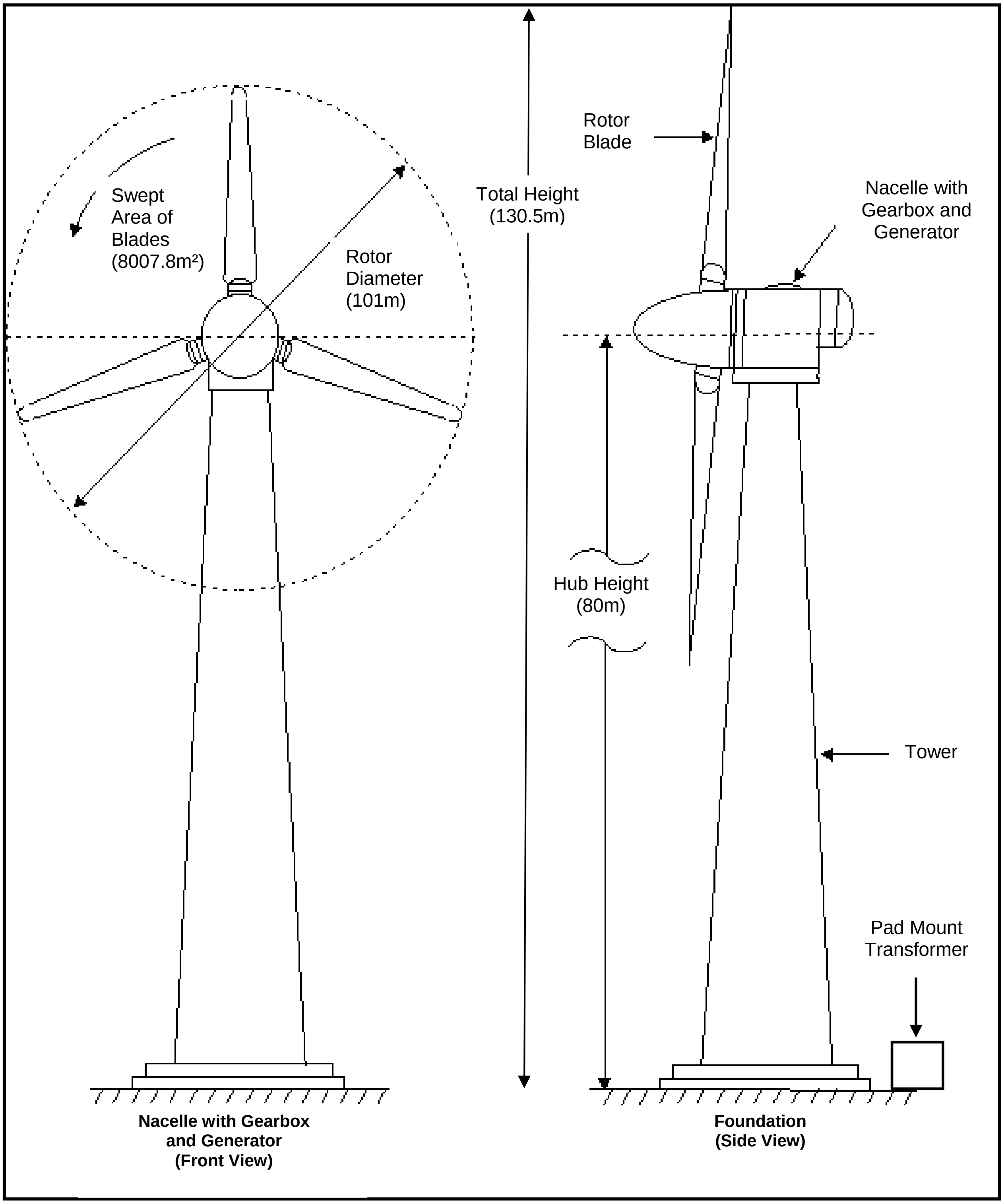


Figure 2.10-1. Turbine technology diagram.

Table 2.10-1. Wind Turbine Specifications

Turbine	Hub Height	Rotor Diameter	Total Height	Rated Capacity Wind Speed	Rotor Speed	Tower Base Diameter
2.3 MW Siemens	80 m	101 m	130.5 m	12–13 m/s	6–16 rpm	14.76 feet (4.5 m)
1.8 MW V90 Vestas	80 m	90 m – 100 m	125 m	12 m/s	9–14.9 rpm	< 15 feet
Repower 2.0	80 m	92.5 m	126 m	12 m/s	9–18 rpm	13 feet (4.0 m)

Notes: m/s = meters per second; rmp = rotations per minute

Modern wind turbines have three-bladed rotors. The diameter of the circle swept by the blades will be no more than 323 feet (101 m). If the maximum number of 75 turbines were constructed, a total rotor swept area of 600,584.3 m^2 (148.4 acres) would be used. Generally, larger WTGs have slower rotating blades, but the specific rotation-per-minute (rpm) values depend on aerodynamic design and vary across machines. Based on the turbines considered, the blades will turn at no more than 18 rpm.

Each turbine is equipped with a state of the art control system to monitor variables such as wind speed and direction, air and machine temperatures, electrical voltages, currents, vibrations, blade pitch, and yaw (side-to-side) angles.

Power generation controlled at the bus cabinet inside the base of the tower include operation of the main breakers to synchronize the generator with the grid as well as control of ancillary breakers and systems. The control system will always operate to ensure that the machines operate efficiently and safely.

Each turbine will be connected to a central Supervisory Control and Data Acquisition (SCADA) system. The SCADA system allows for controlling and monitoring individual turbines and the wind farm as a whole from a central host computer or a remote personal computer. The SCADA system transmits critical information from the turbine via fiber optics to a central control server located in the O&M building and to all other locations as required. The SCADA system will also send signals to a fax, pager, or cell phone to alert operations staff.

Turbines will be equipped with a braking system to stop or release the rotor. The braking system is designed to bring the rotor to a halt under all foreseeable conditions. The turbines also will be equipped with a parking brake used to keep the rotor stationary during maintenance or inspection.

2.11 Electrical Construction Activities

The existing NV Energy 230-kV transmission line that passes from east to west through the project site will be the primary power transmission line from the wind farm. A 34.5-kV underground electrical collector system will be installed to connect the turbines to the Spring Valley substation. Power generated at each turbine at approximately 690 volts is transmitted to a pad mount transformer located next to each turbine on the ground. The pad mount transformer will step up the power from 690 volts to 34.5-kV, which is considered to be medium voltage (MV). Approximately 5 to 10 pad mount transformers (turbines) are interconnected, and one MV cable (homerun circuit) will transmit the power from those turbines to the substation. We expect a total of eight such MV circuits. The power from all eight circuits is stepped up by the main transformer at the Spring Valley substation to 230-kV HV. The HV system is then interconnected to the Osceola substation and the grid. Approximately 27 miles of collector cables and fiber-optic cables will be placed underground in trenches either adjacent to access roads or, in some cases, running cross-country within the project area boundary. Installation of these cables is further discussed in Section 3.2.1.

Vaults and splice boxes will be placed aboveground at locations as needed. There will be several above ground junction boxes that will be used in various locations. Junction boxes are approximately 4 × 6 feet × 4 feet high.

2.12 Aviation Lighting (Wind Turbines, Transmission)

Turbines will be lit as required by the Federal Aviation Administration (FAA). Based on the FAA Obstruction Marking and Lighting Advisory Circular (AC70/7460-1K), no structural markings or alternative colors are proposed for the wind turbines. For nighttime visibility, two flashing red beacons will be mounted on the nacelle. Lights are not recommended to be placed on all turbines, so only those turbines at each end of the array will have lights to mark the extent of the facility. A Lighting Plan will be prepared as part of the COM Plan for the project.

2.13 Site Stabilization, Protection, and Reclamation Practices

All restoration for the project will follow the guidance in the Restoration Plan prepared as part of the COM Plan for the project. Upon completion of the construction aspect of the project, all soils disturbed by short-term access roads and facilities will be reclaimed by stabilization and rehabilitation. Reseeding and fertilization will take place according to specifications provided by BLM, and access to ROWs will be limited to the public, using gates and signs where necessary to allow for the germination and establishment of replanted sites. After construction activities are complete, SVW will restore temporary disturbance areas. In areas with potential seed bearing soils, the top 3 to 6 inches of topsoil recovered during construction activities will be set aside and reapplied to temporary surface disturbances during restoration. To re-establish healthy vegetation communities, a BLM-approved seed mix will be used.

The Spring Valley Wind project will have a lifetime after which cost-effective operation will no longer be feasible. The anticipated life of the Spring Valley Wind Generation Facility is 30 years, and it is likely that after that time the site would be decommissioned, and with the exception of the Osceola substation, existing facilities and equipment would be removed. It is also possible that the facility owners may wish to work with the BLM to replace the old facilities with a new project on the same site. However, that option is not considered in this Plan of Development (POD).

Prior to the termination of the ROW authorization, a decommissioning plan will be developed consistent with the BLM Wind Energy PEIS/ROD, and approved by the BLM. The best management practices (BMPs) and stipulations developed for construction activities will be applied to similar activities during decommissioning. All roads and tower pads would be reclaimed in accordance with the BLM-approved decommissioning plan.

3.0 Related Facilities and Systems

3.1 O&M Facility

An O&M building within the 20-acre facility area will be located in the southern portion of the project area. The O&M building and yard will be constructed to store critical spare parts and provide a building for the operators and maintenance services. A concrete foundation will be required for the maintenance facility, and the area immediately surrounding the building will be covered with gravel for vehicle parking. Any area within the fence not covered by concrete will be covered with gravel to minimize erosion and surface runoff. A permanent 7-foot-high security fence surrounding the O&M facility and directional lighting will be installed. Lighting for the facility will be detailed in the project Lighting Plan.

For communications, a T-1 fiber-optic line will need to be installed from the O&M facility and trenched 0.31 mi underground to connect to a local communication company ROW along Highway 893.

3.2 TRANSMISSION SYSTEM INTERCONNECT

3.2.1 EXISTING AND PROPOSED TRANSMISSION SYSTEM

The project will include the construction of eight 34.5-kV MV circuits connecting into a step-up 34.5-/230-kV transformer at the Spring Valley substation located at the south end of the project area adjacent to the existing NV Energy 230-kV line. The MV collection lines connecting the turbines and the Spring Valley substation will be buried underground and generally adjacent to the turbine access roads. Aboveground components to the electric system will include pad-mounted transformers alongside each turbine, the Spring Valley substation and Osceola switching station (which will be fenced), the overhead 230-kV transmission connector line connecting the substation and switching station, and the 230-kV transmission line fold from the existing transmission line row. Structures will be painted a BLM-approved color to blend in with predominant vegetation and soil types.

3.2.2 SPRING VALLEY SUBSTATION

A 250 × 480–foot substation will be located adjacent to the O&M building within the 20-acre facility area. The substation will have a radial layout with one 230 kV circuit breaker, one 34.5 / 230 kV step up transformer and a single 34.5 kV bus-bar, where the collection circuits will be connected by means of 34.5 kV circuit breakers. Each line terminal will consist of one dedicated circuit breaker, one shared circuit breaker, along with any associated relays, switches, and lightning arrestors. A 230-kV aboveground connector transmission line will connect the Spring Valley substation to the Osceola switching station, which will then connect to the NV Energy 230-kV transmission line. No disturbance outside the 20 acres facility area is expected. Construction of this substation will last approximately 4 to 6 months and will involve two primary stages: site preparation and structural and electrical construction.

Construction of the substation will begin with clearing vegetation and organic material from the site. The site will then be graded to subgrade elevation and exporting and importing of suitable materials may be necessary. Structural footings and underground utilities, along with electrical conduit and grounding grid will be installed, followed by aboveground structures and equipment. A chain-link fence will be constructed around the new substation for security and to restrict unauthorized persons and wildlife from entering the substation. The site will be finish graded and gravel surfaced, and reclamation will be completed to minimize the visual appearance of the substation.

Control buildings will be added to the substation and will more than likely be constructed of prefabricated material. Major equipment to be installed inside the control buildings consist of relay and control panels, alternating current and direct current load centers to provide power to equipment inside and outside the control building, a battery bank to provide a back-up power supply, a heating/cooling system to prevent equipment failure, and communications equipment for remote control and monitoring of essential equipment.

Steel structures will be erected on concrete footings to support switches, electrical buswork, instrument transformers, lightning arrestors, and other equipment, as well as termination structures for incoming and outgoing transmission lines. Structures will be fabricated from tubular steel and galvanized or painted a BLM-approved color to blend in with predominant vegetation and soil types. Structures will be grounded by thermally welding one or more ground wires to each structure. The Lighting Plan, prepared as part of the COM Plan, will detail lighting for the substation.

Major equipment will be set by crane and either bolted or welded to the foundations to resist seismic forces. Oil spill containment basins will be installed around major oil-filled transformers and other equipment. Smaller equipment, including air switches, current and voltage instrument transformers, insulators, electrical buswork, and conductors will be mounted on the steel structures.

Control cables will be pulled from panels in the control building, through the underground conduits and concrete trench system, to the appropriate equipment. After the cables are connected, the controls will be set to the proper settings, and all equipment will be tested before the transmission line is energized.

3.2.3 OSCEOLA SWITCHING STATION

A switching station (Osceola) operated by NV Energy will be constructed adjacent to the Spring Valley substation within the 20-acre facility area. This switching station will be 510 × 360 feet. Construction of the Osceola switching station and components within it will include a 5 breaker, breaker and a half substation with three 230-kV line terminals, one of which will also have a 230-kV, 25-MVAr line reactor. Each line terminal will consist of one dedicated circuit breaker and one shared circuit breaker, along with any associated relays, switches, and lightning arrestors. This substation will connect to the existing NV Energy 230-kV line and will not be decommissioned with the rest of the project. Construction of this substation will last approximately 7 to 10 months and will involve the same two primary stages (site preparation and structural and electrical construction) as previously described for the Spring Valley Substation; however, reclamation is not anticipated for this site.

3.2.4 STATUS OF POWER PURCHASE AGREEMENTS

NV Energy's native load has secured transmission rights for 149.1 MW on the existing 230-kV line in the project area for the output of this project. Favorable discussions with NV Energy are in progress, with the goal of executing the power purchase agreement in fall 2009.

3.2.5 STATUS OF INTERCONNECT AGREEMENT

NV Energy has completed the System Impact Study and the Facilities Study for the project. The goal is to finalize the interconnection agreement with anticipated execution in the 4th quarter of 2009. This project, along with others in the area, is currently being restudied due to the significant delay of large coal plants in the area. If the turbines selected are not equivalent to those NV Energy has studied, further re-study work will be required before the interconnection agreement can be signed.

3.2.6 GENERAL DESIGN AND CONSTRUCTION STANDARDS

Construction of the facilities will follow guidelines set forth by BMPs. For example, construction vehicle movement within the project boundary will be restricted to pre-designated access, contractor-required access, or public roads. In construction areas where ground disturbance is unavoidable, surface restoration will consist of returning disturbed areas back to their natural contour (if feasible) and reseeding with a BLM-approved seed mix. A full list of BMPs will be included with the COM Plan.

3.3 METEOROLOGICAL TOWERS

SVW will install two permanent met towers within the project area (see Figure 6.1-1). The previously installed temporary met towers will be removed prior to construction.

3.4 OTHER RELATED SYSTEMS

3.4.1 COMMUNICATIONS SYSTEM REQUIREMENTS (MICROWAVE, FIBER OPTICS, HARD WIRE, WIRELESS) DURING CONSTRUCTION AND OPERATION

Fiber-optic cable for communications will also be necessary. Approximately 21.7 miles of fiber-optic cables and collector cables (Section 2.11) will be placed underground in trenches adjacent to access roads. Additionally, approximately 0.31 mile of T-1 fiber-optic cable for communications will be placed underground running from the O&M building to Highway 893. Within the 200-foot-wide TLUA, trenches will be excavated up to 20 feet wide (to accommodate multiple circuits) and 3 to 5 feet deep. The cables will then be placed in the trench. Placement of the 0.31 mile of T-1 fiber-optic line will require temporary disturbance to 0.6 acre of land. Following placement of the cables, the trench will be backfilled and any topsoil set aside during excavation will be placed on top and the area restored.

A 100-foot-tall microwave tower will be located within the Osceola switching station area. The tower will be placed where it has a direct line of site, and WTGs will not interfere with it. Fiber-optic cable will also be placed on NV Energy’s 230 kV line structures from the Osceola switching station, west to the east side of highway 893, where a box will be placed to intercept existing conduit.

4.0 OPERATIONS AND MAINTENANCE

4.1 OPERATIONS, WORKFORCE, EQUIPMENT, AND FACILITY MAINTENANCE NEEDS

Once the project has been constructed, the Spring Valley Wind Generation Facility will be monitored and operated year-round by SVW and will have a permanent staff of 10 to 12 full-time technicians. The computer control system for each turbine will perform self-diagnostic tests, allowing a remote operator to ensure each turbine is functioning at peak performance. Routine maintenance activities consisting of visual inspections, oil changes, and gearbox lubrication will result in regular truck traffic on project access roads throughout the year. Project access roads will be graded as necessary to facilitate operations and maintenance.

Annual maintenance activities requiring the shutdown of turbines will be coordinated to occur during periods of little or no wind to minimize the impact to the amount of overall energy generation. Annual maintenance procedures will consist of inspecting wind turbine components and fasteners.

The access roads built and used during the construction phase will be maintained throughout commercial operations. During operations, all project access roads will be evaluated and graded as necessary to facilitate operations and maintenance. In addition to grading, the application of new gravel may be necessary to maintain road surfaces.

4.2 MAINTENANCE ACTIVITIES, INCLUDING ROAD MAINTENANCE

All equipment used in the operation of this project will be maintained and inspected regularly by authorized and trained facility staff. A complete schedule will be established before the start of operations.

The access roads built and used during the construction phase will be maintained throughout commercial operations. During operations, all project access roads will be evaluated and graded as necessary to facilitate operations and maintenance. In addition to grading, the application of new gravel may be necessary to maintain road surfaces. Roads will be watered as needed to provide dust suppression.

5.0 ENVIRONMENTAL CONSIDERATIONS

5.1 GENERAL DESCRIPTION OF SITE CHARACTERISTICS AND POTENTIAL ENVIRONMENTAL ISSUES (EXISTING INFORMATION)

To assess project environmental feasibility and environmental issues inherent in constructing and operating a large scale wind energy facility in Spring Valley, SVW retained Estep Environmental Consulting to conduct an Environmental Screening Analysis. Estep's comprehensive study included a regulatory overview of applicable federal and state laws and regulations plus initial field and/or desktop environmental inventory, including the following:

- Local vegetation
- Wildlife and endangered or special-status species
- Cultural and paleontological resources
- Visual, noise, and recreation
- Livestock grazing
- Woodland and native plant species
- Watershed and fire management
- Special designations (protected areas)
- Local economic and social conditions
- Native American religious or other concerns
- Environmental justice
- Health and safety
- Community issues and aviation

Following this initial desktop review, the Environmental Screening Analysis cataloged project risks in the context of the BLM's Ely District RMP to provide a preliminary risk assessment profile of potential issues that could negatively impact the project's development. Finally, the subject area of the study was intentionally conducted over a much larger area than the initial ROW to provide a broader base of information and flexibility should specific area issues arise.

5.1.1 SPECIAL OR SENSITIVE SPECIES AND HABITATS

The Environmental Screening Process revealed one issue—turbine collision-related bat mortality— as a potential "high-risk" issue due to the presence of the Rose Guano Cave bat roost east of the proposed project area. A number of other issues were regarded as "moderate risk," including wetlands, soils, fish and wildlife resources, special-status species, collision-related avian mortality, cultural resources, and visual resources.

SVW (using protocols approved by the BLM Ely District on April 6 and July 9, 2007) completed a study on the potential issue of bat and bird collisions. Bat studies were completed using Anabat equipment installed on the current met tower and seven other locations throughout the designated project area. Bird studies were completed using point-count and other methods. These surveys have provided information on the number, frequency, and flying patterns of all bird and bat species to assess potential impacts and determine appropriate conservation and/or mitigation measures. Results of these surveys are available in the *Spring Valley Wind Generating Facility Final Preconstruction Survey Results Report* (SWCA 2009).

Radar and telemetry studies have been conducted on bats at the nearby Rose Guano Cave. The results of these studies will be used to describe the existing bat population using the cave in order to help determine impacts. They will also be used in the development of conservation and mitigation measures.

5.1.2 SPECIAL LAND USE DESIGNATIONS

The Swamp Cedar Area of Critical Environmental Concern lies to the northeast of the project area and is adjacent along almost 1 mile of the eastern boundary of the project limits. However, there are no special land use designations within the project area.

5.1.3 CULTURAL AND HISTORIC RESOURCE SITES AND VALUES

Type III intensive cultural resource inventory surveys have been completed. As necessary, project components will be relocated to avoid direct impacts to any eligible sites.

5.1.4 NATIVE AMERICAN TRIBAL CONCERNS

Pursuant to Section 106 of the National Historic Preservation Act, the BLM has initiated Native American consultation. The BLM Ely District Office is conducting government to government Native American consultation. Currently, a sacred site located to the north and east of the project area has been identified and should be avoided.

5.1.5 RECREATION AND OHV CONFLICTS

The BLM manages recreation on public lands by identifying special recreation management areas (SRMAs). SRMAs have a distinct recreation market and corresponding management strategy. BLM-managed public lands not delineated as SRMAs are managed as extensive recreation management areas (ERMAs) and do not require a specific management strategy or activity level planning. Recreation on public lands is also managed through the Recreation Opportunity Spectrum (ROS). The ROS is the framework used for planning and managing recreational experiences and the recreation setting. The BLM Ely District Office has identified the project area as within the Loneliest Highway SRMA, which is managed for a broad ROS to ensure a balance of recreation experiences (BLM 2008). A site-specific Recreation Area Management Plan for the SRMA has not been prepared. There are currently two BLM-developed recreation sites near the project area; Cleve Creek campground and Sacramento Pass. Cleve Creek campground is northwest of the project area on the east side of the Schell Creek Range. The campground has both individual and group camping sites. There are opportunities for hunting, fishing, horseback riding, hiking, and off-highway vehicle riding on existing roads and trails. Sacramento Pass is east of the project area along Highway 50. There is a small pond stocked with fish, and several camping and picnic areas. There are opportunities for horseback riding, mountain biking, hiking, and wildlife observation.

Great Basin National Park is south east of the project area in the Snake Range. Developed recreation sites consisting of the visitor center, Lehman Caves, campgrounds, and trails are located on the east side of the Snake Range. Additionally, there are outstanding opportunities for dispersed recreation on the west side of the Snake Range. The project area is visible from the west side of the Snake Range and from the summit of Wheeler Peak, although the distance, approximately 12 miles, and angle of observation minimize the amount of potential contrast that would be apparent from the proposed action.

Site-specific travel management plans and route designations have not been completed for Spring Valley. Motorized travel in the project area has been limited to existing roads and trails. Roads and trails in the project area are used for dispersed recreation on a limited basis.

5.1.6 NOISE

Site-specific data on outdoor sound levels in the project area are not available. It is known that the project area has low human population density. Additionally, it is known that the existing ambient noise level at the site is low. Typical primary noise sources throughout the project area consist of noise caused by wind and vehicular traffic along the major roads. In general, background noise levels are higher during the day than at night.

Noise levels generated during the construction phase will vary, depending on such factors as equipment used; operation schedule; and conditions of the project area. Most construction activities will occur during the day, and nighttime noise levels are anticipated to drop to the background levels of the project area. Construction activities will last for a short period (1 year) and, accordingly, their potential impacts would be short term and intermittent in nature.

During facility operation, sources of noise will consist of mechanical and aerodynamic noise; transformer and switchgear noise from the substation and switching yard; corona noise from transmission lines; vehicular traffic noise, and noise from the O&M building, all of which is expected to be negligible. Overall, the noise levels from site operation are anticipated to be lower than the noise levels associated with short-term construction activities.

5.1.7 PALEONTOLOGICAL RESOURCES

After evaluation of the geology and sedimentary context of the project area, it has been determined unlikely that paleontological resources exist, and no surveys or additional research is necessary.

5.1.8 VISUAL RESOURCE MANAGEMENT DESIGNATIONS AND VISUAL IMPACTS

The BLM uses a Visual Resource Inventory (VRI) system to inventory and manage visual resources on public lands. VRI classes are visual ratings that describe an area in terms of visual or scenic quality and viewer sensitivity to the landscape (the degree of public concern for an area’s scenic quality). The VRI system uses four classes to describe different degrees of modification allowed to the landscape; Classes I and II are the most valued, Class III represents moderate value, and Class IV represents the least value. The VRI provides the basis for considering visual values in the RMP process. Visual Resource Management (VRM) classes are established through the RMP process. During the RMP process, the VRI class boundaries and assignments may be adjusted to reflect resource allocation decisions made in the RMP. The VRM objectives can then be used to analyze and determine visual impacts of proposed activities and to gauge the amount of disturbance an area can tolerate before it exceeds the visual management objectives of its VRM class (BLM 1980).

VRM analysis involves determining whether the visual impacts of the elements of the proposed project would meet the management objectives established for the project area in the RMP. The BLM has established a visual contrast rating process to complete this analysis. SWCA Environmental Consultants (SWCA) will work with the BLM to select Key Observation Points (KOPs) to represent effects of the project as seen from public areas that permit a high degree of visibility to the project area. Visual resource specialists will evaluate the degree of visual contrasts from each KOP, based on the form, line, color, and texture changes between the existing landscapes and how the landscapes would look after implementation of the proposed action.

The BLM designated the project areas as a VRM Class III. The Class III management objective "is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention, but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape" (BLM 1980).

The proposed Spring Valley Wind Energy facilities occur within a classic Basin and Range landscape that includes broad, open valleys flanked by north-south-trending mountain ranges that define and contain the views. The overall appearance of the landscape is vast with gray-green, low-growing grasses and shrubs as the predominant vegetation. Additional vegetation consists of the darker green rocky mountain juniper or swamp cedars, present on the valley floor. This low-growing vegetation would not provide any vegetative screening for large structures, such as the proposed wind turbines. Turbines are planned for the flat terrain of the valley floor, set against the mountains as a backdrop. The existing landscape has been modified through past and current human habitation, highway and road development, ranching and mining activities, and transmission lines. To assist with the identification of critical KOPs, SWCA prepared a viewshed assessment indicating lands from which the proposed action would be visible within both a 5- and 11-mile radius (Figure 6.6).

5.1.9 AVIATION AND/OR MILITARY CONFLICTS

SVW filed the turbine locations with the FAA. The project received No Hazard Determinations. In accordance with the *Wind Energy Protocol between the Department of Defense and the Bureau of Land Management Concerning Consultation of Development of Wind Energy Projects and Turbine Siting on Public Lands Administered by the Bureau of Land Management to Ensure Compatibility with Military Activities,* the BLM sent the preliminary POD to the Region IX Department of Defense Regional Environmental Coordinator on May 1, 2009. The results of the consultation are that although the proposed wind turbines are within the boundaries of a low-level military training route (VR1259,) because of how that particular route is used, the impacts can be mitigated so they are less than significant. Preliminary screening for wind turbine impacts on Department of Defense and Department of Homeland Security long-range radars indicates that there will not be any adverse impact (personal communication between Natalie McCue [Pattern] and Anthony Parisi [NAVAIR Ranges] on June 12, 2009).

5.1.10 GENERAL VEGETATION

Vegetation within the project area is typical of the Great Basin desert, and is primarily composed of Inter-Mountain Basins Mixed Salt Desert Scrub (mixed salt desert scrub), Inter-Mountain Basins Big Sagebrush Shrubland (big sagebrush shrubland), and Great Basin Xeric Mixed Sagebrush Shrubland (mixed sagebrush shrubland) (USGS 2004). Due to the widespread occurrence of these vegetation communities within Spring Valley, construction and operation of the proposed facility would have only a very slight reduction in overall vegetation in Spring Valley.

5.1.11 GRAZING/RANGELAND

Livestock grazing and production is the dominant land use in and around the project area (Estep 2007). Spring Valley has primarily been utilized as a rangeland, both historically and presently, for cattle and sheep grazing. Rangelands are divided into allotments for management purposes. The proposed project area would be constructed within two existing grazing allotments, the Majors Allotment and the Bastion Creek Allotment. Availability of rangeland may decrease during project construction due to temporary closures.

5.1.12 OTHER ENVIRONMENTAL CONSIDERATIONS

In addition to the Environmental Screening process, a Spring Valley Natural Resources Report has been prepared to examine the current condition of natural resources of interest within the project area. Conditions described for these resources will serve as baseline data for future NEPA analysis of the proposed wind generation facility. These resources include general vegetation and wildlife species, sensitive plant species, noxious weeds, pygmy rabbits, sage grouse, spring snails, bats, and migratory birds.

Additionally, the operation of the wind turbines is not expected to cause significant adverse impacts to nearby residences and occupied buildings from shadow flicker, low-frequency sound, or electromagnetic frequency.

5.2 DESIGN CRITERIA (MITIGATION MEASURES) PROPOSED BY APPLICANT AND INCLUDED IN POD

5.2.1 FACILITY COMMITMENTS

- Alternate Turbine Locations – 85 potential turbine locations will be analyzed, but a range of 66 to 75 sites will be developed, allowing selection of the best wind sites and avoidance of environmentally sensitive areas.
- Use of Tubular Conical Steel Turbine Towers – Tubular towers do not provide locations for raptors to perch, decreasing risk of collisions with turbine blades.
- Underground Collection System – Reduces the visual impact of overhead transmission as well as the potential impact to avian and bat species from collisions.
- Setbacks – Turbines will be set back from public roads at least 1.1× total turbine height and will be setback 1.5× total turbine height from any property lines and ROW boundary.

5.2.2 CONSTRUCTION COMMITMENTS

- Best Management Practices – For example, construction vehicle movement within the project boundary would be restricted to predesignated access, contractor-required access, or public roads. In construction areas where ground disturbance is unavoidable, surface restoration would consist of returning disturbed areas back to their natural contour (if feasible), reseeding with native seed mix. A full list of BMPs will be developed and included in the COM Plan.
- A Transportation Plan shall be developed, particularly for the transport of turbine components, main assembly cranes, and other large pieces of equipment. The plan shall consider specific object sizes, weights, origin, destination, and unique handling requirements and shall evaluate alternative transportation approaches. In addition, the process to be used to comply with unique state requirements and to obtain all necessary permits shall be clearly identified.
- A Traffic Management Plan shall be prepared as part of the Transportation Plan for the site access roads to ensure that no hazards would result from the increased truck traffic and that traffic flow would not be adversely impacted. This plan shall incorporate measures such as informational signs, flaggers when equipment may result in blocked throughways, and traffic cones to identify any necessary changes in temporary lane configuration. Additionally, SVW will consult with local planning authorities regarding increased traffic during the construction phase, including an assessment of the number of vehicles per day, their size, and type. Specific issues of concern (e.g., location of school bus routes and stops) shall be identified and addressed in the traffic management plan.

5.2.3 RESOURCE CONSERVATION MEASURES

- Direct avoidance of any eligible cultural resources.
- Wildlife Mitigation and Monitoring Plan – The BLM Ely District is currently preparing wind energy protocol in coordination with the Nevada Department of Wildlife. If the Ely BLM wind energy protocol is not complete, an individual plan specific to Spring Valley would be prepared as part of the COM Plan. The plan would detail initial mitigation requirements and an adaptive mitigation plan using a tiered approach that details post-construction monitoring requirements and uses those findings to implement necessary levels of mitigation. The plan would be based on avian/bat mortality assessments and be designed and implemented in coordination with the BLM and other appropriate agencies.
- Survey all proposed ground-disturbing activities in suitable pygmy rabbit habitat using the appropriate protocol.
- Facilities shall be designed to discourage their use as perching or nesting substrates by birds. For example, power lines and poles shall be configured to minimize raptor electrocutions and discourage raptor and raven nesting and perching.
- Migratory Birds – If construction is planned between March 15 and July 30, migratory bird clearance surveys would be conducted. Evidence of active nests or nesting will be reported immediately to the BLM to determine appropriate minimization measures (i.e., avoidance buffer will be established until birds have fledged the nest) on a case-by-case basis.
- Where appropriated, restrict permitted activities from March 1 through May 15 within 2 miles of an active greater sage-grouse lek.
- Where appropriate, restrict permitted activities from November 1 through May 15 within greater sage grouse winter range.
- Develop a stormwater management plan for the site to ensure compliance with applicable regulations and prevent off-site migration of contaminated stormwater or increased soil erosion.
- Restoration Plan – A plan would be prepared as part of the COM Plan. The plan would describe restoration methods and requirements for temporary disturbance areas.
- For soil-disturbing actions that will require reclamation, salvage and stockpile all available growth medium prior to surface disturbances. Seed stock piles if they are to be left for more than one growing season. Re-contour all disturbance areas to blend as closely as possible with the natural topography prior to re-vegetation. Rip all compacted portions of the disturbance to an appropriate depth based on site characteristics. Establish an adequate seed bed to provide good seed to soil contact.
- Do not allow bristlecone pine, limber pine, or swamp cedar to be harvested except for education, scientific, research purposes.
- Develop a plan for control of noxious weeds and invasive species, which could occur as a result of new surface disturbance activities at the site. The plan shall address monitoring, education of personnel on weed identification, the manner in which weeds spread, and methods for treating infestations. The use of certified weed-free mulching shall be required. If trucks and construction equipment are arriving from locations with known invasive vegetation problems, a controlled inspection and cleaning area shall be established to visually inspect construction equipment arriving at the project area and to remove and collect seeds that may be adhering to tires and other equipment surfaces.

- If pesticides are used on the site, an integrated pest management plan shall be developed to ensure that applications would be conducted within the framework of BLM and U.S. Department of the Interior policies and entail only the use of U.S. Environmental Protection Agency–registered pesticides. Pesticide use shall be limited to non-persistent, immobile pesticides and shall only be applied in accordance with label and application permit directions and stipulations for terrestrial and aquatic applications.
- All straw, hay, straw/hay, or other organic products used for reclamation or stabilization activities must be certified that all materials are free of plant species listed on the Nevada noxious weed list or specifically identified by the Ely District Office. Inspections will be conducted by a weed scientist or qualified biologist.
- Where appropriate, vehicles and heavy equipment used for the completion, maintenance, inspection, or monitoring of ground-disturbing activities; for emergency fire suppression; or for authorized off-road driving will be free of soil and debris capable of transporting weed propagules. Vehicles and equipment will be cleaned with power or high-pressure equipment prior to entering or leaving the work site or project area. Vehicles used for emergency fire suppression will be cleaned as a part of check-in and demobilization procedures. Cleaning efforts will concentrate on tracks, feet, or tires and on the undercarriage. Special emphasis will be applied to axles, frames, cross members, motor mounts, on and underneath steps, running boards, and front bumper/brush guard assemblies. Vehicle cabs will be swept out and refuse will be disposed of in waste receptacles. Cleaning sites will be recorded using global positioning systems or other mutually acceptable equipment and provided to the Ely District Office Weed Coordinator or designated contact person.
- Prior to the entry of vehicles and equipment to a planned disturbance area, a weed scientist or qualified biologist will identify and flag areas of concern. The flagging will alert personnel or participants to avoid areas of concern.
- To minimize the transport of soil-borne noxious weed seeds, roots, or rhizomes, infested soils or materials will not be moved and redistributed on weed-free or relatively weed-free areas. In areas where infestations are identified or noted and infested soils, rock, or overburden must be moved, these materials will be salvaged and stockpiled adjacent to the area from which they were stripped. Appropriate measures will be taken to minimize wind and water erosion of these stockpiles. During reclamation, the materials will be returned to the area from which they were stripped.

6.0 Maps and Drawings

6.1 Maps with Footprint of Wind Facility (7.5 Min Topographic Maps or Equivalent to Include References to Public Land Survey System)

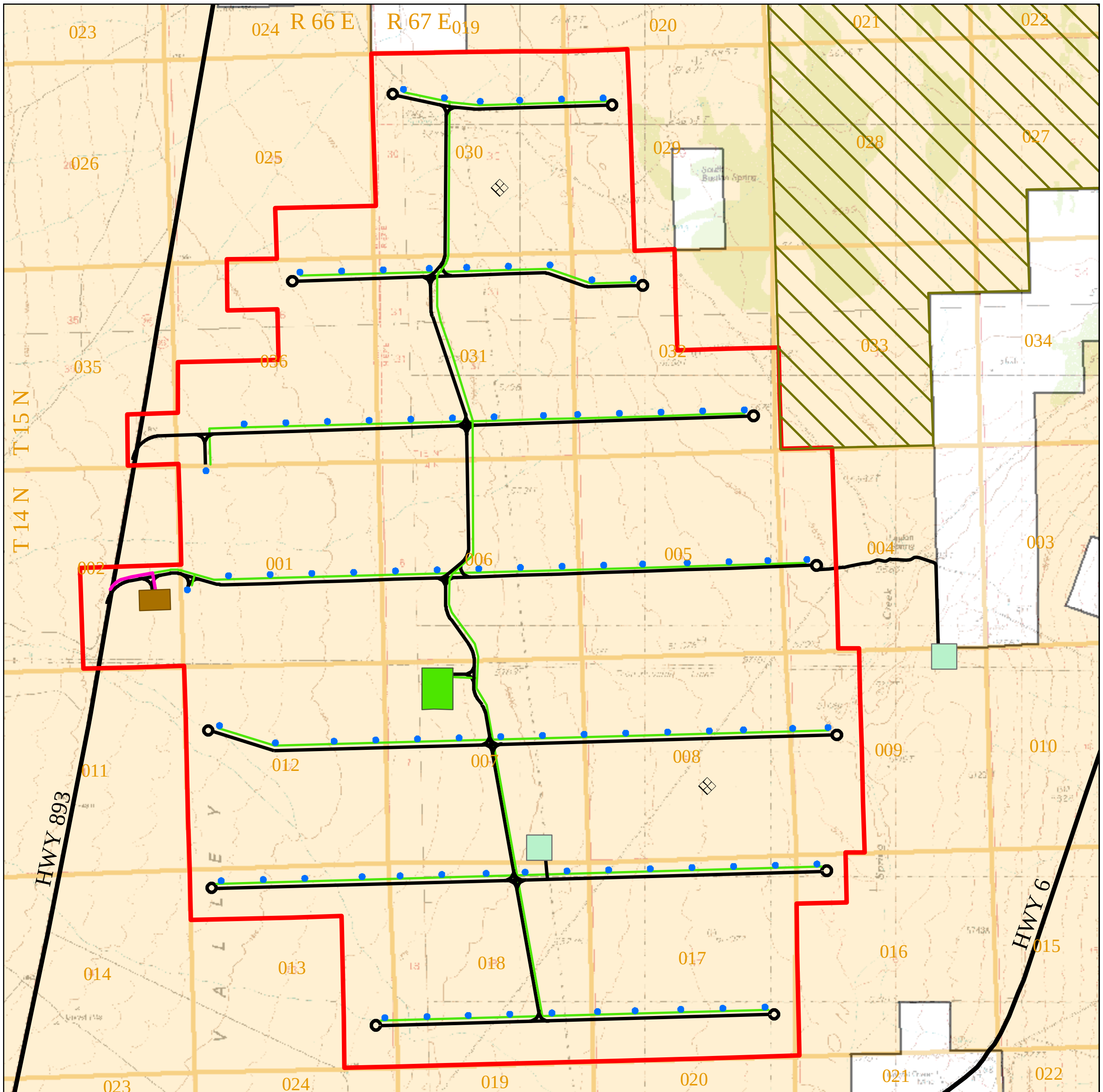
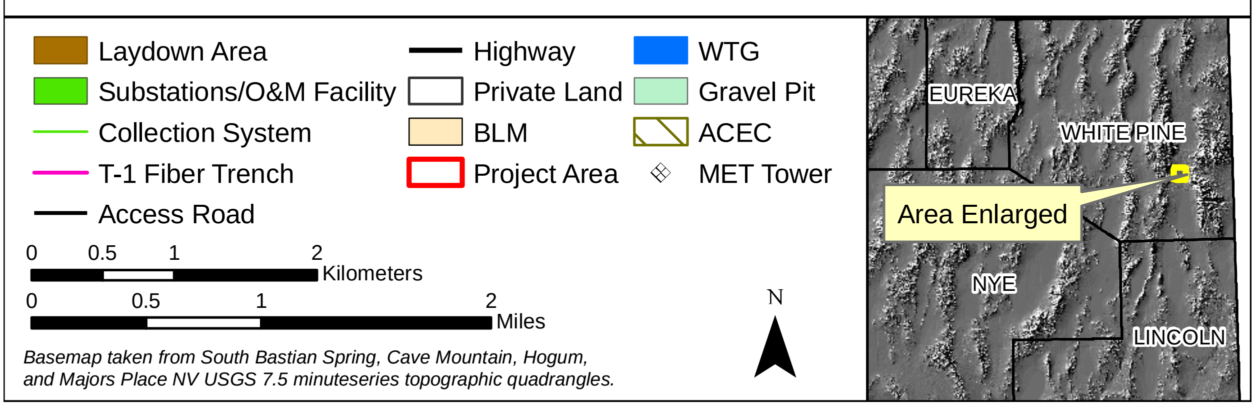


Figure 6.1-1. Project area facility layout.



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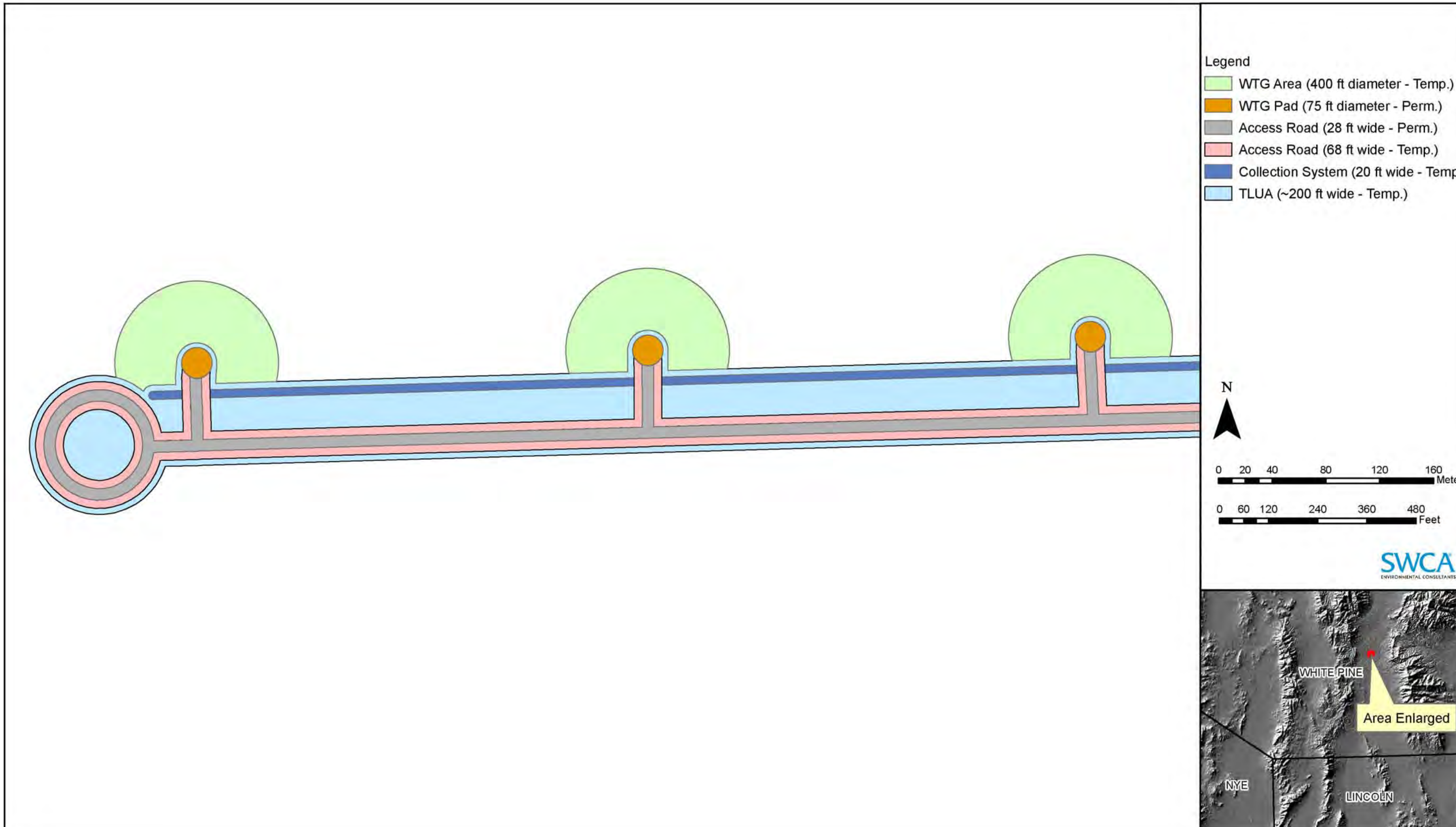

Figure 6.1-2. Typical use areas.

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6.2 Initial Design Drawings of Wind Facility Layout and Installation, Electrical Facilities, and Ancillary Facilities

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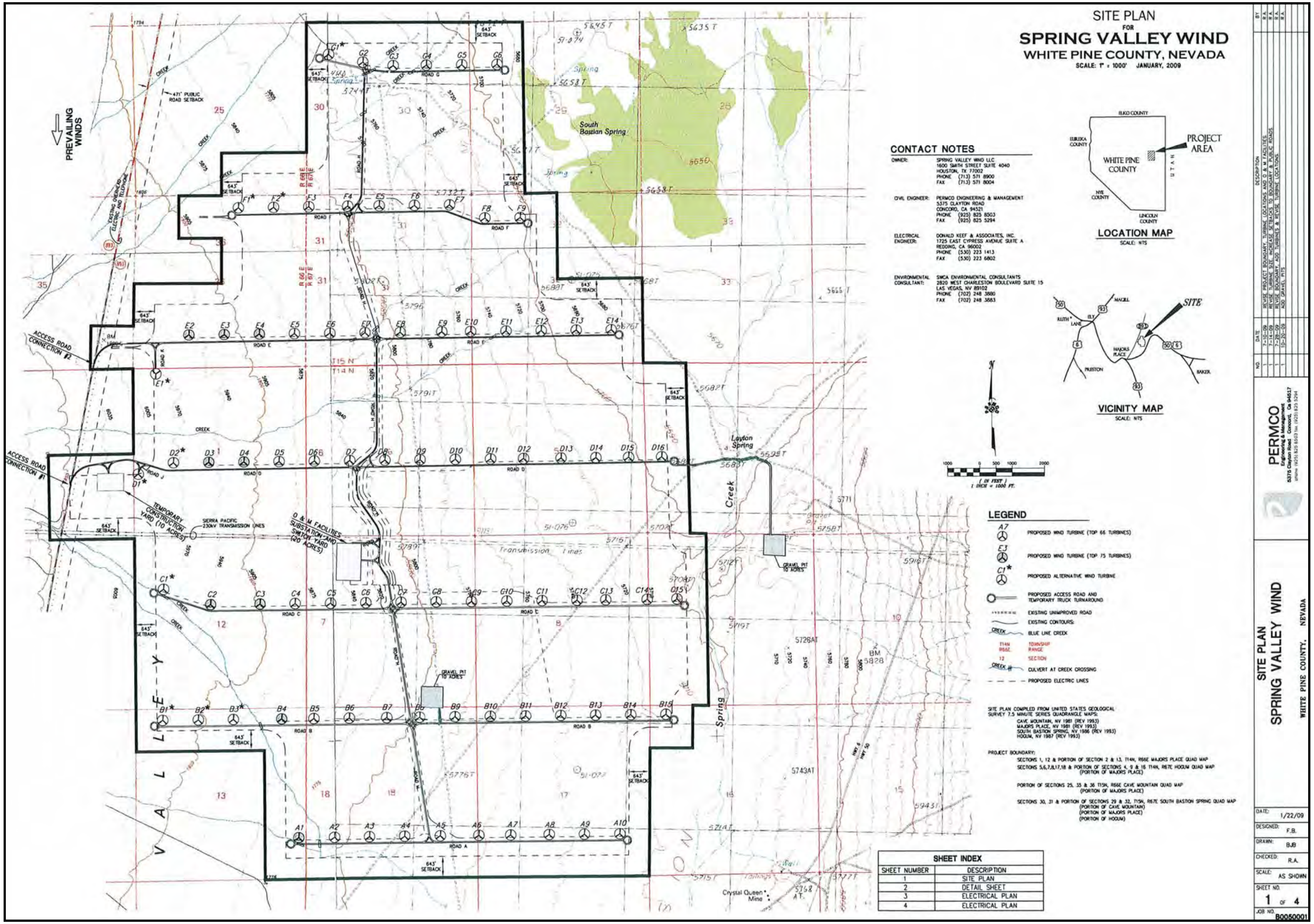

Figure 6.2-1. Site layout.

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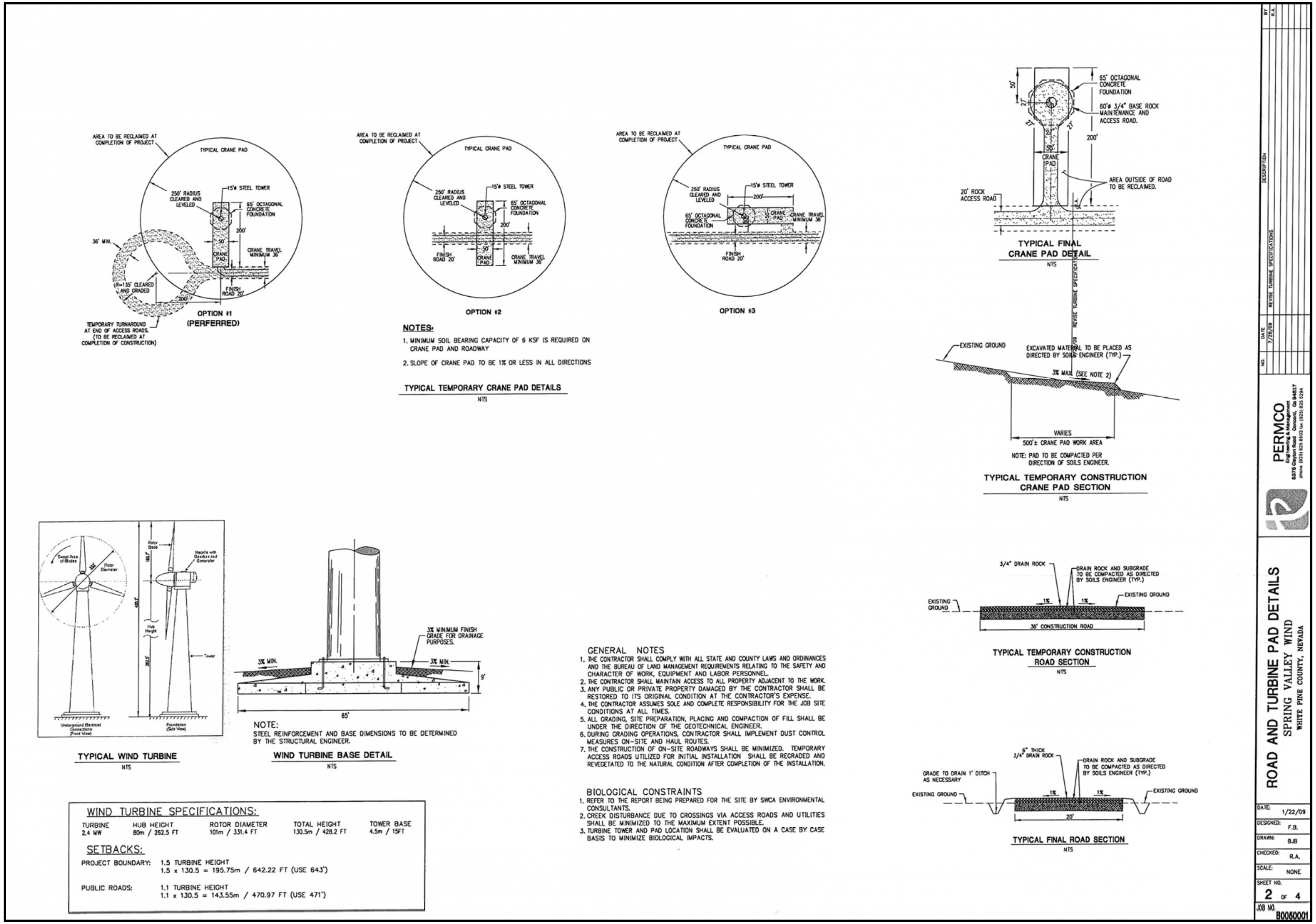

Figure 6.2-2. Road and turbine details.

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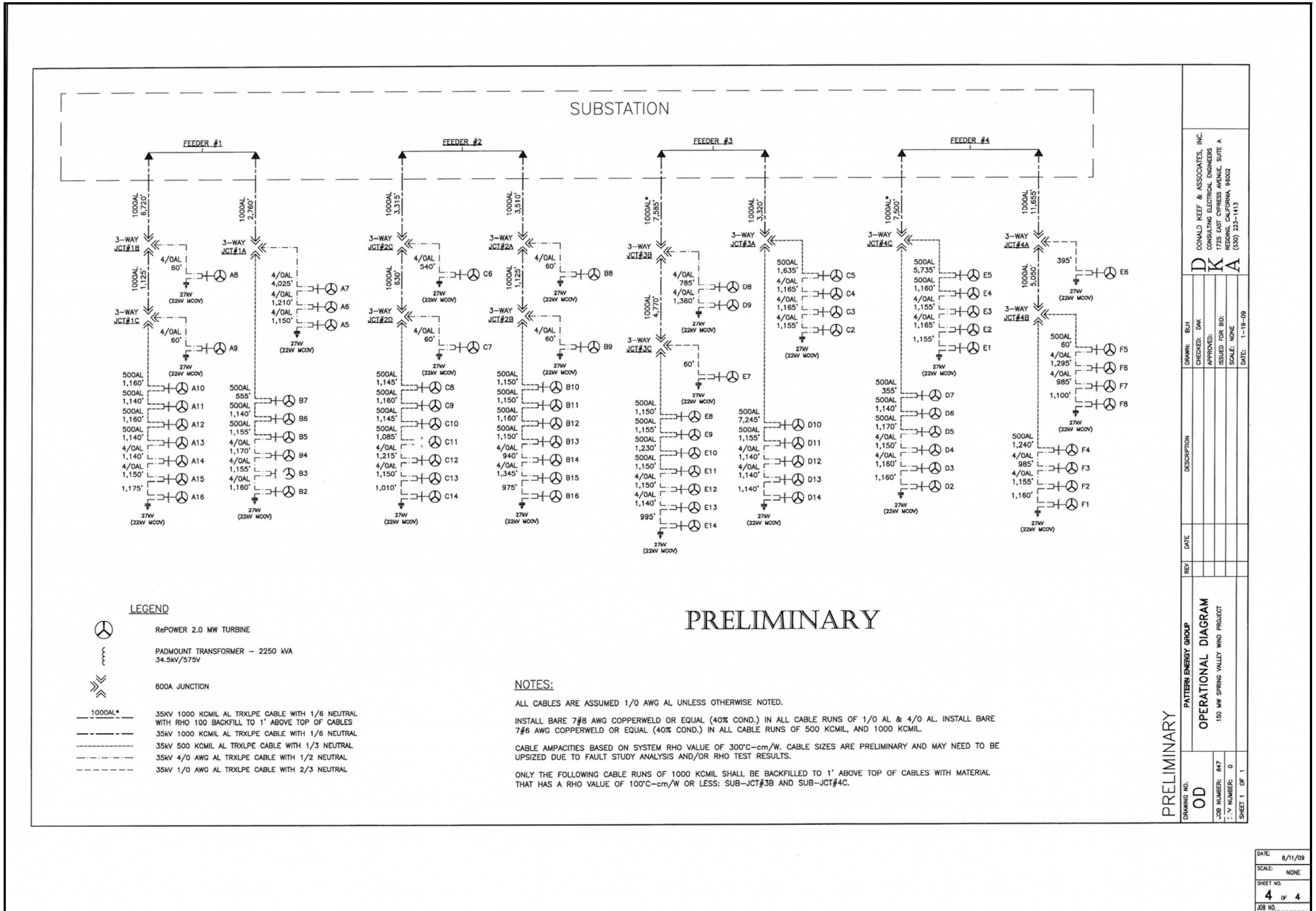

Figure 6.2-3. Operational diagram.

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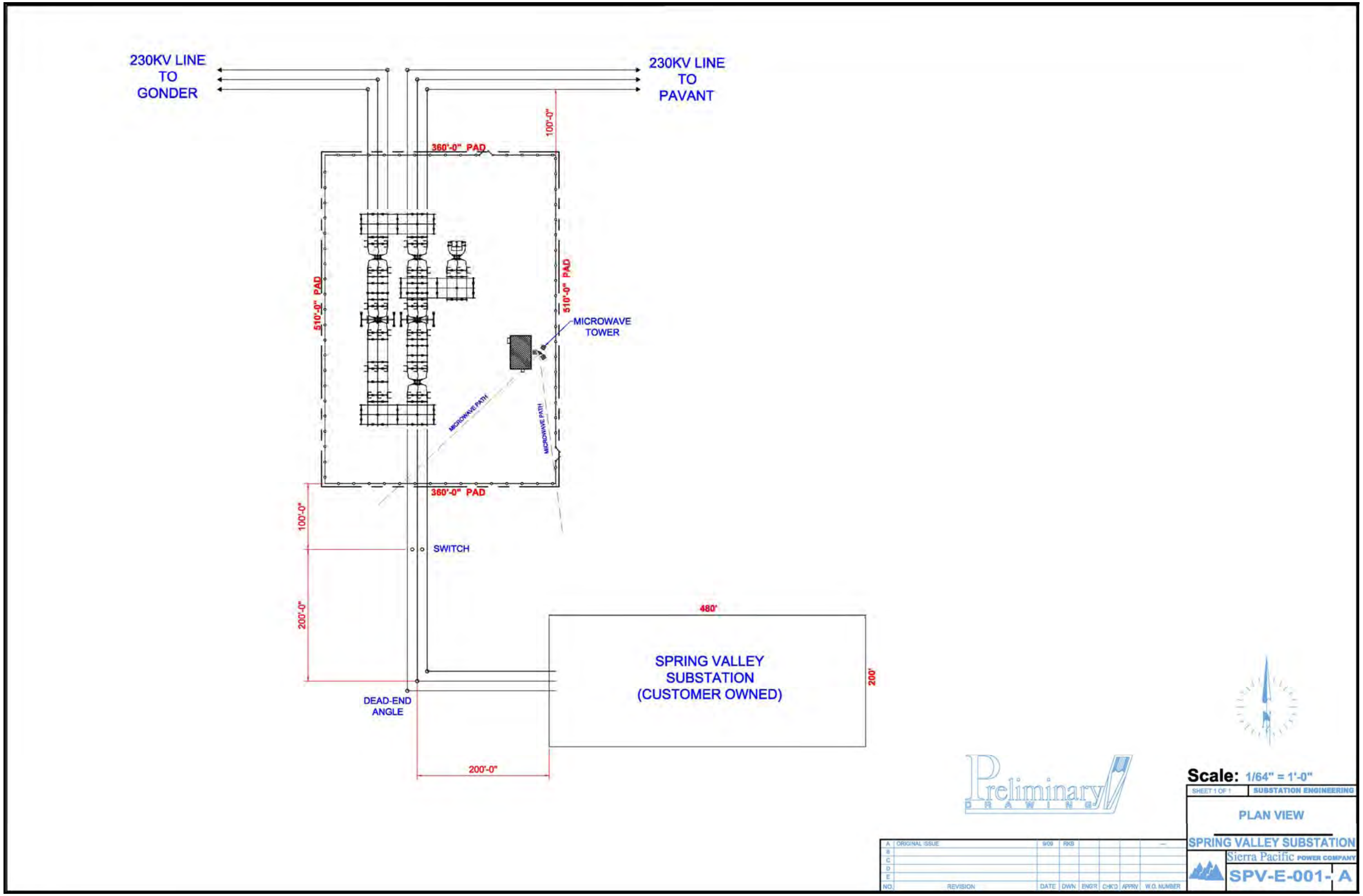

Figure 6.2-4. Substation and Switchyard Plan view.

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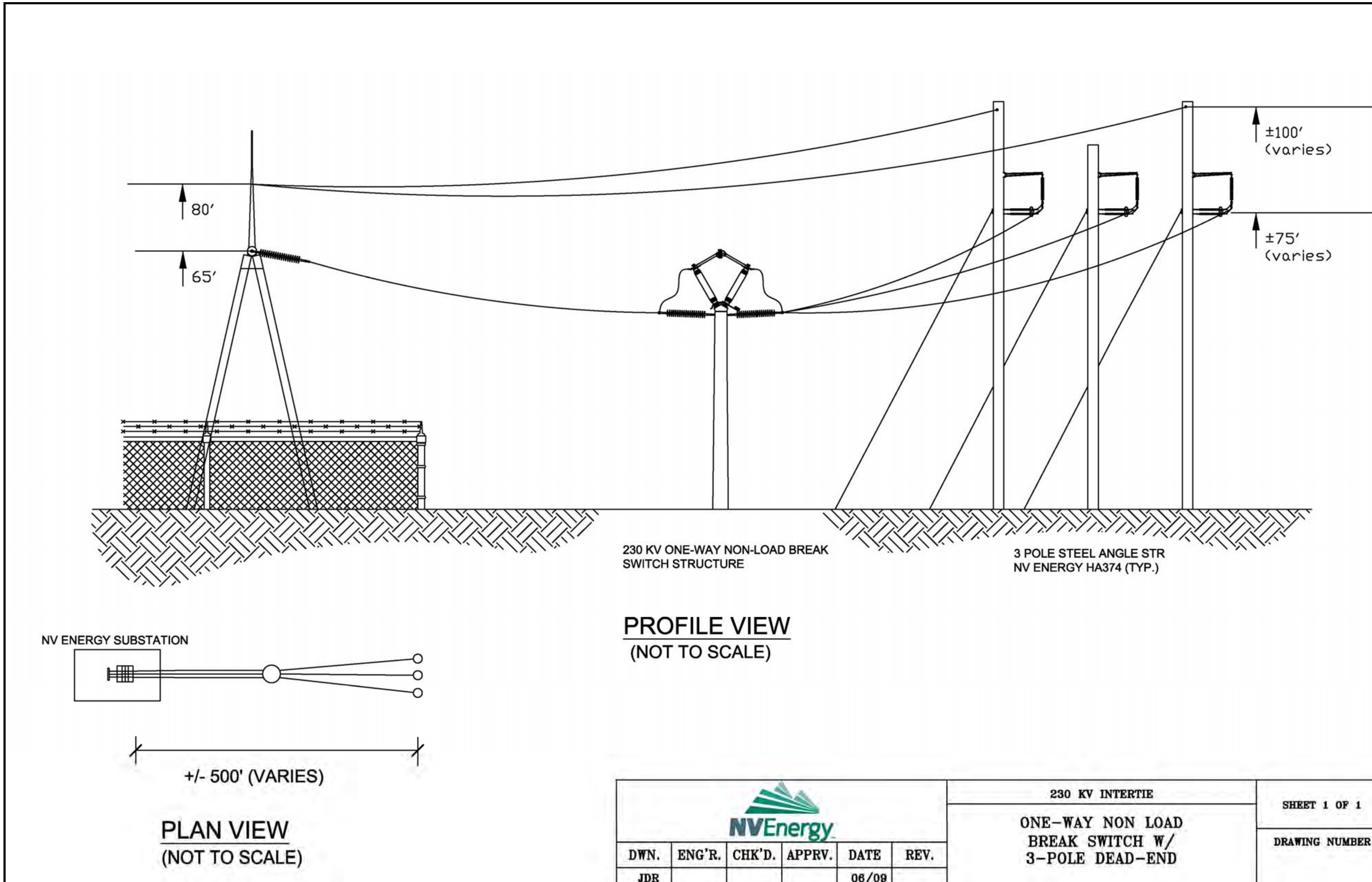

Figure 6.2-5. Substation and Switchyard Profile view.

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6.3 Maps with Transmission Facilities, Substation, Switching Station, Distribution, Communications

See Section 6.2 Figures

6.4 Access and Transportation Maps

See Figure 6.1-1.

6.5 Visual Resource Evaluation and Visual Resource Simulations

A Visual Resource Assessment was completed for this project and is included in Appendix D.

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APPENDIX A. LEGAL DESCRIPTION

LEGAL DESCRIPTION FOR SPRING VALLEY WIND FARM ROW

Township	Range	Section	Quarter-Quarter-Quarter
14N	66E	1	All
		2	All of SE
		12	All
		13	N1/2 of NW
			N1/2 of NE
			E1/2 of SE
			All of SENE
	67E	4	W1/2 of NW
			W1/2 of SW
		5	All
		6	All
		7	All
		8	All
		9	W1/2 of NW
			W1/2 of SW
			W1/2 of NENW
			W1/2 of SENW
			W1/2 of NESW
			W1/2 of SESW
		18	All
		17	All
		16	All of NWNW
15N	66E	25	S1/2 of SE
		35	All of SESE
		36	All of S1/2
			All of NE
			All of NENW
	67E	29	W1/2 of NW
			W1/2 of SW
			W1/2 of NENW
			W1/2 of SENW
			W1/2 of NESW
			W1/2 of SESW
		30	All
		31	All
		32	All of S1/2
			All of NW

LEGAL DESCRIPTION FOR GRAVEL PIT AND ASSOCIATED ROAD OUTSIDE OF WIND FARM ROW

Township	Range	Section	Quarter-Quarter-Quarter
T14N	R67E	4	SWSESE
			E1/2 of SWSE
			SENWSE
			N1/2 of NWSE
			N1/2 of NESW
			NENWSW
		9	NWNENE
			NENWNE
		7	W 1/2 of SESE
			E 1/2 of SWSE

APPENDIX B. POTENTIAL IMPACTS BY TURBINE LOCATION

Turbine #	Resource Impact Potential (3 = High, 2 = Moderate, 1 = Low; 0 = None/Negligible)																						**Total**	**Any High Potential Impacts?**
	ACEC	Cultural Resources	EJ / NA Concerns	Noxious weeds	Rangeland	Recreation	Social Economics	Prime & Unique Farmlands	Watershed-Soils	Watershed-Surface Water	Watershed-Vegetation	Visual	Wetlands / Riparian	Elk	Mule Deer	Pronghorn	Sage Grouse	Pygmy Rabbit	Special Status Species	Birds (inc. migratory) non-raptors	Raptors (inc. migratory)	Bats		
1	0	0	0	1	1	0	0	1	2	1	1	2	0	0	0	0	0	0	0	1	1	2	**13**	**N**
2	0	0	0	1	1	0	0	0	1	1	1	2	0	0	0	0	0	0	0	1	1	2	**11**	**N**
3	0	0	0	1	1	0	0	1	2	1	1	2	0	0	0	0	0	0	0	1	1	2	**13**	**N**
4	0	0	0	1	1	0	0	1	2	1	1	2	0	0	0	0	0	0	0	1	1	2	**13**	**N**
5	0	1	0	1	1	0	0	1	2	1	1	2	0	0	0	0	1	1	0	1	1	2	**16**	**N**
6	0	2	0	1	1	0	0	1	2	1	1	2	0	0	0	0	0	1	0	1	1	2	**16**	**N**
7	0	0	0	1	1	0	0	0	2	1	1	2	0	0	0	0	1	1	0	1	1	2	**14**	**N**
8	0	0	0	1	1	0	0	0	2	1	1	2	0	0	0	0	1	1	0	1	1	2	**14**	**N**
9	0	0	0	1	1	0	0	0	2	1	1	2	0	0	0	0	1	1	0	1	1	2	**14**	**N**
10	0	0	0	1	1	0	0	0	2	1	1	2	0	0	0	0	0	0	0	1	1	2	**12**	**N**
11	0	1	0	1	1	0	0	0	2	1	1	2	0	0	0	0	1	1	0	1	1	2	**15**	**N**
12	0	0	0	1	1	0	0	0	2	1	1	2	0	0	0	0	0	0	0	1	1	2	**12**	**N**
13	0	0	0	1	1	0	0	0	2	1	1	2	0	0	0	0	0	2	0	1	1	2	**14**	**N**
14	0	0	0	1	1	0	0	1	2	2	1	2	0	0	0	0	1	1	0	1	1	2	**16**	**N**
15	0	0	0	1	1	0	0	1	2	1	1	2	0	0	0	0	1	1	0	1	1	2	**15**	**N**
16	0	0	0	1	1	0	0	1	2	1	1	2	0	0	0	0	1	1	0	1	1	2	**15**	**N**
17	0	0	0	1	1	0	0	1	2	1	1	2	0	0	0	0	1	1	0	1	1	2	**15**	**N**
18	0	0	0	1	1	0	0	1	2	1	1	2	0	0	0	0	0	0	0	1	1	2	**13**	**N**
19	0	0	0	1	1	0	0	1	2	1	1	2	0	0	0	0	0	0	0	1	1	2	**13**	**N**
20	0	0	0	1	1	0	0	1	2	1	1	2	0	0	0	0	0	0	0	1	1	2	**13**	**N**
21	0	0	0	1	1	0	0	1	2	1	1	2	0	0	0	0	1	1	0	1	1	2	**15**	**N**
22	0	0	0	1	1	0	0	1	2	1	1	2	0	0	0	0	1	1	0	1	1	2	**15**	**N**
23	0	0	0	1	1	0	0	0	2	1	1	2	0	0	0	0	1	1	0	1	1	2	**14**	**N**
24	0	0	0	1	1	0	0	0	2	1	1	2	0	0	0	0	1	1	0	1	1	2	**14**	**N**
25	0	0	0	1	1	0	0	0	2	1	1	2	0	0	0	0	1	1	0	1	1	2	**14**	**N**
26	0	0	0	1	1	0	0	0	2	1	1	2	0	0	0	0	1	1	0	1	1	2	**14**	**N**
27	0	1	0	1	1	0	0	1	2	1	1	2	0	0	0	0	1	1	0	1	1	2	**16**	**N**
28	0	0	0	1	1	0	0	0	1	1	1	2	0	0	0	0	0	0	0	1	1	2	**11**	**N**
29	0	0	0	1	1	0	0	0	1	1	1	2	0	0	0	0	0	0	0	1	1	2	**11**	**N**
30	0	0	0	1	1	0	0	0	1	1	1	2	0	0	0	0	0	0	0	1	1	2	**11**	**N**
31	0	0	0	1	1	0	0	0	1	1	1	2	0	0	0	0	0	0	0	1	1	2	**11**	**N**
32	0	0	0	1	1	0	0	0	1	1	1	2	0	0	0	0	0	0	0	1	1	2	**11**	**N**

Turbine #	Resource Impact Potential (3 = High, 2 = Moderate, 1 = Low; 0 = None/Negligible)																						**Total**	**Any High Potential Impacts?**
	ACEC	Cultural Resources	EJ / NA Concerns	Noxious weeds	Rangeland	Recreation	Social Economics	Prime & Unique Farmlands	Watershed-Soils	Watershed-Surface Water	Watershed-Vegetation	Visual	Wetlands / Riparian	Elk	Mule Deer	Pronghorn	Sage Grouse	Pygmy Rabbit	Special Status Species	Birds (inc. migratory) non-raptors	Raptors (inc. migratory)	Bats		
33	0	0	0	1	1	0	0	0	1	1	1	2	0	0	0	0	1	1	0	1	1	2	**13**	**N**
34	0	0	0	1	1	0	0	0	1	1	1	2	0	0	0	0	0	0	0	1	1	2	**11**	**N**
35	0	0	0	1	1	0	0	0	1	1	1	2	0	0	0	0	1	1	0	1	1	2	**13**	**N**
36	0	0	0	1	1	0	0	0	1	1	1	2	0	0	0	0	1	1	0	1	1	2	**13**	**N**
37	0	0	0	1	1	0	0	0	1	1	1	2	0	0	0	0	0	0	0	1	1	2	**11**	**N**
38	0	0	0	1	1	0	0	0	2	1	1	2	0	0	0	0	1	1	0	1	1	2	**14**	**N**
39	0	0	0	1	1	0	0	0	2	1	1	2	0	0	0	0	1	1	0	1	1	2	**14**	**N**
40	0	0	0	1	1	0	0	0	2	1	1	2	0	0	0	0	1	1	0	1	1	2	**14**	**N**
41	0	0	0	1	1	0	0	0	2	1	1	2	0	0	0	0	1	1	0	1	1	2	**14**	**N**
42	0	0	0	1	1	0	0	0	2	1	1	2	0	0	0	0	0	0	0	1	1	2	**12**	**N**
43	0	0	0	1	1	0	0	0	2	1	1	2	0	0	0	0	0	0	0	1	1	2	**12**	**N**
44	0	0	0	1	1	0	0	0	2	1	1	2	0	0	0	0	0	0	0	1	1	2	**12**	**N**
45	0	0	0	1	1	0	0	0	2	1	1	2	0	0	0	0	0	0	0	1	1	2	**12**	**N**
46	0	0	0	1	1	0	0	0	1	1	1	2	0	0	0	0	1	1	0	1	1	2	**13**	**N**
47	0	0	0	1	1	0	0	0	1	1	1	2	0	0	0	0	1	1	0	1	1	2	**13**	**N**
48	0	0	0	1	2	0	0	0	1	1	1	2	0	0	0	0	1	1	0	1	1	2	**14**	**N**
49	0	0	0	1	2	0	0	0	1	1	1	2	0	0	0	0	1	1	0	1	1	2	**14**	**N**
50	0	0	0	1	2	0	0	0	1	1	1	2	0	0	0	0	1	1	0	1	1	2	**14**	**N**
51	0	0	0	1	2	0	0	0	1	1	1	2	0	0	0	0	1	1	0	1	1	2	**14**	**N**
52	0	0	0	1	1	0	0	0	2	1	1	2	0	0	0	0	1	1	0	1	1	2	**14**	**N**
53	0	0	0	1	1	0	0	0	2	1	1	2	0	0	0	0	1	1	0	1	1	2	**14**	**N**
54	0	1	0	1	1	0	0	1	2	1	1	2	0	0	0	0	0	0	0	1	1	2	**14**	**N**
55	0	0	0	1	1	0	0	0	2	1	1	2	0	0	0	0	1	1	0	1	1	2	**14**	**N**
56	0	0	0	1	1	0	0	0	1	1	1	2	0	0	0	0	1	1	0	1	1	2	**13**	**N**
57	0	0	0	1	1	0	0	0	1	1	1	2	0	0	0	0	0	0	0	1	1	2	**11**	**N**
58	0	0	0	1	1	0	0	0	2	1	1	2	0	0	0	0	1	0	0	1	2	2	**14**	**N**
59	0	0	0	1	1	0	0	1	2	1	1	2	0	0	0	0	1	2	1	2	2	2	**19**	**N**
60	0	0	0	1	1	0	0	0	2	1	1	2	0	0	0	0	1	2	0	1	2	2	**16**	**N**
61	0	0	0	1	2	0	0	0	1	1	1	2	0	0	0	0	0	0	0	1	2	2	**13**	**N**
62	0	0	0	1	2	0	0	0	1	1	1	2	0	0	0	0	1	1	0	1	1	2	**14**	**N**
63	0	0	0	1	2	0	0	0	1	1	1	2	0	0	0	0	1	1	0	1	1	2	**14**	**N**
64	0	0	0	1	2	0	0	0	1	1	1	2	0	0	0	0	0	0	0	1	1	2	**12**	**N**
65	0	1	0	1	1	0	0	0	2	1	1	2	0	0	0	0	1	1	0	1	1	2	**15**	**N**
66	0	0	0	1	1	0	0	0	2	1	1	2	0	0	0	0	1	1	0	1	1	2	**14**	**N**

Turbine #	Resource Impact Potential (3 = High, 2 = Moderate, 1 = Low; 0 = None/Negligible)																						Total	Any High Potential Impacts?
	ACEC	Cultural Resources	EJ / NA Concerns	Noxious weeds	Rangeland	Recreation	Social Economics	Prime & Unique Farmlands	Watershed-Soils	Watershed-Surface Water	Watershed-Vegetation	Visual	Wetlands / Riparian	Elk	Mule Deer	Pronghorn	Sage Grouse	Pygmy Rabbit	Special Status Species	Birds (inc. migratory) non-raptors	Raptors (inc. migratory)	Bats		
67	0	0	0	1	1	0	0	0	2	1	1	2	0	0	0	0	1	1	0	1	1	2	**14**	**N**
68	0	0	0	1	1	0	0	0	2	1	1	2	0	0	0	0	1	1	0	1	1	2	**14**	**N**
69	0	1	0	1	1	0	0	0	2	1	1	2	0	0	0	0	1	1	0	1	1	2	**15**	**N**
70	0	0	0	1	1	0	0	1	2	2	1	2	0	0	0	0	0	0	0	1	1	2	**14**	**N**
71	0	1	0	1	1	0	0	0	2	1	1	2	0	0	0	0	1	1	0	1	1	2	**15**	**N**
72	0	0	0	1	1	0	0	0	2	1	1	2	0	0	0	0	0	0	0	1	1	2	**12**	**N**
73	0	0	0	1	1	0	0	0	2	1	1	2	1	0	0	0	0	0	1	2	2	2	**16**	**N**
74	0	0	0	1	1	0	0	0	1	1	1	2	0	0	0	0	0	0	0	2	2	2	**13**	**N**
75	0	0	0	1	1	0	0	0	1	1	1	2	0	0	0	0	0	0	0	1	2	2	**12**	**N**
Alt 1	0	1	0	1	1	0	0	0	1	1	1	2	0	0	0	0	1	1	0	1	1	2	**14**	**N**
Alt 2	0	0	0	1	1	0	0	0	1	1	1	2	0	0	0	0	1	1	0	1	1	2	**13**	**N**
Alt 3	0	0	0	1	1	0	0	0	1	1	1	2	0	0	0	0	1	1	0	1	1	2	**13**	**N**
Alt 4	0	0	0	1	1	0	0	0	1	1	1	2	0	0	0	0	1	1	0	1	1	2	**13**	**N**
Alt 5	0	0	0	1	1	0	0	0	1	2	1	2	0	0	0	0	1	1	0	1	1	2	**14**	**N**
Alt 6	0	0	0	1	1	0	0	0	1	1	1	2	0	0	0	0	0	0	0	1	1	2	**11**	**N**
Alt 7	0	0	0	1	1	0	0	0	1	1	1	2	0	0	0	0	1	1	0	1	1	2	**13**	**N**
Alt 8	0	0	0	1	1	0	0	0	2	1	1	2	0	0	0	0	2	0	0	1	2	2	**15**	**N**
Alt 8	0	0	0	1	1	0	0	0	2	1	1	2	0	0	0	0	2	1	0	1	1	2	**15**	**N**
Alt 10	0	0	0	1	1	0	0	1	2	1	1	2	0	0	0	0	2	0	0	1	2	2	**16**	**N**

Impact Rationale:

ACEC	Turbine placement would not impact ACECs because they are all outside of the designated areas.
Cultural	No turbines are within potentially eligible sites, which would have been a potentially high impact; Turbines directly impacting ineligible sites would be a potentially moderate impact; Turbines within about 1/4 mile of a potentially eligible sites would be a potentially low impact; otherwise, impacts would be negligible
EJ/ NA Concerns	No impacts from turbine location because all out of Sacred Area.
Noxious Weeds	All turbines would have equal potential to spread weeds.
Rangeland	All turbines would have equal impact to range, except those within the treatment area. Overall reduction in range in low.
Recreation	All impacts are expected to be negligible.
Social Economics	All impacts are expected to be negligible or beneficial.
Prime and Unique Farmlands	If within DLE, impacts would be low due to those areas having potential to become prime farmland. Removal of land is small and it's not currently being used or ready to be used (i.e. needs irrigation and salts removed).
Watershed - Soils	Moderate impacts if in areas with moderate erosion potential, low if in soils with low erosion potential, etc.
Watershed - Surface water	Moderate if in an ephemeral stream or wash; low if outside of those areas.
Watershed - Vegetation	All impacts to vegetation are expected to be low relative to what's existing.
Visual	All turbines would contribute to a moderate impact.
Wetlands/Riparian	No impact unless in or directly adjacent to a wetland.
Elk	All impacts are expected to be negligible.
Mule Deer	All impacts are expected to be negligible.
Pronghorn	Low impact if within pronghorn migratory corridor.
Sage Grouse	No impact for most; low impact if in the correct vegetation type, moderate impact if within 2 miles of an active lek.
Pygmy Rabbit	No impact for most; low impact if in the correct vegetation type; moderate impact if within areas mapped as occupied.
Special Status Species	No impact for most; low impact if near the preferred habitat.
Birds (inc. migratory) non-raptors	All impacts are expected to be low unless near a water source.
Raptors (inc. migratory)	All impacts are expected to be low unless within 1/2 mile of an active nest.
Bats	All impacts are expected to be moderate.

APPENDIX C. BEST MANAGEMENT PRACTICES

Taken From:

Bureau of Land Management. 2005. *Final Programmatic Environmental Impact Statement on Wind Energy Development on BLM-administered Lands in the Western United States*. FES 05-11. U.S. Department of the Interior, Bureau of Land Management. June. Chapter 2.

2.2.3.2 Proposed BMPs

The BLM proposes that the following BMPs be applied to all wind energy development projects to establish environmentally sound and economically feasible mechanisms to protect and enhance natural and cultural resources. These proposed BMPs were derived from the mitigation measures discussed in Chapter 5 but are limited to those measures that are applicable to all wind energy development projects (Section 5.15). These BMPs would be adopted as required elements of project-specific PODs and/or as ROW authorization stipulations. They are categorized by development activity: site monitoring and testing, development of the POD, construction, operation, and decommissioning. The proposed BMPs for development of the POD identify required elements of the POD needed to address potential impacts associated with subsequent phases of development.

Some of the proposed BMPs address issues that are not unique to wind energy development but that are more universal in nature, such as road construction and maintenance, wildlife management, hazardous materials and waste management, cultural resource management, and pesticide use and integrated pest management. For the most part, however, the level of detail provided by the BMPs is less specific than that provided in other, existing BLM program-specific mitigation guidance documents (Section 3.6.2). As required by proposed policy (Section 2.2.3.1), mitigation measures identified in or required by these existing program-specific guidance documents would be applied, as appropriate, to wind energy development projects; however, they are not discussed in detail in the programmatic BMPs proposed here.

In summary, stipulations governing specific wind energy projects would be derived from a number of sources: (1) the proposed BMPs discussed in this section; (2) other, existing and relevant program-specific mitigation guidance (Section 3.6); and (3) the mitigation measures discussed in Chapter 5. Guidelines for applying and selecting project-specific requirements include determining whether the measure would (1) ensure compliance with relevant statutory or administrative requirements, (2) minimize local impacts associated with siting and design decisions, (3) promote postconstruction stabilization of impacts, (4) maximize restoration of previous habitat conditions, (5) minimize cumulative impacts, or (6) promote economically feasible development of wind energy on BLM-administered land.

2.2.3.2.1 Site Monitoring and Testing

- The area disturbed by installation of meteorological towers (i.e., footprint) shall be kept to a minimum.
- Existing roads shall be used to the maximum extent feasible. If new roads are necessary, they shall be designed and constructed to the appropriate standard.
- Meteorological towers shall not be located in sensitive habitats or in areas where ecological resources known to be sensitive to human activities (e.g., prairie grouse) are present. Installation of towers shall be scheduled to avoid disruption of wildlife reproductive activities or other important behaviors.
- Meteorological towers installed for site monitoring and testing shall be inspected periodically for structural integrity.

2.2.3.2.2 Plan of Development Preparation

General

- The BLM and operators shall contact appropriate agencies, property owners, and other stakeholders early in the planning process to identify potentially sensitive land uses and issues, rules that govern wind energy development locally, and land use concerns specific to the region.
- Available information describing the environmental and sociocultural conditions in the vicinity of the proposed project shall be collected and reviewed as needed to predict potential impacts of the project.
- The Federal Aviation Administration (FAA)-required notice of proposed construction shall be made as early as possible to identify any air safety measures that would be required.
- To plan for efficient use of the land, necessary infrastructure requirements shall be consolidated wherever possible, and current transmission and market access shall be evaluated carefully.
- The project shall be planned to utilize existing roads and utility corridors to the maximum extent feasible, and to minimize the number and length/size of new roads, lay-down areas, and borrow areas.
- A monitoring program shall be developed to ensure that environmental conditions are monitored during the construction, operation, and decommissioning phases. The monitoring program requirements, including adaptive management strategies, shall be established at the project level to ensure that potential adverse impacts of wind energy development are mitigated. The monitoring program shall identify the monitoring requirements for each environmental resource present at the site, establish metrics against which monitoring observations can be measured, identify potential mitigation measures, and establish protocols for incorporating monitoring observations and additional mitigation measures into standard operating procedures and BMPs.
- "Good housekeeping" procedures shall be developed to ensure that during operation the site will be kept clean of debris, garbage, fugitive trash or waste, and graffiti; to prohibit scrap heaps and dumps; and to minimize storage yards.

Wildlife and Other Ecological Resources

- Operators shall review existing information on species and habitats in the vicinity of the project area to identify potential concerns.
- Operators shall conduct surveys for federal- and/or state-protected species and other species of concern (including special status plant and animal species) within the project area and design the project to avoid (if possible), minimize, or mitigate impacts to these resources.
- Operators shall identify important, sensitive, or unique habitats in the vicinity of the project and design the project to avoid (if possible), minimize, or mitigate impacts to these habitats (e.g., locate the turbines, roads, and ancillary facilities in the least environmentally sensitive areas; i.e., away from riparian habitats, streams, wetlands, drainages, or critical wildlife habitats).
- The BLM will prohibit the disturbance of any population of federal listed plant species.
- Operators shall evaluate avian and bat use of the project area and design the project to minimize or mitigate the potential for bird and bat strikes (e.g., development shall not occur in riparian habitats and wetlands).
- Scientifically rigorous avian and bat use surveys shall be conducted; the amount and extent of ecological baseline data required shall be determined on a project basis.

- Turbines shall be configured to avoid landscape features known to attract raptors, if site studies show that placing turbines there would pose a significant risk to raptors.
- Operators shall determine the presence of bat colonies and avoid placing turbines near known bat hibernation, breeding, and maternity/nursery colonies; in known migration corridors; or in known flight paths between colonies and feeding areas.
- Operators shall determine the presence of active raptor nests (i.e., raptor nests used during the breeding season). Measures to reduce raptor use at a project site (e.g., minimize road cuts, maintain either no vegetation or nonattractive plant species around the turbines) shall be considered.
- A habitat restoration plan shall be developed to avoid (if possible), minimize, or mitigate negative impacts on vulnerable wildlife while maintaining or enhancing habitat values for other species. The plan shall identify revegetation, soil stabilization, and erosion reduction measures that shall be implemented to ensure that all temporary use areas are restored. The plan shall require that restoration occur as soon as possible after completion of activities to reduce the amount of habitat converted at any one time and to speed up the recovery to natural habitats.
- Procedures shall be developed to mitigate potential impacts to special status species. Such measures could include avoidance, relocation of project facilities or lay-down areas, and/or relocation of biota.
- Facilities shall be designed to discourage their use as perching or nesting substrates by birds. For example, power lines and poles shall be configured to minimize raptor electrocutions and discourage raptor and raven nesting and perching.

Visual Resources

- The public shall be involved and informed about the visual site design elements of the proposed wind energy facilities. Possible approaches include conducting public forums for disseminating information, offering organized tours of operating wind developments, and using computer simulation and visualization techniques in public presentations.
- Turbine arrays and turbine design shall be integrated with the surrounding landscape. Design elements to be addressed include visual uniformity, use of tubular towers, proportion and color of turbines, nonreflective paints, and prohibition of commercial messages on turbines.
- Other site design elements shall be integrated with the surrounding landscape. Elements to address include minimizing the profile of the ancillary structures, burial of cables, prohibition of commercial symbols, and lighting. Regarding lighting, efforts shall be made to minimize the need for and amount of lighting on ancillary structures.

Roads

- An access road siting and management plan shall be prepared incorporating existing BLM standards regarding road design, construction, and maintenance such as those described in the BLM 9113 Manual (BLM 1985) and the Surface Operating Standards for Oil and Gas Exploration and Development (RMRCC 1989) (i.e., the Gold Book).

Ground Transportation

- A transportation plan shall be developed, particularly for the transport of turbine components, main assembly cranes, and other large pieces of equipment. The plan shall consider specific object sizes, weights, origin, destination, and unique handling requirements and shall evaluate alternative transportation approaches. In addition, the process to be used to comply with unique state requirements and to obtain all necessary permits shall be clearly identified.

- A traffic management plan shall be prepared for the site access roads to ensure that no hazards would result from the increased truck traffic and that traffic flow would not be adversely impacted. This plan shall incorporate measures such as informational signs, flaggers when equipment may result in blocked throughways, and traffic cones to identify any necessary changes in temporary lane configuration.

Noise

- Proponents of a wind energy development project shall take measurements to assess the existing background noise levels at a given site and compare them with the anticipated noise levels associated with the proposed project.

Noxious Weeds and Pesticides

- Operators shall develop a plan for control of noxious weeds and invasive species, which could occur as a result of new surface disturbance activities at the site. The plan shall address monitoring, education of personnel on weed identification, the manner in which weeds spread, and methods for treating infestations. The use of certified weed-free mulching shall be required. If trucks and construction equipment are arriving from locations with known invasive vegetation problems, a controlled inspection and cleaning area shall be established to visually inspect construction equipment arriving at the project area and to remove and collect seeds that may be adhering to tires and other equipment surfaces.
- If pesticides are used on the site, an integrated pest management plan shall be developed to ensure that applications would be conducted within the framework of BLM and DOI policies and entail only the use of EPA-registered pesticides. Pesticide use shall be limited to nonpersistent, immobile pesticides and shall only be applied in accordance with label and application permit directions and stipulations for terrestrial and aquatic applications.

Cultural/Historic Resources

- The BLM will consult with Indian Tribal governments early in the planning process to identify issues regarding the proposed wind energy development, including issues related to the presence of cultural properties, access rights, disruption to traditional cultural practices, and impacts to visual resources important to the Tribe(s).
- The presence of archaeological sites and historic properties in the area of potential effect shall be determined on the basis of a records search of recorded sites and properties in the area and/or, depending on the extent and reliability of existing information, an archaeological survey. Archaeological sites and historic properties present in the area of potential effect shall be reviewed to determine whether they meet the criteria of eligibility for listing on the National Register of Historic Places (NRHP).
- When any ROW application includes remnants of a National Historic Trail, is located within the viewshed of a National Historic Trail’s designated centerline, or includes or is within the viewshed of a trail eligible for listing on the NRHP, the operator shall evaluate the potential visual impacts to the trail associated with the proposed project and identify appropriate mitigation measures for inclusion as stipulations in the POD.

- If cultural resources are present at the site, or if areas with a high potential to contain cultural material have been identified, a cultural resources management plan (CRMP) shall be developed. This plan shall address mitigation activities to be taken for cultural resources found at the site. Avoidance of the area is always the preferred mitigation option. Other mitigation options include archaeological survey and excavation (as warranted) and monitoring. If an area exhibits a high potential, but no artifacts were observed during an archaeological survey, monitoring by a qualified archaeologist could be required during all excavation and earthmoving in the high-potential area. A report shall be prepared documenting these activities. The CRMP also shall (1) establish a monitoring program, (2) identify measures to prevent potential looting/vandalism or erosion impacts, and (3) address the education of workers and the public to make them aware of the consequences of unauthorized collection of artifacts and destruction of property on public land.

Paleontological Resources

- Operators shall determine whether paleontological resources exist in a project area on the basis of the sedimentary context of the area, a records search for past paleontological finds in the area, and/or, depending on the extent of existing information, a paleontological survey.
- If paleontological resources are present at the site, or if areas with a high potential to contain paleontological material have been identified, a paleontological resources management plan shall be developed. This plan shall include a mitigation plan for collection of the fossils; mitigation could include avoidance, removal of fossils, or monitoring. If an area exhibits a high potential but no fossils were observed during survey, monitoring by a qualified paleontologist could be required during all excavation and earthmoving in the sensitive area. A report shall be prepared documenting these activities. The paleontological resources management plan also shall (1) establish a monitoring program, (2) identify measures to prevent potential looting/vandalism or erosion impacts, and (3) address the education of workers and the public to make them aware of the consequences of unauthorized collection of fossils on public land.

Hazardous Materials and Waste Management

- Operators shall develop a hazardous materials management plan addressing storage, use, transportation, and disposal of each hazardous material anticipated to be used at the site. The plan shall identify all hazardous materials that would be used, stored, or transported at the site. It shall establish inspection procedures, storage requirements, storage quantity limits, inventory control, nonhazardous product substitutes, and disposition of excess materials. The plan shall also identify requirements for notices to federal and local emergency response authorities and include emergency response plans.
- Operators shall develop a waste management plan identifying the waste streams that are expected to be generated at the site and addressing hazardous waste determination procedures, waste storage locations, waste-specific management and disposal requirements, inspection procedures, and waste minimization procedures. This plan shall address all solid and liquid wastes that may be generated at the site.
- Operators shall develop a spill prevention and response plan identifying where hazardous materials and wastes are stored on site, spill prevention measures to be implemented, training requirements, appropriate spill response actions for each material or waste, the locations of spill response kits on site, a procedure for ensuring that the spill response kits are adequately stocked at all times, and procedures for making timely notifications to authorities.

Storm Water

- Operators shall develop a storm water management plan for the site to ensure compliance with applicable regulations and prevent off-site migration of contaminated storm water or increased soil erosion.

Human Health and Safety

- A safety assessment shall be conducted to describe potential safety issues and the means that would be taken to mitigate them, including issues such as site access, construction, safe work practices, security, heavy equipment transportation, traffic management, emergency procedures, and fire control.
- A health and safety program shall be developed to protect both workers and the general public during construction, operation, and decommissioning of a wind energy project. Regarding occupational health and safety, the program shall identify all applicable federal and state occupational safety standards; establish safe work practices for each task (e.g., requirements for personal protective equipment and safety harnesses; Occupational Safety and Health Administration [OSHA] standard practices for safe use of explosives and blasting agents; and measures for reducing occupational electric and magnetic fields [EMF] exposures); establish fire safety evacuation procedures; and define safety performance standards (e.g., electrical system standards and lightning protection standards). The program shall include a training program to identify hazard training requirements for workers for each task and establish procedures for providing required training to all workers. Documentation of training and a mechanism for reporting serious accidents to appropriate agencies shall be established.
- Regarding public health and safety, the health and safety program shall establish a safety zone or setback for wind turbine generators from residences and occupied buildings, roads, ROWs, and other public access areas that is sufficient to prevent accidents resulting from the operation of wind turbine generators. It shall identify requirements for temporary fencing around staging areas, storage yards, and excavations during construction or decommissioning activities. It shall also identify measures to be taken during the operation phase to limit public access to hazardous facilities (e.g., permanent fencing would be installed only around the electrical substation and switchyard, and turbine tower access doors would be locked).
- Operators shall consult with local planning authorities regarding increased traffic during the construction phase, including an assessment of the number of vehicles per day, their size, and type. Specific issues of concern (e.g., location of school bus routes and stops) shall be identified and addressed in the traffic management plan.
- If operation of the wind turbines is expected to cause significant adverse impacts to nearby residences and occupied buildings from shadow flicker, low-frequency sound, or EMF, site-specific recommendations for addressing these concerns shall be incorporated into the project design (e.g., establishing a sufficient setback from turbines).
- The project shall be planned to minimize electromagnetic interference (EMI) (e.g., impacts to radar, microwave, television, and radio transmissions) and comply with Federal Communications Commission [FCC] regulations. Signal strength studies shall be conducted when proposed locations have the potential to impact transmissions. Potential interference with public safety communication systems (e.g., radio traffic related to emergency activities) shall be avoided.
- The project shall be planned to comply with FAA regulations, including lighting regulations, and to avoid potential safety issues associated with proximity to airports, military bases or training areas, or landing strips.

- Operators shall develop a fire management strategy to implement measures to minimize the potential for a human-caused fire.

2.2.3.2.3 Construction

General

- All control and mitigation measures established for the project in the POD and the resource-specific management plans that are part of the POD shall be maintained and implemented throughout the construction phase, as appropriate.
- The area disturbed by construction and operation of a wind energy development project (i.e., footprint) shall be kept to a minimum.
- The number and size/length of roads, temporary fences, lay-down areas, and borrow areas shall be minimized.
- Topsoil from all excavations and construction activities shall be salvaged and reapplied during reclamation.
- All areas of disturbed soil shall be reclaimed using weed-free native grasses, forbs, and shrubs. Reclamation activities shall be undertaken as early as possible on disturbed areas.
- All electrical collector lines shall be buried in a manner that minimizes additional surface disturbance (e.g., along roads or other paths of surface disturbance). Overhead lines may be used in cases where burial of lines would result in further habitat disturbance.
- Operators shall identify unstable slopes and local factors that can induce slope instability (such as groundwater conditions, precipitation, earthquake activities, slope angles, and the dip angles of geologic strata). Operators also shall avoid creating excessive slopes during excavation and blasting operations. Special construction techniques shall be used where applicable in areas of steep slopes, erodible soil, and stream channel crossings.
- Erosion controls that comply with county, state, and federal standards shall be applied. Practices such as jute netting, silt fences, and check dams shall be applied near disturbed areas.

Wildlife

- Guy wires on permanent meteorological towers shall be avoided.
- In accordance with the habitat restoration plan, restoration shall be undertaken as soon as possible after completion of construction activities to reduce the amount of habitat converted at any one time and to speed up the recovery to natural habitats.
- All construction employees shall be instructed to avoid harassment and disturbance of wildlife, especially during reproductive (e.g., courtship and nesting) seasons. In addition, pets shall not be permitted on site during construction.

Visual Resources

- Operators shall reduce visual impacts during construction by minimizing areas of surface disturbance, controlling erosion, using dust suppression techniques, and restoring exposed soils as closely as possible to their original contour and vegetation.

Roads

- Existing roads shall be used, but only if in safe and environmentally sound locations. If new roads are necessary, they shall be designed and constructed to the appropriate standard and be no higher than necessary to accommodatetheir intended functions (e.g., traffic volume and weight of vehicles). Excessive grades on roads, road embankments, ditches, and drainages shall be avoided, especially in areas with erodible soils. Special construction techniques shall be used, where applicable. Abandoned roads and roads that are no longer needed shall be recontoured and revegetated.
- Access roads and on-site roads shall be surfaced with aggregate materials, wherever appropriate.
- Access roads shall be located to follow natural contours and minimize side hill cuts.
- Roads shall be located away from drainage bottoms and avoid wetlands, if practicable.
- Roads shall be designed so that changes to surface water runoff are avoided and erosion is not initiated.
- Access roads shall be located to minimize stream crossings. All structures crossing streams shall be located and constructed so that they do not decrease channel stability or increase water velocity. Operators shall obtain all applicable federal and state permits.
- Existing drainage systems shall not be altered, especially in sensitive areas such as erodible soils or steep slopes. Potential soil erosion shall be controlled at culvert outlets with appropriate structures. Catch basins, roadway ditches, and culverts shall be cleaned and maintained regularly.

Ground Transportation

- Project personnel and contractors shall be instructed and required to adhere to speed limits commensurate with road types, traffic volumes, vehicle types, and site-specific conditions, to ensure safe and efficient traffic flow and to reduce wildlife collisions and disturbance and airborne dust.
- Traffic shall be restricted to the roads developed for the project. Use of other unimproved roads shall be restricted to emergency situations.
- Signs shall be placed along construction roads to identify speed limits, travel restrictions, and other standard traffic control information. To minimize impacts on local commuters, consideration shall be given to limiting construction vehicles traveling on public roadways during the morning and late afternoon commute time.

Air Emissions

- Dust abatement techniques shall be used on unpaved, unvegetated surfaces to minimize airborne dust.
- Speed limits (e.g., 25 mph [40 km/h]) shall be posted and enforced to reduce airborne fugitive dust.
- Construction materials and stockpiled soils shall be covered if they are a source of fugitive dust.
- Dust abatement techniques shall be used before and during surface clearing, excavation, or blasting activities.

Excavation and Blasting Activities

- Operators shall gain a clear understanding of the local hydrogeology. Areas of groundwater discharge and recharge and their potential relationships with surface water bodies shall be identified.

- Operators shall avoid creating hydrologic conduits between two aquifers during foundation excavation and other activities.
- Foundations and trenches shall be backfilled with originally excavated material as much as possible. Excess excavation materials shall be disposed of only in approved areas or, if suitable, stockpiled for use in reclamation activities.
- Borrow material shall be obtained only from authorized and permitted sites. Existing sites shall be used in preference to new sites.
- Explosives shall be used only within specified times and at specified distances from sensitive wildlife or streams and lakes, as established by the BLM or other federal and state agencies.

Noise

- Noisy construction activities (including blasting) shall be limited to the least noise-sensitive times of day (i.e., daytime only between 7 a.m. and 10 p.m.) and weekdays.
- All equipment shall have sound-control devices no less effective than those provided on the original equipment. All construction equipment used shall be adequately muffled and maintained.
- All stationary construction equipment (i.e., compressors and generators) shall be located as far as practicable from nearby residences.
- If blasting or other noisy activities are required during the construction period, nearby residents shall be notified in advance.

Cultural and Paleontological Resources

- Unexpected discovery of cultural or paleontological resources during construction shall be brought to the attention of the responsible BLM authorized officer immediately. Work shall be halted in the vicinity of the find to avoid further disturbance to the resources while they are being evaluated and appropriate mitigation measures are being developed.

Hazardous Materials and Waste Management

- Secondary containment shall be provided for all on-site hazardous materials and waste storage, including fuel. In particular, fuel storage (for construction vehicles and equipment) shall be a temporary activity occurring only for as long as is needed to support construction activities.
- Wastes shall be properly containerized and removed periodically for disposal at appropriate off-site permitted disposal facilities.
- In the event of an accidental release to the environment, the operator shall document the event, including a root cause analysis, appropriate corrective actions taken, and a characterization of the resulting environmental or health and safety impacts. Documentation of the event shall be provided to the BLM authorized officer and other federal and state agencies, as required.
- Any wastewater generated in association with temporary, portable sanitary facilities shall be periodically removed by a licensed hauler and introduced into an existing municipal sewage treatment facility. Temporary, portable sanitary facilities provided for construction crews shall be adequate to support expected on-site personnel and shall be removed at completion of construction activities.

Public Health and Safety

- Temporary fencing shall be installed around staging areas, storage yards, and excavations during construction to limit public access.

2.2.3.2.4 Operation

General

- All control and mitigation measures established for the project in the POD and the resource-specific management plans that are part of the POD shall be maintained and implemented throughout the operational phase, as appropriate. These control and mitigation measures shall be reviewed and revised, as needed, to address changing conditions or requirements at the site, throughout the operational phase. This adaptive management approach would help ensure that impacts from operations are kept to a minimum.
- Inoperative turbines shall be repaired, replaced, or removed in a timely manner. Requirements to do so shall be incorporated into the due diligence provisions of the ROW authorization. Operators will be required to demonstrate due diligence in the repair, replacement, or removal of turbines; failure to do so could result in termination of the ROW authorization.

Wildlife

- Employees, contractors, and site visitors shall be instructed to avoid harassment and disturbance of wildlife, especially during reproductive (e.g., courtship and nesting) seasons. In addition, any pets shall be controlled to avoid harassment and disturbance of wildlife.
- Observations of potential wildlife problems, including wildlife mortality, shall be reported to the BLM authorized officer immediately.

Ground Transportation

- Ongoing ground transportation planning shall be conducted to evaluate road use, minimize traffic volume, and ensure that roads are maintained adequately to minimize associated impacts.

Monitoring Program

- Site monitoring protocols defined in the POD shall be implemented. These will incorporate monitoring program observations and additional mitigation measures into standard operating procedures and BMPs to minimize future environmental impacts.
- Results of monitoring program efforts shall be provided to the BLM authorized officer.

Public Health and Safety

- Permanent fencing shall be installed and maintained around electrical substations, and turbine tower access doors shall be locked to limit public access.
- In the event an installed wind energy development project results in EMI, the operator shall work with the owner of the impacted communications system to resolve the problem. Additional warning information may also need to be conveyed to aircraft with onboard radar systems so that echoes from wind turbines can be quickly recognized.

2.2.3.2.5 Decommissioning

General

- Prior to the termination of the ROW authorization, a decommissioning plan shall be developed and approved by the BLM. The decommissioning plan shall include a site reclamation plan and monitoring program.
- All management plans, BMPs, and stipulations developed for the construction phase shall be applied to similar activities during the decommissioning phase.
- All turbines and ancillary structures shall be removed from the site.
- Topsoil from all decommissioning activities shall be salvaged and reapplied during final reclamation.
- All areas of disturbed soil shall be reclaimed using weed-free native shrubs, grasses, and forbs.
- The vegetation cover, composition, and diversity shall be restored to values commensurate with the ecological setting.

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APPENDIX D. SPRING VALLEY WIND VISUAL RESOURCE ASSESSMENT

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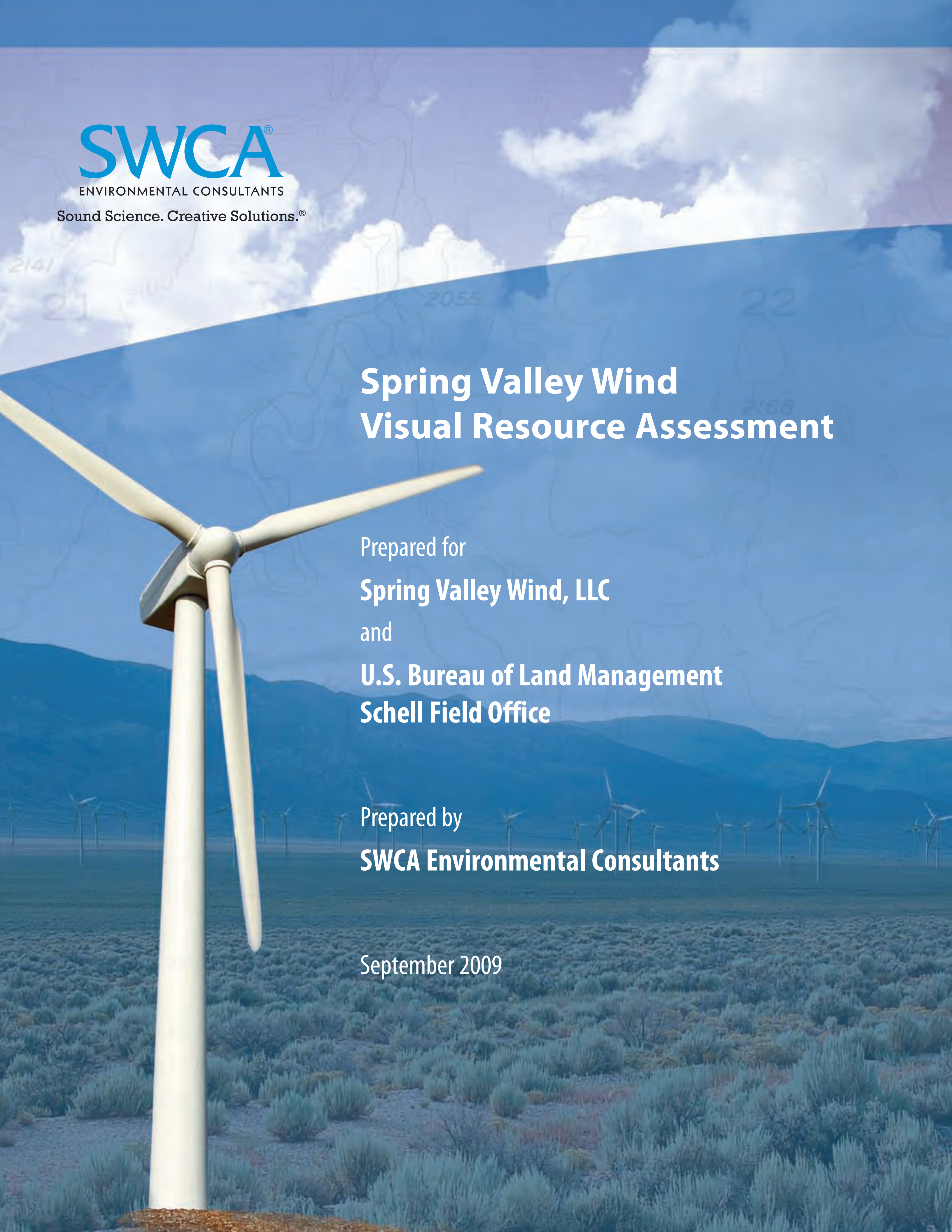

SWCA ENVIRONMENTAL CONSULTANTS
Sound Science. Creative Solutions.®

Spring Valley Wind
Visual Resource Assessment

Prepared for

Spring Valley Wind, LLC

and

U.S. Bureau of Land Management
Schell Field Office

Prepared by

SWCA Environmental Consultants

September 2009

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1.0 INTRODUCTION

1.1 BACKGROUND

Spring Valley Wind, LLC is proposing the development of a 150 Megawatt (MW) Wind Generating Facility (WGF) along with associated roads, rights-of-way (ROWs), and ancillary facilities within Spring Valley, which is located approximately 40 km (25 miles) southeast of Ely, Nevada. Development of this project is motivated by growing electrical power needs within the State of Nevada and will help to satisfy the State of Nevada goal of achieving not less than 20% of electrical energy generation from renewable resources by 2015 (NRS 704.7821). Development of the WGF will include placement of up to 75 wind turbines, which have an anticipated life span of 30 years.

Spring Valley is situated between the Schell Creek Range to the west and the Snake Range to the east (Figure 1). The project area is 7,820 acres and is comprised of Federal lands. The project is located in White Pine County, Nevada within Township 15 N, Range 66 E, Sections 25 and 36, Township15 N, Range 67 E, Sections 30, 31 and 32, Township 14N, Range 66 E, Sections 1 and 12; Township 14N, Range 67 E, Sections 5, 6 and 7-9 found on the South Bastion Spring, Yellowwood Dry Lake, Hogum, and Cave Mountain Nevada, USGS Quadrangles. The project area is generally bounded on the west side by Nevada State Highway 893 and on the south and east sides by U.S. Highway 6\50 (Figure 1).

This visual resource assessment describes both the current condition of the landscape within and surrounding the project area and the potential effects to the landscape from the proposed action in order to support future documentation for the National Environmental Policy Act. Visual resources were identified by the BLM as one of the issues of concern regarding this project during a pre-project meeting between SWCA Environmental Consultants (SWCA) and the BLM Ely District Office on April 2, 2008. SWCA's analysis of effects to the landscape is three tiered. The first level of analysis consists of a general discussion of changes to the landscape resulting from the proposed action. The second level of analysis consists of an assessment of impacts resulting from those same actions as seen from five key observation points (KOPs). The KOPs are critical viewpoints of typical landscapes of the project area that have been selected to represent the views of disturbances throughout the life of the project and that are encountered by the greatest number of people. The location and rationale for the selection of KOPs are identified below. The third level of analysis consists of an assessment of whether the proposed changes to the landscape would meet the BLM's objectives for management of visual resources, as prescribed in the BLM-Ely RMP/ROD (BLM 2008). This assessment is presented in the conclusion.

1.2 ENVIRONMENTAL SETTING

The proposed action would occur within a classic basin and range landscape which consists of broad, open valleys flanked by north-south trending mountain ranges that define and contain the views. The dominant landscape characteristic within and surrounding the proposed project area is common of the basin and range with the broad valley floor extending north and south to the horizons flanked by the steep rugged Schell Creek range to the west and the Snake range to the east. Vegetation typical of the Great Basin environment occurs throughout the project area. Sagebrush is interspersed with greasewood, shadscale, rabbitbrush and other shrubs and grasses that contribute to the scenic quality of the area. Naturally exposed white, buff and tan-colored soils also add scenic contrasts and scenic quality to the area. Additional vegetation consists of the darker green rocky mountain juniper – or swamp cedars, present on the valley floor. The existing landscape has been only somewhat modified through past and current human habitation, highway and road development, ranching and mining activities, and transmission lines.

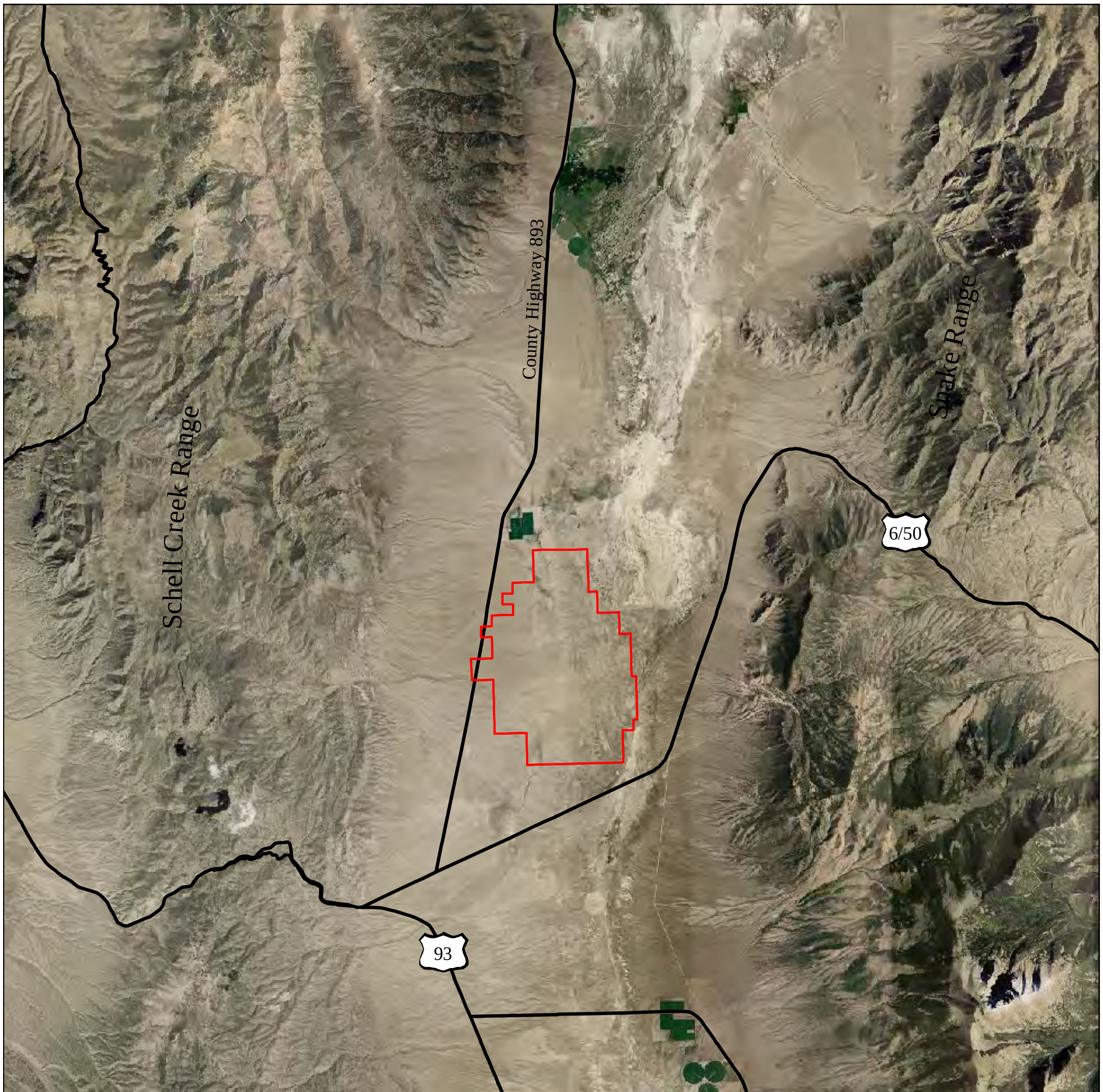
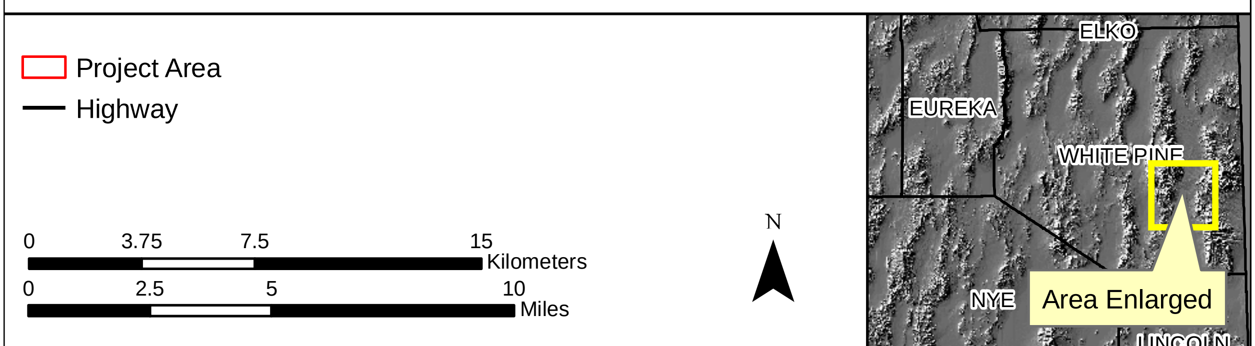


Figure 1. Project area overview.



Basemap taken from USGS 24K series topographic quadrangles.

1.3 BLM Visual Resource Management Program

Visual resources (i.e. the landscape) consist of landform (topography and soils), vegetation, bodies of water (lakes, streams, and rivers), and human-made structures (roads, buildings, and modifications of the land, vegetation, and water). These elements of the landscape can be described in terms of their form, line, color, and texture. Normally, the more variety of these elements there is in a landscape, the more interesting or scenic the landscape becomes, especially if the elements exist in harmony with each other (BLM 1992). The BLM manages landscapes for varying levels of protection and modification, giving consideration to other resources values and uses and the scenic quality of the landscape.

The BLM uses a Visual Resource Inventory (VRI) system to inventory and manage visual resources on public lands. VRI classes are visual ratings that describe an area in terms of visual or scenic quality and viewer sensitivity to the landscape (the degree of public concern for an area's scenic quality). The VRI system uses four classes to describe different degrees of modification allowed to the landscape; classes I and II being the most valued, class III representing moderate value, and class IV representing the least value. The VRI provides the basis for considering visual values in the resource management planning (RMP) process. Visual Resource Management (VRM) classes are established through the RMP process, during which time the VRI class boundaries and assignments may be adjusted to reflect resource allocation decisions made in the RMP. The VRM objectives can then be used to analyze and determine visual impacts of proposed activities and to gauge the amount of disturbance an area can tolerate before it exceeds the visual management objectives of its VRM class (BLM 1980).

VRM class designations are based on the area's visual sensitivity and are a result of a combination of factors, including the degree of visitor interest in and public concern for the area's visual resources, the area's public visibility, the level of use by the public, and the type of visitor use the area receives. The BLM designated the project area as VRM Class III (BLM 2008). The Class III management objective is "to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention, but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape" (BLM 1980).

2.0 Methodology

2.1 Viewshed Delineation

The visual area of analysis for the landscape is considered to be lands where potential visual effects to the landscape from the proposed action may be discerned. To better define the area of analysis, a viewshed delineation was prepared. The viewshed delineation reveals those areas from which the proposed action would have a clear line of sight, and is a useful tool in defining the final area of analysis and facilitating the selection of KOPs. To generate the 3D environment necessary for the viewshed delineation, Digital Elevation Model (DEM) data files from the USGS were joined into a mosaic with an extent expansive enough to include the area of analysis and potential KOPs (Figure 2). The "Visible" and "Not Visible" areas resulting from the analysis indicate which areas an observer may be able to see the project area from. The area of analysis for the Spring Valley Wind Project consists of an 11-mile radius around the project area which roughly marks the maximum distance away that an observer could clearly distinguish the turbine structures. This includes Wheeler Peak in Great Basin National Park.

2.2 KOP SELECTION

The method BLM uses to determine whether proposed projects conform to VRM class objectives is a contrast rating system that evaluates effects of proposed projects on visual resources. Contrast rating is done from critical viewpoints, known as KOPs, which are usually along commonly traveled routes, such as highways, access roads, or hiking trails. A KOP can either be a single point of view that an observer/evaluator uses to rate an area or panorama, or a linear view along a roadway, trail, or river corridor. SWCA worked with the BLM visual resource specialist to select KOPs for the proposed project based on the following considerations:

- The viewshed delineation
- Distance from the proposed project
- High degree of visibility to the project area
- Angle of observation or slope of the proposed project area
- The vast open area of the landscape
- Number of potential viewers of the project area
- Length of time that the project would be in view
- Relative size of the project
- Light conditions

The primary public views of the proposed action would be from two travel routes, U.S. 50 and County Road 893. SWCA worked with the BLM to select Key Observation Points (KOPs) to represent effects of the project as seen from public areas that permit a high degree of visibility to the project area. Potential static KOPs that were considered included the campground at Cleve Creek, the private property at Sacramento Pass, and Wheeler Peak within Great Basin National Park. After evaluation of the three static points, it was determined that the proposed action would only be visible from Wheeler Peak. For that reason, the KOPs at Sacramento Pass and Cleve Creek were dropped from further evaluation. Ultimately, five KOPs were identified to represent typical views of the project area to people traveling through Spring Valley, and views from Wheeler Peak.

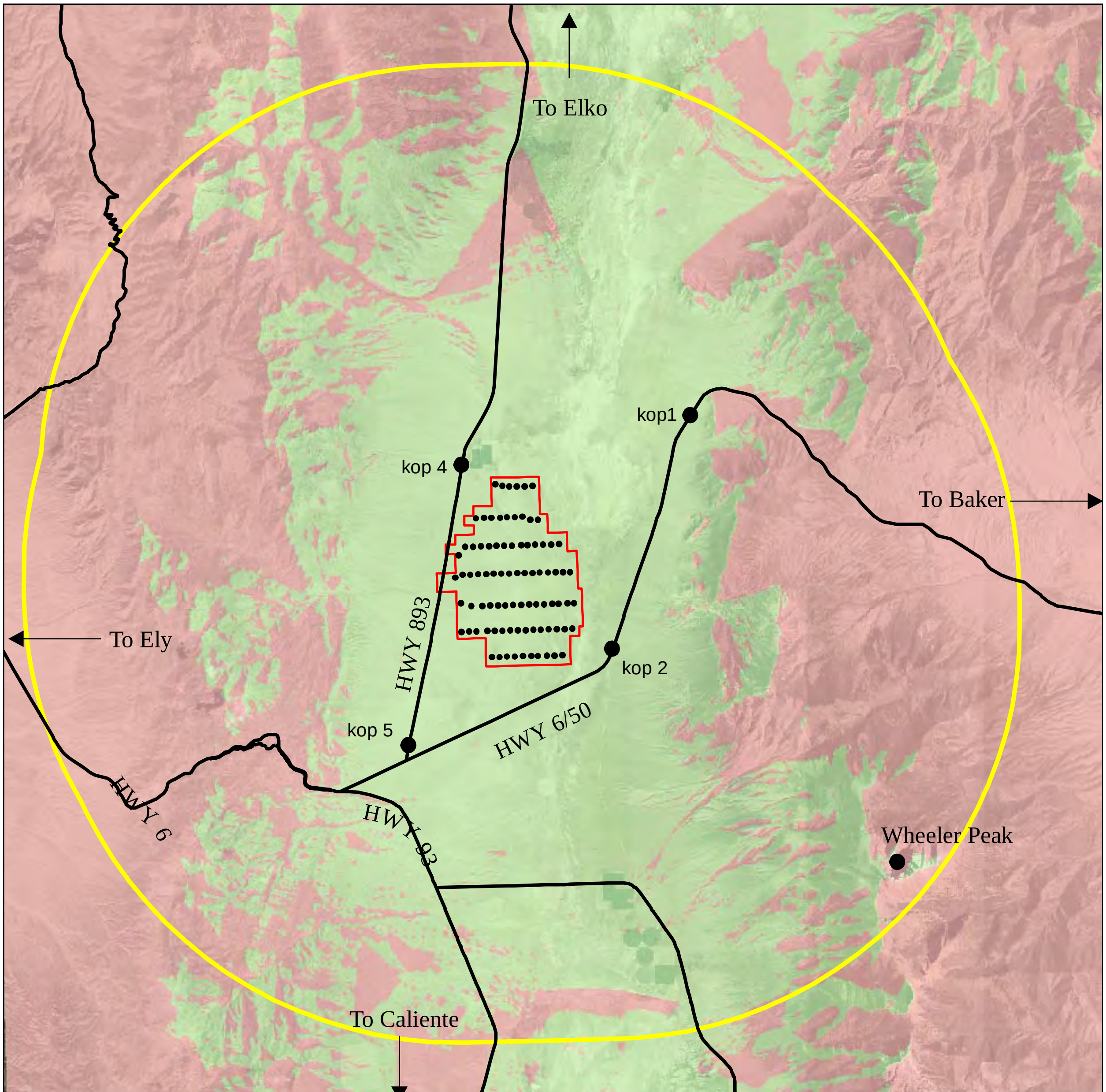
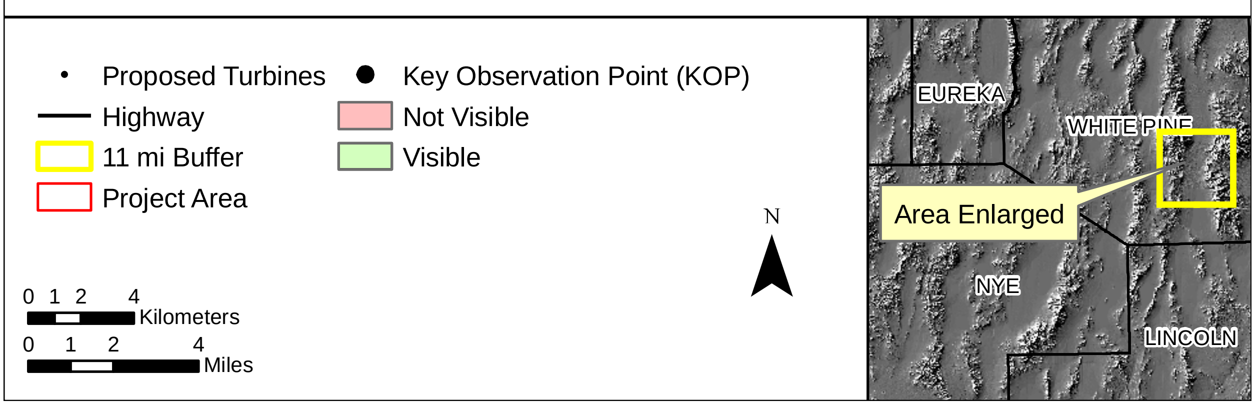


Figure 2. Viewshed delineation and KOP locations.



2.3 VISUAL CONTRAST RATINGS

VRM analysis involves determining if the visual impacts of the elements of the proposed project would meet the management objectives established for the project area in the RMP. The BLM has established a visual contrast rating process to complete this analysis. Using BLM form 8400-4-Visual Contrast Rating Worksheet, visual resource specialists evaluated the degree of visual contrasts from each KOP, based on the form, line, color, and texture changes between the existing landscapes and how the landscapes would look after implementation of the proposed action. Forms were completed in the field from each KOP on August 5 and 6, 2009 and are included in Appendix A.

2.4 VISUAL SIMULATIONS

Visual simulations provide an excellent tool to evaluate a proposed project's impact on the landscape. There are several steps to complete accurate simulations for the proposed action; still photographs were taken, Google SketchUp was used to create and dimension the wind turbine model, Google Earth was used for the placement of the wind turbines in a 3D environment, and Photoshop Elements was used to bring these together to create and edit the final image.

The location of each KOP was recorded in the field with mapping grade GPS receivers. From each KOP, a series of photos was taken in the direction of the proposed turbine locations with a 50mm (Normal) lens and merged together into panoramic views (Figure 3) using Adobe Photoshop Elements. An object with a known height and location was included in the foreground of each photo frame to help confirm accurate turbine heights in the photographic simulation. To do this, a 15 foot tall marker was placed in the foreground of each photo and the location of the marker was recorded using a mapping grade GPS receiver (Figure 3).

Figure 3. Panoramic photo with marker

The geographic coordinates for the photo point locations, marker location and proposed turbine locations were imported to Google Earth. A human model (height ~5.6 ft) was imported from SketchUp and placed at each photo point. By tilting and panning in Google Earth, the view from each point was adjusted to line up with the model's head (Figure 4). This was done to mimic the camera height, angle and direction used while taking the photos. Additionally, Google SketchUp was used to create the marker model and wind turbine model that was imported for each of the proposed turbine locations. Google SketchUp allows the user to define the dimensions of the turbine including height and width.

Figure 4. Image from Google Earth showing a properly aligned view

The lighting in Google Earth was adjusted to approximate the time of day and year that the panoramic photos were taken, casting appropriate shading on the turbine models. An image of the adjusted view of the turbines, 15ft marker and surrounding terrain was exported from Google Earth (Figure 5).

Figure 5. Example of exported image of turbines with simulated shading

Using Photoshop Elements, the exported image from Google Earth was superimposed on the panoramic photo. The size of the exported image was increased to the point at which the marker height in the export matched that of the marker height in the photo. The terrain size in both images was used to further assist scaling (Figure 6). This method scales the turbines to provide a close approximation of the turbine size that would be observed from the photo points. Once aligned, the turbines were extracted from the Google Earth export and merged with the actual photo. Further image enhancements were made using the tools available in Photoshop Elements. These included softening the hard imagery of the export and correcting for losses and errors from pixilation.

Figure 6. Image exported from Google Earth superimposed photo

A small amount of turbine size error can be expected for any one of the simulated images due to the inexact method of manually lining up and scaling the superimposed images. However, this error was minimized through the use of the markers of known height and location.

3.0 VISUAL CONTRAST ANALYSIS

3.1 OVERVIEW

Turbines and associated facilities and infrastructure are planned for the flat terrain of the valley floor set against the mountains as a backdrop. There would be only minor changes to the existing topography and landform within Spring Valley, and to the existing vegetation and soil surfaces. However, the wind energy turbines would be the largest human made structures to occur within Spring Valley. There would be up to 75 vertical towers approximately 127.5 meters tall. The rotor blades would have a slow, circular movement. The towers would be set against the solid backdrop of the valley floor, alluvial fans, or the Schell Creek and Snake ranges, and against the sky.

3.2 KEY OBSERVATION POINTS

A visual simulation and Visual Contrast Rating Form (Appendix A) were completed for each KOP and the findings are summarized below. SWCA visual resource specialists evaluated the degree of visual contrasts from each KOP based on the form, line, color, and texture changes between the existing landscapes and how the landscapes would look after implementation of the proposed action.

KOP 1 is located on highway 50 just west of Sacramento Pass (Figure 2). From this location, the view is to the southwest and looks out over the wide open valley floor. Low shrubs and grasses cover the valley floor interspersed with patches of darker green juniper. The rugged horizon line of the Schell Creek Range occurs in the middle ground and background. Figure 7 provides a view from the KOP. This location represents the views of people traveling south and west on highway 50 through Spring Valley. The Spring Valley Wind Project repeats some of the basic elements of line and texture, but not color and form of the existing conditions within Spring Valley. The nearest proposed turbine is located approximately 4.6 miles from the KOP. At this distance, the turbines are clearly visible, and there is a moderate contrast with the surrounding landscape (Figure 8). From this section of highway 50, the project would be in view for approximately 7 miles against the backdrop of the Schell Creek Range. Viewers traveling at the 70 mph posted speed limit would view the project for no more than 10 minutes.

Figure 7 – View from KOP 1

Figure 8 – Visual Simulation from KOP 1

KOP 2 is located on highway 50 south of KOP #1 (Figure 2). From this location, the view of the project area is to the northwest and looks up the valley floor and the higher peaks of the Schell Creek range. Low shrubs and grasses cover the valley floor. Although the darker green swamp cedars are visible, they occur outside the primary view of the project area. The rugged horizon line of the Schell Creek Range occurs in the background. Figure 9 provides a view from the KOP. This location represents the views of people traveling north and east on highway 50 through Spring Valley. The Spring Valley Wind Project repeats some of the basic elements of line and texture, but not color and form of the existing conditions within Spring Valley (Figure 10). The nearest proposed turbine is located approximately 1.3 miles from the KOP. From this section of highway 50, the turbines of the proposed project would be clearly visible for several miles against the backdrop of the Schell Creek Range and a moderate contrast in form and line would occur. Viewers traveling at the 70 mph posted speed limit would view the project for no more than 10 minutes.

KOP 4 is located on 893 just south of the SNWA ranch property (Figure 2). From this location, the view is to the southeast and looks out over the wide open valley floor. Low shrubs and grasses cover the valley floor interspersed with patches of darker green juniper. The rugged horizon line of the Snake range occurs in the background. Figure 11 provides a view from the KOP. This location represents the views of people traveling south on route 893. The turbines of the proposed project are clearly visible and a moderate linear contrast would result. Additionally, moderate contrasts in form and color would occur (Figure 12). The nearest proposed turbine is located approximately one mile from the KOP. From this section of 893, the project would be in view for approximately 5 miles against the backdrop of the Schell Snake Range. Viewers traveling at 65 mph would view the project for no more than 8 minutes.

KOP 5 is located on 893 just south of KOP#4 (Figure 2). From this location, the view is to the east and northeast and looks out over the wide open valley floor. Low shrubs and grasses cover the valley floor interspersed with patches of darker green juniper. The rugged horizon line of the Snake Range occurs in the background. Figure 13 provides a view from the KOP. This location represents the views of people traveling north on route 893 and would consist of local residents, hunters, and visitors to Cleve Creek. The proposed action repeats some of the basic elements of line and texture, but not the color and form of existing conditions within Spring Valley. The majority of turbines are set against the darker background of the mountains. The nearest proposed turbine is located approximately 3.2 miles from the KOP, at this distance; the turbines are clearly visible and moderate contrasts to form, line and color would occur (Figure 14). From this section of 893, the project would be in view for approximately 5 miles against the backdrop of the Schell Creek Range. Viewers traveling at 65 mph would view the project for no more than 8 minutes.

Wheeler Peak is located approximately 11 miles southeast of the project area (Figure 2). The valley floor is covered in vegetation and crisscrossed with roads and transmission lines. The rugged horizon line of the Schell Creek Range occurs in the background. Figure 15 provides a view from the summit. This location represents the views of people looking directly at the project area from the summit. Although the turbines are visible, the apparent visual contrast is minor as a result of the distance (11 miles) and the high angle of observation. At this distance, the turbines appear as points on the valley floor connected by the faint linear lines of the access roads (Figure 16). Additionally, the valley floor is not the dominant view from the summit. Views to the south, east and north of the rugged Snake Range are more scenic to visitors at the summit.

Figure 9 – View from KOP 2

Figure 10 – Simulation from KOP 2

Figure 11 – View from KOP 4

Figure 12 – Simulation from KOP 4

Figure 13 – View from KOP 5

Figure 14 – Simulation from KOP 5

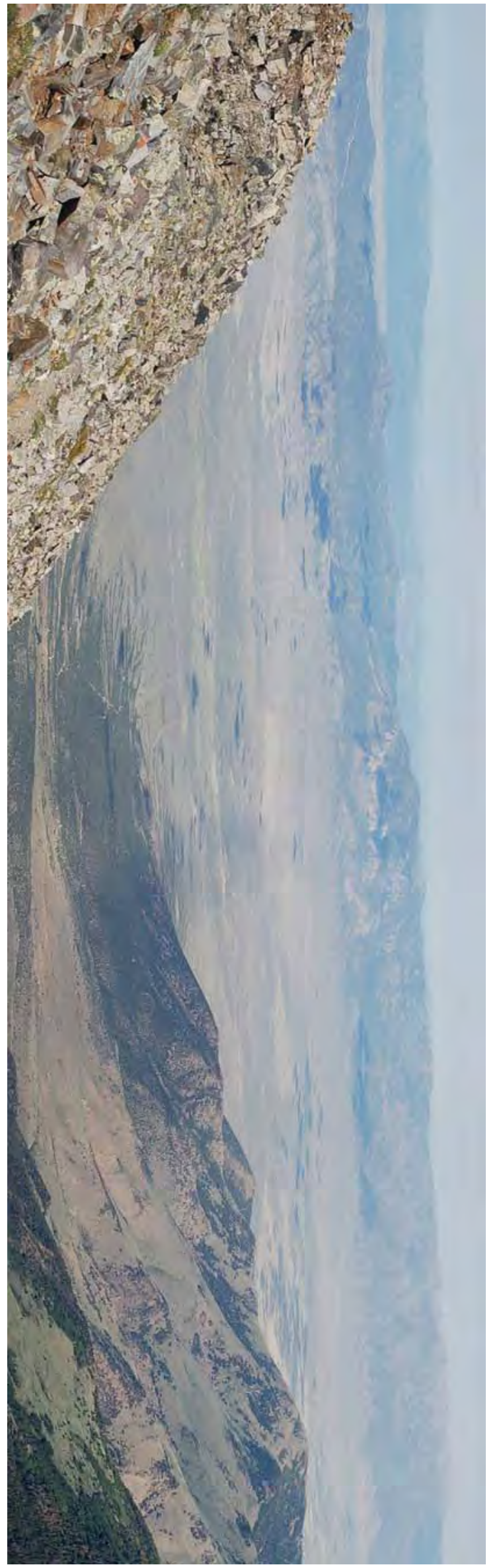


Figure 15 – View from Wheeler Peak

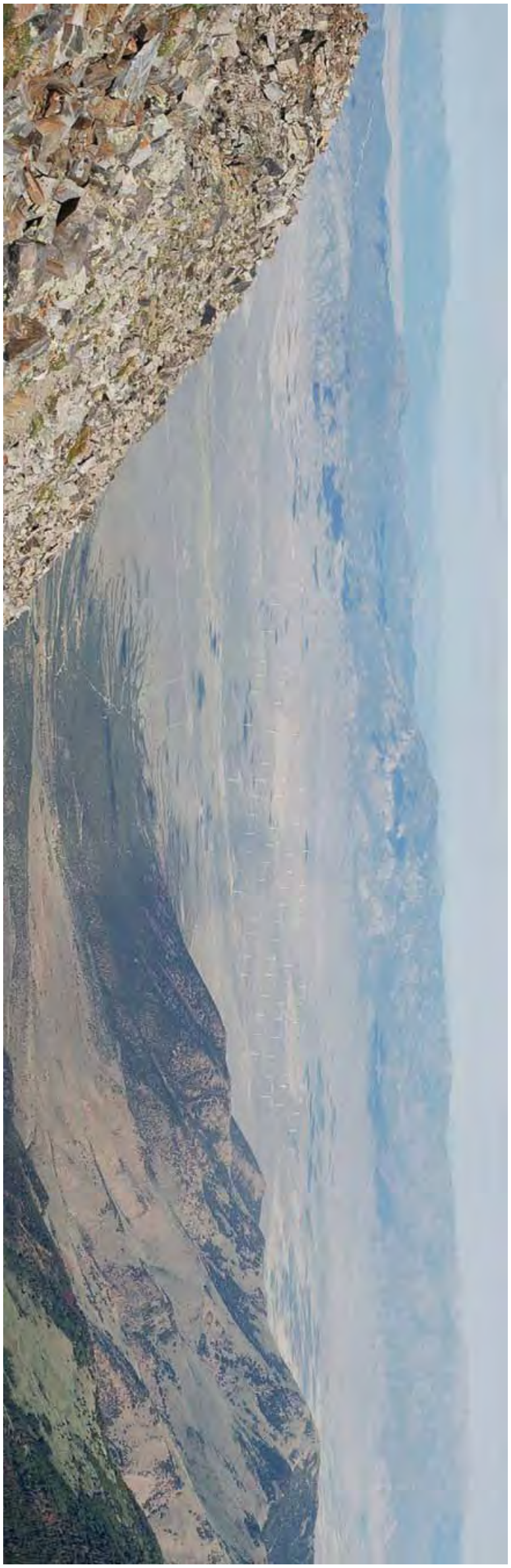


Figure 16 – Simulation from Wheeler Peak

4.0 CONCLUSIONS

The level of change to the landscape apparent from KOPs 1, 2, 4 and 5 would be moderate based on the visual resource contrast analysis. Moderate contrasts in the elements of the environment are consistent with BLM's objectives for VRM Class III. The level of change to the landscape apparent from Wheeler Peak would be weak based on the visual resource contrast analysis. Although there are visible contrasts apparent from each of the KOPs, because they occur primarily along high speed travel routes, the contrasts would be visible for limited periods of time, no more than 10 minutes. Typical vehicle travel time from the city of Ely to the town of Baker is one hour. Additionally, the project would not be visible from the private residences at Sacramento Pass or the Cleve Creek Campground. When considering the contrast ratings cumulatively, implementation of the project would attract the attention of viewers traveling through Spring Valley, and would result in moderate contrasts to the existing landscape. The conclusion that the Spring Valley Wind Project would attract attention and be seen, but would not dominate the view of the casual observer from those KOPs is consistent with class III management objectives.

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APPENDIX A - VISUAL CONTRAST RATING WORKSHEETS

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Spring Valley Wind Power Generating Facility Final Preconstruction Survey Results Report

Prepared for

Spring Valley Wind, LLC

and

U.S. Bureau of Land Management
Schell Field Office

Prepared by

SWCA Environmental Consultants

August 2009

SPRING VALLEY WIND POWER GENERATING FACILITY FINAL PRECONSTRUCTION SURVEY RESULTS REPORT

Prepared for

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August 2009

EXECUTIVE SUMMARY

Spring Valley Wind, LLC (SVW) proposes to develop the 150 MW (up to 75 turbines) Spring Valley Wind Generating Facility (WGF) on 8,565 acres of land administered by the Bureau of Land Management (BLM) in Spring Valley, east of Ely, Nevada. As outlined in the BLM Programmatic Environmental Impact Statement for Wind Development, preconstruction surveys should be completed to assess bird and bat use within the project area in order to minimize impacts to these resources. SWCA Environmental Consultants was retained by SVW to complete these studies.

Surveys for birds and bats began in the summer of 2007 and continued throughout 2008. Bird surveys consisted of spring migratory passerine surveys, spring raptor migration surveys, raptor nest searches, and breeding bird point-counts. Bat surveys were primarily accomplished using acoustic survey methods, with some capture surveys.

A total of 92 different bird species were identified in the project area, including 12 species of diurnal raptors. Many of these species have already been recorded as mortalities at other wind energy generating facilities in the western United States, including some of the most common mortalities like horned lark (*Eremophila alpestris*), sparrows (family Emberizidae), and blackbirds (family Icteridae). Risk was assessed for all species recorded in the project area and a risk index value was assigned to any species observed within the proposed rotor-swept area.

Twelve bat species were identified through acoustic surveys. Of these, six species have been reported as fatalities at other wind energy facilities in the United States and include the little brown (*Myotis lucifugus*), big brown (*Eptesicus fuscus*), Brazilian free-tailed (*Tadarida brasiliensis*), silver-haired (*Lasionycteris noctivagans*), hoary (*Lasiurus cinereus*), and Western red (*L. blossevillii*) bats. Flight characteristics and patterns of mortality at other wind energy facilities were evaluated and used to assess potential for mortality resulting from turbine strikes. In the case of the Brazilian free-tailed bat, a detailed study of the Rose Guano Cave also contributed to this assessment. Rose Guano Cave is a major roost site in Nevada for the Brazilian free-tailed bat, and therefore, extra attention was focused on this species.

In addition to the risk assessment, potential mitigation measures are discussed for both birds and bats. The measures described include operational mitigations measures such as altering cut-in speeds, seasonal and nightly curtailment, and bat deterrent devices.

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1.0 INTRODUCTION

1.1 Project Overview

Spring Valley Wind, LLC (SVW) has proposed the development of a 150 MW (up to 75 turbines) Wind Generating Facility (WGF) and associated roads, rights-of-way (ROWs), and ancillary facilities on approximately 8,565 acres of federal land within Spring Valley, which is located approximately 40 km (25 miles) southeast of Ely, Nevada (Figure 1). While wind energy produces clean, carbon-free energy, it is not entirely without environmental impacts. Wind turbines are known to impact birds and bats, which can be killed or injured as a result of colliding with turbine blades. Wind energy is a fast-growing utility and increased by 50% installed capacity in 2008 (AWEA 2009); therefore, these wildlife resources are of particular concern for this and all other wind power projects.

To address these concerns, the Bureau of Land Management (BLM) issued guidance for implementing their 2005 Programmatic Environmental Impact Statement (PEIS) for Wind Development (BLM 2005), which recommends that "scientifically rigorous avian surveys be conducted prior to construction." This recommendation also states that "bat use of the project area should be evaluated, and the project should be designed to minimize or mitigate the potential for bat strikes. Both macro- and micro-siting options can be considered to minimize impacts to bats." In order to comply with these guidelines, detailed preconstruction wildlife monitoring of the project area was conducted to document existing uses by wildlife, specifically migratory and resident birds and bats.

The following report presents the comprehensive findings of all surveys across the two-year survey period (2007−2008), with the primary objective of identifying the potential for postconstruction threats to bird and bat species in the project area and to provide suggestions for mitigating those threats. Postconstruction surveys will be conducted to determine whether preconstruction surveys were accurate predictors of threats to bird and bat populations on the study site and whether mitigation measures were effective.

1.2 Bird Surveys

Impacts to birds from the operation of Wind Turbine Generators (WTG) have been studied for more than two decades. Most of the early studies were at a single or a few WTGs and recorded bird mortalities were relatively low (Erickson et al. 2005). Real concern didn't arise until a California Energy Commission report from the Altamont Pass Wind Resource Area (APWRA) surfaced, which indicated 108 raptor fatalities had been recorded over a four-year period (CEC 1989). Subsequent reports from APWRA revealed alarming levels of mortality for many species of birds, but most troubling were the levels of mortality in a number of raptor species including red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), and golden eagle (*Aquila chrysaetos*) (Erickson et al. 2005). While mortality studies have been completed at many other WGFs in the United States, none have found levels to be as high as have been recorded at APWRA. Still, the concern persists that the development of wind turbines can lead to impacts to local bird populations, especially raptors.

To address these concerns, bird surveys in Spring Valley were initiated in the spring of 2007 and continued through December 2008. A number of different types of surveys were completed, including spring migratory passerine surveys, spring raptor migration surveys, raptor nest searches, and breeding bird point-counts. These surveys were completed to assess bird use of the project area over different seasons and among different habitat types, as well as to identify potential impacts to specific species.

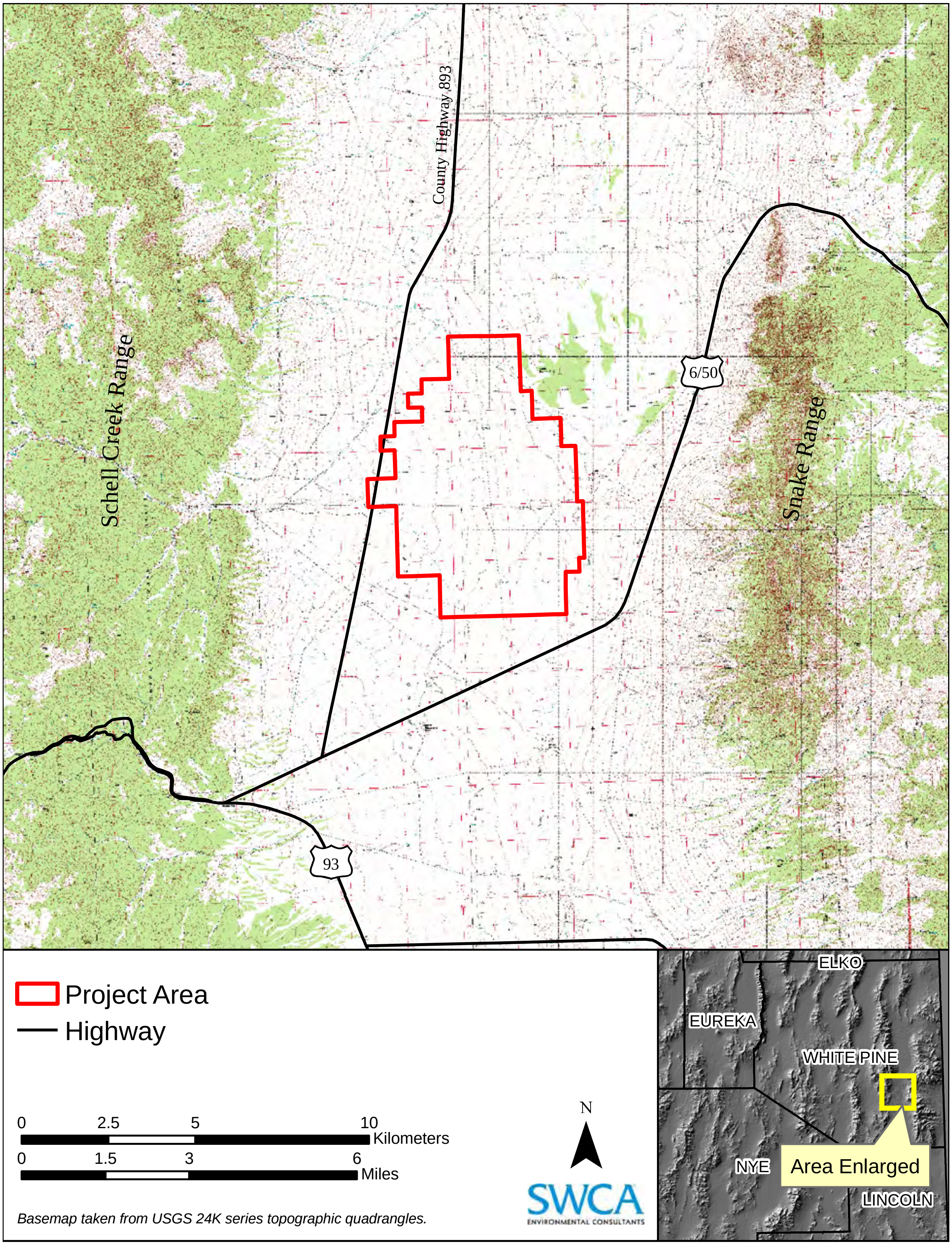

Figure 1. Spring Valley WGF project area.

1.3 Bat Surveys

Substantial impacts to bats from WTGs are a recently realized concern, as showcased in studies from the Mountaineer Wind Energy Facility in West Virginia (Kerns and Kerlinger 2004). Numerous migratory bat mortalities were observed beneath the turbines of this mountain ridge facility, which spurred future bat studies at wind power facilities. In response to the suspected decline in worldwide bat populations (Arnett et al. 2008) and growth of the wind-energy sector (AWEA 2009), preconstruction bat studies at proposed project areas have become commonplace. This preconstruction study aimed to accomplish several goals: develop a species inventory, determine the spatial and temporal use of the project area by these species, identify potential impacts to bats within Spring Valley, and identify mitigation measures that may reduce or prevent impacts to those bats.

To achieve these goals, SWCA Environmental Consultants (SWCA) conducted two years of AnaBat acoustic monitoring throughout the project area. Additionally, one session of capture surveys was completed in 2007. The survey methodology and intensity was determined in conjunction with Dr. Michael O'Farrell (O'Farrell Biological Consulting), who was contracted by SWCA to provide technical oversight for this study and analyze and interpret acoustic data. Dr. O'Farrell is a well-respected bat biologist in Nevada and has extensive experience conducting AnaBat acoustic surveys. His knowledge of bats and experience conducting AnaBat acoustic surveys were instrumental to this study.

2.0 METHODOLOGY

2.1 Study Site and Project Area

Over the course of two and a half years of planning, the layout of turbine locations and the project area boundary have changed numerous times. Therefore, as identified in Figure 1, the initial project area identified at the onset of the bird and bat surveys is different than the current project area. Subsequently, many of the survey points and monitoring stations designated at the beginning of this study are no longer within the current project area boundary. However, because a wide range of habitats were sampled within the initial project area and because no other habitat types occur in the current project area, the survey results discussed in this report should appropriately document bird and bat communities within the current project area.

The project area is bordered by the Schell Creek Range to the west and the Snake Range to the east. The project area includes approximately 8,565 acres and encompasses both private and public lands. Public lands in the project area are managed by the BLM Ely Field Office. The project site ranges from 1,730 to 1,825 m (5,675 to 5,990 feet) above mean sea level (amsl), and vegetation comprises Great Basin Xeric Mixed Sagebrush Shrubland, Inter-Mountain Basins Big Sagebrush Shrubland, Inter-Mountain Basins Greasewood Flat, Inter-Mountain Basins Mixed Salt Desert Scrub, and Inter-Mountain Basins Playa (U.S. Geological Survey [USGS] 2004).

The 2005 PEIS for Wind Development states that operators of WGFs should "identify important, sensitive, or unique habitats in the vicinity of the project" in order to minimize or avoid impacts to these sensitive resources during planning phases of the WGF (BLM 2005). With these guidelines in mind, SWCA biologists conducted a general site investigation during spring 2007 to determine the presence and extent of different wildlife habitats (e.g., riparian areas, woodlands, sagebrush scrub) within the project area, including a 1-mile buffer surrounding the project area. Survey points were chosen during this initial site investigation in order to ensure that all habitats were covered and that sensitive or unique habitats were not overlooked.

2.2 Avian Surveys

Preconstruction avian surveys were conducted in Spring Valley from April 2007 through December 2008. During this study, surveys were performed during specific months; these surveys were defined as follows:

Spring Migration	March−May
Breeding Bird Point-Counts	June
General Use (Summer)	July−August
Fall Migration	September−November
General Use (Winter)	December−February

2.2.1 Migratory Raptor Surveys

The methodology for conducting raptor surveys was developed based on techniques employed by Hawkwatch International (HWI) during their exploratory surveys of potential raptor migration sites with wind-power generation potential in Nevada (Smith 2005). Because the project area is situated completely in low-lying sagebrush and rangeland habitat, rather than along ridgelines typically used by migrating raptors, it is unlikely that this area lies within a raptor migration corridor. Consequently, the use of HWI’s standard survey methods (used for their long-term monitoring sites) was considered unnecessary. Nevertheless, HWI recommended that preliminary exploratory surveys be completed to confirm this hypothesis (personal communication, M. Neal, HWI, 9 April 2007).

During the general site investigation conducted in spring of 2007, no distinct high point could be identified within the project area. Because of the large size of the project area and the lack of an adequate single vantage point, it was determined that three separate raptor migration survey sites (observation points) would be needed in order to assess raptor migration in and around the project area.

The survey sites originally consisted of the northern, western, and southern observation points (Figure 2). However, for fall migration periods, it was determined that the Southern Observation Point offered little elevation gain and was an inadequate observation point. It was therefore replaced with a more appropriate observation point just outside the northeastern project area boundary, referred to as the Eastern Observation Point (see Figure 2).

The Eastern Observation Point was located on a hill just outside the eastern boundary of the project area in heavily grazed mixed salt desert scrub. This site offered good views of the west side of the project area. The Northern Observation Point was centrally located along the northern boundary of the project area. It was located in heavily grazed rangeland and situated atop a small rise, which looked out over much of the project area. The Western Observation Point was located on a hill on the west side of State Highway 893, just outside the western edge of the project area in xeric mixed sagebrush habitat. The Western Observation Point was selected because it represented the tallest elevation in the immediate vicinity of the project area. This point provided a great vantage point over much of the project area to the east and ensured that, along with the other observation points, migration across the entire project area was successfully monitored.

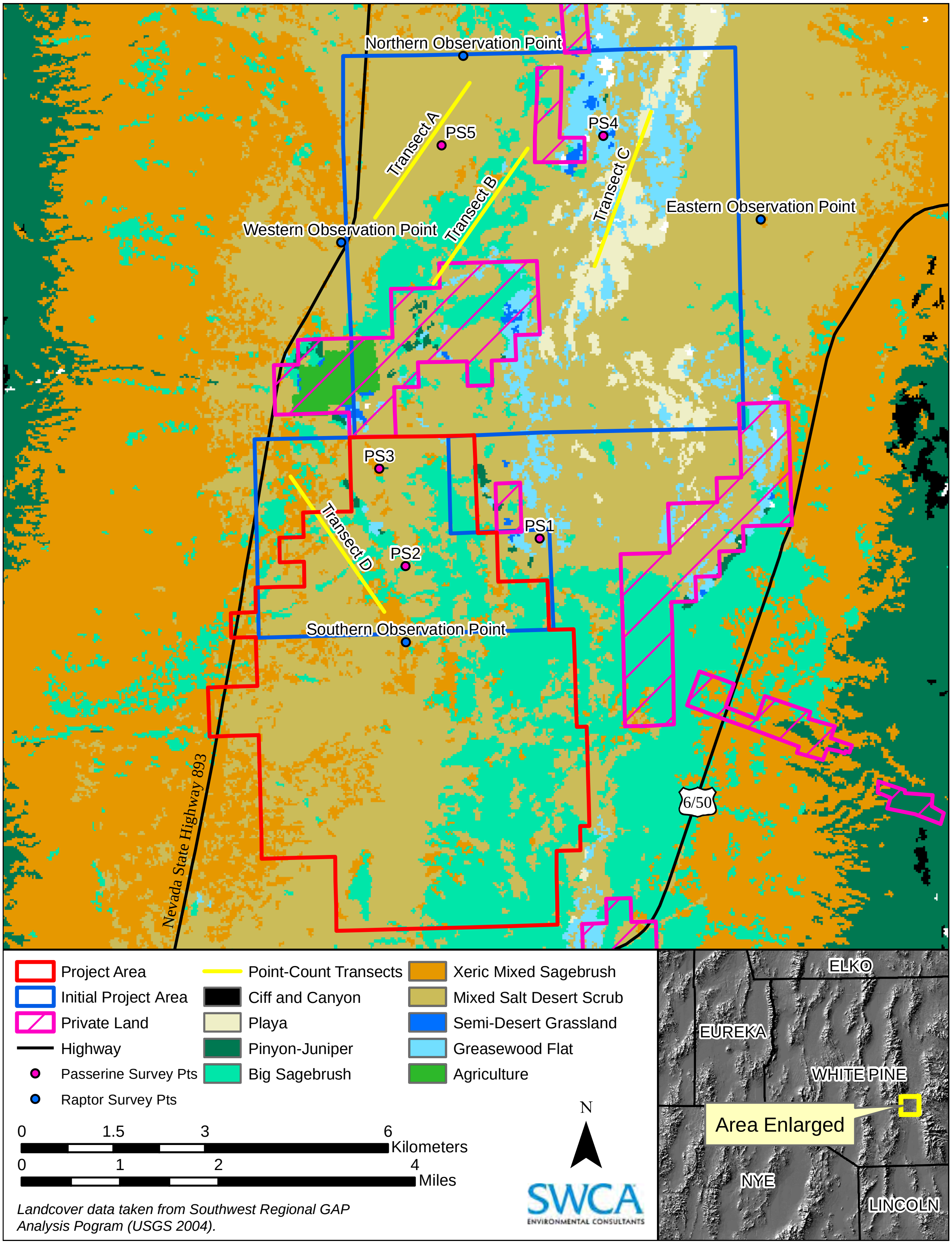

Figure 2. Vegetation types and bird survey point locations.

Surveys were conducted once a month in March, April, and May for spring migration and in September, October, and November for fall migration. Surveys were conducted over these months in order to identify early-, mid- and late-season migrants. During each survey period, each of the three observation points was surveyed once.

SWCA biologists recorded observations on modified HWI raptor migration data forms used during exploratory migration site surveys. The following data were recorded: UTM coordinates of the count site, physical description of the count site area, elevation of the count site, the name of the observers for the day, daily observation start/end times, date, wind speed, temperature, wind direction, percent cloud cover (estimated), precipitation class, and an assessment of thermal lift conditions, which may be indicative of migrant activity. These data were recorded for each hour of observation on the half-hour (Smith 2005). A sample data form, as well as weather codes and species codes, has been included in Appendix A.

In accordance with HWI methods (Smith 2005), raptor migration was monitored for up to 8 hours each survey day, depending on weather (surveys were uninterrupted unless extreme weather conditions developed during the course of a survey). Observers used high-quality 10× binoculars and a 60× spotting scope to observe and identify raptors. The *Sibley Guide to Birds* (Sibley 2000) and *Hawks from Every Angle* (Ligouri 2005) served as primary references for verifying raptor identification.

Migrant raptors typically exhibit a direct, continuous flight pattern in the predominant seasonal direction (north in spring, south in fall), whereas the flight pattern of resident raptors varies as they move along non-migratory routes for short distances (Smith 2005). However, there is overlap in flight styles and direction between residents and migrants, sometimes making it difficult to distinguish between raptors that are migrating and simply foraging or moving within a territory.

For every raptor determined to be a migrant, the following data were recorded: species, age, sex, and color morph of each observed migrant raptor (when possible and/or applicable), time of migrant passage, lateral direction at closest point to the observers, closest horizontal distance of each migrant from the observer, and predominant flight altitude using standard HWI categories (Smith 2005) (Table 1).

Table 1. HWI Flight Height Categories

0	Below eye level
1	Eye level to about 30 m above eye level
2	Birds above 30 m easily seen with the unaided eye (eyeglasses not counted as aids)
3	At height limit of unaided vision
4	Beyond height limit of unaided vision but visible with binoculars to 10×
5	At height limit of binoculars
6	Beyond limit of binoculars10× or less, but detectable with binoculars or telescope of greater power
7	No predominant height

Flight heights are often used to assess risk when analyzing potential impacts at WGFs. Birds within the potential rotor-swept area (RSA) are considered high risk birds because of potential collisions with WTG blades. For the Spring Valley WGF, the RSA is anticipated to be between 35 and 130.5 m (115 and 428 feet) above ground level (agl). When referring to Table 1, this means that raptors within flight height category 2 (birds easily seen with the unaided eye, but above 30 m) would be at a higher risk of collision with WTG blades than raptors at other flight heights. For each species, the percentage of observations in the RSA was calculated by dividing the number of observations in the RSA by the total number of observations. Percentage of observations in the RSA alone tends to give higher risk indices to species that were observed on only a few occasions. Therefore, the frequency of observation, or percentage of surveys during which a species was observed, would also factor into its RI. Using these two factors, the following equation was used to determine the RI:

$$RI = (\text{Frequency of Observation} \times \%\ \text{Observations in RSA}) / 100$$

The product of these two factors is divided by 100 simply to produce smaller, more manageable numbers. This RI establishes which species would have a higher risk of collisions with WTG blades. A RI was also calculated for passerine surveys, but it should be noted that the RI is a relative measure and should only be compared with other species during the same type of survey.

2.2.2 Migratory Passerine Surveys

Observation points for conducting migratory passerine surveys were identified during the spring 2007 general site investigation. From this investigation, it was determined that five survey sites would be necessary to adequately monitor passerine migration across the project area’s varying habitats (see Figure 2). More survey sites were deemed necessary for migratory passerine surveys than for migratory raptor surveys because of the variety of microhabitats and associated resources distributed throughout the project area.

Passerine survey location one (PS 1) was located in a stand of Rocky Mountain juniper (juniper) (*Juniperus scopulorum*), near the Cedar Swamp Natural Area and represented the southeastern-most survey point. These junipers provide substantial vertical structure relative to the surrounding sagebrush habitat. Passerine survey location two (PS 2), located in big sagebrush (*Artemisia tridentata*) habitat, represented much of the southern portion of the project area. PS 2 was the southern-most survey point within the project area. Passerine survey location three (PS 3) was located at a water source used by both cattle and area wildlife species. This water source exhibits wetland vegetation, such as cattail (*Typha* spp.) and arumleaf arrowhead (*Sagittaria cuneata*), and is surrounded by xeric mixed sagebrush and an isolated stand of juniper. Passerine survey location four (PS 4) represented the northeastern-most survey location. It was located next to a seasonal pond within an open stand of juniper. Passerine survey location five (PS 5) was centrally located in the northern portion of the project area. PS 5 was situated within heavily grazed rangeland consisting of short grass and bud sagebrush (*Picrothamnus desertorum*) habitat. The different characteristics used in selecting these points are identified in Table 2.

Table 2. Vegetation Communities of the Passerine Survey Points

Survey Point	Water Present	Juniper Present	Dominant Vegetation Type*
PS 1	No	Yes	Mixed Salt Desert Scrub/Greasewood Flat
PS 2	No	No	Big Sagebrush
PS 3	Perennial	Yes	Xeric Mixed Sagebrush
PS 4	Ephemeral	Yes	Semi-Desert Grassland/Greasewood Flat
PS 5	No	No	Mixed Salt Desert Scrub

* Source: USGS (2004).

Surveys for migratory passerines were conducted during the same survey periods as raptor migration surveys. During each survey period, biologists surveyed each location for one hour at dawn and one hour at dusk. Data were collected in accordance with the habitat-based monitoring program for breeding birds of Nevada established by the Great Basin Bird Observatory (GBBO) (GBBO 2003). Unlike breeding bird point-counts, these surveys were intended to detect resident birds as well as birds that are not known to breed in the area and that therefore are likely migrating through the project area. Modified GBBO point-count data forms were completed with an emphasis on observed bird activity (e.g., flight height above ground level, flight direction, etc.). However instead of using flight height categories as suggested by HWI for raptors, flight heights for migratory passerines are estimated to the nearest meter, as passerines typically fly much lower than raptors. A sample data form has been included in Appendix B.

Flight heights were recorded for all passerines observed, and they were used to assess risk of collision with WTG blades. Birds that are more frequently observed and that may spend a higher proportion of their time within or near the potential RSA are considered higher risk birds because of potential collisions. For the Spring Valley WGF, the RSA is anticipated to be between 35 and 130.5 m agl. For each species observed during passerine surveys, the percent of observations in the RSA and the frequency of total observations were used to determine an RI (Section 2.2.1). This RI establishes which species would be at a higher risk of collisions with WTG blades. The RI is a relative measure and should only be compared with other species observed during those same surveys.

2.2.3 General Use Surveys

The survey periods for general use passerine surveys alternated with migratory passerine survey periods. That is, general use passerine surveys included the summer and winter months in which migratory bird surveys or breeding bird point-counts were not performed. Methodology for these surveys was consistent with methodology described for migratory passerine surveys, except that general use passerine surveys were conducted only once per day, as opposed to twice per day for migratory passerine surveys. General use passerine survey sites were the same as those used for migratory passerine surveys. The purpose of these surveys was to fill in data gaps during times of the year at which avian communities are typically surveyed less intensely (late summer and winter). Data collected during these surveys were used in conjunction with migratory passerine data to determine the seasonal abundance fluctuations in several species found in Spring Valley, particularly the most common ones.

2.2.4 Breeding Bird Point-counts

Point-count surveys were conducted in accordance with the habitat-based monitoring program for breeding birds of Nevada established by the GBBO (2003). Four point-count transects that were representative of the major vegetation communities within the project area were established using GBBO protocol (see Figure 2). These vegetation communities were the Inter-Mountain Basins Mixed Salt Desert Scrub, Inter-Mountain Basin Big Sagebrush Shrubland, mixture of Inter-Mountain Basins Greasewood Flat and Inter-Mountain Basins Playa, and Great Basin Xeric Mixed Sagebrush Shrubland (Table 2). In accordance with GBBO protocol, each point-count transect consisted of 10 fixed-radius (100-m) point-count stations spread evenly along each linear transect. Each transect was surveyed between sunrise and 10:00 a.m. during acceptable weather conditions (no precipitation or high winds). Each linear transect was placed in habitats representative of the project area, with point-count stations located approximately 300 m apart along each transect. Every survey point required 10 minutes of actual survey time, during which birds were distinguished as observed during the time interval of 0 to 3, 3 to 5, or 5 to 10 minutes. In accordance with GBBO protocol, two individuals conducted point-count surveys: an observer identified and called out bird detections, and a helper monitored time intervals, navigated to and from survey points, and recorded data. Data were recorded on a standard data collection form. Each individual bird was recorded on the data form, along with their approximate distance from an observer stationed at the center of the point (0−50 m, 50−100 m, or >100 m) and any evidence of territorial defense (e.g., singing) or breeding (e.g., carrying nest material or food). The same bird was not recorded twice per point-count. Environmental conditions such as temperature, cloud cover, and wind were recorded for each point-count station. A sample data sheet, as well as weather codes, has been included in Appendix C. Because of the different protocol and survey points from other passerine surveys, breeding bird point-count data were not included in analyses that combined all passerine data, such as seasonal fluctuation graphs.

2.2.5 Raptor Nest Surveys

Nest searches for raptors were performed for the entire project area, including a 1-mile buffer surrounding the project area. These surveys were completed from a helicopter to minimize survey time and maximize searcher efficiency. Behavior, flight patterns, and nest locations (when possible) of resident raptors were observed during other avian surveys for the project in order to determine the areas in which nesting raptors may be concentrated. Emphasis was placed on junipers, as they provided almost all of the vertical structure within the project area. Nest locations found within the project area and within the 1-mile buffer were documented by noting the species, dates of activity, UTM coordinates, nest contents (where possible), and behavior. Nests occupied by common ravens were also recorded because raptors will regularly use nests abandoned by common ravens and vice versa.

2.3 Bat Surveys

Capture and acoustic survey methods are standard for the identification of bat species; however, each method of survey has inherent biases and limitations (O'Farrell and Gannon 1999). Acoustic survey methods have potential to underestimate the activity of large-eared bats, such as Townsend's big-eared bats (*Corynorhinus townsendii*) and pallid bats (*Antrozous pallidus*). These species have simple, short-duration calls of low intensity and are therefore difficult to detect acoustically (O'Farrell and Gannon 1999). It has also been suggested that migratory species, such as the hoary (*Lasiurus cinereus*) and western red bats (*L. blossevillii*), may not use echolocation during migration (Gruver 2002). Capture survey methods are also very limited since these only sample a very small area (O'Farrell and Gannon 1999), especially in relation to a multi-thousand acre project area. Capture survey methods are generally most effective when used at attractant features, such as areas with water, or at known day or night roosting locations. Additionally, capture surveys are labor intensive and are therefore more costly, compared with acoustic methods. Both survey methods are limited in their range of detection, although acoustic monitoring stations can be deployed at various heights along MET towers, as described by Arnett and Hayes (2006), in order to evaluate vertical stratification of bat use.

Despite inherent flaws with acoustic bat detection, this technique still identifies the greatest number of bats, compared with other techniques (O'Farrell and Gannon 1999); therefore, it was chosen as the primary method of data collection for these surveys. AnaBat acoustic detectors (AnaBat II Ultrasound Detectors[1]) were deployed throughout the project area to collect acoustic data. AnaBat detectors capture high frequency bat echolocation and social calls (collectively referred to as echolocation calls in subsequent text), which can be used to identify bats to species (O'Farrell et al. 1999). Acoustic methods cannot be used to estimate populations, since an individual may be responsible for numerous detected calls; therefore, acoustic data are used to generate an index of activity (IA) value (described below). Another useful feature of AnaBat acoustic data are the attached time and date information, which can be used to evaluate nightly and seasonal fluctuations in the IA.

Prior to installing the monitoring stations, biologists reviewed aerial and topographic maps of the project area to determine approximate locations for the monitoring stations. Final locations of monitoring stations

[1] Manufactured by Titley Electronics, Ballina, New South Wales, Australia.

were determined by SWCA biologists during the installation process. Monitoring station locations were chosen to represent the variety of habitat types available within the project area with the intent of observing differential habitat and spatial use within the project area by bats. In addition, both perennial and ephemeral water resources were chosen for monitoring station locations since these sites are expected to have concentrated bat activity (O’Farrell et al. 1999) and may, therefore, provide the most information for a species inventory. Descriptions of the monitoring station locations and site attributes are presented in Appendix D.

In total, 10 monitoring stations were placed within the lease area (Figure 3) at eight locations. Seven monitoring stations were individually installed on 10-foot lengths of Telespar 2-square-inch tubing purchased from Pacific Products and Services in Highland, California. The Telespar tubing was inserted into a receiver that was cemented into a 5-gallon bucket and completely buried beneath the surface soil. The three remaining monitoring stations were installed on one MET tower located near the southern project area boundary.

This MET tower was the only suitably tall vertical structure that could be used to observe flight height stratification of bat species. Monitoring stations used on the MET tower had microphones located at 3, 30, and 60 m (10, 98, and 197 feet), similar to the methods described in Arnett and Hayes (2006). Site descriptions for each monitoring station can be found in Appendix D.

Each monitoring station contained a microphone (i.e., transducer) encased in a protective shroud using a reflector plate to collect bat vocalizations. Reflector plates were either mounted atop a 10-foot section of Telespar tubing approximately 3 m aboveground or on a MET tower, as described above. Reflector plates were oriented to provide a horizontal, multi-lobed volume of detection, providing a 45° spread from the plate.

The remaining equipment consisted of an Anabat II bat detector, a Compact Flash Zero Crossings Analysis Interface Module (CF ZCAIM), a 10-watt solar panel, a rechargeable battery, and a solar charge controller. Excluding the solar panel, all components were encased in a weatherproof case designed by the National Electrical Manufacturers Association (NEMA). The detector and CF ZCAIM were purchased from Titley Electronics in Ballina, New South Wales, Australia. Other monitoring station components were purchased from EME Systems in Berkeley, California. Each station used 1 GB Compact Flash Cards that were changed at least once a month. Each CF ZCAIM was programmed to start approximately 0.5 hour before sunset and stop 0.5 hour after sunrise. Monitoring stations were left in place for the entire survey period in order to document seasonal fluctuations in activity levels of this highly mobile mammal community.

AnaBat data files (.dat files) were downloaded using cfcread software (developed by Chris Corben) and identified to species by Dr. Michael J. O’Farrell (O’Farrell Biological Consulting) using Analook software (developed by Chris Corben). Species-level analysis was accomplished using methods described by O’Farrell et al. (1999). Bat activity is presented as an IA value, which is obtained by taking the sum of 1-minute time increments for which a species was detected and dividing by the number of sampling nights (Miller 2001). The resulting value is then multiplied by a factor of 100 so that values consist of whole numbers (IA = minutes of activity/nights of recording*100). The IA has been rounded to the nearest whole number for ease of use. AnaBat data files are collected with a time and date stamp, which can then be used to evaluate seasonal and nightly trends in the IA (Appendix E).

Capture surveys were done on two nights at the water resources located near CF-2076. These surveys were accomplished using a single 12-m mist net purchased from Avinet that was set across the widest part of the water resource. The mist net was checked at 10-minute intervals and was in place for approximately 3 hours per survey night.

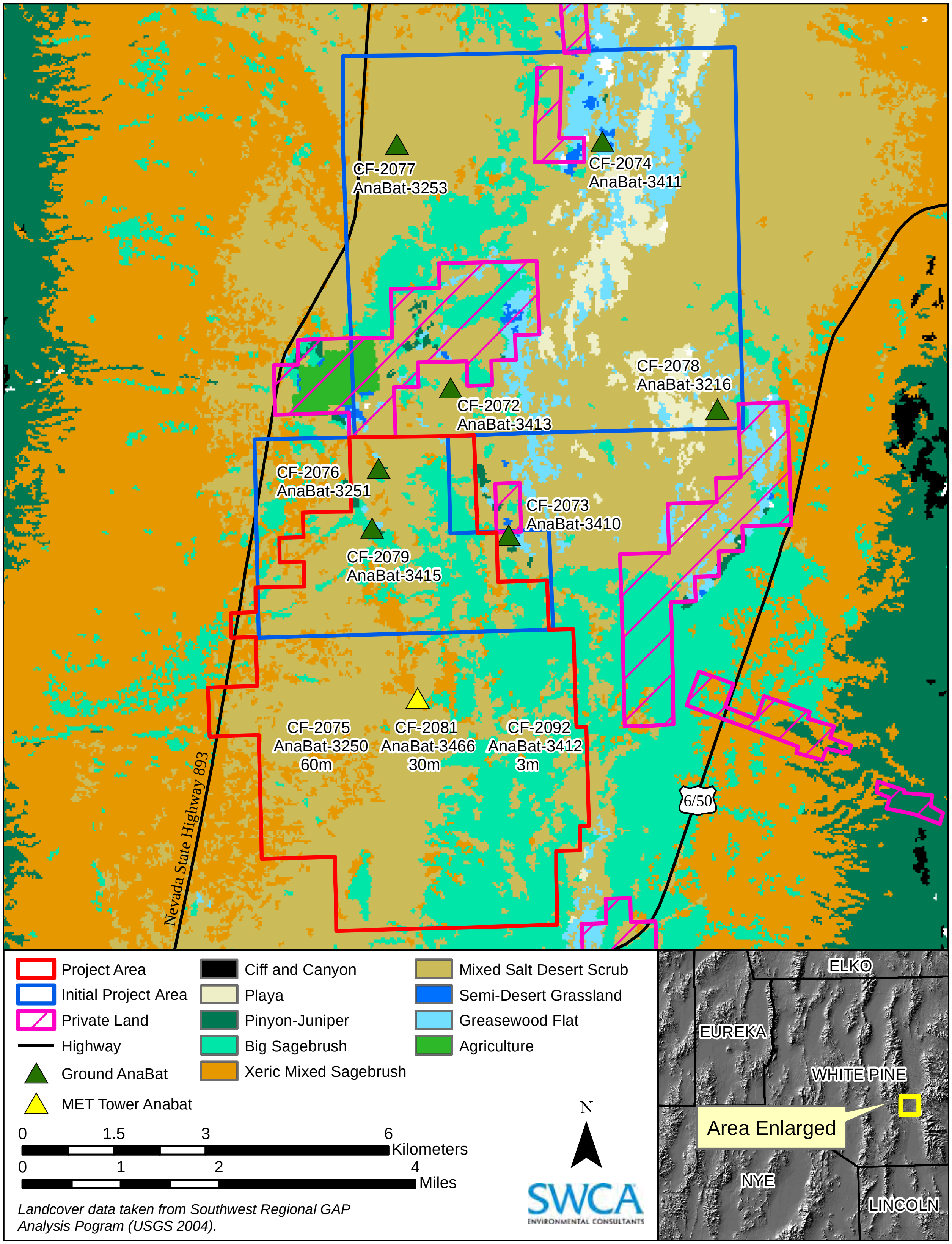

Figure 3. Vegetation types and AnaBat monitoring station locations.

3.0 RESULTS

3.1 Avian Surveys

3.1.1 Raptor Migration Surveys

Over the course of four seasons of raptor migration surveys, biologists recorded a total of 166 migrating raptors during 203.75 hours of survey. This correlates to an overall passage rate of 0.81 migrating raptor per hour for Spring Valley. Table 3 shows the number of migrating raptors seen for each season that surveys were conducted. In addition, tables displaying the number of migrating raptors per survey day by species for all surveys combined can be found in Appendix F.

Table 3. Migrating Raptors Observed during All Surveys

Survey Season	Number of Observation Hours	Number of Raptors Detected	Migrating Raptors per Hour
Spring 2007	60.00	42	0.70
Fall 2007	47.50	31	0.65
Spring 2008	51.75	43	0.83
Fall 2008	44.50	50	1.12
Spring Totals	111.75	85	0.76
Fall Totals	92.00	81	0.88
Project Totals	**203.75**	**166**	**0.81**

The most abundant migrating raptors in Spring Valley were turkey vultures (*Cathartes aura*), Swainson's hawks (*Buteo swainsoni*), and northern harriers (*Circus cyaneus*) in the spring and red-tailed hawks, turkey vultures, and sharp-shinned hawks (*Accipiter striatus*) in the fall. Other species observed include (in order of abundance for all seasons combined): American kestrel, golden eagle, Cooper's hawk (*Accipiter cooperii*), ferruginous hawk (*B. regalis*), prairie falcon (*F. mexicanus*), rough-legged hawk (*B. lagopus*), and bald eagle (*Haliaeetus leucocephalus*) (seen only once). For all seasons combined, turkey vultures, red-tailed hawks, and sharp-shinned hawks were the most abundant raptors observed. Multiple parameters were recorded during all seasons of raptor migration surveys for the project. These variables are recorded in order to help determine how various factors correlate with raptor migration; several of these variables are discussed in the following sections.

3.1.1.1 MIGRANT RAPTOR COUNTS BY TIME OF DAY

During all four seasons of raptor migration surveys in Spring Valley, the time was recorded for the passage of each individual migrant raptor. Figure 4 shows that raptor passage was fairly consistent throughout the middle of the day with a peak from 11 a.m. to 1 p.m., particularly during the hour from 11 a.m. to 12 p.m. To determine whether there were differences observed between the spring and fall surveys, raptor migration data were also broken down by season.

During two seasons of spring raptor migration surveys, the highest passages rates were recorded from 12 p.m. to 3 p.m., and the most active single hour was from 12 p.m. to 1 p.m. Figure 5 portrays how raptor counts vary from one hour to the next for the two spring seasons of raptor migration surveys.

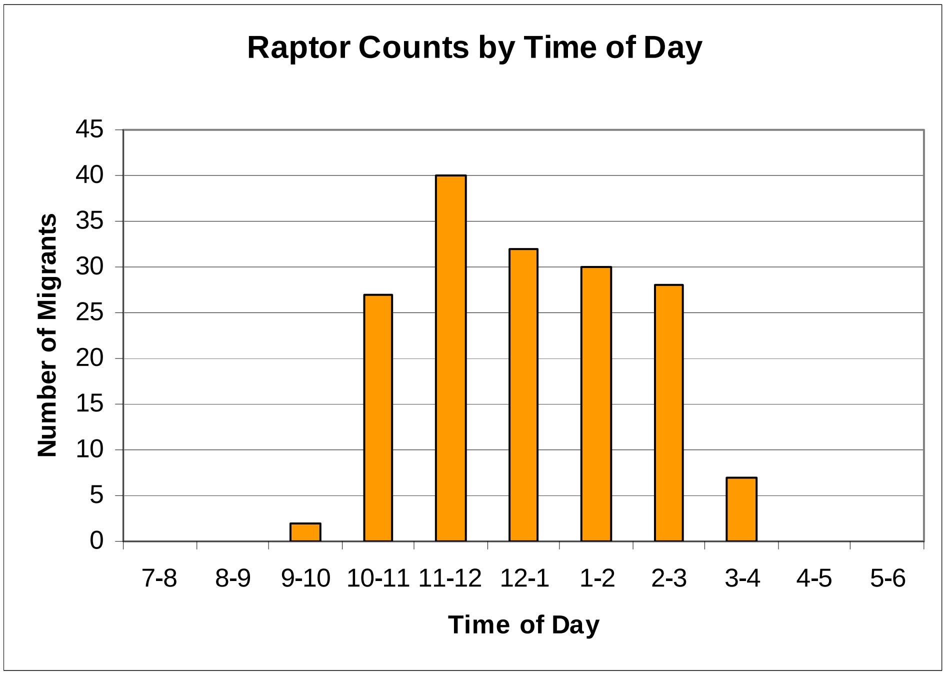

Figure 4. Raptor counts by time of day for all seasons combined.

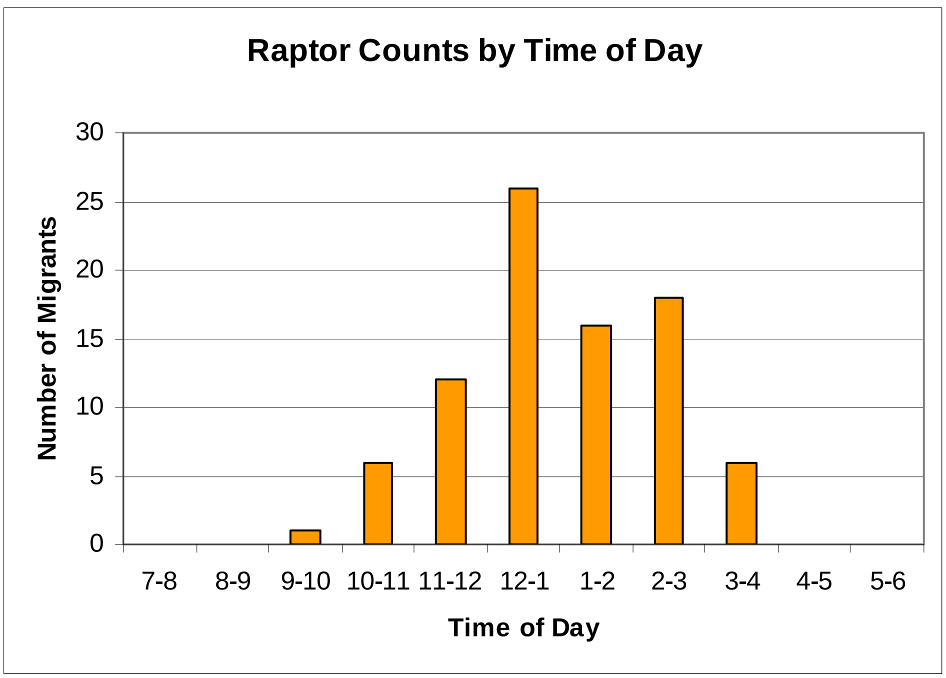

Figure 5. Spring raptor counts by time of day.

During two seasons of fall raptor migration surveys, the passage rates were slightly different, with the most active period occurring from 10 a.m. to 12 p.m. During the fall surveys, the single most active hour was from 11 a.m. to 12 p.m. Figure 6 portrays how raptor counts vary by hour for both fall seasons combined.

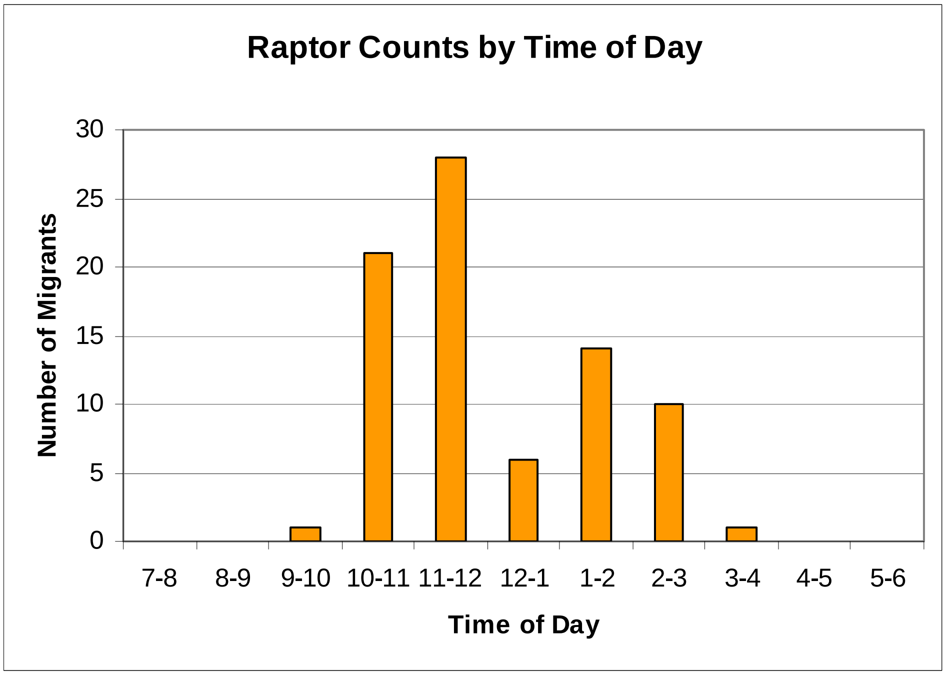

Figure 6. Fall raptor counts by time of day.

3.1.1.2 MIGRANT RAPTOR COUNTS BY WIND DIRECTION

During four seasons of surveys, wind direction seems to have little influence over raptor migration. Figure 7 shows how the wind direction recorded during raptor passage is distributed fairly sporadically across all directions, with no obvious preference for northerly or southerly winds. Some differences between the two spring and two fall seasons would be expected, as migrants fly in opposite directions during these two migrations. However, even when wind direction data are broken down by season, still no preference seems apparent.

During two seasons of spring raptor migration surveys, the most common wind direction in which raptors were observed changed from spring 2007 to spring 2008. The most common wind direction in which raptors were observed during spring 2007 was from the northeast (13 raptors), whereas 11 raptors observed when winds were out of the south. The most common wind direction when raptors were observed during spring 2008 surveys was out of the southwest (13 raptors). However, 11 raptors were observed when wind was blowing from a northwesterly direction. These two years of data show that migrants will fly both during periods of opposing winds as well as following winds. Overall, for the spring surveys, raptors were most commonly observed when the wind was blowing from the southwest. Figure 8 displays the most common wind directions in which raptors were observed for both spring seasons combined.

During fall 2007 raptor migration surveys, the most common wind direction when raptors were observed was out of the north-northeast (nine raptors). During fall 2008, however, the most common wind direction in which raptors were observed was from the south-southeast (12 raptors). Again, as is the case with the spring migration, two years of surveys reveal that raptors are migrating during varying conditions in Spring Valley. Overall raptors were most commonly observed when the wind was blowing out of the northeast during the two fall seasons combined. Figure 9 displays the most common wind directions in which raptors were observed for both fall seasons combined.

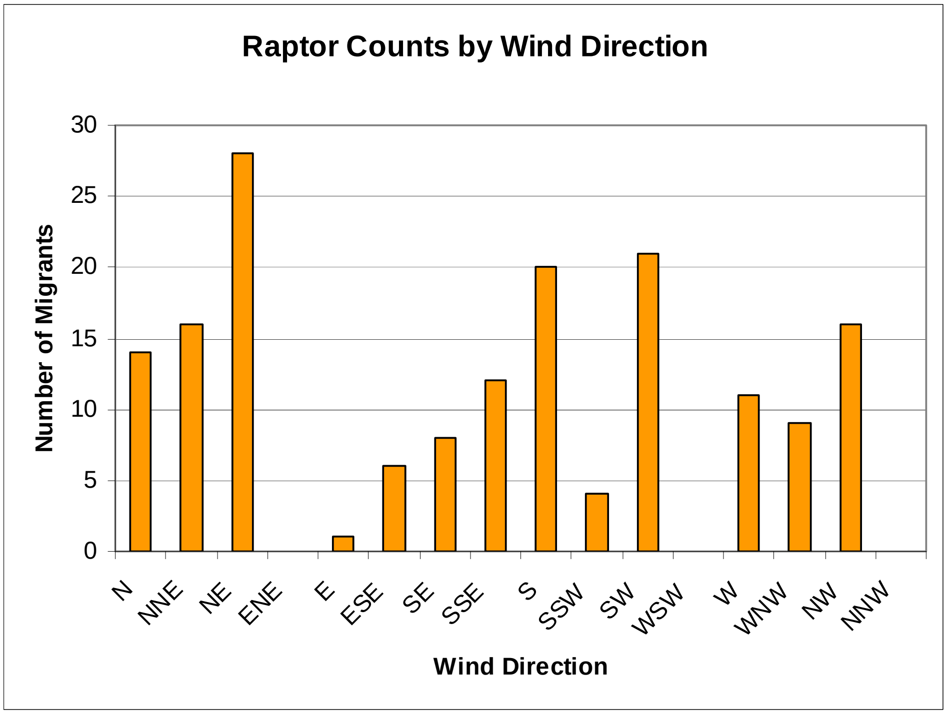

Figure 7. Raptor counts by wind direction for all seasons combined.

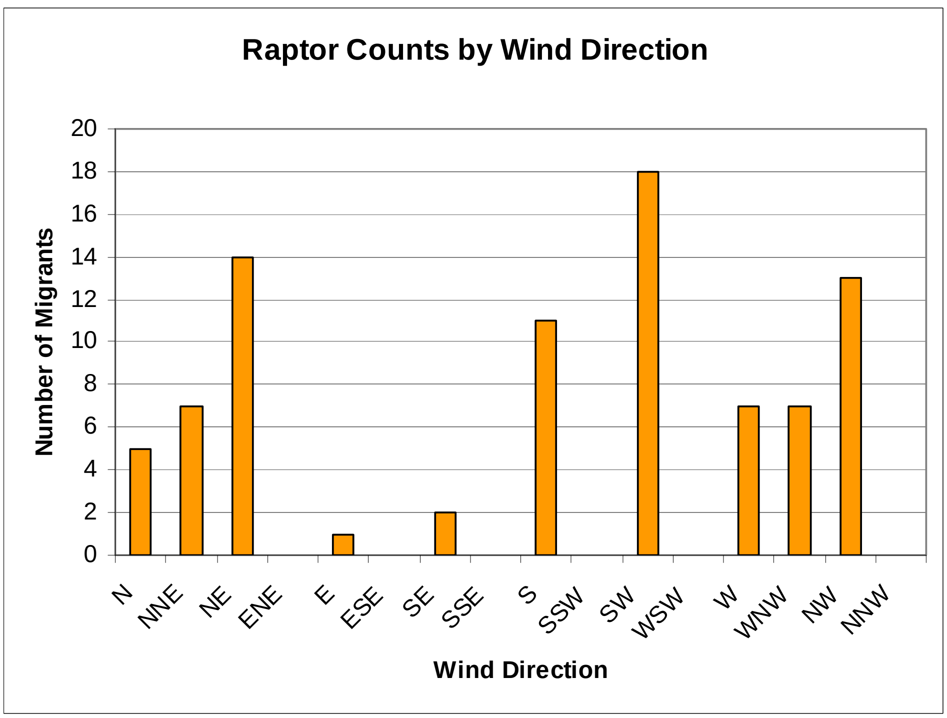

Figure 8. Spring raptor counts by wind direction.

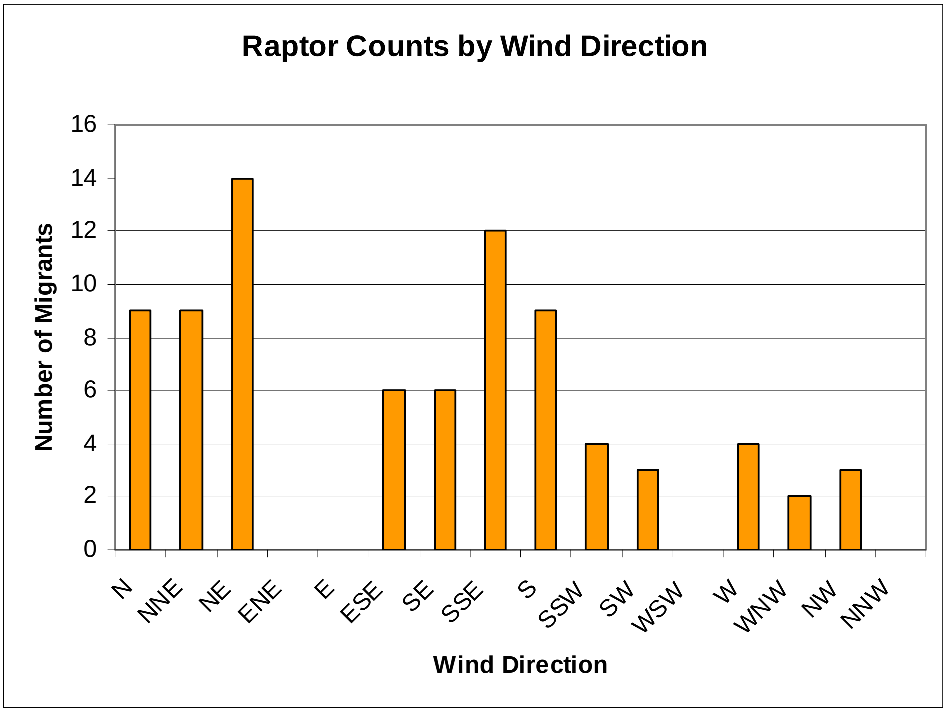

Figure 9. Fall raptor counts by wind direction.

3.1.1.3 MIGRANT RAPTOR COUNTS BY WIND SPEED

Counts by wind speed for all four seasons of raptor migration followed a fairly normal distribution. Appendix A gives definitions of the wind speed categories. Overall migrant raptors in Spring Valley appear to prefer low wind speeds (Categories 1–3), showing a peak of migration during category 2 wind speeds (Figure 10). In fact, almost 80% of raptors in Spring Valley were recorded during low wind speeds. When wind speed preference is broken down by season, only minor differences emerge.

During spring 2007 raptor migration surveys, most raptors were observed when wind speeds were low (Categories 1–3), particularly at Category 2 wind speed. Similarly, while the number of raptor observations during spring 2008 migration surveys was extremely variable across all wind speeds, Category 2 wind speed also yielded the most migrant raptors. Not surprisingly, for both spring seasons combined, raptors were most commonly observed during Category 2 wind speeds, and 66% of all raptors recorded during spring migration surveys were recorded during periods of low wind. Figure 11 displays the most common wind speeds in which raptors were observed for both spring seasons combined.

During fall 2007 raptor migration surveys, raptors were most frequently observed when wind speeds were low, particularly at a Category 3 wind speed. While most raptors were also seen during low category wind speeds in fall 2008 surveys, raptors were most commonly seen in Category 1 wind speeds. For both fall surveys combined, raptors were most commonly seen in Category 1 wind speeds, but were fairly evenly distributed between Categories 1–3. In total, 93% of migrant raptors were noted during low wind speeds during both fall seasons combined. Figure 12 displays the most common wind speeds in which raptors were observed for both fall seasons combined.

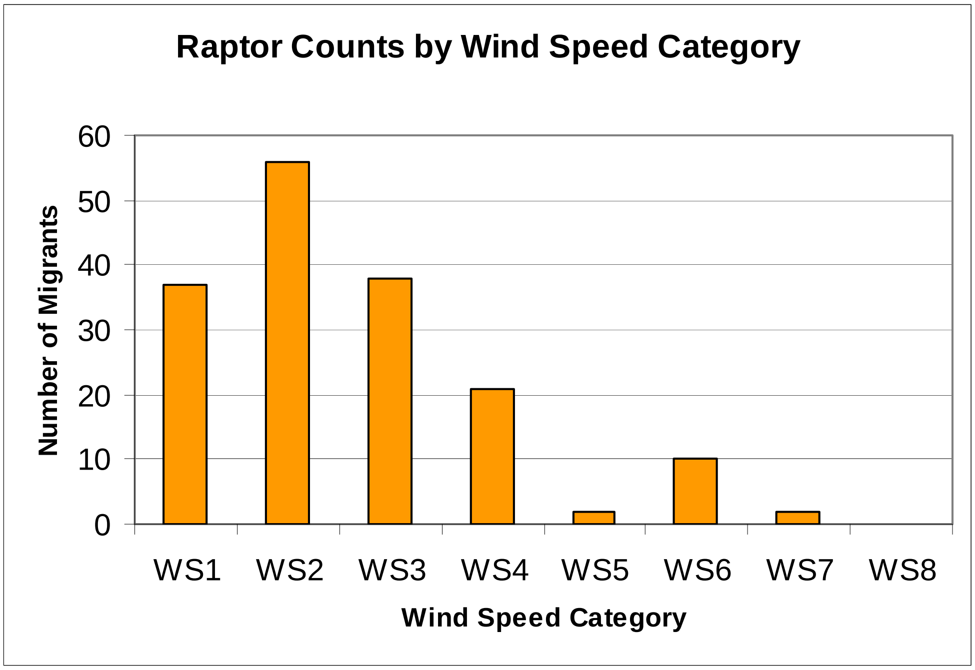

Figure 10. Raptor counts by wind speed category for all seasons combined.

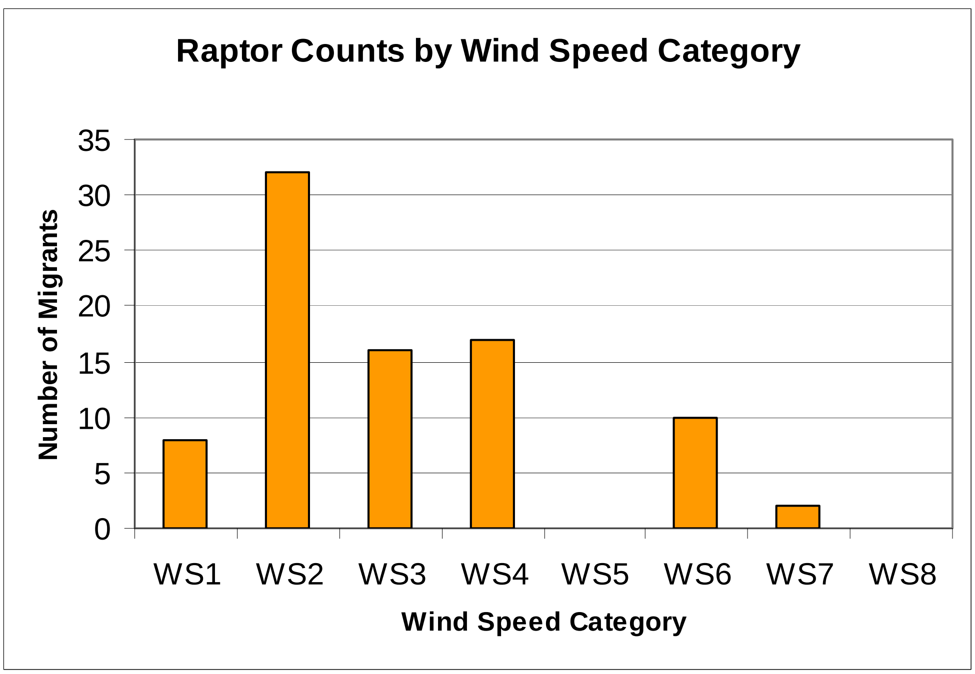

Figure 11. Spring raptor counts by wind speed category.

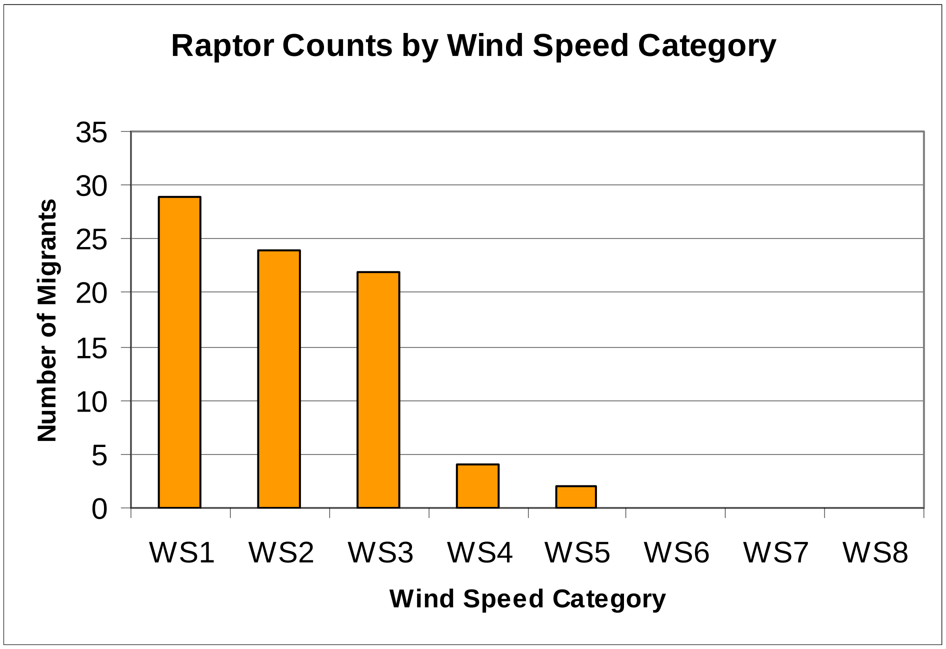

Figure 12. Fall raptor counts by wind speed category.

3.1.1.4 COUNTS BY FLIGHT HEIGHT

For all four seasons of raptor migration surveys combined, the majority of migrants (63%) were seen flying within Flight Height Categories 3 and 4. (Categories are defined in Appendix A.) However, a sizable portion of migrating raptors (25%) were observed at Flight Height Category 2 (closest to the anticipated RSA height). Figure 13 displays in which flight height categories raptors were seen for all seasons of survey. It is unclear whether significant differences between flight heights of spring and fall migrants exist, but differences were observed at Spring Valley. For birds recorded during spring migration, only 15% of migrants were recorded at Flight Height Category 2, whereas 35% of fall migrants were recorded at Flight Height Category 2.

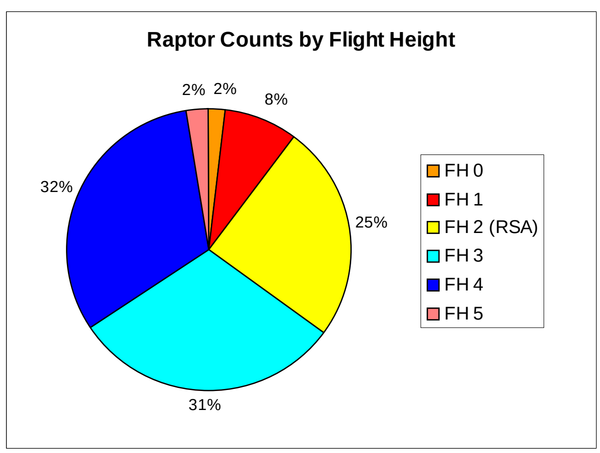

Figure 13. Raptor counts by flight height.

Of the 12 identified raptor species observed during raptor migration surveys, only two were not observed flying within the potential RSA, ferruginous hawk and bald eagle. Ten different species were identified within the RSA.
Table 4 shows the RI for all identified species during raptor migration surveys. This index assesses a particular species' potential risk of collision with a WGT blade based on observed flight behavior and the frequency with which that species was observed in the project area. Turkey vultures, red-tailed hawks, and northern harriers have the highest RIs—13.5, 12.2, and 10.0, respectively. Again, these numbers are relative figures that are being used solely to contrast potential risks between

raptors species observed during raptor migration surveys, and RIs for raptors should not be compared to the RIs for passerines calculated from passerine survey data.

Table 4. Species Observed during Raptor Migration Surveys and Their Risk Indices

Species	Frequency (% of Surveys Observed)	Number of Observations	Number of Observations in RSA	% of Observations in RSA	Risk Index*
Turkey vulture	44.4	33	10	30.3	13.5
Red-tailed hawk	30.6	20	8	40.0	12.2
Northern harrier	25.0	10	4	40.0	10.0
Golden eagle	19.4	8	4	50.0	9.7
American kestrel	22.2	10	3	30.0	6.7
Rough-legged hawk	8.3	4	2	50.0	4.2
Swainson's hawk	13.9	9	2	22.2	3.1
Prairie falcon	13.9	5	1	20.0	2.8
Sharp-shinned hawk	19.4	11	1	9.1	1.8
Cooper's hawk	8.3	6	1	16.7	1.4
Ferruginous hawk	16.7	6	0	0.0	–
Bald eagle	2.8	1	0	0.0	–

*Risk Index = (Frequency × % of Observations in RSA) / 100

3.1.2 Migratory Passerine Surveys

Eighty-two species of bird were identified during migratory passerine surveys. Of these 82 species, the most abundant species were the horned lark (*Eremophila alpestris*), common raven (*Corvus corax*), and mountain bluebird (*Sialia currucoides*). Other common birds (in order of abundance) that were observed during migratory passerine surveys include: pinyon jay (*Gymnorhinus cyanocephalus*), western meadowlark (*Sturnella neglecta*), Brewer’s blackbird (*Euphagus cyanocephalus*), cinnamon teal (*Anas cyanoptera*), northern flicker (*Colaptes auratus*), European starling (*Sturnus vulgaris*), American kestrel, black-billed magpie (*Pica hudsonia*), mallard (*Anas platyrhynchos*), Canada goose (*Branta canadensis*), loggerhead shrike (*Lanius ludovicianus*), tree swallow (*Tachycineta bicolor*), green-winged teal (*Anas crecca*), snow goose (*Chen caerulescens*), and yellow-rumped warbler (*Dendroica coronata*). Whereas some of these species are known to or are likely to breed within the project area, such as the horned lark and common raven, others are only observed during the migration, such as cinnamon teal, green-winged teal, and snow goose (all seen in one flock flying far above the project area).

Figure 14 illustrates the most abundant birds observed during migratory passerine surveys for all survey seasons combined. Any species observed fewer than 40 times was excluded from the figure. However, merely exhibiting the abundance of birds observed during surveys shows bias toward those species that are seen less often, but in larger flocks. Therefore, to represent with what regularity a species was found in Spring Valley during avian surveys, Figure 15 displays the frequency (% of surveys) a species was recorded during all passerine surveys. Those species observed during less than 10% of surveys were excluded from the figure. Appendix G lists all species observed during passerine surveys (including unidentified species categories) and their percent species composition, frequency observed, and RI (if applicable).

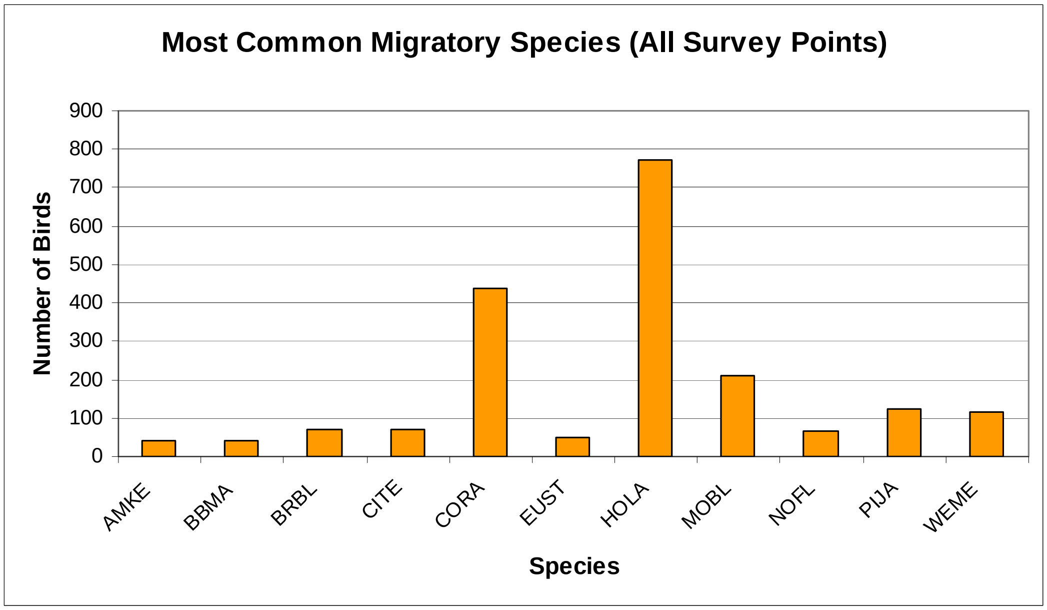

Figure 14. Most abundant species at all migratory passerine points combined.

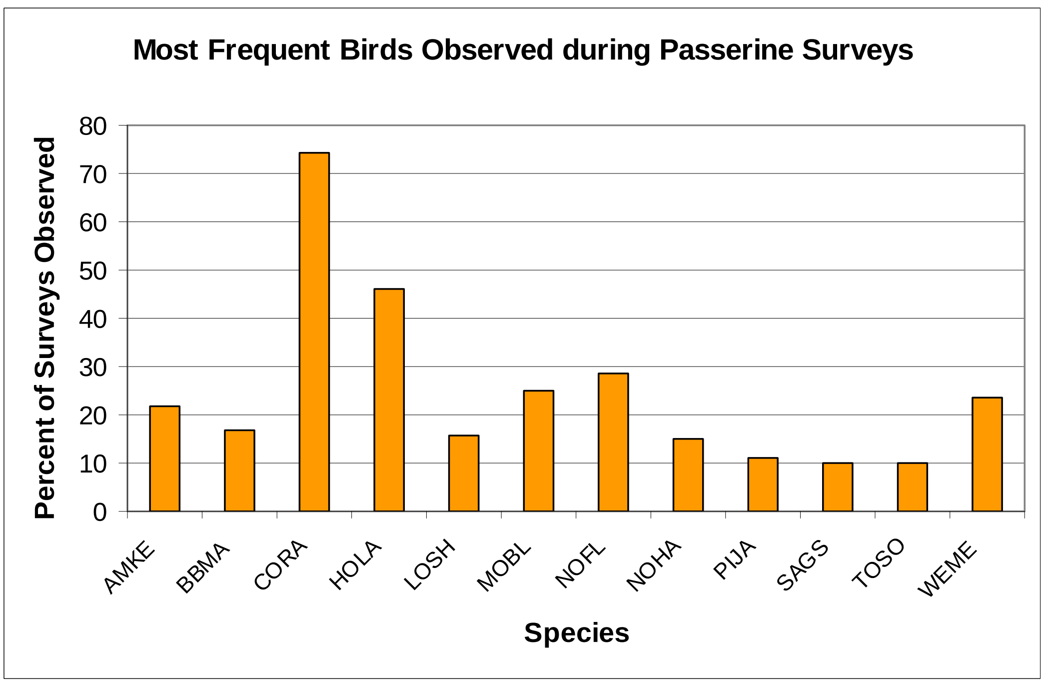

Figure 15. Most frequently observed birds during all passerine surveys.

While several species of birds are ubiquitous in Spring Valley and can be found at every survey point, others specialize in certain habitats and were far more abundant at some surveys points than others. To account for differing species composition and diversity, migratory passerine survey points were located within different major vegetation communities to more accurately represent all species within the project area and specific habitat use for these species. Figure 16 reflects species diversity observed at each survey point, excluding unidentifiable birds. The highest diversity was observed at PS 3 and PS 4, each with a total of 58 different species. PS 1 was the second-most diverse, with a total of 35 different species. A total of 24 species was identified at PS 2, whereas 16 species were observed at PS 5. Each of these survey points is discussed in detail below. Appendix H gives the codes for species observed in Spring Valley.

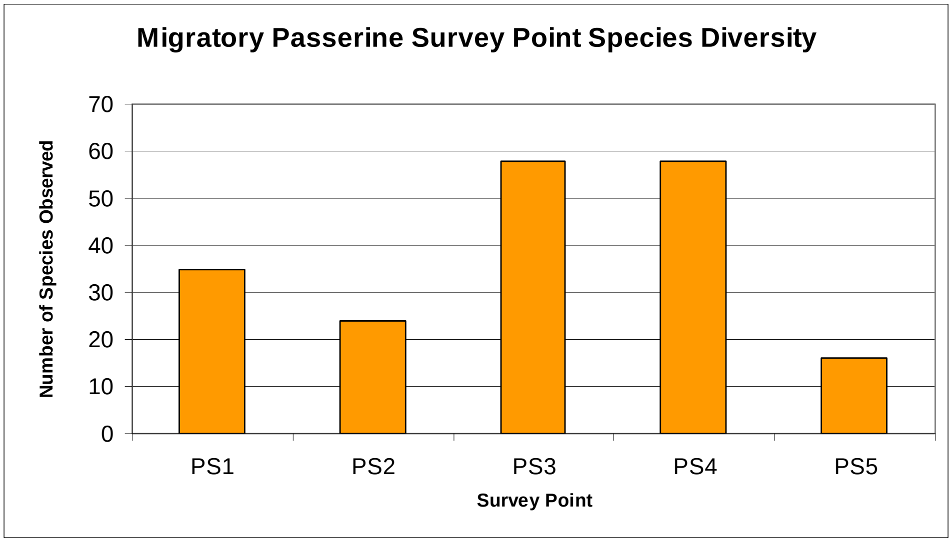

Figure 16. Species diversity observed at each migratory passerine survey point during all surveys combined.

PS 1 is characterized by mixed salt desert scrub and greasewood flat. This point is intermixed with juniper, which offers more vertical structure for birds. The most abundant birds at this point were pinyon jay, common raven, mountain bluebird, and western meadowlark. Figure 17 shows all species observed at least 10 times at PS 1 during migratory passerine surveys. PS 2 is characterized by the big sagebrush vegetation community, and the avian community is represented by species that prefer sagebrush and mixed scrub habitats. The most abundant species at PS 2 were horned lark, common raven, loggerhead shrike, and savannah sparrow (*Passerculus sandwichensis*). Figure 18 shows all species observed at least five times at PS 2 during migratory passerine surveys. PS 3 is situated next to a perennial pond in the middle of Xeric Mixed Sagebrush. The most abundant species at this point were the common raven, horned lark, Brewer's blackbird, and black-billed magpie, and Figure 19 shows all species observed at least 10 times at PS 3 during migratory passerine surveys. PS 4 is made up of Semi-Desert Grassland, Greasewood Flat, intermixed juniper, and an ephemeral pond. This unique combination of habitat yields a high diversity of birds, including many species not observed at other survey points. The most abundant species at this point were mountain bluebird, western meadowlark, and cinnamon teal. Figure 20 represents the diverse avian community at PS 4, excluding any species observed fewer than 25 times. Figure 21 represents the avian species recorded at least twice during migratory passerine surveys at PS 5. This survey point was dominated by horned lark and common raven. Snow geese were the third-most abundant species observed at PS 5, but all 33 individuals recorded at this point were observed within a single flock flying more than 300 m (1,000 feet) above the project area on October 28, 2008. Other fairly abundant species at this point included tree swallow and long-billed curlew (*Numenius americanus*). See Appendix H for the codes for these species.

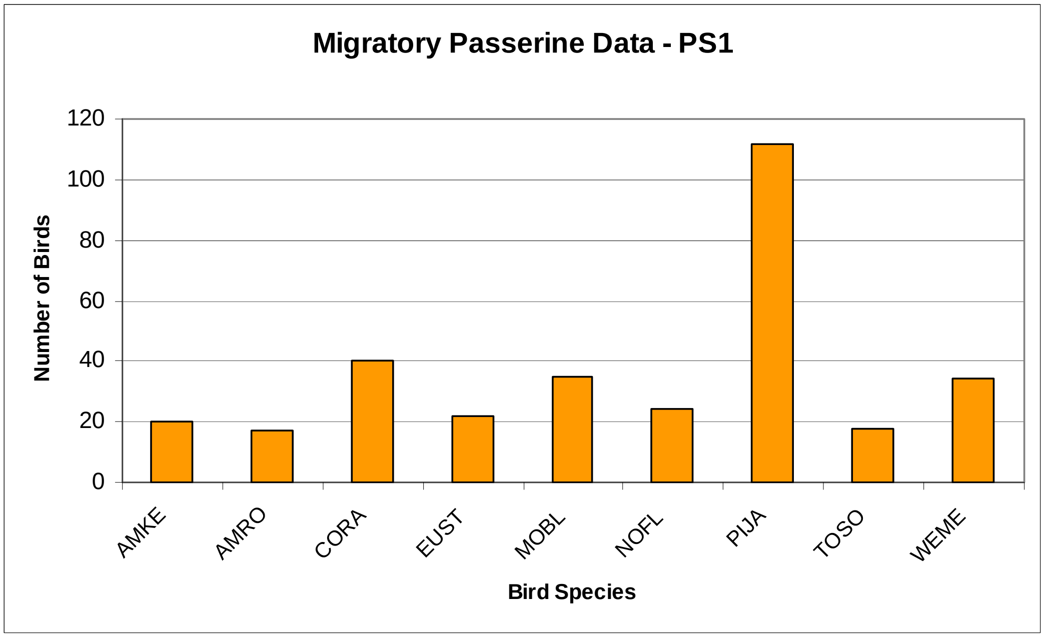

Figure 17. Most abundant species at PS1 during migratory passerine surveys.

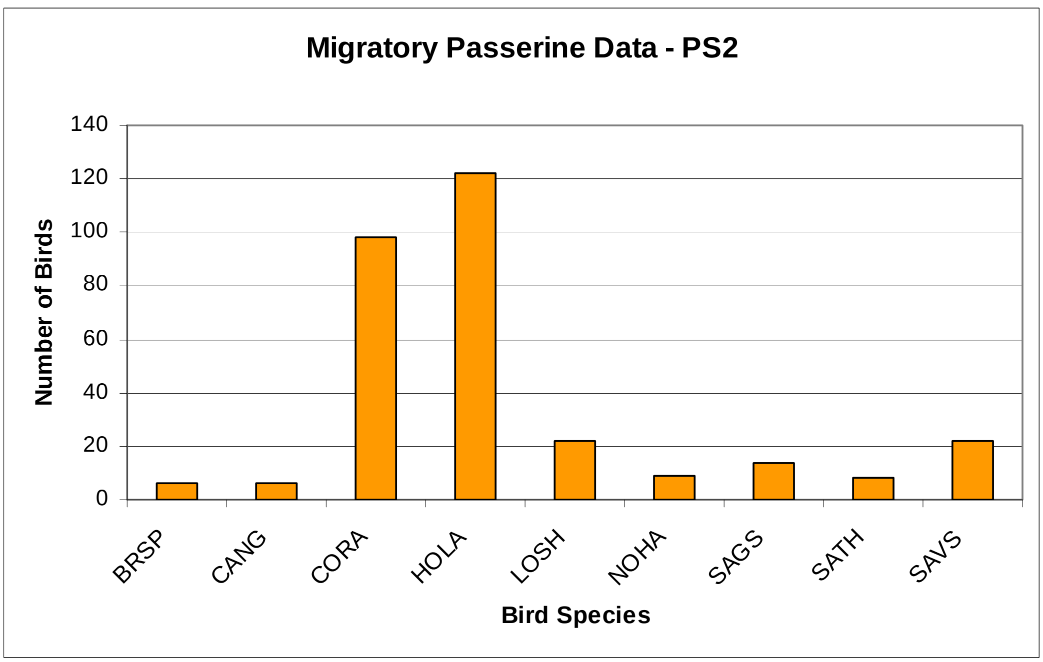

Figure 18. Most abundant species at PS2 during migratory passerine surveys.

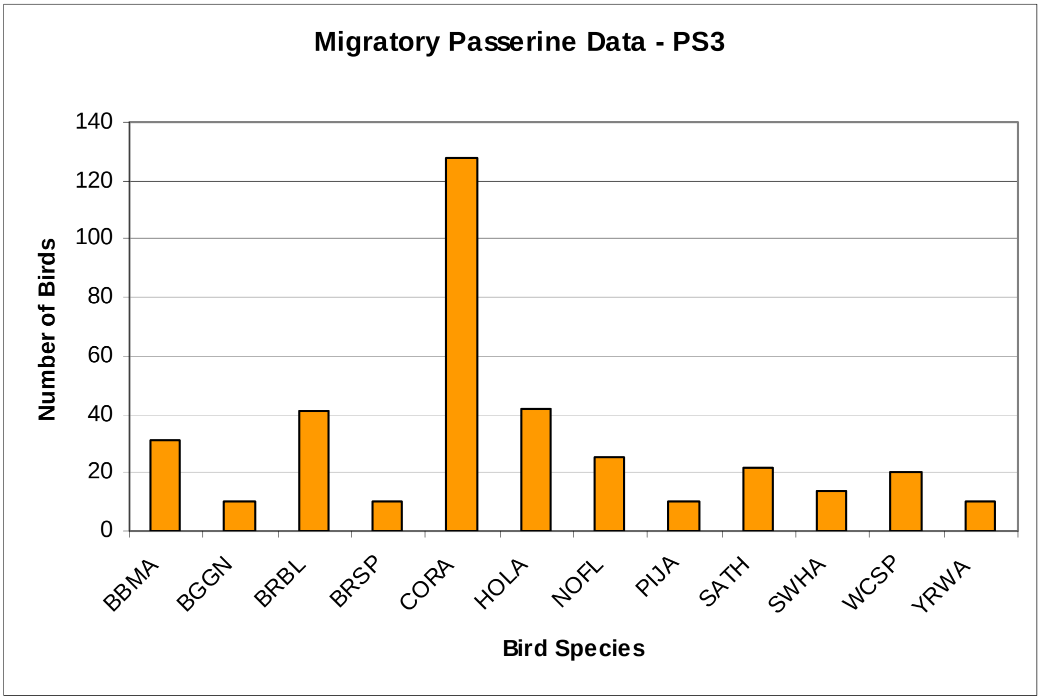

Figure 19. Most abundant species at PS3 during migratory passerine surveys.

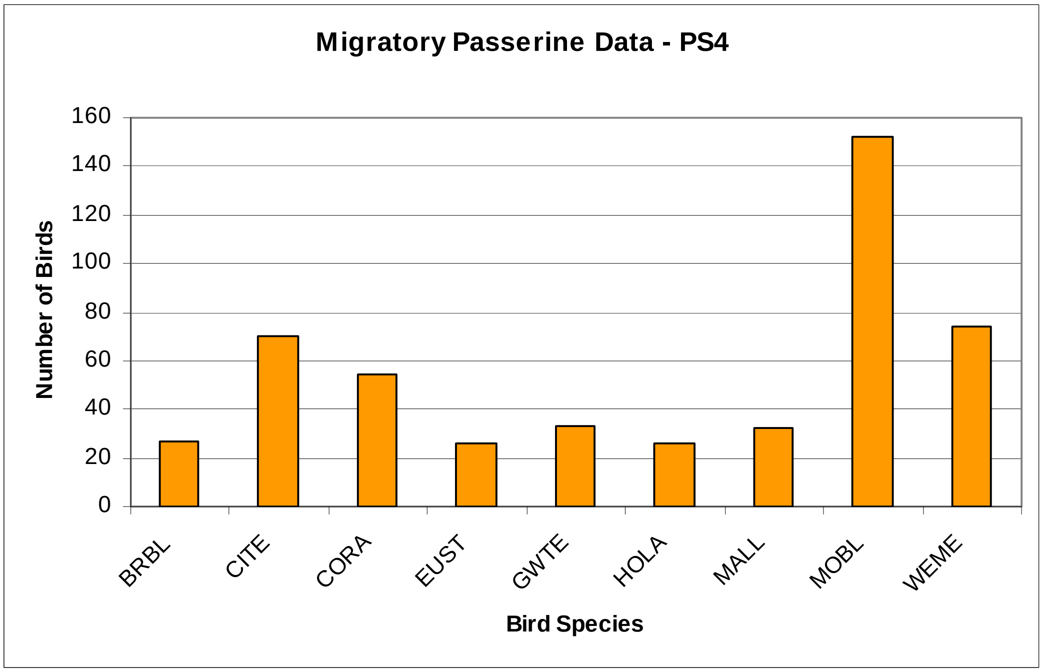

Figure 20. Most abundant species at PS4 during migratory passerine surveys.

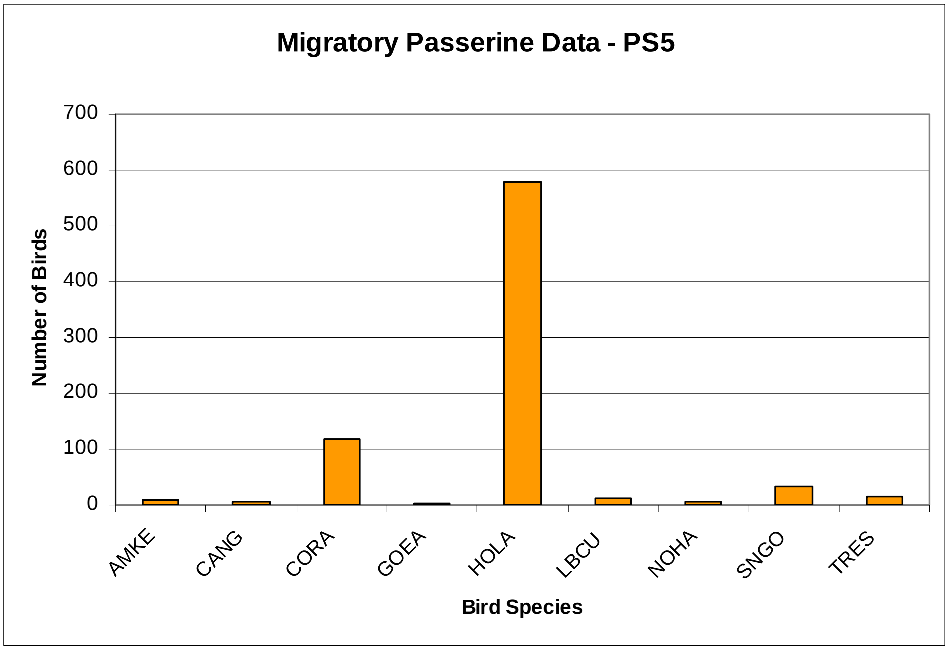

Figure 21. Most abundant species at PS5 during migratory passerine surveys.

Flight heights were recorded during all migratory passerine surveys to analyze potential risk of collisions with WTG blades. Ninety percent of all birds observed during migratory passerine surveys occurred at a height below 35 m. Additionally, 8% occurred within the potential RSA (between 35 and 130.5 m), and 2% occurred at a height greater than 130.5 m. Figure 22 portrays how these percentages compare. Of the 8% of birds observed within the RSA, a total of 23 migratory species was represented. Of these species, horned lark, common raven, and pinyon jay were the most abundant species, respectively, observed within the RSA.

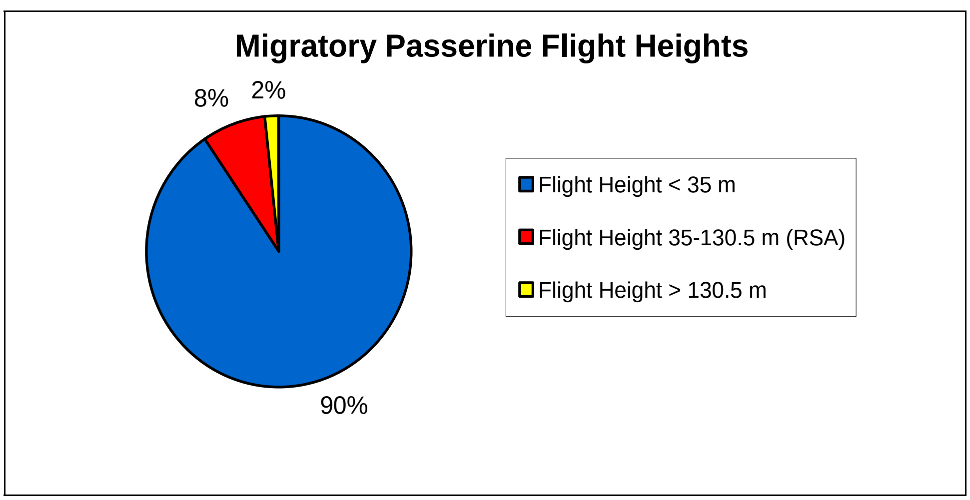

Figure 22. Migratory passerines observed within the rotor-swept area.

Twenty-five species were identified flying within the anticipated RSA during all passerine surveys. Table 5 shows the RI for all species observed in the RSA. This index assesses a particular species' potential risk of collision with a WGT blade based on observed flight behavior and the frequency with which that species was observed in the project area. Of all the birds seen during migratory passerine surveys, common ravens, Canada geese, and Swainson's hawks have the highest RIs—5.2, 4.8, and 3.0, respectively.

Table 5. Species Observed in the RSA during Passerine Surveys and Their Risk Indices

Species	Frequency (% of Surveys Observed)	Number of Observations	Total Number of Observations in the RSA	% of Observations in RSA	Risk Index*
Common raven	74.4	543	38	7.0	5.2
Canada goose	9.4	64	33	51.6	4.8
Swainson's hawk	9.4	25	8	32.0	3.0
Mourning dove	5.0	15	8	53.3	2.7
Mountain bluebird	25.0	242	24	9.9	2.5
Golden eagle	8.1	13	4	30.8	2.5
Pinyon jay	11.3	194	37	19.1	2.2
Horned lark	46.3	1158	51	4.4	2.0
Brewer's blackbird	6.9	71	19	26.8	1.8
American kestrel	21.9	58	4	6.9	1.5
American robin	8.8	81	12	14.8	1.3
Red-tailed hawk	1.9	3	2	66.7	1.3
Long-billed curlew	3.1	13	4	30.8	1.0
Cooper's hawk	1.3	2	1	50.0	0.7
Ferruginous hawk	1.3	2	1	50.0	0.7
Yellow-headed blackbird	1.3	2	1	50.0	0.7
Turkey vulture	0.6	4	4	100.0	0.6
House finch	0.6	2	2	100.0	0.6
Northern harrier	15.0	29	1	3.4	0.5
Killdeer	6.9	15	1	6.7	0.5
Blue-gray gnatcatcher	6.3	18	1	5.6	0.4
Black-billed magpie	16.9	49	1	2.0	0.3
Sandhill crane	1.9	6	1	16.7	0.3
Tree swallow	6.3	34	1	2.9	0.2
Sage thrasher	6.9	32	1	3.1	0.2

* Risk Index = (Frequency × % of Observations in RSA) / 100

3.1.3 Breeding Bird Point-Counts

Breeding bird point-counts were conducted to determine the distribution and relative abundance of birds likely to be nesting within the project area. In total, 29 different species were observed during breeding bird point-counts in 2007 and 2008. Of these species, biologists observed five different species that exhibited breeding behavior during point-counts: Brewer's sparrow (*Spizella breweri*), common raven, lark sparrow (*Chondestes grammacus*), Loggerhead shrike, and sage sparrow (*Amphispiza belli*). Incidentally, several other species were observed exhibiting breeding behavior during other survey efforts in Spring Valley. Swainson's hawks and ferruginous hawks were observed nesting in the project area during raptor nest surveys. A female northern harrier was observed with at least two juveniles during site visits in July. An active sage thrasher (*Oreoscoptes montanus*) nest was observed while biologists were conducting routine maintenance at an AnaBat monitoring station. Several black-billed magpie nests were observed in junipers throughout the project area, but none of these nests showed signs of recent activity. Several juvenile killdeer (*Charadrius vociferus*) were observed soon after fledging from a nest near PS 3. Cumulatively, considering all recorded and incidental sightings, at least 11 species are known to breed in the Spring Valley project area. Additionally, because of the timing of surveys during the middle of the breeding season, it is assumed that most or all of the 29 species observed during point-counts are breeding in the general area.

3.1.3.1 POINT-COUNTS BY TRANSECT

Species diversity varies between different habitat types, and point-count transects were located within different major vegetation communities within the project area to more accurately represent all species within the project area and the species' specific habitat use. Figure 23 reflects species diversity observed at each transect, excluding unidentifiable birds. The highest diversity was observed at Transect C, with a total of 18 different species. Transect B was the second-most diverse with a total of 17 different species, and both Transects A and D had a total of nine different identifiable species observed during point-count surveys.

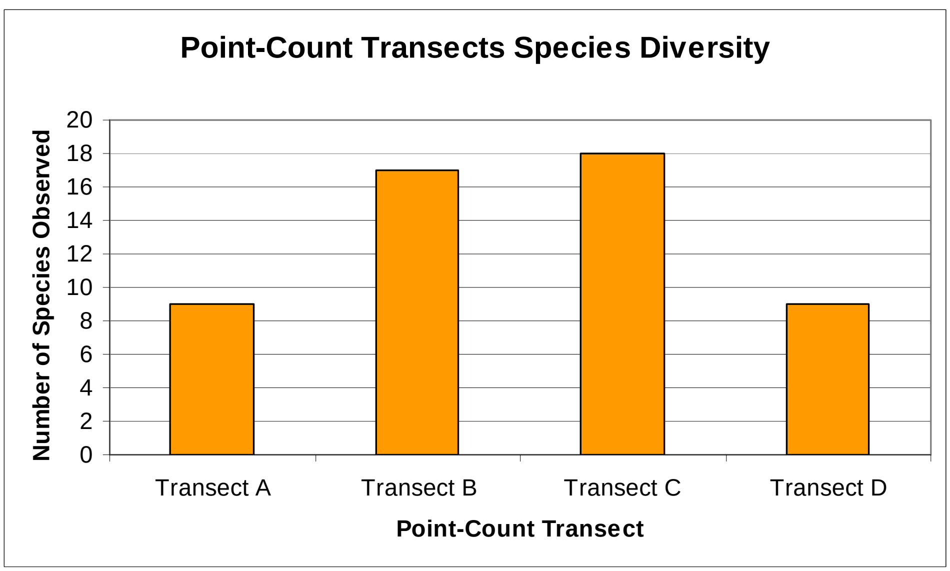

Figure 23. Bird species diversity among point-count transects.

Among all birds observed during the point-counts, horned larks were by far the most abundant bird, with 128 total sightings. Other abundant species observed during point-counts were Brewer's sparrow, sage sparrow, western meadowlark, yellow-headed blackbird (*Xanthocephalus xanthocephalus*), and common raven. Birds that were observed more than once during point-counts include Brewer's blackbird, Brewer's sparrow, black-throated sparrow (*Amphispiza bilineata*), common raven, ferruginous hawk, lark sparrow, long-billed curlew, loggerhead shrike, mountain bluebird, mourning dove (*Zenaida macroura*), northern harrier, northern mockingbird (*Mimus polyglottos*), sage sparrow, vesper sparrow, western kingbird (*Tyrannus verticalis*), western meadowlark, and yellow-headed blackbird.

Transect A is found within the Inter-Mountain Basins Mixed Salt Desert Scrub vegetation community. There was a total of nine species observed along this transect. The most abundant species was the horned lark, with 92 sightings (Figure 24). Located mostly within the Inter-Mountain Basin Big Sagebrush Shrubland, Transect B had a total of 17 species observed. The most commonly observed species was Brewer's sparrow, followed by sage sparrow and common raven (Figure 25). A mixture of Inter-Mountain Basins Greasewood Flat and Inter-Mountain Basins Playa forms the habitat of Transect C. While western meadowlark and lark sparrow were the most abundant along this transect, there was a total of 18 species observed (Figure 26). Transect D occurs along the most prominent stretch of Great Basin Xeric Mixed Sagebrush Shrubland within the project area. There were nine bird species observed along this transect, with horned lark being the most commonly observed species (Figure 27). See Appendix H for the species codes.

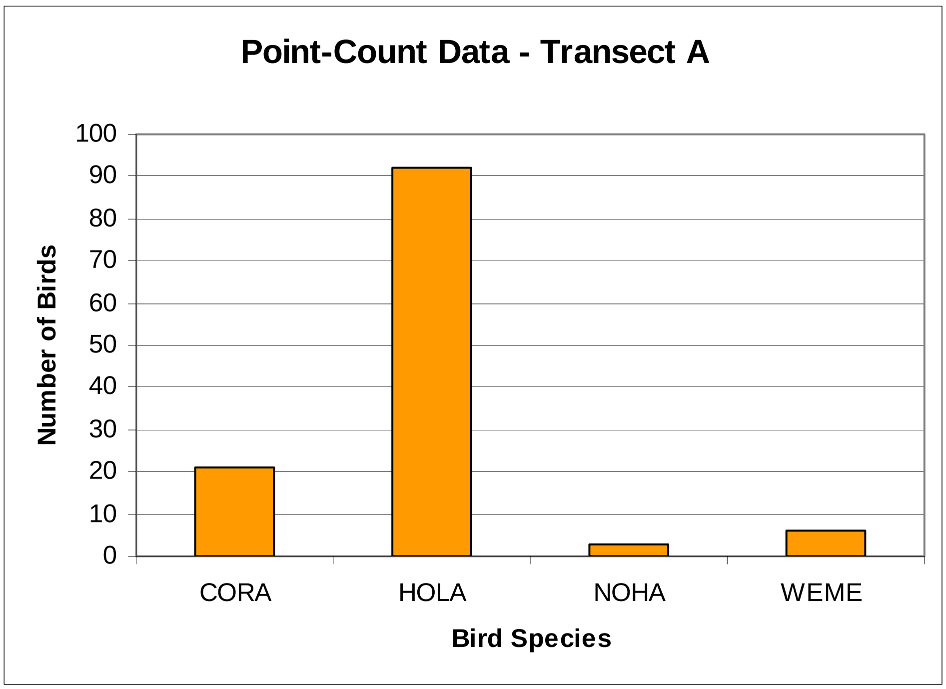

Figure 24. Bird species observed on Transect A.

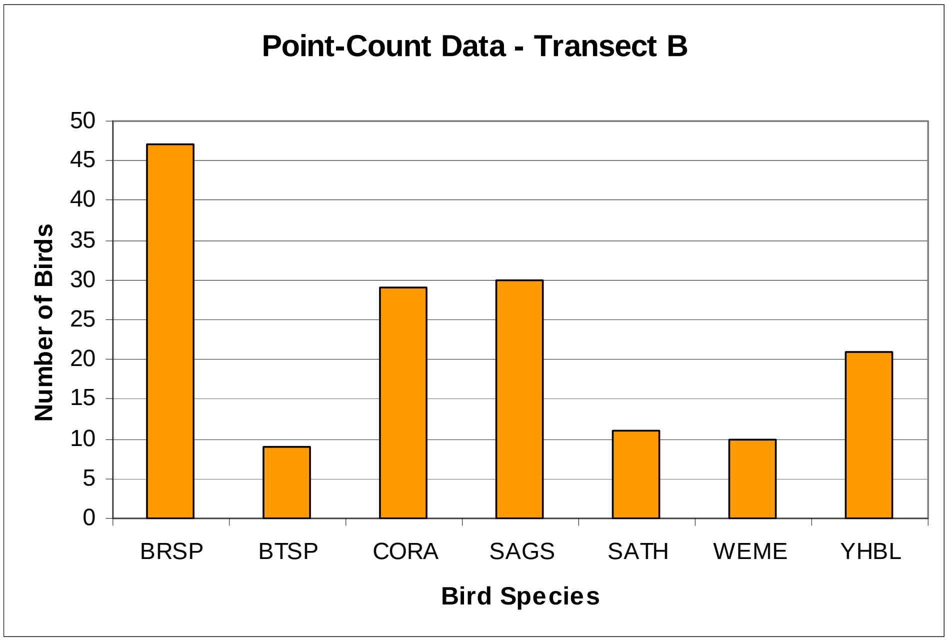

Figure 25. Bird species observed on Transect B.

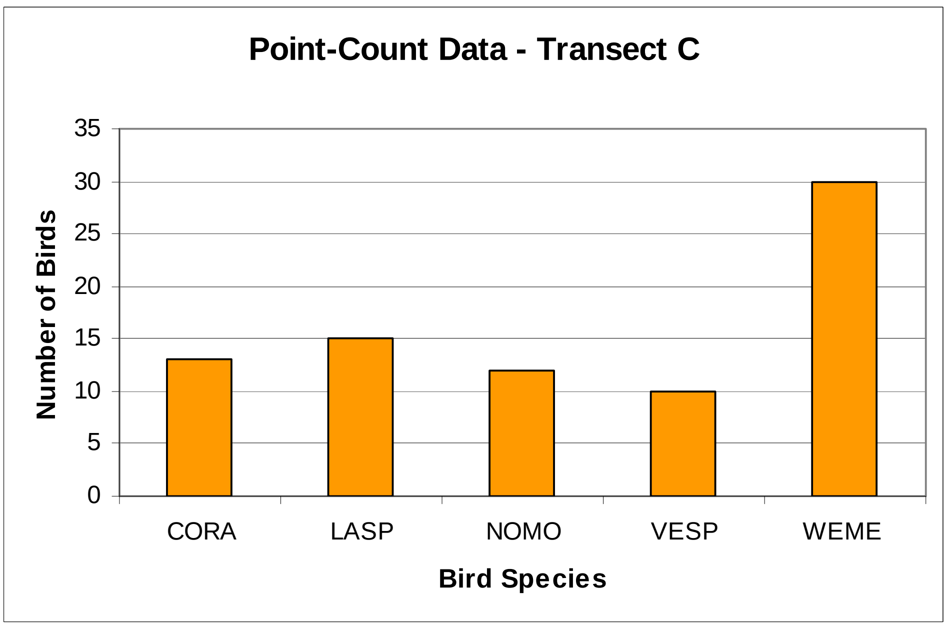

Figure 26. Bird species observed on Transect C.

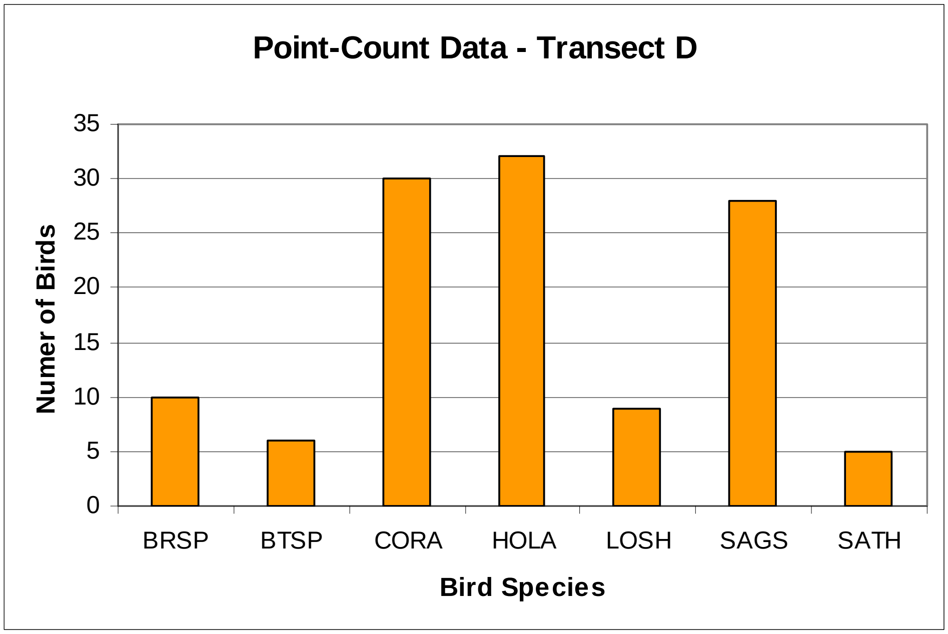

Figure 27. Bird species observed on Transect D.

Flight heights are recorded during breeding bird point-counts to analyze potential risk from collisions with WTG blades, just as they were for migratory passerine surveys. Most birds were observed below 35 m, while only 1% was observed within the RSA (35–130.5 m). There were only two birds observed above 130.5 m (Figure 28). The 1% of birds recorded in the RSA consisted of eight birds: three common ravens, two ferruginous hawks, an unknown hawk, an unknown blackbird, and an unidentified bird.

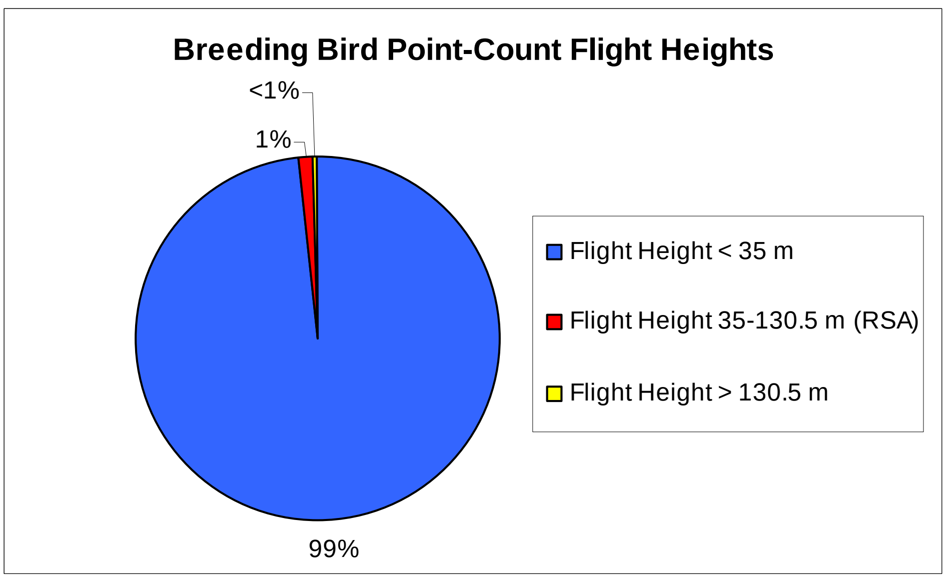

Figure 28. Birds observed within the RSA during breeding bird point-counts.

3.1.4 General Use Surveys

During general use surveys, 40 identifiable species of birds were observed. These birds constitute those species that take up residence in Spring Valley during either the summer or winter months. Bohemian waxwing (*Bombycilla garrulus*) and horned lark were the most abundant species observed during general use surveys. Other species with more than 20 observations include American robin (*Turdus migratorius*), Canada goose, common raven, European starling, mallard, mountain bluebird, pinyon jay, and western meadowlark. Some species, however, were only observed as large, transient flocks, such as the Bohemian waxwing and European starling. Species such as these may use the project area for only short periods of time during winter or summer seasons. The most abundant species observed during summer months are shown in Figure 29 and include, in order of abundance, pinyon jay, common raven, and horned lark. During the winter months, however, the most abundant species were Bohemian waxwing, horned lark, and European starling (Figure 30). See Appendix H for the species codes.

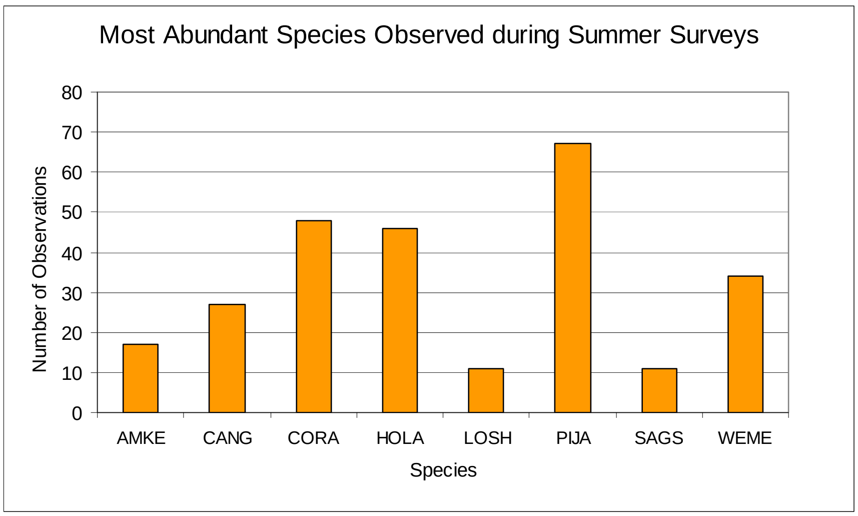

Figure 29. Most abundant bird species observed during summer general use surveys.

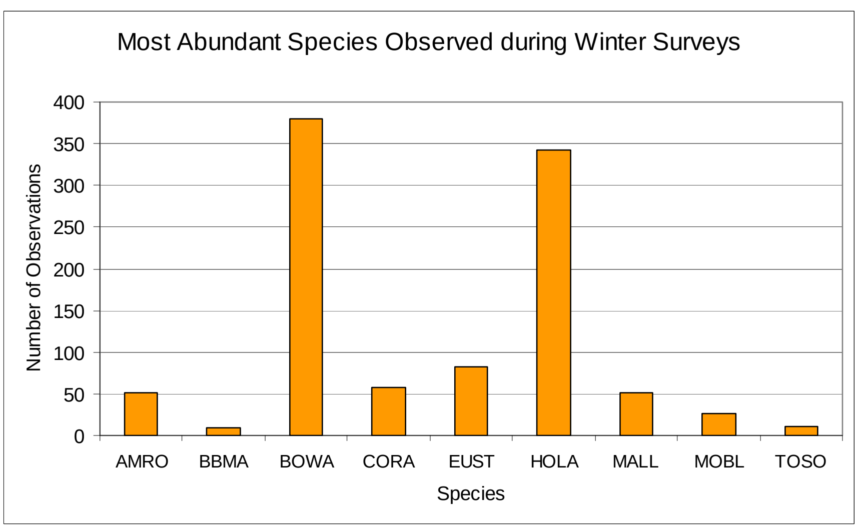

Figure 30. Most abundant bird species observed during winter general use surveys.

3.1.4.1 SEASONAL ABUNDANCE

General use surveys were conducted in part to detect seasonal fluctuations of bird abundance in Spring Valley. Some of the species observed were recorded throughout the year, while others use the project area for only one or two seasons. Seasonal changes in abundance are represented graphically over time for some of the most commonly observed species. These trends could be analyzed to determine whether a specific species has a greater potential risk of collision during a particular season, especially when compared with the mean bird abundance. To do this, we first need to look at overall bird abundance over time.

The total number of birds observed during migratory passerine surveys remained fairly consistent through spring and summer months (Figure 31). September seems to indicate a slight drop in overall bird abundance. Then, abundance begins to increase in Spring Valley with the onset of fall and winter as migratory flocks begin to move through the area. However, there was a dramatic decrease in activity in January 2007 and December 2008, likely as a result of extremely low temperatures. Individual species abundance can be compared to overall bird abundance by dividing overall bird abundance by the total number of species observed in Spring Valley, which results in a mean bird abundance that has been included in each of the subsequent figures.

Horned larks, although common in Spring Valley throughout the year, show an increase in numbers beginning in the fall and continuing through winter (Figure 32). During these months, horned lark may have a greater risk potential, relative to other birds, because of the large number of individuals. Because horned larks are so abundant, this species' abundance line dwarfs that of the mean bird abundance, as can be seen in Figure 32. Common raven was also abundant in Spring Valley and shows sporadic increases throughout the year (Figure 33); predicting seasonal changes in the RI for this species could be difficult. Mountain bluebird numbers increase during migration months, with a small peak in the spring and a greater increase in the fall (Figure 34). If this trend continues in the future, mountain bluebirds may be at a greater risk of strikes with WTG blades during these peak periods, particularly relative to other birds. Pinyon jays appear to follow mean bird abundance only during certain periods, and then peaks during the summer months (Figure 35). Western meadowlarks, however, appear to have an opposite trend, compared with the fluctuation in the average bird abundance in Spring Valley. This species increases in abundance beginning in March and continues throughout the summer, when mean bird abundance is low (Figure 36). This could mean that when the risk of mortality from striking WTGs is low for most birds, western meadowlark could be at its greatest risk. Following the same general trend in bird abundance, the mallard (Figure 37) and American robin (Figure 38) show an increase in abundance beginning in the fall and continuing throughout the winter. Cinnamon teals, however, show large peaks in the spring (Figure 39). Large flocks of cinnamon teal were commonly observed at PS 4, which had an ephemeral pond nearby, and cinnamon teal abundance seems to temporally coincide with the presence of water in this pond. This could mean that this species' risk potential could be greatest during the spring migration, but it should be noted that PS 4 and this ephemeral pond are roughly 5.6 km (3.5 miles) outside of the current project area. American kestrels seem to begin to increase in abundance in the late spring and peak during the summer (Figure 40). However, American kestrels are almost absent in Spring Valley in the winter, when mean bird abundance is at its highest.

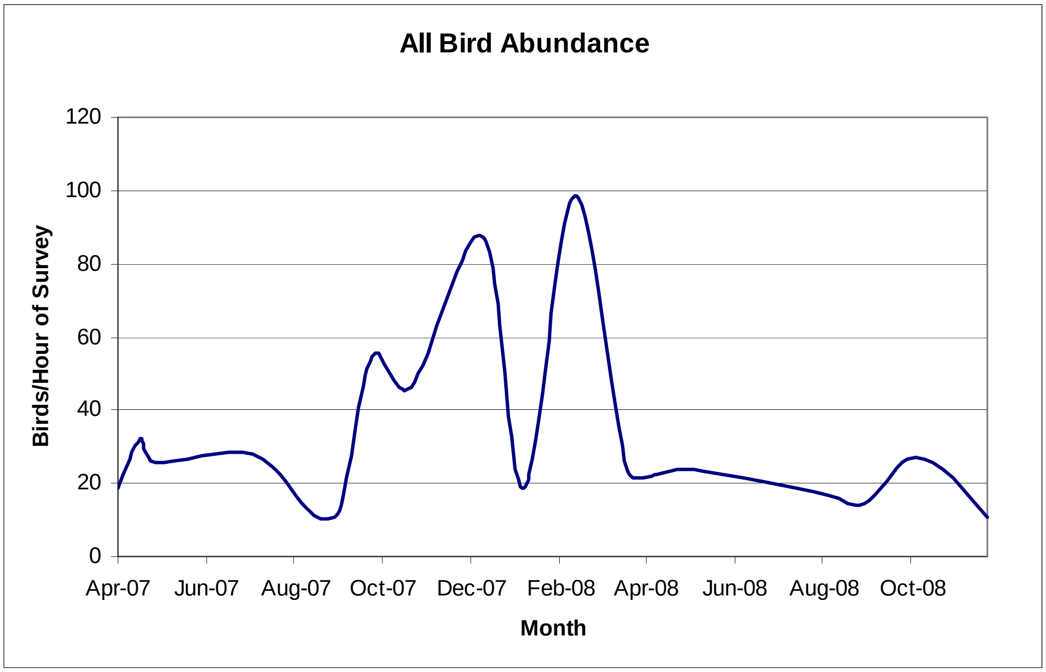

Figure 31. Overall bird abundance in Spring Valley throughout field surveys.

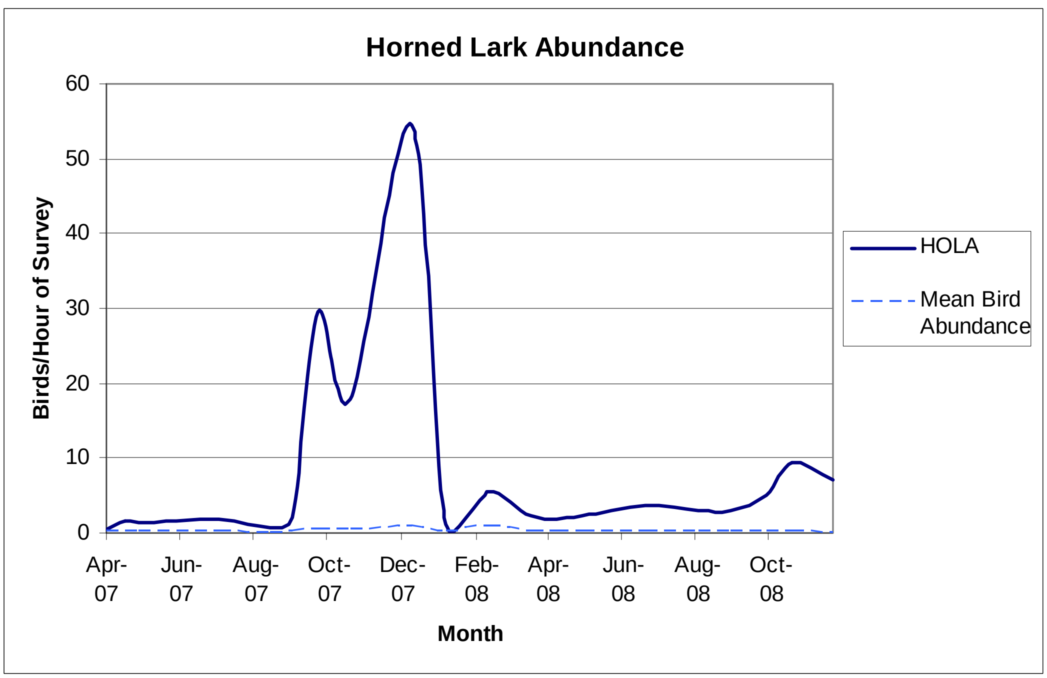

Figure 32. Horned lark abundance in Spring Valley throughout field surveys.

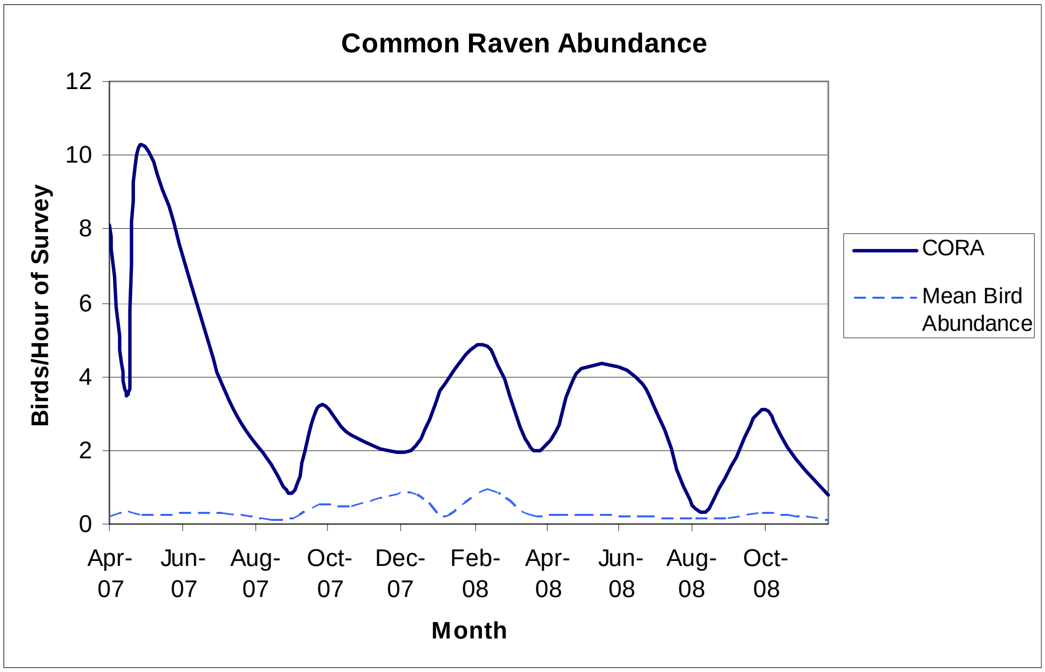

Figure 33. Common raven abundance in Spring Valley throughout field surveys.

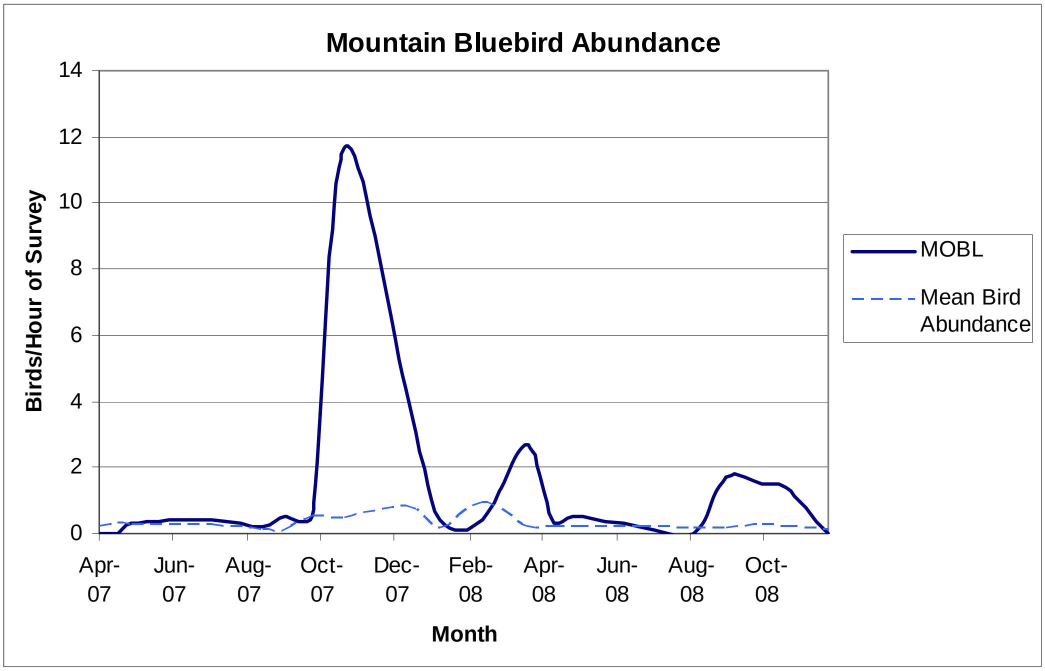

Figure 34. Mountain bluebird abundance in Spring Valley throughout field surveys.

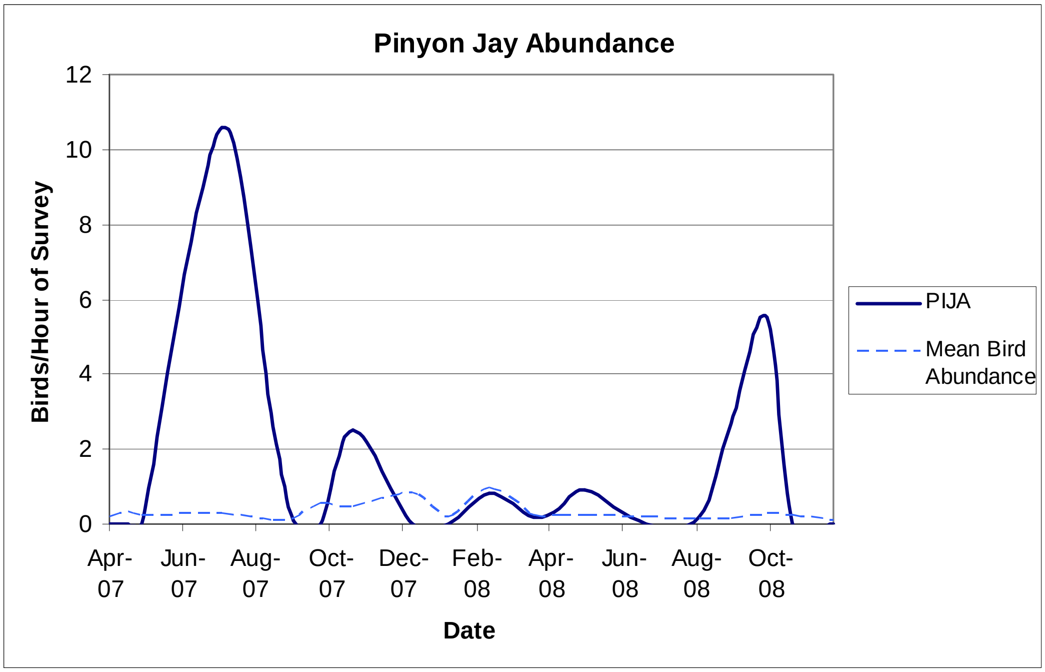

Figure 35. Pinyon jay abundance in Spring Valley throughout field surveys.

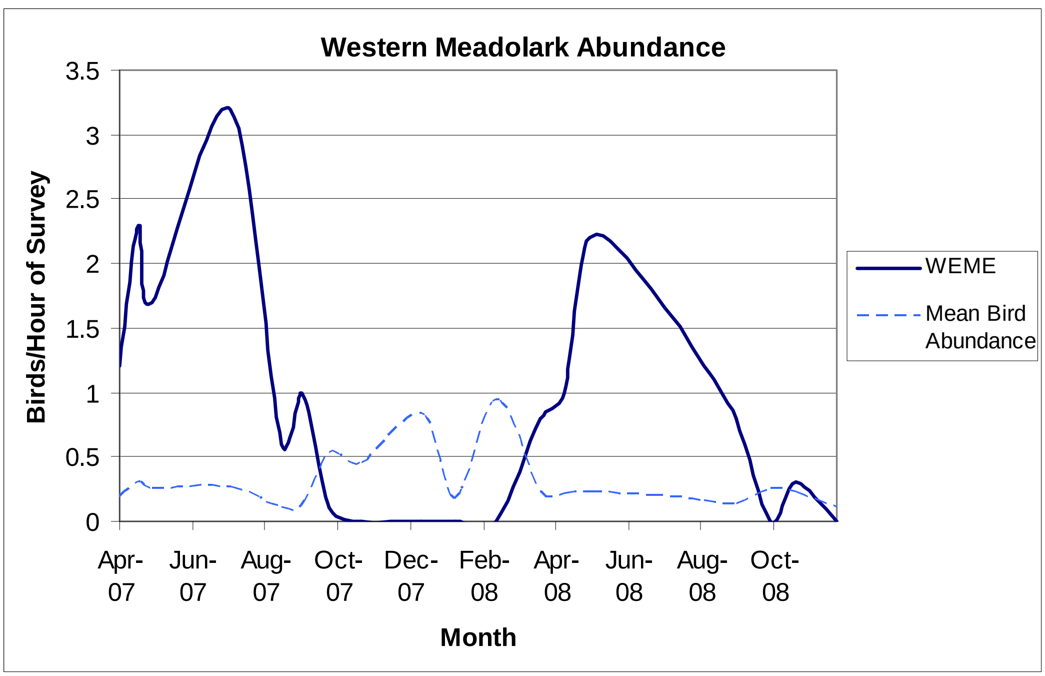

Figure 36. Western meadowlark abundance in Spring Valley throughout field surveys.

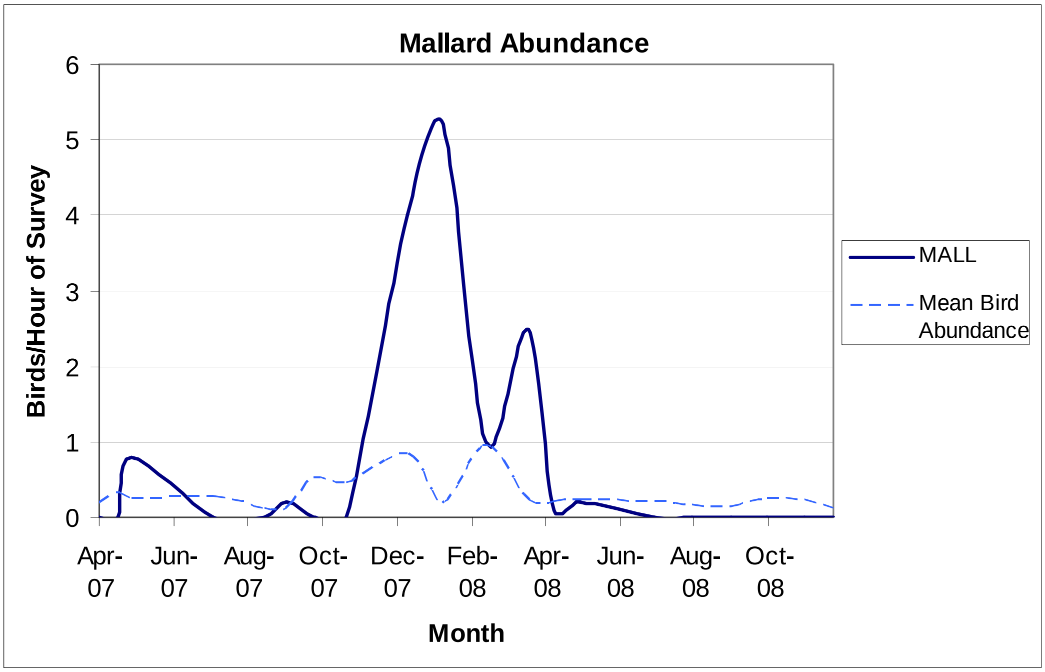

Figure 37. Mallard abundance in Spring Valley throughout field surveys.

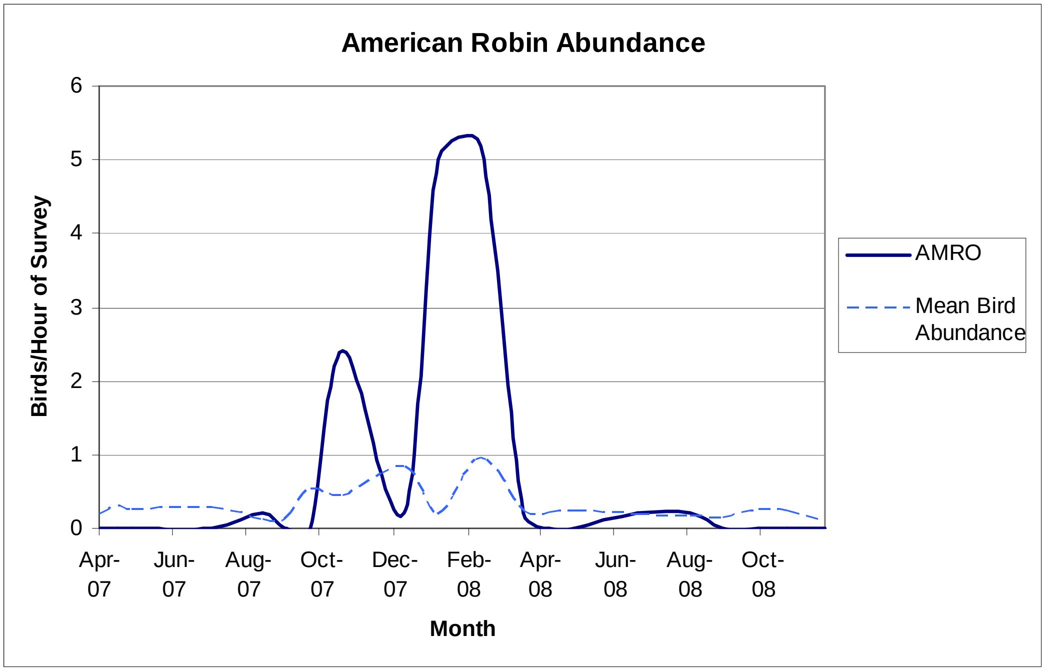

Figure 38. American robin abundance in Spring Valley throughout field surveys.

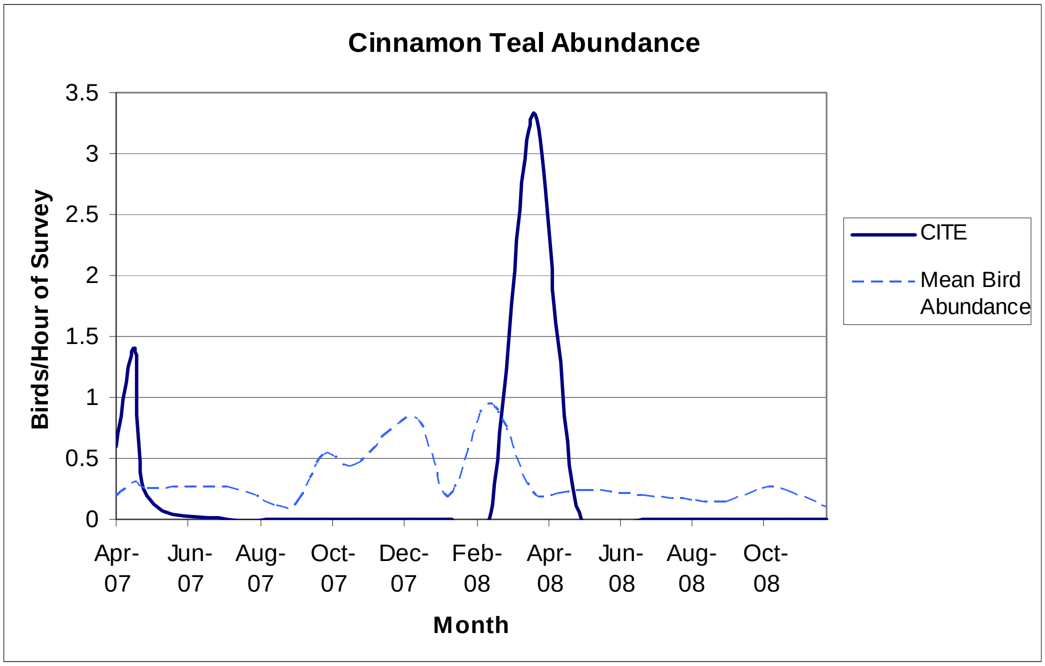

Figure 39. Cinnamon teal abundance in Spring Valley throughout field surveys.

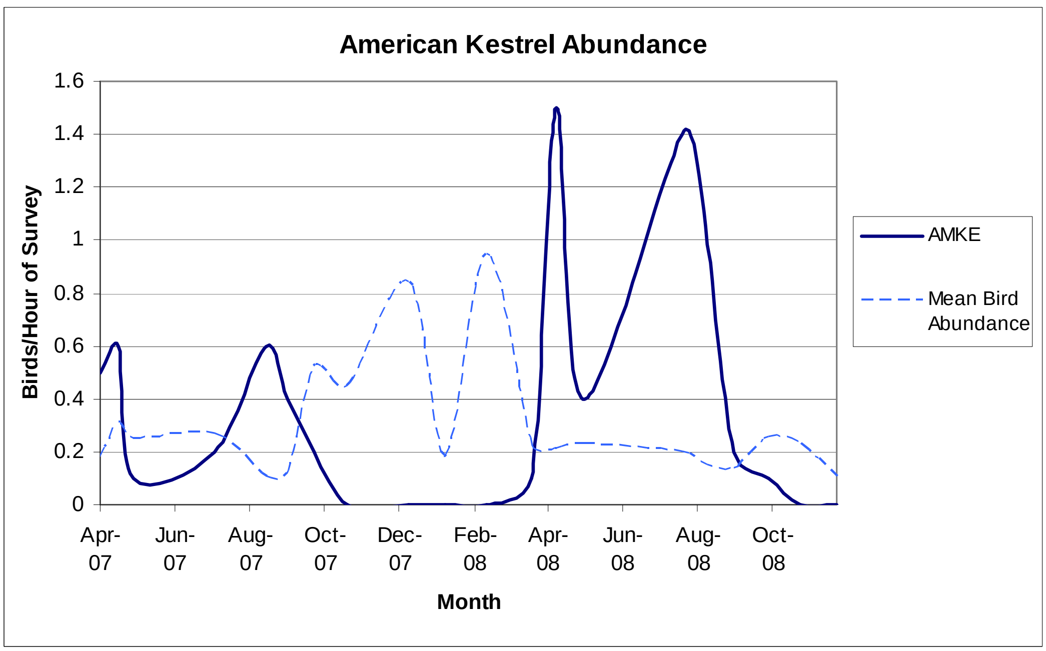

Figure 40. American kestrel abundance in Spring Valley throughout field surveys.

3.1.5 Raptor Nest Surveys

3.1.5.1 2007 SURVEYS

During the 2007 raptor nest surveys, biologists observed 11 nests (Figure 41, Table 6). Ten of these nests were located in juniper trees, and the remaining nest was observed atop a power transmission pole. Four of these nests were confirmed to be active. Two Swainson's hawk nests were observed, but firmly planted adults would not reveal whether adults were incubating eggs or already attending young in either of these nests. Biologists returned to these nests on July 11 and 12, 2007, to confirm nest activity and to assess nest content, and adults flew from both nests as biologists approached. In the summer of 2007, Nest 7.07 contained one juvenile Swainson's hawk that looked fully feathered and ready to fledge. Nest 8.07 contained two nearly fully feathered chicks. The third active nest observed during helicopter surveys (Nest 6.07) had three ferruginous hawk chicks, with all feather tracts. The fourth active nest (Nest 5.07), which was just outside the project area buffer, contained two fully feathered juveniles that were ready to fledge. This nest was originally marked as being occupied by unidentified buteos, but now biologists believe these to be ferruginous hawks. A long-eared owl was incidentally sighted near one nest (Nest 11.07), although nothing was observed at this nest during helicopter surveys. Upon further inspection, the nest appeared to have been active during spring 2007. However, at that time, it was not clear whether it was this owl or another bird that had occupied this nest in 2007.

3.1.5.2 2008 SURVEYS

During 2008 raptor nest surveys, biologists returned to those nests recorded in 2007, as well as searched for new nests not recorded in 2007. Raptor nest surveys resulted in the observation of 24 total nests (see Figure 41, Table 6), 10 of which were identified from 2007 raptor nest searches (Nest 2.07 was observed in 2007 but could not be located in 2008). Of these 24 nests, seven were confirmed to be in use by raptors during one of the two years of survey. Additionally, four nests were occupied by common ravens during at least one of the two years of surveys. In 2008, the active raptor nests were composed of three Swainson's hawk nests and two ferruginous hawk nests. All of the active raptor nests were located in juniper trees. Of the inactive nests, all were located in juniper trees, except for one old, dilapidated nest in a cottonwood (*Populus* sp.) tree and a common raven nest on a transmission pole observed in 2007 at the south end of the project area. Of the three Swainson's hawk nests, adults stayed on two of the nests (7.07 and 8.08) in 2008, leaving the contents hidden. An adult Swainson's hawk flew from the third nest (4.07), revealing two eggs. Downy chicks were observed in both of the two ferruginous hawk nests observed during helicopter surveys (5.07 and 11.08). No adult was seen at Nest 11.08, affording a clear view of three downy chicks. However, at Nest 5.07, the adult stayed on the nest, so only one downy chick could be seen, although ferruginous hawks almost always have at least two young per brood (Ehrlich et al. 1998). The three other active nests observed in 2008 (10.08, 11.07, and 14.08) were occupied by common ravens. Three nests recorded as active in 2007 (6.07, 8.07, and 10.07) were recorded as inactive in 2008. Both nest 5.07 (ferruginous hawk) and nest 7.07 (Swainson's hawk) were active in both 2007 and 2008. It is believed that Nest 11.08 (ferruginous hawk) was also active in 2007, although biologists did not find this nest until the fall of 2007.

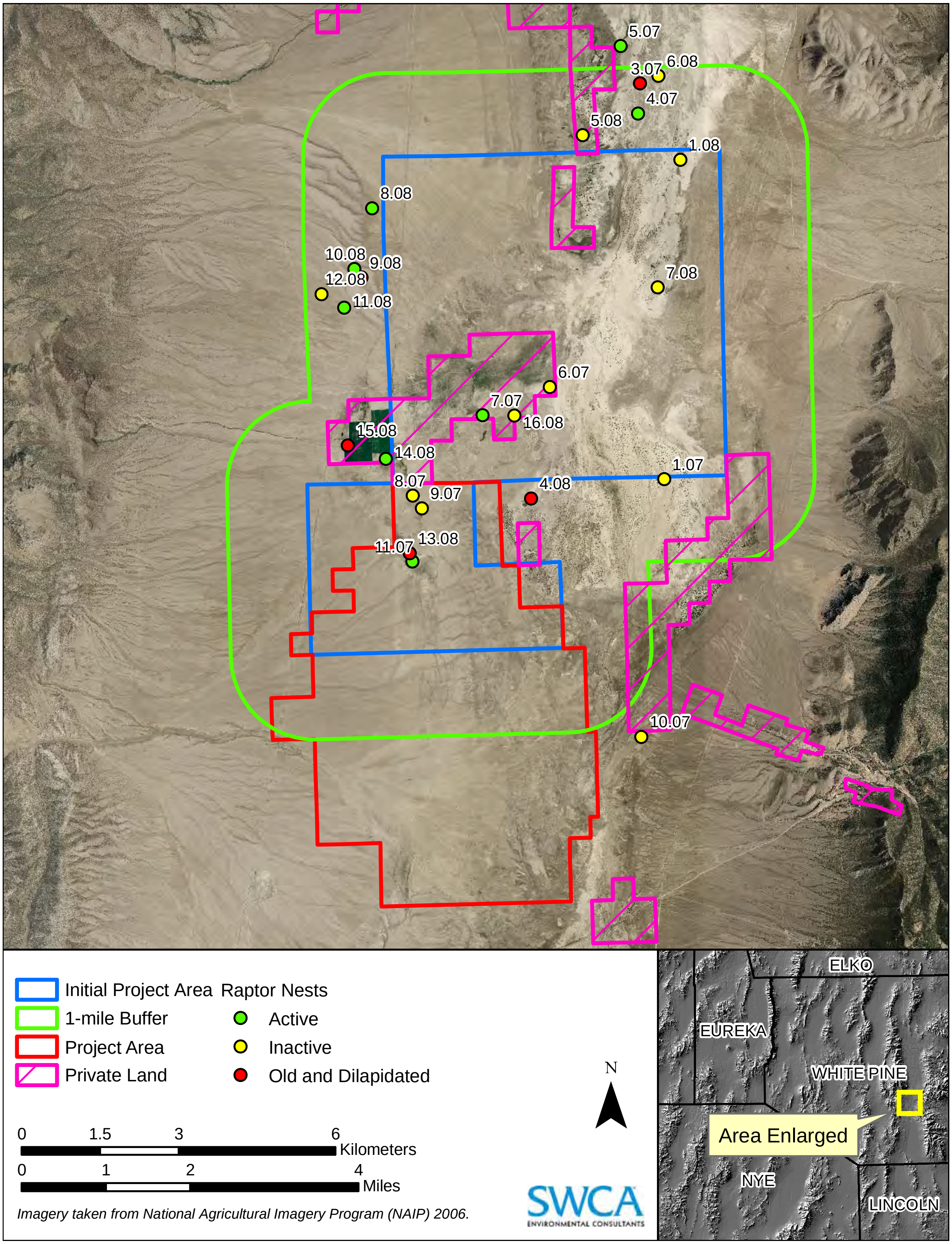

Figure 41. Raptor nests observed within the project area.

Table 6. Nesting Raptor Activity in Spring Valley

Nest ID	Year First Observed	Condition in 2007	Condition in 2008	Species Observed
1.07	2007	Inactive	Inactive	–
2.07	2007	Inactive	–	–
3.07	2007	Old and Dilapidated	Old and Dilapidated	–
4.07	2007	Old and Dilapidated	Active	Swainson's Hawk
5.07	2007	Active	Active	Ferruginous Hawk
6.07	2007	Active	Inactive	Ferruginous Hawk
7.07	2007	Active	Active	Swainson's Hawk
8.07	2007	Active	Inactive	Swainson's Hawk
9.07	2007	Inactive	Inactive	–
10.07	2007	Active	Inactive	Common Raven
11.07	2007	Active	Active	Common Raven
1.08	2008	–	Inactive	–
4.08	2008	–	Old and Dilapidated	–
5.08	2008	–	Inactive	–
6.08	2008	–	Inactive	–
7.08	2008	–	Inactive	Ferruginous Hawk (nearby)
8.08	2008	–	Active	Swainson's Hawk
9.08	2008	–	Old and Dilapidated	–
10.08	2008	–	Active	Common Raven
11.08	2008	–	Active	Ferruginous Hawk
12.08	2008	–	Inactive	–
13.08	2008	–	Old and Dilapidated	–
14.08	2008	–	Active	Common Raven
15.08	2008	–	Old and Dilapidated	–
16.08	2008	–	Inactive	–

3.1.6 Special-Status Species

Threatened and endangered species are placed on a federal list by the U.S. Fish and Wildlife Service (USFWS) and receive protection under the Endangered Species Act (ESA). Almost all the birds that were observed within the proposed project area are considered to be migratory birds. The USFWS defines a migratory bird as any species or family of birds that live, reproduce or migrate within or across international borders at some point during their annual life cycle. All migratory birds are protected under the Migratory Bird Treaty Act (MBTA) of 1918, as amended (16 United States Code 703 *et seq*.).

In addition, there were several species observed during avian surveys that are considered special-status species. While these species are not protected by the USFWS, they are considered special-status or sensitive species by the BLM or are included on the sensitive species list for Nevada, which is maintained by the Nevada Natural Heritage Program (NNHP). Fifteen special-status species were observed or are known to occur in the project area. These species, their current status, and the frequency with which they were observed in Spring Valley are listed in Table 7.

Table 7. Special-Status Avian Species Observed within the Project Area

Common Name	Scientific Name	Status	Frequency (% of Surveys Observed)*
Golden eagle	*Aquila chrysaetos*	N, S	19.4
Long-eared owl[†]	*Asio otus*	N, S	–
Western burrowing owl[†]	*Athene cunicularia hypugaea*	N, S	–
Juniper titmouse	*Baeolophus ridgwayi*	N, S	2.5
Ferruginous hawk	*Buteo regalis*	N, S	16.7
Swainson's hawk	*Buteo swainsoni*	N, S	13.9
Greater sage-grouse[‡]	*Centrocercus urophasianus*	N, S	–
Prairie falcon	*Falco mexicanus*	N, S	13.9
Greater sandhill crane	*Grus canadensis tabida*	N, S	1.9
Pinyon jay	*Gymnorhinus cyanocephalus*	N, S	11.3
Bald eagle	*Haliaeetus leucocephalus*	N, S	2.8
Loggerhead shrike	*Lanius ludovicianus*	N, S	15.6
Long-billed curlew	*Numenius minutus*	N, S	3.1
Vesper sparrow	*Pooecetes gramineus*	N, S	3.1
Red-naped sapsucker	*Sphyrapicus nuchalis*	N, S	0.6

Source: NNHP (2008).
Status: N = BLM Nevada Special Status Species, designated Sensitive by State Office.
S = Nevada State Protected.
* Frequency of raptors from raptor migration survey data; other results from passerine survey data.
† Incidental species observed in project area (not during survey periods).
‡ Known to occur within the project area according to historical data (Location data taken from NDOW GIS data).

3.2 Bat Surveys

Initially, seven monitoring stations were installed on Telespar tubing and began collecting data on July 12, 2007. The remaining three monitoring stations were installed on an existing MET tower and began collecting data on August 9, 2007. Once installed, monitoring stations ran nightly through December 31, 2008, with the exception of nights when equipment malfunctions caused monitoring stations to shut off.

Equipment malfunctions were minor; during 2007, 54 of 1,652 nights of data were lost (3.3% of potential data) and during 2008, 186 of 3,660 nights of data were lost (5.1% of potential nights of data). In total, 240 of 5,312 nights of data (4.5% of potential nights of data) were lost due to equipment malfunctions. Monitoring stations on the MET tower seemed especially prone to malfunction, although the cause of these malfunctions is unknown. Additionally, monitoring stations were mistakenly set to begin recording 30 minutes after sunset during September, October, and November 2007, resulting in an unknown loss of data. All sampling dates are summarized in Appendix I.

The microphone bracket for the 30-m (98-foot) monitoring station had broken at an unknown date between March 20 and April 16, 2008, and was not repaired until the MET tower could be lowered on August 21, 2008. Although broken, the microphone bracket was entangled in the microphone cable from the monitoring station installed at 60 m (197 feet) and continued to collect data very close to its original height. However, the orientation of the microphone bracket was constantly changing as it rotated in the wind, confounding direct comparison between this monitoring station and the other MET tower monitoring stations.

Of the 23 bat species that have been documented in Nevada (Bradley et al. 2006), AnaBat acoustic surveys in Spring Valley resulted in the identification of 12 different bat species. Table 8 identifies the bat species observed in Spring Valley and includes all relevant USFWS, BLM, and State of Nevada (State) protection classifications. The observed species include eight non-migratory (or resident bats) and four migratory species, according to life history descriptions provided by Bradley et al. (2006). Non-migratory species include pallid bat, Townsend's big-eared bat, big brown bat (*Eptesicus fuscus*), western small-footed bat (*Myotis ciliolabrum*), long-eared myotis (*M. evotis*), little brown bat (*M. lucifugus*), long-legged myotis (*M. volans*), and Yuma myotis (*M. yumanensis*). Migratory species include silver-haired (*Lasionycteris noctivagans*), Western red, hoary, and Brazilian free-tailed (*Tadarida brasiliensis*) bats. Detailed life histories of each species are presented in Appendix J.

Table 8. Bat Species Identified from Acoustic Surveys, Spring Valley 2007–2008

Common Name	Scientific Name	6-Letter Code	USFWS	BLM	State
Pallid bat	Antrozous pallidus	ANTPAL		N	Protected
Townsend's big-eared bat	Corynorhinus townsendii	CORTOW	xC2	N	Sensitive
Big brown bat	Eptesicus fuscus	EPTFUS		N	
Silver haired bat	Lasionycteris noctivagans	LASNOC		N	
Western red bat	Lasiurus blossevillii	LASBLO		N	Sensitive
Hoary bat	Lasiurus cinereus	LASCIN		N	
Western small-footed myotis	Myotis ciliolabrum	MYOCIL	xC2	N	
Long-eared myotis	Myotis evotis	MYOEVO	xC2	N	
Little brown bat	Myotis lucifugus	MYOLUC		N	
Long-legged myotis	Myotis volans	MYOVOL	xC2	N	
Yuma myotis	Myotis yumanensis	MYOYUM	xC2	N	
Brazilian free-tailed bat	Tadarida brasiliensis	TADBRA		N	Protected

Protection classification data taken from Bradley et al. (2006).

USFWS Species Classification
xC2 = Former USFWS Category 2 Candidate, now species of concern.
BLM Species Classification
N = Nevada Special-Status Species, designated Sensitive by State Office.

The IA levels varied greatly between these 12 bat species (Table 9) with approximately 91% of all data attributed to four bat species: Western small-footed myotis, little brown bat, long-eared myotis, and Brazilian free-tailed bat. The remaining eight species contributed 9% of the acoustic data. Table 9 summarizes each species' contribution to acoustic data and identifies all AnaBat monitoring stations where each species was detected. Detailed IA data for each monitoring station can be found in Appendix E.

Table 9. Species Detection by Monitoring Station, Spring Valley, 2007 and 2008

6-Letter Code	% of Total Data	CF-									
		2072	2073	2074	2075	2076	2077	2078	2079	2081	2092
MYOCIL	41.5	×	×	×	×	×	×	×	×		×
MYOLUC	25.6	×	×	×	×	×	×	×	×	×	×
MYOEVO	12.5	×	×	×		×	×	×	×		×
TADBRA	11.4	×	×	×	×	×	×	×	×	×	×
MYOVOL	3.4	×	×	×		×	×		×		×
EPTFUS	2.1	×	×	×	×	×		×	×	×	×
LASNOC	1.4	×	×	×	×	×	×	×	×	×	×
ANTPAL	1.2	×	×	×	×	×	×	×	×		×
LASCIN	0.5	×	×	×	×	×	×	×	×	×	×
CORTOW	0.4	×	×	×	×	×		×	×		×
LASBLO	0.0*	×	×	×	×	×			×		
MYOYUM	0.0*								×		

* This bat species was detected but contributed less than 0.1% of the total data.

Seasonal patterns in bat IA levels were apparent and expected. Figure 42 illustrates the overall pattern in seasonal IA levels, with most activity occurring between June and September. There were also seasonal differences in IA levels between the migratory and non-migratory species (Figure 43). Non-migratory species exhibited a rapid rise in IA levels from spring to summer, with peaks levels occurring in June and July. IA levels of migratory species were much lower but showed a small peak in June, followed by lower activity during July, ultimately reaching peak levels in August. This small peak in June migratory species IA levels can be attributed primarily to silver-haired bats, which showed different seasonal patterns from the other migratory species (Figure 44). Figure 45 shows all migratory species, but excludes Brazilian free-tailed bats in order to better illustrate seasonal activity patterns in the other migratory species. Table 8 gives the codes for bat species.

Nightly patterns in the IA levels were also apparent. Among all bat species, the number of calls peaked around 2 to 2.5 hours after sunset and a small peak was observed approximately 7 hours after sunset (Figure 46). Figure 47 illustrates the nightly activity patterns for the four species that were most often recorded. Each species shown in Figure 47 exhibits a unique pattern. Western small-footed myotis exhibited a bimodal pattern in nightly activity, with a primary peak occurring at approximately 2.5 hours after sunset and a smaller secondary peak approximately 8 hours after sunset. A unimodal distribution was exhibited by both little brown bat and Brazilian free-tailed bat, which both reached peaks in activity at 1 and 2.5 hours after sunset, respectively, followed by a rapid decline. Long-eared myotis exhibited a slightly different pattern, in which peak activity occurred approximately 2 hours after sunset but stayed relatively constant throughout the night. Seasonal and nightly activity patterns are summarized for each bat species individually in Appendix K. Codes for each bat species can be found in Table 8.

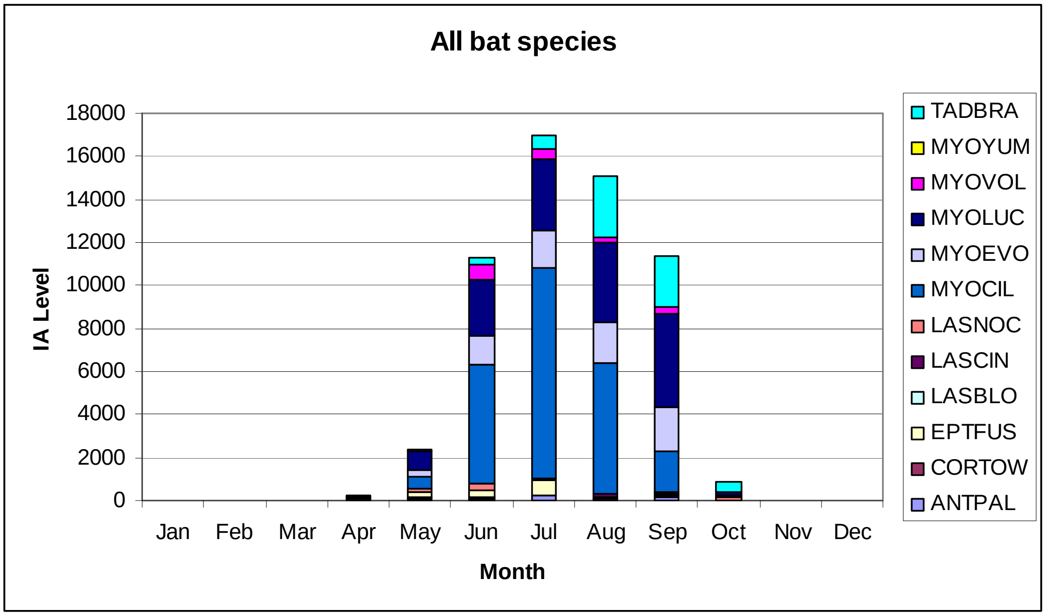

Figure 42. Seasonal activity patterns of all bat species, 2007–2008.

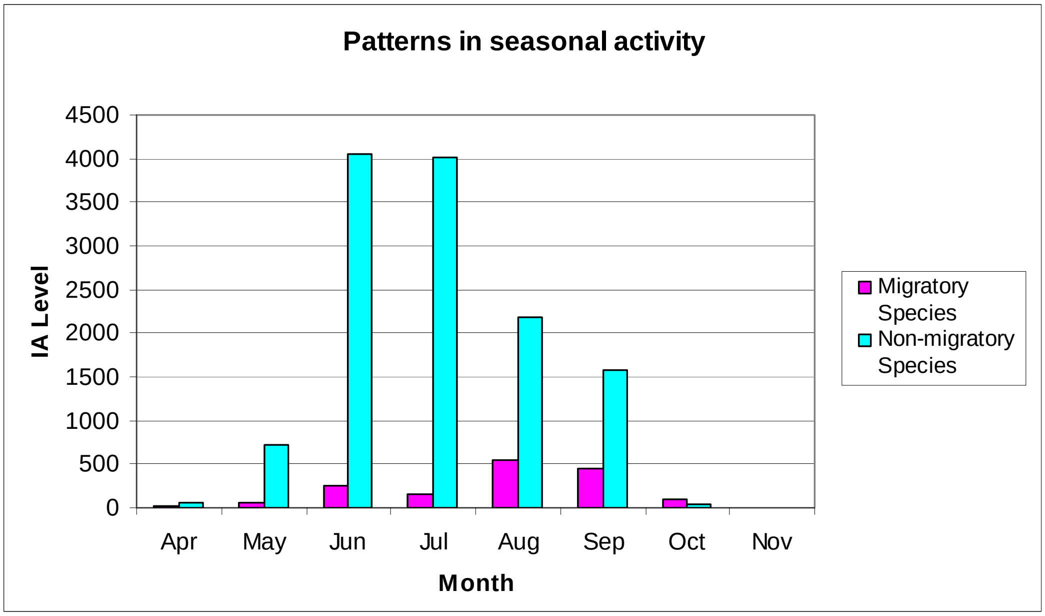

Figure 43. Seasonal IA patterns of all bat species, 2007–2008.

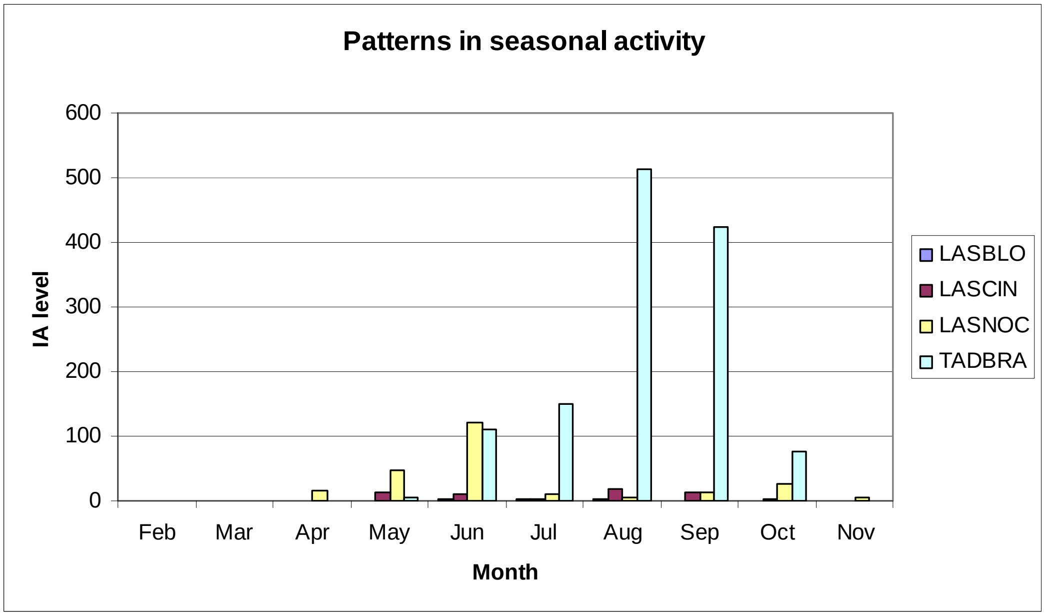

Figure 44. Seasonal IA patterns of migratory bat species, 2007–2008.

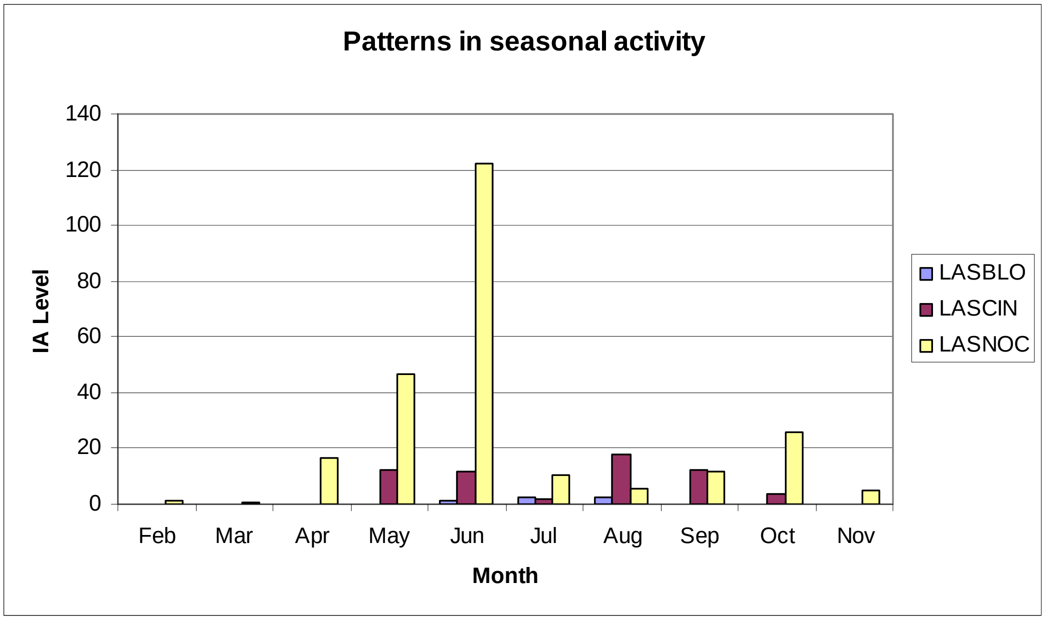

Figure 45. Seasonal IA patterns of migratory bat species, excluding the Brazilian free-tailed bat, 2007–2008.

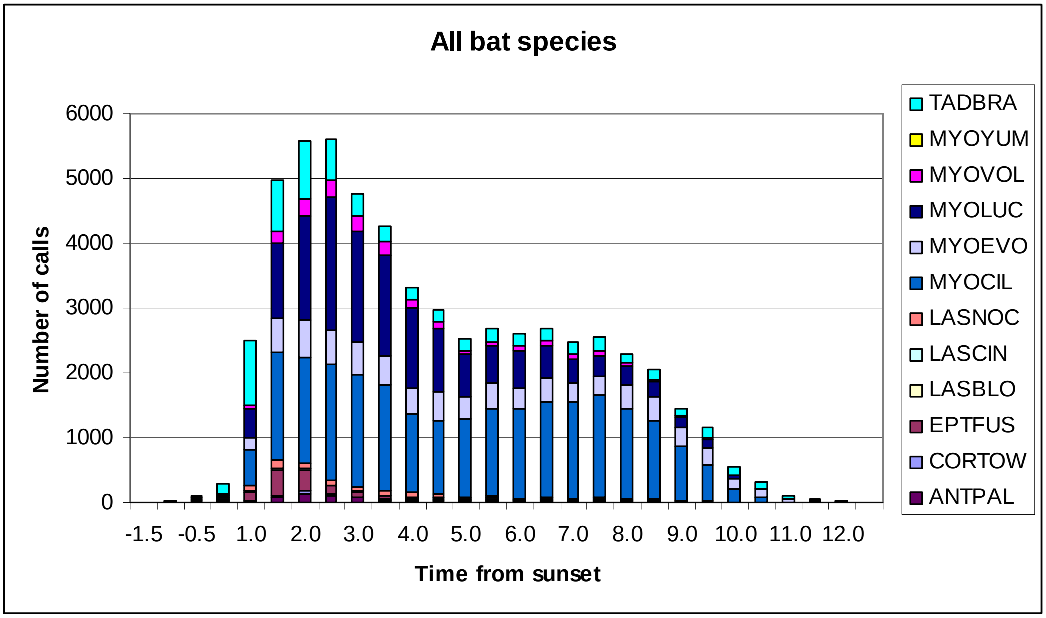

Figure 46. Nightly activity patterns of all bat species, 2007–2008.

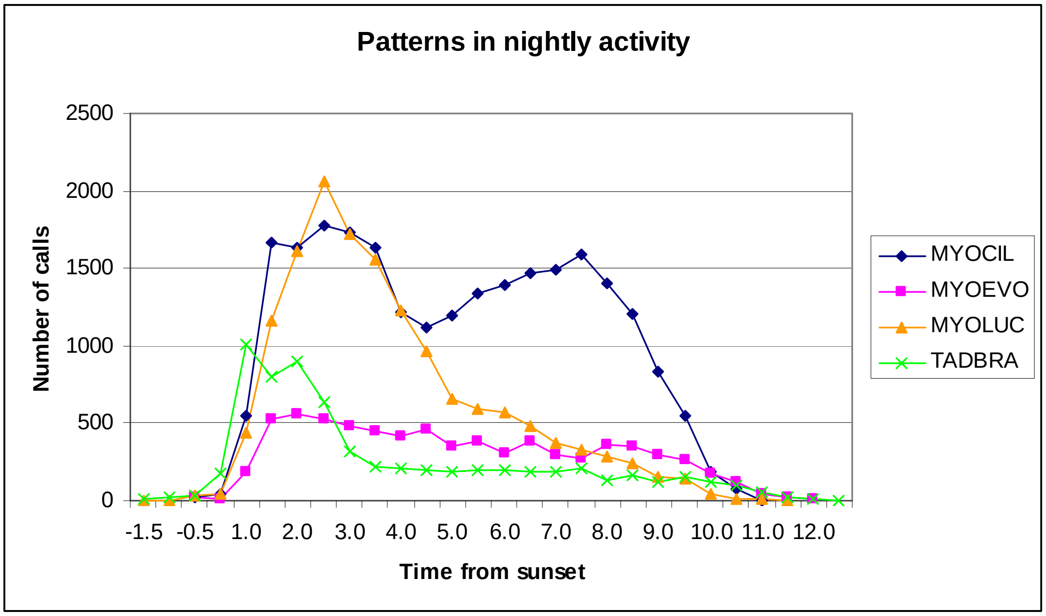

Figure 47. Nightly activity patterns of western small-footed myotis, long-eared myotis, little brown bat, and Brazilian free-tailed bat, 2007–2008.

IA levels varied greatly between monitoring stations. Table 10 summarizes the difference in the volume of data collected between monitoring stations. Monitoring stations CF-2079 and CF-2076 accounted for approximately 63% of all data, recording approximately 38% and 25%, respectively, of all data. The MET tower monitoring stations (CF-2075, CF-2081 and CF-2092) combined collected approximately 5% of all data. This variation in the volume of data was expected, as the monitoring stations were located in different habitat types; some were located at attractant features, such as ephemeral and perennial water sources, whereas others were not. Table 11 summarizes the IA, species richness, and habitat features that describe the habitat surrounding the monitoring station.

Table 10. Summary of Monitoring Stations

Monitoring Station	Files	Calls	Minutes	Species Richness	IA
2007					
CF-2072	1,306	9,834	1,065	10	611
CF-2073	2,319	8,173	2,048	9	1,169
CF-2074	1,642	12,959	1,371	10	791
CF-2075 (60 m)	302	2,591	255	5	230
CF-2076	7,056	53,634	4,830	11	2,776
CF-2077	1,015	8,702	866	8	501
CF-2078	684	4,870	559	9	345
CF-2079	13,377	64,206	6,564	12	3,772
CF-2081 (30 m)	625	5,765	494	4	361
CF-2092 (3 m)	275	1,909	233	4	161
Total	**28,601**	**172,643**	**18,285**		
2008					
CF-2072	3,971	47,206	2,936	11	802
CF-2073	8,040	52,739	6,254	11	1,757
CF-2074	2,155	19,876	1,917	11	589
CF-2075 (60 m)	796	6,930	450	8	132
CF-2076	31,728	437,242	17,790	11	4,861
CF-2077	883	7,241	796	8	233
CF-2078	765	6,039	665	7	210
CF-2079	15,579	160,076	7,980	12	2,180
CF-2081 (30 m)	260	2,367	216	5	75
CF-2092 (3 m)	695	5,650	645	10	176
Total	**64,872**	**745,366**	**39,649**		

Much of the variation in the volume of data can be attributed to the environmental site characteristics of the locations of the monitoring stations. Three characteristics—habitat type, presence of trees, and water availability—were expected to influence bat activity. These variables were analyzed using a Pearson Correlation Matrix (Table 12) to determine whether there was a correlation between these habitat characteristics, the observed IA levels, and species richness. The Pearson Correlation matrix analysis indicates that there was a significant positive correlation between all variables in 2007 ($p < 0.001$). In 2008, the relation between the respective variables also showed a significant positive correlation, except for species richness and IA. However, although this did not result in a significant value, there was a weak positive correlation. Still, habitat type, presence of trees, and water availability each have a strong positive correlation to the amount of bat activity (IA levels) and the species richness.

Table 11. Summary of IA, Species Richness, and Habitat Characteristics for Acoustic Sampling Stations

Monitoring Station	IA		Species Richness		Characteristics		
	2007	2008	2007	2008	Habitat	Trees	Water
CF-2076	2,776	4,861	11	11	Wetland	Juniper	Spring
CF-2079	3,772	2,180	12	12	Meadow	Juniper	Seasonal
CF-2073	1,169	1,757	9	11	Meadow	Juniper	Guzzler
CF-2072	611	802	10	11	Meadow	Juniper	Spring
CF-2074	791	589	10	11	Grass	Juniper	Seasonal
CF-2077	501	233	8	8	Ruderal	None	Livestock
CF-2078	345	210	9	7	Greasewood	None	None
CF-2092	161	176	4	10	Sagebrush	None	None
CF-2075	230	132	5	8	Sagebrush	None	None
CF-2081	361	75	4	5	Sagebrush	None	None

Table 12. Pearson Correlation Matrix Analyzing IA, Species Richness, Habitat, Presence of Trees, and Water Availability

2007				
	Trees	Water	Habitat	IA
Water	0.9635 $p < 0.001$			
Habitat	0.99159 $p < 0.001$	0.9078 $p < 0.001$		
IA	0.8176 $p < 0.01$	0.8165 $p < 0.01$	0.8314 $p < 0.01$	
Species Richness	0.8603 $p < 0.01$	0.8845 $p < 0.001$	0.9689 $p < 0.001$	0.8073 $p < 0.01$
2008				
	Trees	Water	Habitat	IA
Water	0.9705 $p < 0.001$			
Habitat	0.8980 $p < 0.005$	0.9006 $p < 0.01$		
IA	0.7759 $p < 0.05$	0.7910 $p < 0.05$	0.7943 $p < 0.05$	
Species Richness	0.7911 $p < 0.05$	0.8265 $p < 0.01$	0.9472 $p < 0.001$	0.6565 $p = 0.0548$

The two capture surveys at CF-2076 were unsuccessful in catching bats. Weather conditions were not ideal and likely contributed to the negative results. Although no bats were captured, one lesser nighthawk (*Chordeiles minor*) was inadvertently captured and released unharmed.

4.0 DISCUSSION

Numerous studies have been conducted across the United States to determine bird and bat mortality associated with various WGFs. However, many variables could affect mortality levels at these WGFs; for example, vegetation communities, available habitat, population densities, or specific species' use of the area. Another factor that may influence mortality levels is the type of turbines being used. New generation facilities typically use fewer larger, slower-moving turbines, which may reduce mortality levels, compared with older generation facilities (Erickson et al. 2002). Table 13 presents results from post-construction studies that have been conducted in western states that may have habitats similar to those present in Spring Valley. Foote Creek Rim appears to be the most similar to Spring Valley when considering the habitat present and types of turbines that would be used. While the exact number of fatalities that will occur at the Spring Valley WGF is difficult to predict, comparing our results with previous studies could help to estimate the levels of direct mortality expected in Spring Valley following construction.

Table 13. Selected Mortality Studies from WGFs in Western States with Habitats Similar to Spring Valley

Reference	WGF Study Area Location	Dates of Study	Turbines in WGF	Number of Turbines in Study	Turbine/ Project Mw	Mortality per Turbine per year		
						All Avian	Raptor	Bat
Young et al. (2003a)	Foote Creek Rim, WY	11/98–6/02	69	69	600 kW / 41.4 MW	1.50	0.03	1.34
Erickson et al. (2003)	Nine Canyon, WA	09/02–08/03	37	37	Bonus 1.3 MW / 48.1 MW	3.59	0.07	3.21
Erickson et al. (2004)	Stateline, OR/WA	01/02–12/03	454	454	Vestas 660 kW / 299.64 MW	1.93	0.06	1.12
Johnson et al. (2003)	Klondike, OR	02/02–02/03	16	16	Enron 1.5 MW / 24 MW	1.42	0.00	1.16
Erickson et al. (2000)	Vansycle, OR	01/99–12/99	38	38	Vestas 660 kW / 24.9 MW	0.63	0.00	0.74

4.1 Avian Surveys

Collisions at WGFs are estimated to represent 0.01% to 0.02% of annual avian fatalities in the United States, which is a small percentage of the total avian fatalities resulting from collisions with human-made structures (Erickson et al. 2001). According to the National Wind Coordinating Collaborative (NWCC 2004), it is estimated that 2.3 avian fatalities per turbine per year (3.1 per megawatt per year) occur in the United States, excluding California facilities, which are mainly composed of older generation turbines. From two studies in the Rocky Mountain Region, fatalities are estimated at 1.5 birds per turbine per year (2.3 birds per megawatt per year). Raptor fatalities in the Rocky Mountain Region are estimated at 0.03 raptor per turbine per year (0.05 raptor per megawatt per year). Other studies have estimated 0 to 0.04 raptor fatalities per turbine per year for new generation wind turbines (Erickson et al. 2002). Of the wind facility studies in western states, the habitat at the Spring Valley WGF would be most similar to the habitat at Foote Creek Rim than any other WGF. Mortality rates at Foote Creek Rim are estimated to be 0.03 raptor per turbine per year and 1.5 birds per turbine per year. These mortality estimates are relatively low, compared with other WGFs in the western United States (see Table 13).

It has also been suggested that overall use rates are positively correlated with mortality rates (CEC and CDFG 2007). Although, preconstruction avian use surveys can assist in predicting the composition of post-construction fatalities, mortality levels for some species cannot be accurately correlated to preconstruction surveys (NWCC 2009). Thelander and Rugge (2000) noted that the relative abundance of a specific species did not absolutely predict the relative frequency of fatalities for that species, because some species may be less susceptible to collision. Preconstruction migration surveys have suggested Spring Valley is not located in a major flyway and exhibits relatively low use, compared with other migration studies. Additionally, Spring Valley is not identified as an Important Bird Area (IBA), whereas the Northern Snake Range, D.E. Moore Bird and Wildlife Sanctuary, and Great Basin National Park are three areas east of the project area that have been identified as IBAs (McIvor 2005). Therefore, relative to other areas nearby the project area, Spring Valley may be less important to resident and migratory birds than habitats in those areas.

4.1.1 Migratory Raptors

Raptors are a great concern at WGFs across the country, particularly at the APWRA. One study revealed that raptors made up 65% of all mortalities at APWRA (Kingsley and Whittam 2005). However, studies at newer WGFs have reported few to no raptor mortalities, which may be partially the result of raptors avoiding turbines. High mortality rates within California have been attributed to unusually high raptor densities, topography, and older turbine technology (Kingsley and Whittam 2005). Therefore, high raptor mortality levels at APWRA may be unique and avoidable at other WGFs (Erikson et al. 2002). Furthermore, raptor mortality rates at WGFs considered similar to Spring Valley (see Table 13) are extremely low, averaging less than 0.1 mortality per turbine per year.

The passage rates observed in Spring Valley during raptor migration surveys are low, compared with other areas of the Intermountain West. Spring migration yielded a passage rate of 0.76 migrants per hour, while fall migration totaled 0.88 migrants per hour. Overall, raptor migration surveys yielded a passage rate of 0.81 migrant per hour. This rate is extremely low, compared with very active flyways in the Goshute Mountains of Northeastern Nevada, which have exhibited average passage rates over a single day as high as 75.5 migrants per hour and long-term rates (15+ years) of 21.8 raptors per hour (Smith 2008). Other HWI migration monitoring sites in Arizona, Utah, New Mexico, and Wyoming have yielded long-term passage rates from 10 to 13 migrants per hour (Smith 2005). Sometimes, it can be difficult to distinguish between resident and migrating raptors. However, if all resident raptors had been determined to be migrants, the total passage rate would still remain very low, at 1.62 migrants per hour (330 raptors/203.75 h). This passage rate is still substantially lower than passage rates at HWI raptor migration monitoring sites.

The low passage rates observed at Spring Valley could be attributable primarily to this area being situated between two large mountain ranges to the east and west. Spring Valley is bordered on the east by the Snake Range and on the west by the Schell Creek Range. Both of these north-south-trending mountain ranges would presumably provide better migration corridors for raptors than the valley floor in which the project area is situated. It is known that raptors congregate along prominent ridgelines because of better lift conditions and/or assistance in orientation (Allen et al. 1996). Smith (2005) identifies the lack of a predominant north-south-trending mountain range in the Southern Nevada as a possible explanation for the low passage rates in the region, and it is assumed that the high concentration of raptors observed in the Goshute Mountains disperse rapidly upon moving south of that site. This could mean that migrating raptors have already dispersed by the time they reach the project area in Spring Valley, approximately 144.8 km (90 miles) to the south.

It is believed that many of the raptors observed in the Goshute Mountains likely continue down the Snake Range to the east of the project area (personal communication, J. Smith, HWI, January 14, 2009). Furthermore, surveys performed by HWI to the west of the project area yielded much lower passage rates than the Goshute Mountains. In the fall of 2004 and the spring of 2005, HWI biologists conducted over

180 hours of raptor migration surveys from 36 different sites near Ely, Nevada, resulting in an average raptor passage rate of 3.9 migrants per hour (Smith 2005). Ten of these sites were situated in the aforementioned Schell Creek Range, immediately west of the project area. Sites along the North Schell Creek Range yielded passage rates of 6.6 migrants/hour, and sites along the South Schell Creek Range yielded passage rates of 4.8 migrants/hour (Smith 2005). These data suggest that raptors are more likely to migrate by using these mountain ridges, as opposed to the lowlands of Spring Valley.

Several environmental variables have been shown to affect raptor migration. Understanding variables that are conducive to raptor migrations could promote estimations of when there may be high numbers of migrants through an area. This could assist in management efforts to develop preventive strategies or effective mitigation measures to reduce raptor mortality rates. Using a data set of 4,140 red-tailed hawks observed from Hawk Mountain Sanctuary, Pennsylvania, Maransky et al. (1997) found that time of day, wind speed, and wind direction all affect raptor migration intensity. This study revealed that red-tailed hawks were most often seen migrating during mid-day, during periods of following winds, and during periods of high vs. low winds. During surveys of both the spring and fall migrations, our data appear to be consistent with only one of these three factors.

4.1.1.1 TIME OF DAY

Maransky et al. (1997) reported that the most active flight period for all the red-tailed hawks observed at Hawk Mountain Sanctuary occurred during the middle of the day, particularly from 11:00 a.m. to 2:00 p.m. This is most likely attributable to higher winds and increased thermal activity in the middle of the day. The most active period for raptors observed during both fall and spring migrations in Spring Valley was also midday, with the most active period recorded from 11 a.m. to 1 p.m.; during this time, 43.4% of all raptors were recorded. Collectively, the single most active hour was from 11 a.m. to 12 p.m. When analyzed separately, spring migration was most active, from 12 p.m. to 1 a.m., and fall migration's most active hour was 11 a.m. to 12 p.m. For this factor, our results appear to be consistent with those of Maransky et al. (1997).

4.1.1.2 WIND DIRECTION

Maranksy et al. (1997) also found that red-tailed hawks were more likely to migrate during periods of following winds vs. opposing winds. This suggests that during the spring migration, for example, we would expect to see more migrating raptors when winds are blowing from a southerly direction. Data collected during migration surveys show that wind directions observed during raptor passage tend to be fairly sporadic. Data collected during spring migrations show that the most common wind direction when raptors were observed was out of the southwest, a following wind. Other wind directions during most raptor observations were from the northeast, northwest, and south, respectively. Although a following wind was the single most common wind direction for migrating raptors, migrating raptors were more commonly observed during opposing winds (60%) overall.

During spring surveys, 113 predominant wind directions were recorded during each full or partial hour of survey. However, 10 of these wind directions were from the west or the east, which are neither following nor opposing winds; therefore, these winds were excluded. Of these, 103 remaining wind directions recorded; 76 (74%) of these were from a northerly direction. This shows that although northerly winds were more common, a disproportionate percentage of raptors migrated through the project area during southerly, or following, winds. So while our observations were not consistent with Maransky et al. (1997), this could be attributable in part to the fact that the predominant wind was opposing during much of the migration season.

According to Maransky et al. (1997), it would be expected that for fall migration surveys, the majority of migrating raptors would be observed while the wind was blowing from a northerly direction, or a following wind. The fall migration results show that the greatest amount of raptors was recorded when the wind was out of the northeast. However, the second highest amount of raptors was recorded when the wind was blowing from the south-southeast. Overall, there was only a slight difference between the percentage of raptors observed during a following wind (48%) and those observed during an opposing wind (52%).

During fall surveys, 98 predominant wind directions were recorded during each full or partial hour of survey. However, three of these wind directions were neither following nor opposing winds (east or west); therefore, these winds were excluded. Of the 95 remaining wind directions, 74 (78%) of these were from a southerly direction, and 21 (22%) were from a northerly direction. Therefore, although winds from a northerly direction were less common, still almost one-half of migrating raptors were observed during this following wind, which indicates a distinct preference for this wind direction.

4.1.1.3 WIND SPEED

Lastly, Maransky et al. (1997) discovered that red-tailed hawks were more likely to migrate during periods of high winds, as opposed to periods of low wind speeds. Maransky et al. (1997) classified high winds as those greater than 20 km/h. Conversely, SWCA biologists observed migrating raptors most frequently (79% of migrant raptors) during low wind speeds during both fall and spring seasons combined. However, of the 211 wind speeds recorded during both fall and spring migration surveys, 65% were low wind speeds of Category 3 or lower. Thus, whereas only 21% of migrant raptors were recorded during high wind speeds of Category 4 or higher, 35% of wind speeds recorded were of higher categories. This difference shows an affinity for migrating during lower wind speeds. Therefore, the differences between our observations and those of Maransky et al. (1997) appear to be attributable to a preference for low wind speeds and are not merely a reflection of the commonality of those winds.

4.1.1.4 RISK INDEX

Flight heights were recorded for migrating raptors in Spring Valley and were divided into eight HWI flight height categories (see Table 1). Of the possible categories, only birds flying at a Flight Height Category 2 (above 30 m, but easily seen with the unaided eye) would be within the anticipated RSA. Overall, 25% of raptors were observed within the RSA (41 out of 166 raptors). This does not mean that 25% of migrating raptors will be struck by a WTG blade, but rather that these birds are at greater risk of collision than other migrating raptors. Morrison (2000), in summarizing the findings of Dr. Hugh McIsaac, states that American kestrels should be able to detect and avoid a WTG blade spinning at upward of 69 rotations per minute (rpm) from 150 m away, if there is good light. However, the weather is not always clear and some birds may simply not see a WTG blade, especially if their eyes are “locked-on” to a prey item or perch (Morrison 2000). It is commonly thought that avian mortality at many large structures increases greatly with the onset of inclement weather (Erickson et al. 2001).

According to the RI (see Table 4), turkey vultures were at highest risk, with an RI of 13.5. Red-tailed hawks and northern harriers also received high RIs—13.5 and 10.0, respectively. Turkey vultures, red-tailed hawks, and northern harriers have all been recorded fatalities at other WGFs (Kingsley and Whittam 2005), although northern harriers have few documented mortalities, even in areas with relatively high northern harrier use (Erikson et al. 2002). This could possibly indicate that this species is able to avoid impacts with WTG blades.

In addition to the amount of time that raptors spend within the RSA, high mortality rates at APWRA are partially attributed to a high prey base (particularly in the winter), steep topographic features that are conducive to dangerous flight styles (kiting), and differences in types, sizes, and distribution of turbines being used. Specific species may also have a greater risk of collisions as a result of behavioral tendencies.

Hoover and Morrison (2005) observed red-tailed hawks frequently flying within the potential RSA at APWRA. They attributed much of this to topography and this species' affinity for soaring and kiting in areas where ridges and canyons made hunting easier. Red-tailed hawks are regularly killed by WTG blades at APWRA and make up more than one-half of all raptor mortalities at that WGF (Hoover and Morrison 2005; Kingsley and Whittam 2005). However, at Foote Creek Rim, Strickland et al. (2003) documented golden eagles as the species that spent the most time in the RSA, making them the species with the highest risk of collision with WTG blades. Red-tailed hawks were also noted as one of the highest risk species at Foote Creek Rim. Golden eagle use at Foote Creek Rim is similar to that at APWRA, yet APWRA has three to seven times the golden eagle fatalities of Foote Creek Rim, which only recorded one golden eagle fatality in 18 months of surveys, from July 1999 to December 2002 (Young et al. 2003b). Despite relatively high observation rates for these species in the RSA, the total low number of golden eagle fatalities (1) and the lack of red-tailed hawk fatalities at this facility may indicate these species are able to detect and avoid WTG blades at Foote Creek Rim.

It is anticipated that mortality levels in Spring Valley will be substantially lower than at APWRA. Raptor numbers appear to be much lower, and there is very little topographic variation within Spring Valley that would lead to using deflective updrafts for hunting (kiting) within the RSA. Additionally, it is anticipated that the types and arrangements of turbines that will be used in Spring Valley will be similar to those used at Foote Creek Rim. One concern is the abundance of prey (particularly lagomorphs) observed by biologists while conducting surveys throughout Spring Valley. This high prey base could lead to elevated raptor mortality levels, or at least elevated risk levels. A high prey base was also noted at Foote Creek Rim, with a relatively abundant prairie dog colony near turbines (Erikson et al. 2002). This was considered a possible reason for the golden eagle mortality at this site.

4.1.2 Migratory Passerines

Surveys for migrating passerines yielded 82 different species of identifiable birds. Of these species, horned lark was the most abundant bird observed, with 770 total observations recorded. The second-most abundant species was common raven, with 448 total observations recorded, and the third-most observed species was mountain bluebird, with 212 sightings during migratory passerine surveys. At least one of these three species was the most common species at each of the survey points as well, except for PS 1, where pinyon jay was most abundant. Common ravens were consistently abundant throughout the year, whereas horned larks and mountain bluebirds were more common toward the end of fall migration surveys, when large flocks use Spring Valley.

To account for high abundance as a result of large flocks and more accurately assess avian use within Spring Valley, frequency of occurrence was also determined for each species. Again, common ravens and horned larks topped the list. These species were observed during 74% and 46% of all passerine surveys, respectively. The third-most frequent species was northern flicker, which was recorded during almost 30% of all surveys. Though northern flickers were seen frequently, they are not flocking birds and were almost always seen singly.

The greatest species diversity was observed at PS 3 and PS 4 (see Figure 16), which were the only points situated in habitat that provided both a water resource and vertical structure (juniper). The survey point with the third-highest diversity was PS 1, where water was not present but juniper was. The lowest diversity was observed at PS 2 and PS 5; neither of these sites has a water source or juniper present.

To better analyze the potential risk of avian strikes with WTG blades, flight heights were recorded for all species observed. In total, 258 individual birds (8%) were observed within the RSA during migratory passerine surveys. Again, this does not mean 8% of all birds in Spring Valley will be struck by WTG blades; many birds would be able to avoid WTG blades. During passerine surveys, horned larks and common ravens were the most frequently observed species per survey and the most abundant observed within the RSA. Their commonality within the project area and within the RSA would put these species at high risk of collision. Erickson et al. (1999) identified common ravens and horned larks as two species that are most susceptible to strikes with WTG blades, based on the amount of time they spent within the RSA at a WGF in the state of Washington.

Because the common raven was observed spending a high proportion of time within the RSA and because it was observed so frequently, this species has the highest RI—5.2. Common ravens are fairly common at various other WGF studies as well. However, Erikson (2003) cites corvids (a family which includes ravens) as only constituting 0.2% of mortalities at newer WGFs studied since 2001. Studies at the Big Horn Wind Power Project found that while common ravens were the second-most commonly observed species, there was not one common raven observed during fatality studies (NWCC 2009). Additionally, it has been noted that common ravens typically show a disproportionately low number of mortalities relative to how common the species is and how much time it spends in the RSA (Dorin and Speigel 2005; Thelander and Rugge 1999). Various studies have indicated that common ravens do not have a high collision rate and are found as fatalities far less than their abundance would indicate, which suggests this species simply recognizes the turbine blades and deliberately avoids collisions with spinning blades (NWCC 2009). Therefore, it is expected that common raven mortality due to collisions with WTG blades will be rare following construction.

Horned larks received an RI of 2.0, which is the eighth highest RI among birds observed during migratory passerine surveys. As noted previously, this species was also the most abundant bird observed during migratory passerine surveys. These factors would point to horned lark as a species of concern when assessing potential impacts from collisions with WTG blades. Erikson (2003) states that horned larks make up 29.6% of mortalities at new generation WGFs. Studies at Foote Creek Rim have suggested a positive correlation between horned larks having the highest use estimates and the highest amount of fatalities at this site (Young et al. 2003b). At the Stateline Wind Project, horned larks received the highest mean use estimate of 1.649 (number of birds/10 minute survey) and were also the most commonly observed mortality at this facility, with an estimated mortality rate of 0.89 per turbine per year (Erickson 2004). Additionally, horned lark has a high number of mortalities recorded at a number of other WGFs (Kingsley and Whittam 2005).

Horned larks could potentially be at a greater risk of strikes with WTG blades than other birds, because this species performs aerial courtship displays that could lead the bird into the RSA (Howe and Atwater 1999; WAI 2006). However, these courtship displays are typically conducted during the breeding season, when populations of horned larks in Spring Valley are far reduced. Additionally, biologists regularly recorded large flocks of horned larks flying very low to the ground. The large flocks observed in the winter of 2007 and 2008 were all recorded flying at an average height of 1 to 2 m off the ground, well below the RSA. Still, it appears that this species exhibits mortality rates proportionate to its abundance, unlike other species such as common raven. Therefore, it is estimated that horned larks will make up the majority of mortalities at the Spring Valley WGF. However, it should be noted that horned larks have been observed to habituate to operating turbines (Kingsley and Whittam 2005).

Other species with high risk indices based on passerine surveys include Canada geese and Swainson's hawk at an RI of 4.8 and 3.0 respectively. Swainson's hawks were observed nesting in the project area and are discussed further in Section 4.1.5 Nesting Raptors. Canada Geese have been documented routinely foraging under a turbine at the Pickering Nuclear Generating Station in Ontario and were even observed using flight patterns that clearly avoided the turbine (James 2003). In addition, studies at the Klondike WGF in Oregon had documented several flocks of Canada Geese during surveys and recorded no mortalities for this species (Erickson et al. 2002). Furthermore, while waterfowl have been abundant at other WGFs, these birds do not typically have a high rate of mortality. This could be attributed to their propensity to migrate at higher altitudes than other species (NWCC 2009).

Based on the results of migratory passerine surveys, other species that could also be at a high risk of mortality at the Spring Valley WGF include mourning dove, mountain bluebird, and pinyon jay. These species were fairly common during surveys and have been recorded within the RSA. Foote Creek Rim has recorded a mourning dove fatality and only two mountain bluebird fatalities, although Foote Creek Rim also indicates a low use estimate for these species (Young et al. 2003a,. 2003b). As of 2005, no records of pinyon jay fatalities were found at other WGF projects (Kingsley and Whittam 2005). Like common ravens, pinyon jay is a member of the Family Corvidae and may be consciously avoiding WTG blades. It is expected that mountain bluebirds and mourning doves will experience relatively moderate levels of mortality at the Spring Valley WGF, whereas pinyon jay mortalities are expected to be rare.

It is known that many species of passerines migrate nocturnally, which was not analyzed as part of these migratory passerine surveys, and the potential risk to nocturnally migrating passerines remains unknown. A primary reason is the limited information on the behavior of nocturnal birds. Nocturnally migrating passerines usually fly at great heights, sometimes as high as 925 m (3,037 feet) (Able 1970). Therefore, it is assumed that nocturnally migrating passerines would not be at a high risk of collision with WTG blades in Spring Valley. However, the shear numbers of migrating passerines and the fact that they have to ascend and descend through the RSA ensure that some risk is still present, no matter how high some species may fly when migrating. However, at this time, it appears that potential project-related impacts to nocturnally migrating passerines would be low.

4.1.3 General Avian Use

General use surveys yielded 40 identifiable bird species. Of those birds observed during the winter general use surveys, horned lark was the most common species, followed by Bohemian waxwing and common raven. While Bohemian waxwing was the second-most abundant species observed during general use surveys, this species was only observed from two survey locations, both in February (likely members of the same transitory flock). During the first observation, a single large flock of an estimated 330 individuals moved through the area, and the second observation consisted of a flock of 50 individuals. These flocks were not recorded within the RSA, and there have been no recorded mortalities for this species at WGFs (Kingsley and Whittam 2005).

While flocks of horned larks were not as large as those of Bohemian waxwings, horned larks were observed more consistently throughout the winter general use surveys. As discussed in the *Spring Valley Wind Power Generating Facility Fall 2007 Avian Survey Results Report* (SWCA 2008), the population of horned larks in Spring Valley spikes substantially throughout the late fall and into the winter. This increase in population is evident in huge flocks of horned larks in the open rangeland of Spring Valley, particularly around PS 5. On December 19, 2007, a flock of approximately 150 horned larks was recorded at this survey point. Horned larks were discussed as a resource of concern in Section 4.1.2 Migratory Passerines, and their high numbers throughout Spring Valley during the winter continue to raise concerns about this species. Additionally, this species was the most abundant species, was the second-most frequently observed (46.3 % of surveys), and has the eighth-highest RI—2.0. This species is, however, ubiquitous throughout North America, and it is doubtful that impacts to this species would be detrimental to the species' survival.

Of the 40 species identified during the general use surveys, only eight were observed within the RSA: American kestrels, American robins, Canada geese, common ravens, horned larks, pinyon jays, Swainson's hawks, and yellow-headed blackbird.

American kestrels have had several reported mortalities at other WGFs. However, the majority of these occurred in California, and only three were reported from Foote Creek Rim (Kingsley and Whittam 2005). As of 2005, four different WGFs in North America have each recorded a single American robin mortality (Kingsley and Whittam 2005). As previously discussed, Canada geese may have a higher risk of collision, but there are indications that this species may be able to habituate to turbines (James 2003; James and Coady 2003). Common ravens, also mentioned previously, are rarely killed at WGFs. Horned larks, discussed previously, are common mortalities at other WGFs and would likely experience mortalities in Spring Valley because of their relatively large numbers and the amount of time they spend in the RSA. Swainson's hawks have had several mortalities recorded at other WGFs (Kingsley and Whittam 2005). Pinyon jays and yellow-headed blackbirds, however, have had no recorded fatalities as of 2005 (Kingsley and Whittam 2005). Pinyon jays and Swainson's hawks are further discussed in Sections 4.1.2 Migratory Passerines and 4.1.5 Nesting Raptors, respectively.

4.1.3.1 SEASONAL FLUCTUATIONS

Overall, general bird surveys and migratory passerine surveys revealed that bird numbers in Spring Valley fluctuate greatly throughout the year. Numbers are fairly constant through the spring and early summer, but drop consistently just before migration. This could be as a result of birds congregating in staging areas before migrating south. If Spring Valley is not a typical staging area, then residents from Spring Valley would disperse elsewhere prior to migration. In both years, as the fall migration commenced, bird numbers began to greatly increase. These numbers only continued to increase throughout the fall, with the greatest spikes in activity occurring in December 2007 and February 2008, before dropping precipitously and returning to their relatively steady levels for the remainder of the year. For unknown reasons, overall bird abundance was noticeably lower during the second year of surveys than it was during the first. There was, however, a dramatic decrease in activity during January 2007 and December 2008 surveys. This is most likely attributable to the extremely cold temperatures experienced during these surveys. Temperatures recorded during survey periods ranged from 9.7°F to 22.8°F in January 2007 and 3.6°F to 26.1°F in December 2008.

Large flocks of birds were evident throughout Spring Valley in the fall and winter months, but the largest flocks were almost always horned larks. As previously discussed, some resident avian species have been shown to habituate to wind turbines (Curry and Kerlinger, LLC 2006), and it is assumed that some of the summer and winter residents in Spring Valley will do the same. While it cannot be known for certain, it is assumed that species migrating through the area would be less habituated to the presence of WTGs than residents and would therefore be more susceptible to strikes.

General use surveys have helped in portraying fluctuating populations of specific species in Spring Valley. Figures 31 through 40 show how different species show population peaks at different times of the year. While some species are fairly consistent throughout the year, some species, like cinnamon teal (see Figure 39), are most common in the spring, when ephemeral streams and ponds are more prevalent in Spring Valley. Other species, like western meadowlark (see Figure 36) and American kestrel (see Figure 40), exhibit spikes in the summer, immediately following the breeding season. Still others, like horned lark (see Figure 32) and American robin (see Figure 38) show peaks in abundance during the fall and winter months as migratory waves move through Spring Valley. These spikes, exhibited at different times of the year, will likely lead to disproportionate risks to different species across the year following construction of the Spring Valley WGF.

For species with relatively high risk indices, seasonal fluctuations may help indicate at what time of the year all or most mortality for that species would occur. Mountain bluebird (see Figure 34), for example, had a relative RI of 2.5 (fifth highest), and species abundance appears to peak in the fall. It would then be expected that most mountain bluebird mortalities would occur in the fall. Taking into account seasonal fluctuations, horned lark (RI = 2.0; see Figure 32) and American robin (RI = 1.3; see Figure 38) may experience elevated mortality rates in the fall and winter, when abundance peaks. American kestrel (RI = 1.5; see Figure 40) would likely be at a higher risk in the late spring and late summer months as numbers increase. Other species, like pinyon jay (RI = 2.2), show no specific seasonal increase (see Figure 35), and it would be difficult to predict a particular time of the year during which risk to this species is elevated.

4.1.4 Breeding Bird Point-Counts

Previous studies have suggested that breeding birds in a given area have lower mortality rates than nonresidents, who may not be as familiar with turbines and the ways of avoiding them (Kingsley and Whittam 2005). Although residents may have fewer fatalities, WGFs may impact breeding bird populations by disturbing breeding sites, removing habitat, destroying active nests, and affecting feeding areas (Kingsley and Whittam 2005).

Breeding bird point-counts identified 29 bird species during surveys. While direct evidence of breeding was not observed for all of these species, breeding bird point-counts are performed during the middle of the breeding season, and it is suspected that most or all of these species breed in or near the project area. In total, including incidental sightings, there were 11 species of birds confirmed to be breeding in the project area.

Upon installation of a WGF, strikes with WTG blades are a potential risk for breeding birds in the project area. However, of all of the birds observed during breeding bird point-counts, only 1% was observed flying within the RSA, and when compared with percentages of migratory birds in the RSA, it can be safely deduced that resident birds are generally at a lower risk than birds migrating through the project area.

Nine of the 11 observed species of breeding birds have been recorded as mortalities at other WGFs, having at least one collision with a wind turbine. These nine species were Brewer’s sparrow, common raven, loggerhead shrike, Swainson’s hawk, ferruginous hawk, northern harrier, sage thrasher, black-billed magpies, and killdeer. As of 2005, the sage sparrow and lark sparrow had never been recorded mortalities at a WGF (Kingsley and Whittam 2005). While killdeer has been recorded to have had collisions with wind turbines, this species has also been observed nesting within 60 m of a turbine tower (James 2003). As mentioned previously, it is hypothesized that impacts to common ravens will be low. For the other dominant species, some studies have suggested resident avian species habituate to wind turbines, and it is assumed that some of the resident species in Spring Valley will do the same (Curry and Kerlinger, LLC 2006).

4.1.5 Nesting Raptors

Overall, 2007 and 2008 raptor nest searches found 25 raptor or common raven nests during helicopter surveys of the project area. Ferruginous haw and Swainson’s hawk were the only identified raptor species nesting during these surveys. Ferruginous and Swainson’s hawks are special-status species (see Table 7), and impacts to these birds could be detrimental. According to present raptor migration data, ferruginous hawks were not observed within the RSA and therefore did not receive an RI value. However, this species was observed within the RSA during passerine surveys and was calculated from this data set to have an

RI of 0.7. Swainson's hawks were calculated to have an RI of 3.1 using raptor migration data and of 3.0 using passerine data.

Swainson's hawks have been recorded as a relatively commonly observed species with little to no recorded fatalities in other WGF studies (Brown and Hamilton 2004; Erikson et al. 2002; Kingsley and Whittam 2005). However, Brown and Hamilton (2004) recorded seven Swainson's hawk fatalities at the McBride Lake Wind Farm in Alberta. All of these carcasses were young-of-the-year or juveniles. This could possibly indicate that the inexperience of juveniles could increase the risk of collision with a WTG blade for this specific age group (Brown and Hamilton 2004). Because Swainson's hawks nest in the project area, impacts to juveniles of this species could be of particular concern during operation of the WGF.

Both Swainson's hawk and ferruginous hawk are described as displaying nesting site tenacity (Ehrlich et al. 1988). The evidence of multiple nests indicates this area may be an important reproduction site for these raptors. In addition, Swainson's hawk activity is of particular interest, as these are uncommon nesters in Nevada; only five territories with active Swainson's hawk nests were recorded during HWI 2005 nest surveys in Northeastern Nevada. The observation of three active nests in Spring Valley seems to indicate a relatively high concentration of this species in the project area.

While there have been several WGF studies that have documented nesting raptors within the vicinity of project areas, few data exist to determine the level of impacts WGFs have to these nesting species. Foote Creek Rim has had the highest recorded nest density within 2 miles of a wind facility, with the majority of these nests recorded as red-tailed hawks. However, despite high concentrations of nesting red-tailed hawks at this site, no red-tailed hawk fatalities have been documented (Erikson et al. 2002).

4.1.6 Special-Status Species

Golden eagles were commonly observed by biologists when traveling throughout the project area. During surveys, this species was recorded during 19.4% of raptor migration surveys and 8.1% of passerine surveys. Golden eagles received a relatively high RI during both raptor (9.7) and passerine surveys (2.9). Golden eagles are sensitive to disturbance, particularly while nesting, and will abandon the nest if provoked (Tesky 1994). These raptors prefer to nest on cliff ledges in rocky canyons or even in large trees, neither of which are present in the project area. However, golden eagles will also nest on tall, artificial structures, such as electrical poles and towers. These vertical structures are often used to perch while hunting as well.

Although the long-eared owl was not observed during avian surveys, biologists had seen and heard this species while camping and traveling within the project area. One long-eared owl fatality has been recorded from the Tehachapi Pass WRA in California (Anderson et. al 2004; Kingsley and Whittam 2005). However, as of 2005, no fatalities of this species have been recorded from WGFs outside California. Still, limited information exists on nocturnal avian species; therefore, little is known of the disturbance impacts and how owl species react to turbines (Kingsley and Whittam 2005).

Western burrowing owl was another incidental species observed while biologists were traveling in the project area. Although there have been substantial burrowing owl fatalities at WGFs in California, none have been reported from other WGFs. Again, little is known of the disturbance impacts and how owl species react to turbines (Kingsley and Whittam 2005).

Juniper titmouse was relatively uncommon during avian surveys. This species was only observed during 2.5% of surveys, including both migratory and winter general use surveys. However, this species was not observed in the RSA. Considering that titmice feed by collecting insects from the bark of trees and they are not known to perform aerial displays, the presence of this species in the RSA is expected to be limited. As of 2005, there were no recorded collision mortalities for this species (Kingsley and Whittam 2005). Therefore, because of its flight behavior and modest numbers, it would be expected that juniper titmouse will be a rare mortality at the Spring Valley WGF.

Although ferruginous hawks were not observed in the RSA during raptor migration, this species was observed using this flight height during passerine surveys and was calculated with an RI of 0.7. During raptor migration surveys, this species was observed on 16.7% of surveys and only 1.3% of observations during passerine surveys. Ferruginous hawks are also known to nest in the project area and were observed during breeding bird point counts. Ferruginous hawks have had several recorded mortalities at other WGFs (Kingsley and Whittam 2005). Although this species has a relatively low RI, it was observed relatively frequently in the project area. Considering all of these variables, ferruginous hawk would be a resource of concern when assessing impacts from the Spring Valley WGF. It is anticipated that ferruginous hawks could likely be impacted by this WGF, and mortality may occur.

Swainson's hawk was fairly frequently observed during raptor migration surveys (13.9%), and 22.2% of these observations were within the RSA. This resulted in an RI for this species of 3.1. Swainson's hawks were observed on 9.4% of passerine surveys and received a strikingly similar RI from these surveys—3.0. Swainson's hawks were also observed nesting in the project area and during breeding bird point-counts. Records indicate nine recorded fatalities at three other WGF studies: seven of these were juveniles recorded at McBride Lake, one fatality occurred at APWRA, and the other was at Stateline, Washington (Kingsley and Whittam 2005). Considering all of these factors, the Swainson's hawk should be considered a resource of concern for the Spring Valley WGF. It is probable that Swainson's Hawks may be impacted by the Spring Valley WGF, and some mortality may be observed.

Greater sage-grouse were not observed in the project area, but according to geographic information system (GIS) data provided by the Nevada Department of Wildlife (NDOW), this species is known to occur in Spring Valley. The closest active lek is located approximately 1,200 m (4,000 feet) from the western project area boundary, on the west side of County Highway 893. This lek is relatively small, averaging only three males per year over the last ten years. Grouse are sensitive to human modifications on the landscape and will overtly avoid vertical structures that increase exposure to avian predators (Erikson et al. 2002; Stinson et al. 2004). Sage-grouse have been documented to abandon leks within 1.4 miles of newly constructed power lines, and reduction of lek attendance was noted up to 3 miles away (Stinson et al. 2004). However, there is already one overhead transmission line and a County Highway between the closest active lek and the proposed project area, so development of any new facilities would be in addition to existing disturbance. While no fatalities have been reported for sage-grouse from other studies at wind facilities, there are limited data regarding whether leks occur in the vicinity of those project areas (Erikson et al. 2002). Therefore, little is known about the impacts that WGFs present to leks and grouse populations. However, USFWS (2003) guidelines recommend that wind turbines should be located 5 miles away from known lek areas, and the North American Bird Conservation Initiative (2009) states that improper siting of wind turbines can lead to habitat fragmentation, resulting in disruptions in nesting activity. It is anticipated that greater sage-grouse would experience minimal impacts from the development of the Spring Valley WGF based on the limited number of individuals near the project area and existing vertical structures and roads between the active lek and proposed turbine locations.

Prairie falcons were observed on 13.9% of raptor migration surveys and had an RI of 2.8. This species was also observed twice during passerine surveys (0.04%), although it was not flying within the RSA during these observations. Prairie falcons have had several recorded mortalities at other WGFs. (Kingsley and Whittam 2005). Although, overall mortality of large falcons has been low at newer generation wind plants, and only one prairie falcon mortality was observed at Foote Creek Rim, which estimates one prairie falcon mortality per year for every 200 turbines at the site (Erickson et al. 2002). It is anticipated that Spring Valley prairie falcons would experience impacts that are similar to those described for Foote Creek Rim.

Sandhill crane was another relatively uncommon species, with only six observations (1.9% of surveys) during migratory passerine surveys and one observation during breeding bird point-count surveys. Sandhill crane was also among those species observed in the RSA during passerine surveys and had an RI of 0.3. As of 2005, this species has not been a recorded fatality at any WGF (Kingsley and Whittam 2005). This species is usually associated with water and therefore may only be present in the project area during those times of the year when water is present. Additionally, almost all observations of this bird occurred within portions of the initial project area that are not part of the current project area, further limiting the potential for impact to this species. This bird also spends a high proportion of time on the ground while foraging and performing courtship displays (Ehrlich et al. 1988). Considering these behaviors, its relatively low representation during surveys, and low RI, it is estimated that this species would be a rare mortality at the proposed Spring Valley WGF.

Pinyon jays were commonly observed during passerine surveys (11.3%) and received an RI of 2.2. Although these birds were recorded throughout the year, they were more frequently observed during migration. During general use surveys, pinyon jays were more commonly observed during the summer than in winter. As of 2005, there were no recorded mortalities for this species from other WGF studies (Kingsley and Whittam 2005). As previously mentioned, pinyon jays are members of the Family Corvidae (like common ravens) and may be able to recognize and avoid WTG blades. Therefore, it is anticipated that these birds will have rare instances of mortality from the proposed Spring Valley WGF.

Bald eagle was observed once during fall raptor migration surveys (2.8%) and was not using the RSA during this observation. This species was noted incidentally while traveling through the project area on a few occasions, but its presence in the project area is thought to be uncommon. There has never been a bald eagle mortality reported at a WGF as of 2005 (Kingsley and Whittam 2005). For these reasons, it is not likely bald eagle will be impacted by the proposed wind facility.

Loggerhead shrike was observed fairly frequently (15.6% of surveys) but was never observed within the RSA during surveys. Although this species was not observed within the RSA, this species does practice aerial pursuit of the female while courting (Ehrlich et al. 1988), which could increase its time in the RSA. However, the only recorded loggerhead shrike mortality at a wind facility occurred in California (Kingsley and Whittam 2005). The majority of loggerhead shrike observations occurred during migration surveys (76%), although this species was also recorded during summer general use surveys (24%) following the breeding season. In addition, during breeding bird point-counts, this species was observed displaying breeding behavior. Therefore, it is anticipated that the proposed wind facility may impact loggerhead shrike.

Long-billed curlews were observed during 3.1% of surveys and received an RI of 1.0. This species was also observed during breeding bird point counts. However, as of 2005, long-billed curlew mortalities have not been recorded at other WGFs (Kingsley and Whittam 2005). Therefore, because of limited availability of preferred habitat, the low abundance of individuals, and the moderate RI, it is anticipated mortality levels for this species would be low.

Vesper sparrows were observed during 3.1% of surveys and were not recorded in the RSA. However, this species has several recorded mortalities at other WGFs (Kingsley and Whittam 2005). Although not observed in the RSA during surveys, this species exhibits aerial courtship displays that would increase the risk of collision with a WTG blade. Considering this behavior and its low numbers, it is estimated that this species would be a rare mortality at the proposed Spring Valley WGF.

Red-naped sapsucker was observed once during migratory passerine surveys (0.6%) and was not calculated with an RI because this species was not observed in the RSA. It is estimated that this species is an uncommon visitor to Spring Valley. In addition, this species has not been an observed mortality at other WGF studies (Kingsley and Whittam 2005). Therefore, it is estimated that this species would be a rare mortality at the proposed Spring Valley WGF.

4.2 Bat Surveys

Long-term preconstruction bat surveys for the Spring Valley WGF were initiated in order to determine the species present and assess their use of the project area. This information establishes baseline data with which to assess the potential for impacts to bat species and identify methods of reducing anticipated impacts. Collection and analysis of these data are necessary to satisfy the requirements and goals for minimizing impacts to bats, as outlined by the PEIS.

AnaBat acoustic surveys were conducted nightly within the Spring Valley WGF lease area and project area from July 12, 2007, through December 21, 2008. Less than 5% of potential nights of data collection were missed as a result of equipment malfunctions, and some additional data were missed as a result of detectors' start times being incorrectly set in the late fall of 2007. Despite minor losses of data, 12 of the 23 known bat species in Nevada (Bradley et al. 2006) were detected in the lease area and project area.

Of the detected bat species, six have never been reported as fatalities from other wind energy fatality studies, including western small-footed myotis, long-eared myotis, long-legged myotis, pallid bat, Townsend's big eared bat, and Yuma myotis. It is worth noting that long-eared myotis, long-legged myotis, and Yuma myotis were never detected at monitoring stations CF-2081 and CF-2075 (30- and 60-m MET tower locations, respectively), which could indicate that their natural feeding behavior could keep them out of the RSA. The other three species that have never been recorded as fatalities were detected within the anticipated RSA for the Spring Valley WGF (35 to 130.5 m agl), which indicates that there may be increased potential for mortality based on observed flight heights. However, it is anticipated that previous fatality study results, such as those reviewed by Arnett et al. (2008), are predictive of future fatality trends. Based on these studies, it is anticipated that impacts to the six bat species listed above will not occur or that impacts will be extremely minor. Therefore, seasonal and nightly IA levels for these six species are not discussed further in this document.

The remaining six species—little brown bat, Brazilian free-tailed bat, big brown bat, silver-haired bat, hoary bat, and western red bat—have all been reported as fatalities at other WGFs in the western U.S. (BLM 2005; Kerlinger et al. 2006) and have been shown to form the majority of fatalities at all WGFs in the United States (Johnson and Strickland 2004; Johnson et al 2003; Keeley 2001). Based on these studies, these six species are considered to be at greatest risk from development of a WGF, and the remainder of the discussion will focus on these species.

While the cause for these patterns of mortality may not be fully understood, different flight and foraging characteristics likely offer a partial explanation. In general, migratory species fly faster, are less maneuverable, and fly at higher altitudes than other non-migratory species. This combination of flight characteristics seems to make migratory species more vulnerable to collisions with turbine rotors. There are also hypotheses that bats may be attracted to turbines for roosting locations (in the case of the tree-roosting Lasiurine species) (Arnett et al. 2008) or as foraging areas because of insect swarms that can occur in the RSA; however, none of these hypotheses have been rigorously tested through scientific observation (O'Farrell 2009). One of the most recent studies on the cause of bat mortalities at WGFs shows that many bats, possibly even the majority, are killed not by collision with WTGs, but by barotrauma (tissue damage to air-containing structures in the lungs) when they fly within the low-pressure wake produced by a moving WTG blade (Baerwald et al. 2008).

4.2.1 Monitoring Stations

There was substantial variation in the volume of data collected by different monitoring stations. This amount of variation was anticipated as the monitoring stations were located in different habitat types and at attractant features, such as ephemeral and perennial water sources. A large proportion of data was attributed to monitoring stations CF-2076 and CF-2079, which collected 38% and 25% of acoustic data, respectively. CF-2076 was located at one of the largest perennial water sources in the lease area and was anticipated to attract numerous bats. Activity levels at CF-2079 are not as clearly explained. During site evaluations, the area around CF-2079 was identified as an area for survey because of the variety of vegetation species and presence of tall summer grasses. Additionally, it appeared as though the area might provide an ephemeral water source, based on the plant species present and the topography. Although no standing water was ever observed at this site, vegetation production appeared higher than the surrounding vegetation community. It is presumed that the diverse and densely growing vegetation served as an attractant for insects and therefore bats.

Monitoring stations were evaluated in a Pearson correlation matrix, which showed significant positive correlations between habitat features, presence of water, IA levels, and species richness in 2007. In 2008, significant positive correlations were observed between all variables except species richness and IA levels, although there was a positive but statistically insignificant correlation. The results of this analysis indicate that both bat activity and species richness are higher near water and are influenced by habitat features. Based on these results, it may be that the potential for bat impacts could be reduced by siting turbines away from water and trees, although currently no research has shown that micrositing to avoid these types of resources is effective for reducing impacts to bats.

The MET tower monitoring stations (CF-2075, CF-2081, and CF-2092) combined collected approximately 5% of all data. Nine species were detected at CF-2075 (30-m MET tower), although the IA levels varied greatly between these species. Brazilian free-tailed bats constitute the majority of activity at both CF-2075 and CF-2081 (60- and 30-m MET towers, respectively). At CF-2075 (60-m MET tower) Brazilian free-tailed bats accounted for 95% and 94% of activity in 2007 and 2008, respectively. At monitoring station CF-2081 (30-m MET tower), Brazilian free-tailed bats accounted for 94% and 88% of activity in 2007 and 2008, respectively. These two monitoring stations are located within or near the anticipated RSA for the Spring Valley WGF; therefore, it is anticipated that Brazilian free-tailed bats are at an elevated risk of collision or barotrauma as a result of their known habit of foraging at higher elevations (McCracken 1996).

Deployment of monitoring stations at attractant features is useful for compiling a complete species list, although it may serve to bias the data in a way that exaggerates the IA for species that are actively foraging at these resources. For example, bats known to use the areas immediately surrounding an attractant resource for foraging are likely to generate an elevated IA level, compared with species that do not use the areas in the same manner. To illustrate this point, Table 14 shows the number of AnaBat files at three monitoring stations located away from trees and water, except for CF-2074. CF-2074 has been included in this demonstration because this particular cattle water trough was only observed with water at one time, during the winter, throughout the course of the study, and is therefore considered a weak attractant at best. While the monitoring stations presented in Table 14 only represent approximately 3.5% of all acoustic data, these locations show a dramatic difference in activity by species. Away from attractant features, Brazilian free-tailed bat constitute approximately 60% of bat activity, substantially more activity than is shown by the entire data set. This may indicate that the Brazilian free-tailed bat has a greater presence in the project area. In addition, the silver-haired bat also forms a higher percentage of the total data in Table 14.

Table 14. Activity Away from Attractant Features

Species Code	Monitoring Station			Number of AnaBat Files	% of Files
	CF-2077	CF-2078	CF-2092		
ANTPAL	49	142	5	196	0.6
CORTOW	0	4	1	5	0.0
EPTFUS	0	73	94	167	0.5
LASCIN	66	78	33	177	0.5
LASNOC	333	455	211	999	2.9
MYOCIL	1,596	909	2,084	4,589	13.3
MYOEVO	134	281	323	738	2.1
MYOLUC	3,743	1,337	1,752	6,832	19.9
MYOVOL	13	0	5	18	0.1
TADBRA	10,009	7,630	3,051	20,690	60.1
Total	**15,943**	**10,909**	**7,559**	**34,411**	**100.0**

4.2.2 Nightly and Seasonal Trends

4.2.2.1 NIGHTLY TRENDS

Nightly trends in bat activity were apparent, although these patterns differed between species. Four distinct patterns were demonstrated and included unimodal and bimodal distribution, in which dramatic peaks in activity were followed by equally dramatic drops in activity (see Figures 46 and 47). These patterns contrasted with other patterns, the first of which exhibited an initial peak in activity that slowly declined throughout the night, and another that had no noticeable peaks, but sustained low levels of activity throughout the night.

Although the analysis of these trends has not taken into account other variables affecting them, such as weather, the large data set would suggest that these patterns are fairly consistent. Understanding nightly trends in activity may be useful from a management perspective, as these patterns could be used to identify times at night when the potential for impacts to bats is greatest. Peaks in activity could be used to design species specific mitigations, such as shutting down or feathering turbines during narrow windows of high activity. Additional potential mitigation strategies will be discussed in further detail in Section 4.4.

4.2.2.2 SEASONAL TRENDS

In addition to nightly trends in activity, seasonal trends in activity were also observed. These trends followed patterns already documented by previous research, which has shown that migratory species tend to have spring and fall peaks in activity, with a more dramatic peak in the fall (Arnett et al. 2008). Interestingly, the silver-haired bat exhibited this pattern, but peaked earlier in the spring and later in the fall than the other migratory species. This is likely as a result of this species' preference for northern latitudes, higher elevations, and general tolerance of colder conditions (Bradley et al. 2006). In contrast, activity levels in the non-migratory species all followed a pattern of a gradual buildup in late spring, followed by a peak in mid-summer and a gradual decline in the fall.

Seasonal trends in activity are useful for the same reasons as nightly trends. These can be used to assess when the potential for impacts to bats is greatest based on seasonality, in order to craft effective mitigation measures. For example, mitigations for migratory species may only need to be enacted during the spring and fall, when the activity of these species is greatest. Potential mitigation measures are discussed further in Section 4.4.

4.2.3 Species-Specific Discussions

The following sections summarize the observations of the six bat species that have been observed as mortalities at other WGF. This section summarizes seasonal and nightly trends observed within the project area, which can be useful for determining species-specific mitigation measures. Patterns of mortality from other WGF are also summarized and used to infer the anticipated impacts to these species.

4.2.3.1 LITTLE BROWN BAT

Little brown bats are a BLM-designated Sensitive species but are not afforded any federal or state protection. This species was the second-most detected bat in the lease area, accounting for approximately 25.6% of all recorded activity. The little brown bat IA levels peaked in June, then exhibited a second small peak in IA levels during September. Nightly activity peaked dramatically at 1.5 to 2.5 hours after sunset, then declined until a second smaller increase in activity occurred 6 hours after sunset. This species was detected at all monitoring stations, although IA levels were low at CF-2081 and CF-2075 (30- and 60-m MET tower locations, respectively), which indicates that they use the area within the anticipated RSA in a limited capacity.

In contrast to most other non-migratory bat species, the little brown bat has been reported as a fatality at other WGFs in the western United States (BLM 2005), although they constitute a low percentage of total fatalities. In one study from a WGF on the Oregon-Washington border, one individual (<1% of fatalities) was reported as a fatality (WEST 2004); in another study, in Wyoming, seven individuals (approximately 14% of fatalities) were reported as fatalities (Young et al. 2003a).

The little brown bat exhibited high levels of activity during this study, compared with other bats observed within the project area. Given its record of mortality at other WGFs, it may be considered the most at-risk, non-migratory species as a result of WGF operation. However, because of the limited number of reported mortalities, compared with some of the migratory species, the little brown bat is considered to be at low risk from development of the Spring Valley WGF.

4.2.3.2 BIG BROWN BAT

Big brown bats (*Eptesicus fuscus*) are a BLM-designated Sensitive species. They accounted for approximately 2.1% of all recorded activity and were detected at all monitoring stations, except for CF-2077. Big brown bats were detected from May to September, with IA levels peaking in July, then dropping sharply by August. Nightly activity peaked dramatically at 1.5 to 2.0 hours after sunset, then rapidly declined throughout the night. No secondary peaks in activity were observed.

Like the little brown bat, this species has also been reported as a fatality at other western U.S. WGFs (BLM 2005), although in low numbers. In one study from a WGF on the Oregon-Washington border, approximately 2% (two individuals) were reported as a fatalities (Erickson et al. 2004); in another study, in Wyoming, approximately 2% of mortalities (one individual) were attributed to big brown bats (WEST 2004). This species was detected at monitoring stations CF-2081 and CF-2075 (30- and 60-m MET tower, respectively), which indicates that they are flying at heights within the anticipated RSA.

The big brown bat is a widespread and regionally common species in Nevada (Bradley et al. 2006), although it exhibited low activity levels, compared with other bats in the project area. This species has a record of fatality at other WGFs and has been observed within the anticipated RSA for the Spring Valley WGF. Although these observations may give some cause for concern, this species is anticipated to be at minor risk of mortality from development of the Spring Valley WGF. This hypothesis is primarily based on the low observed activity levels of this species and the low number of reported mortalities. Low activity levels suggest that big brown bats likely are not as abundant as other at-risk species, although acoustic survey techniques can only determine relative activity and not abundance.

4.2.3.3 BRAZILIAN FREE-TAILED BAT

Brazilian free-tailed bat is impressive in flight and is known to travel up to 80 km (50 miles) to foraging grounds (NatureServe 2008), sometimes foraging at heights up to 750 m (2,400 feet) above ground level (McCracken 1996). Bats foraging within this altitudinal range have increased potential to fly within the anticipated RSA. This BLM-designated Sensitive species accounted for approximately 11% of all activity and was detected at each monitoring station. Brazilian free-tailed bat has been reported as a fatality at the High Winds Wind Power facility in California (Kerlinger et al. 2006) and the Oklahoma Wind Energy Center in Oklahoma (Piorkowski 2006). During these two-year studies, Brazilian free-tailed bats constituted approximately 41% (22 individuals) and 86% (95 individuals), respectively, of fatalities.

Although this species has only been reported as a fatality at two WGF facilities, few WGFs built within the known range of Brazilian free-tailed bats have been monitored for bat mortalities (Arnett et al. 2008). Based on the behavioral characteristics of this species, they are anticipated to be vulnerable to collisions with turbine blades or barotrauma, much like the other migratory species. Because of the proximity of a known colony of Brazilian free-tailed bats at Rose Guano Cave, understanding their use of the project area is critical to managing and reducing impacts to this species.

Rose Guano Cave is located approximately 2 miles east of the project area and has long been known as a late summer roosting location for Brazilian free-tailed bats. Studies of the Rose Guano Cave and accounts of its use by bats have largely been anecdotal and opportunistic, making it difficult to determine any changes to the colony (Sherwin 2009). Despite the lack of scientifically rigorous study, it has generally been assumed that 50–100,000 Brazilian free-tailed bats form a bachelor colony at this location from August to September (Sherwin 2009). It is also assumed that the current number of individuals has declined from historic levels as a result of the excavation of a second entrance, which likely affected the cave’s microclimate and provided easier access into the cave for humans (Bradley et al. 2006).

In order to establish baseline population estimates for the Brazilian free-tailed bat colony using Rose Guano Cave, a radar and telemetry study was initiated by the BLM, NDOW, and Rick Sherwin from August 1 through September 30, 2008. Detailed study of the colony indicates that as many as 1 million individuals use the Rose Guano Cave during the fall (Sherwin 2009). Evaluating telemetry data with emergence data (gathered using radar techniques) indicates that far more bats are using the cave than was previously assumed. Nightly colony averages were determined to be approximately 30,000 individuals, and telemetry results showed that an individual bat remained at Rose Guano Cave for three days on average (Sherwin 2009). Radar data showed that emergence occurred for about 230 minutes, with the bulk of individuals emerging between 2000 to 2130 hours (Sherwin 2009), or an average of 1 to 2.5 hours after sunset. Following emergence the bats generally climbed to a higher altitude, averaging approximately 1,200 feet above the valley floor, as they flew south toward agricultural fields located in southern Spring Valley (Sherwin 2009). However, some bats dropped out of the group prior to reaching the agricultural fields or headed west over the project area or north along the Snake Range (Sherwin 2009).

AnaBat acoustic data for the Brazilian free-tailed bat collected from the project area followed a pattern that was similar to the data collected by Sherwin (2009) for Rose Guano Cave. Activity for this species was recorded throughout the night; however, there was a substantial peak in activity from 1 to 2.5 hours after sunset. With an approximate average sunset time of 1900 hours for this period, these results have a strong correlation with the peak emergence from Rose Guano Cave. The correlation in activity between Rose Guano Cave and the project area suggests that Brazilian free-tailed bats are dispersing through the project area much in the same way that they are dispersing from Rose Cave. However, acoustic data do show that some Brazilian free-tailed bats are detected throughout the night, and it is unknown whether these individuals are primarily using the project area for foraging or are dispersing through the area. Observations of seasonal fluctuations in activity show that Brazilian free-tailed bats are present from May through October, although activity levels increase substantially in August and September.

Brazilian free-tailed bat had the highest activity level of any migratory species by a large margin and exhibited the fourth-highest IA level. Given the relatively high levels of observed activity, the close proximity of the project area to a known roosting location, and the previous record of mortality at other WGFs, Brazilian free-tailed bat is considered to be at high risk of mortality from development of the Spring Valley WGF. This hypothesis is further supported by this species' propensity to forage high above the ground, beyond the range of acoustic detectors. It is anticipated that far more Brazilian free-tailed bats are using the RSA, in some manner, than can be inferred from data gathered using acoustic techniques. Despite this hypothesis, it is anticipated that species-specific mitigation measures could substantially reduce impacts.

4.2.3.4 SILVER-HAIRED BAT

Silver-haired bats are a BLM-designated Sensitive species. This forest-associated species is primarily found at higher altitudes and latitudes (Bradley et al. 2006) and is the smallest of the migratory species observed within the Spring Valley WGF project area. The silver-haired bat accounted for approximately 1.4% of all recorded data and was detected at all monitoring stations.

Like other migratory species, the silver-haired bat has been recorded as a fatality during other WGF studies. This species accounted for 50% of all fatalities (64 individuals) during a two-year study at a WGF on the Oregon-Washington border (WEST 2004). Kerlinger et al. (2006) also reported this species as a fatality at a WGF in California, although they only constituted 1.8% (two individuals) of all recorded mortalities. Unlike the other migratory species within the project area, the silver-haired bat exhibited its greatest peak in the IA in June. Nightly patterns in IA levels were different than for the Brazilian free-tailed bat. While the peak activity occurred at 1.5 hours after sunset, the peak was much less dramatic. Also, higher activity was sustained for a longer duration, but finally began to drop off approximately 4 hours after sunset.

The silver-haired bat exhibited the second-highest activity level of the migratory species observed in the project area. Given their high observed activity relative to other migratory species and their record of fatalities at other wind facilities, the silver-haired bat is anticipated to be at moderate risk of mortality from development of the Spring Valley WGF. Despite this hypothesis, it is anticipated that species-specific mitigation measures could reduce impacts to the silver-haired bat, should these be required.

4.2.3.5 HOARY BAT

The hoary bat is a migratory, solitary, tree-roosting bat species that is known to occur throughout the United States, as well as in areas of Canada and Mexico. This BLM-designated Sensitive species (Bradley et al. 2006) accounted for approximately 0.5% of all recorded activity and was detected at all monitoring stations. Hoary bats were observed within a project area from May to October, with IA levels peaking in

August. Nightly IA levels exhibited a slight peak from 1 to 2 hours after sunset and a smaller peak 6 hours from sunset. In general, nightly IA levels were sustained throughout the night, exhibiting some minor peaks in activity.

This species has been known to constitute a high percentage of fatalities at other wind energy studies. In a review of bat and wind energy literature, Kunz et al. (2007) showed that hoary bats formed approximately 40% of recorded bat mortalities at WGFs across the United States. Mortality rates of hoary bats at other WGFs have been consistently high (BLM 2005; Erickson et al 2003; Kern and Kerlinger 2004), especially in the eastern US. At the Stateline Wind Project on the Oregon-Washington border, hoary bats accounted for 46% (59 individuals) of mortalities (WEST 2004); at the Foote Creek Wind Facility in Carbon County, Wyoming, they accounted for approximately 80% (67 individuals) of mortalities (Young et al. 2003a). In the eastern United States, at the Mountaineer WGF in West Virginia and the Meyersdale WGF in Pennsylvania, this species accounted for approximately 34% (134 individuals) and 46% (119 individuals), respectively, of all mortalities (Arnett 2005).

The hoary bat is probably the species most well known for high mortality levels at WGFs from studies to date. While the hoary bat is known to be a primary species of concern at other wind facilities, this species is anticipated to be at minor risk of mortality from development of the Spring Valley WGF. This hypothesis is primarily based on the low observed activity levels, particularly compared with other bat species observed in Spring Valley. These observations suggest that hoary bats likely are not as abundant as other at-risk species, although acoustic survey techniques can only determine relative activity and not abundance.

4.2.3.6 WESTERN RED BAT

Western red bats are BLM-designated Sensitive and State-designated Sensitive. They were the least observed migratory species and accounted for less than 0.1% of all activity. Western red bats were only observed at monitoring stations CF-2079 and CF-2076 from June through August. Nightly patterns in IA levels are unclear, and this is likely as a result of the limited observations of this species.

Within Nevada, this species has a very limited distribution and is cited by Bradley et al. (2006) as being extremely rare. Western red bat has been observed as a fatality at the High Winds Wind Power Facility (Kerlinger et al. 2006) in California. The closely related Eastern red bat has a very similar life history and has been documented as accounting for 42.1% of fatalities during a study of the Mountaineer WGF in West Virginia (Kerns and Kerlinger 2004). These studies could indicate that Western red bats are susceptible to fatalities from construction of a WGF, based on similarities between these species.

Little is known about western red bat and its potential to be impacted by WGF development. It is assumed that this species has a life history that is similar to eastern red bat and would therefore be at increased risk of mortality. However, Western red bat is anticipated to be at minor risk of mortality from development of the Spring Valley WGF. This hypothesis is primarily based on the very limited number of detections of this species in the project area and low observed activity levels, particularly compared with other bat species observed in Spring Valley. These observations suggest that Western red bats are likely not as abundant as other at-risk species, although acoustic survey techniques can only determine relative activity and not abundance.

5.0 CONCLUSION AND RECOMMENDATIONS

The development of WGFs has caused major concern over the impacts turbines have to both bird and bat populations. Although impacts to both birds and bats are not anticipated to be great, this section reassesses the species that may be at greatest risk and potential mitigation measures to minimize or eliminate those risks.

5.1 Birds

Initial studies of wind facilities in California indicated high mortality rates of birds, especially raptors, about which particular concerns were raised. Many of these studies, however, analyzed wind resource areas with older turbine technology, and turbine arrays were designed without considering specific turbine placement, local topography, or local avian population densities. Spring Valley does not offer topographic features that would attract large numbers of migrating raptors. The valley also lacks landscapes conducive to kiting, a behavior displayed by some raptors while hunting that would increase the amount of time spent in the RSA. In addition, field survey data indicate that Spring Valley is not part of a major flyway and has relatively low passage rates and low winter resident densities.

When assessing potential impacts to avian species, it is important to understand habits and high-use areas of both resident and migrating birds. While all raptors are of particular concern, some species were identified with a higher risk of mortality following construction of the Spring Valley WGF. Of the raptors identified during Spring Valley raptor migration surveys, turkey vulture and red-tailed hawk were the most frequently observed species and received the top two RIs. For these reasons, it is anticipated that turkey vulture and red-tailed hawk would be among the most frequent mortalities during raptor migration. Both of these species are relatively common throughout the West and have large home ranges. Cumulative effects may occur if additional wind facilities are constructed along well-traveled migration routes, but Spring Valley is not located along a known migration route. Therefore, while it is predicted that the Spring Valley WGF would have an effect on these species, construction and operation of the Spring Valley WGF alone would not likely be detrimental to either species' long-term persistence. Even at APWRA, where high numbers of golden eagle strikes have been reported for over a decade, populations of nearby eagles seem to be intact and recruitment has not diminished (Hunt and Hunt 2006).

Raptor nest surveys confirmed Swainson's hawks and ferruginous hawks to be actively nesting in the project area. These species should be of particular concern when considering the effects this wind facility could have on raptor populations. Both Swainson's and ferruginous hawks are special-status species. These species also have been known to show nest tenacity, meaning these birds will most likely return to old nests, particularly when they have been successful in the past, as these nests appear to have been. Therefore, consideration should be made for moving or eliminating turbines near known raptor nests. Post-construction surveys should focus on the activity levels of these nests and any fatalities of these species.

Again, although impacts to all avian species are a concern, there were specific species identified during passerine surveys that were determined to have a higher risk of mortality than other species. Migratory species may be of particular concern, as some resident species may become familiar with turbines and actively avoid them. The most abundant species during migratory passerine surveys were horned lark, common raven, mountain bluebird, and pinyon jay. These species are anticipated to be among the migratory passerines that experience fatalities following construction of the Spring Valley WGF. In particular, it is estimated that horned larks will account for the majority of mortalities following construction, whereas common ravens and pinyon jays, both members of the family Corvidae, will likely avoid collisions with WTGs.

Resident species may also have potential collisions with WTGs, although impacts to summer residents are usually low. In addition these species may be impacted by habitat loss, in particular loss of breeding, feeding, and nesting areas. Biologists observed five different species that exhibited breeding behavior during point-counts, including Brewer's sparrow, common raven, lark sparrow, loggerhead shrike, and sage sparrow. Other species, like the sage thrasher, were incidentally observed nesting in the project area as well.

In addition, there were several species of special concern that were identified within the project area. These species are typically more susceptible to changes in the environment and should be of particular concern during post-construction surveys.

There are several factors that could influence avian behaviors, such as the density of birds in the area, landscape features, and weather conditions. While these variables have been considered, species responses to changing environmental factors can vary greatly from one year to the next and influence local abundance and diversity. Therefore, studies such as these often observe significant variation in species diversity and number of individuals from year to year (Hall et al. 1992; Hoffman and Smith 2003). Studies from a WGF in Tarifa, Spain, a highly used avian corridor, demonstrate how varying environmental factors and subsequent bird behavior can influence mortality rates within the same area from year to year. Mortality studies in one year recorded 106 fatalities, whereas a subsequent study at the same facility (over 14 subsequent months) found only two carcasses (Kingsley and Whittam 2005).

5.1.1 Potential Measures to Reduce Impacts to Avian Species

For those years when avian densities are at their highest, there are many mitigation measures that could reduce impacts to avian species in Spring Valley. For example, micrositing (addressing placement of specific turbines) is thought to be one of the most effective ways to limit impacts to avian species (Sinclair 2001). While a formal Mitigation and Monitoring Plan should be developed specifically for this site, there are many mitigation measures that have been effectively implemented at other WGFs that could be put into practice in Spring Valley. The following measures serve as a guideline for what has been undertaken at other WGFs and could be considered for the design, construction, and operation of the Spring Valley WGF.

5.1.1.1 AVOIDANCE MEASURES

- All practicable efforts should be made to implement ground-disturbing activities outside the nesting season (March through September). If disturbance must occur during the active breeding season, all activities must be in accordance with the MBTA.

- Appropriate buffers could be placed on known raptor nests, and construction activities could avoid these designated buffers (Bonneville Power Administration 2002; Department of Energy 2006). Active nests could be avoided, and construction activities could begin only after fledglings have left the nest.

- Turbine placement could be arranged to reduce avian mortality by placing turbine rows parallel to known raptor migration movements (NWCC 2006) and spacing individual WTGs at specified distances to allow for avian movement between and around turbines.

5.1.1.2 LIGHTING

- Although all lighting must already follow Federal Aviation Administration (FAA) regulations, the following lighting mitigation measures would greatly reduce potential effects to avian species.

- The use of sodium vapor lights should be avoided throughout the WGF.
- Lights are not required on every WTG and should be placed at the end of turbine strings and at the edge of turbine clusters with the required separation between lights on strings of turbines as recommended by the FAA (2007).
- The minimum amount of pilot warning and obstruction avoidance lighting required by the FAA should be used.
- It is recommended that red flashing L-864 obstruction marker lights be used with the minimum number, minimum intensity, minimum duration per flash, and minimum number of flashes per minute allowable by FAA.
- Security lighting for on-the-ground facilities and equipment should be downshielded to keep light within the boundaries of the site.

5.1.1.3 DESIGN

- All transmission lines could be buried as opposed to having overhead lines that could lead to increased electrocution to avian species. If overhead transmission lines are required, the lines and poles could comply with Avian Power Line Interaction Committee standards, which include perch-deterrent devices.
- Whenever possible, new MET towers could be raised without guy wires to prevent avian collisions with the guy wires, which could lead to mortality. If guy wires must be used, it is recommended they be fitted with BLM-approved guy wire markers.

5.1.1.4 RESOURCE REMOVAL

- Any transmission lines near the project area could be retro-fitted with perch-deterrent devices to limit the availability of perching sites for predatory raptors.
- To limit the number of nesting sites in the project area, WTGs could have perch-deterrent devices on top of the nacelles, and the towers should have as few external ladders or platforms as possible.
- Nests that are determined to be inactive could be removed by the project proponent or a qualified consultant to deter raptors from using the nest site in the future. A nest must be determined to be inactive by an authorized BLM or USFWS wildlife biologist or authorized contractor.
- The availability of carrion could be reduced by regularly removing carcasses from areas near WTGs, which could help reduce the presence of scavenging avian species.

5.1.1.5 OPERATION

- To reduce unnecessary impacts to birds, turbines could be feathered or locked in place during periods of excessively high wind speeds and during periods of maintenance.
- Upon completion of construction activities, if an active raptor nest is found in the vicinity of an operating WTG, the project proponent could coordinate with a BLM representative, who will coordinate with NDOW and USFWS, to determine a method to minimize potential impacts to both the adults and fledglings.

5.2 Bats

This study has documented bat species richness, distribution, and patterns in seasonal and nightly activity levels within the Spring Valley WGF project area using acoustic methods. Although 12 bat species were observed, studies of bat fatalities at other WGF locations show that only six of these species have been reported as fatalities: little brown bat, big brown bat, Brazilian free-tailed bat, silver-haired bat, hoary bat, and Western red bat (BLM 2005; Kunz et al. 2007). If these past studies are predictive of future fatalities, then these species should be considered at greatest risk of mortality from an operational WGF.

A primary goal of this study is to develop a knowledge base regarding bat use of the project area prior to development of the Spring Valley WGF in order to reduce impacts to bats during operation to the greatest extent possible. However, at this time, it is not yet possible to accurately predict post-development fatality rates based solely on preconstruction bat activity (Weller 2007). Bat researchers have identified environmental parameters (e.g., wind speed, storm fronts), and trends in bat mortality that can be used to identify at-risk bat species and the conditions under which mortality is expected to be highest.

Arnett et al. (2008) have analyzed numerous bat fatality studies and have observed that fatalities consist primarily of migratory species. Fatalities of migratory species have, to this point, been concentrated in the late summer and fall (Arnett 2005; Arnett et al. 2008; BLM 2005; Kerlinger et al. 2006; Kerns and Kerlinger 2004; Kunz et al. 2007). Fatalities also increase on low wind speed nights (<6 m/sec) and before and after weather fronts (Arnett et al. 2008), which indicates the importance of seasonal and nightly timing and environmental factors in the prediction of bat fatalities. Recent studies have evaluated different cut-in speeds as methods of reducing fatalities and have shown that fatalities can be greatly reduced with minor power losses (Arnett el al. 2009; Baerwald 2009).

One of the most effective methods of mitigating impacts to bats is shutting down or feathering (orienting turbine blades parallel to the wind and allowing them to rotate freely) turbines, which consequently reduces power output and therefore viability of the WGF. SWCA anticipates that future WGFs, such as Spring Valley, will be able to incorporate weather patterns, wind speed, and site-specific seasonal and nightly patterns of bat activity to identify the site-specific conditions under which bats are at greatest risk. With this knowledge, it should be possible to protect bats to the greatest extent practicable through shutting down or feathering turbines while also minimizing the time that wind turbines are not producing power.

This study presents patterns in activity for all species of bats observed within the Spring Valley WGF. These patterns in activity should be considered in conjunction with known patterns of bat fatalities to develop mitigation measures to reduce impacts to bats to the greatest extent possible while maintaining a viable wind energy facility.

5.2.1 Potential Measures to Reduce Impacts to Bat Species

Since there is such a large gap in knowledge regarding bat populations as a whole, the degree of impacts to bats from wind energy development is difficult to ascertain. However, populations of long-lived species with low fecundity rates are generally at greater risk from novel sources of mortality (Baerwald 2009; Szewczak and Arnett 2008). Because of the current predicted growth of installed wind energy capacity (AWEA 2009), researchers are looking into methods of reducing bat mortality. Identifying useful mitigations measures may offer the greatest benefit to bats, as it may take considerable time to determine the effects of wind energy development on bat populations, whose current status is unknown but suspected to be declining (Arnett et al. 2009). The following section summarizes operational and deterrent mitigation measures that are currently being evaluated in the field or are anticipated to be used in the future. The operational mitigation measures will likely require advanced wind turbine generators that are highly programmable, in order to maximize the effectiveness of these mitigations and minimize costs. In contrast to the mitigation measures discussed specifically for birds above, these measures are relatively new and their long-term effectiveness has not been fully explored. As such, these measures and the research that supports them are discussed, rather than presented in a bulleted format.

5.2.2 Cut-in Speeds

Cut-in speed refers to the minimum wind speed (m/s) required for wind turbines to begin operating and generating electricity. Increasing the cut-in speed for wind turbines is an operational mitigation measure that may prove very effective, as bat mortality is greatest on nights with low wind speeds (Arnett et al. 2005; Arnett et al. 2008; Kunz et al. 2007). To date, two field experiments assessing the interaction of cut-in speed bat mortality have shown that increasing the cut-in speed can dramatically reduce bat mortality. Cut-in speed experiments done by Arnett et al. (2009) showed that increasing the cut-in speed from 3.5 to 5.0 or 6.5 m/s reduced mortality from 53% to 87%. Another study by Baerwald (2009) showed that increasing cut-in speeds from 4.0 to 5.5 m/s decreased bat mortality by 52%. The cost to increase the cut-in speed was shown to be minor, as power output from wind turbines is nonlinear. Arnett et al. (2009) estimated that increasing cut-in speeds to 5.0 m/s would result in a loss of 0.3% of total annual power output, while raising cut-in speeds to 6.5 m/s would result in a loss of 1% of total annual power output.

5.2.3 Seasonal, Timed Shutdowns

Another operational mitigation strategy is to shut down or feather wind turbines. This strategy obviously results in a reduction in power output from a WGF and therefore is not a preferred mitigation measure. However, by implementing shutdowns during specific times, this tactic could prove effective at reducing impacts to bats while remaining cost effective. It is anticipated that shutdowns could be implemented during known seasonal periods of high activity; and that within that period, shutdowns could be limited to nightly periods of high activity for specific turbines where mortalities have been observed.

For example, species specific shutdowns for the Brazilian free-tailed bat may only occur during the months of August and September, when their IA levels are highest. Within these months it may be possible to limit shutdowns to the time of night when the observed IA levels are highest. While the effectiveness of this type of shutdown has not been evaluated through scientific study, it is anticipated that positive results may be achieved at a minimal cost.

Due to the observed effect of weather conditions upon bat activity (Arnett et al. 2008), it may be possible to further limit shutdowns based upon the weather conditions within the project area. Effective implementation of these types of strategy would likely require a detailed real-time analysis of the weather conditions in the project area and turbines that are capable of rapidly responding to the current weather conditions.

5.2.4 Deterrent Devices

One non-operational mitigation tool currently under development and field testing is bat deterrents (Horn et al. 2007; Szewczak and Arnett 2008). Deterrents consist of a high-intensity sound-emitting device that broadcasts white noise within the hearing range of bats. The goal of the deterrent is to create an area that bats would avoid, either because of the intensity of sound produced or their inability to effectively echolocate near the deterrent.

Current field testing of bat deterrents has shown limited effectiveness, and it is unknown how well current deterrents repel bats within the RSA (Horn et al. 2007). At this time, a limited amount of study has been done to evaluate deterrent devices; while seemingly effective at close ranges, no deterrents are currently capable of emitting sound across the entire RSA. Szewczak and Arnett 2008 report that their tests indicate that deterrents are effective within a 12–15m radius. Horn et al. (2007) hypothesize that these devices could actually attract bats because of the novelty of the experience and further that the high-intensity sound could disorient or trap bats within their effective range. At this time, much research needs to be completed to examine the effectiveness and benefits of using bat deterrents.

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APPENDIX A

Raptor Migration Daily Report Form and General Instructions

RAPTOR MIGRATION DAILY REPORT FORM

SWCA ENVIRONMENTAL CONSULTANTS

LOCATION: Western Obs Pt

ELEVATION: ______ UTM: ______

START TIME: 1020

DESCRIPTION: ______

END TIME: 1450

OBSERVER(S): JJS y MJV

MO 10 DAY 30 YR 07

TIME (STD)	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-1	1-2	2-3	3-4	4-5	5-6	6-7	
Wind Speed						2	3 —	—	—	1					
Wind Dir. (From)						NNW	NNE —	—	—	NE					
Temp. (Deg. C)						17.5	19.0	18.9	16.8 —	—					
Humidity						34%	31% —	—	—	37%					
Bar. Pressure															
Cloud Cover						15	45	75	65	30					
Visibility															
Precipitation						0 —	—	—	—	2					
Flight Direction						SE	SE	—	SE						
Therm. Lift Conditions						2 —	—	—	—	1					
No. of Observers						2 —	—	—	—	—					Total
Dur. of Obs. (min)						40	60	60	60	50					270

Raptor Number	Common Name	Code	Time	Age	Sex	Flight Height	Color Morph	Dir. from Obs	Dist. from Obs
1	Red-tailed hawk	RT	1046	A	U	3	U	E → SE	2000 m
2	Sharp-shinned hawk	SS	1053	U	U	3	N/A	NE → SE	1500 m
3	Red-tailed hawk	RT	1102	A	U	4	L	NE → SE	2000 m
4	Cooper's hawk	CH	1128	U	U	3	N/A	E → SE	1500 m
5	Red-tailed hawk	RT	1300	A	U	2	D	NE → SE	1000 m
6	Cooper's hawk	CH	1301	U	U	3	N/A	NE → SE	1000 m
7	Unknown buteo	UB	1319	U	U	4	U	S	2000 m
8	Rough-legged hawk	RL	1320	U	U	2	L	NE → SE	1500 m
9	Unknown buteo	UB	1340	U	U	4	L	NE → SE	2000 m
10	Ferruginous hawk	FH	1347	A	U	4	L	NE → SE	1500 m
11	Golden Eagle	GE	1347	A	U	3	N/A	NE → SE	1500 m
12	Rough-legged hawk	RL	1435	A	U	4	L	NE → SE	2000 m
13									
14									
15									
16									
17									
18									
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31									
32									
33									
34									

Comments: Use back of form. Rarities: List species, hour number and description on back of form.

Rev: 03/06 JJS

RAPTOR MIGRATION DAILY REPORT FORM

Raptor Number	Common Name	Code	Time	Age	Sex	Flight Height	Color Morph	Dir. from Obs	Dist. from Obs
35									
36									
37									
38									
39									
40									
41									
42									
43									
44									
45									
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72									
73									
74									
75									

COMMENTS: 1115 (3) Golden Eagles circling to East ~ 2000 m away at least (1) immature
1300 (1) Rough-legged hawk circling ~ 1000 m away
1450 (1) AMKE moving from NE -> E ~ 1000 m from obs pt.

Comments: Use back of form. Rarities: List species, hour number and description on back of form. Rev: 03/06 JJS

RAPTOR MIGRATION DAILY REPORT FORMS

GENERAL INSTRUCTIONS:

For weather, enter for the first hour of observation, for following hours only if data changes, if there are no changes, draw a line from the recorded data through the hours in which no change occurred; do not use ditto marks or dashes.

Weather and Observation Codes

Wind Speed : 0 - less than 1 km/h, (calm, smoke rises vertically)

1 - 1-5 km/h, (smoke drift shows wind direction)

2 - 6-11 km/h, (leaves rustle, wind felt on face)

3 - 12-19 km/h, (leaves, small twigs in constant motion; light flag extended)

4 - 20-28 km/h (raises dust, leaves, loose paper; small branches in motion)

5 - 29-38 km/h (small trees in leaf sway)

6 - 39-49 km/h (larger branches in motion; whistling heard in wires)

7 - 50-61 km/h (whole trees in motion; resistance felt walking against the wind)

8 - 62-74 km/h (twigs small branches broken off trees; walking generally impeded)

Wind Direction : Enter compass direction from which the wind is coming, i.e., N, NNE, SE, etc. If variable, enter VAR.

Temperature : Record temperature in degrees Celsius.

Humidity : Record the percent relative humidity.

Barometric Pressure : Record barometric pressure in inches.

Cloud Cover : Record percent of sky with background cloud cover.

Visibility : Judge from your longest view and enter distance in kilometers. To convert miles to kilometers multiply by 1.61.

Precipitation : 0 - none

1 - Haze or Fog

2 - Drizzle

3 - Rain

4 - Thunderstorm

5 - Snow

6 - wind driven dust, sand or snow.

Flight Direction : Enter compass direction migrants are heading, i.e., S, SSW, etc.

Thermal Lift Conditions : 1 - Excellent - Sunny and little or no wind

2 - Good - Sunny and light to moderate winds

3 - Fair - Sunny but windy

4 - Poor - Cloudy and windy

Observers: Number of observers CONTRIBUTING to the count for the hour noted.

Duration of Observation: Specify time in minutes.

Time : Time that migrant passed the observers

Age : A = Adult, I = Immature, Br = Brown (female or immature), U = Unknown

Sex : F = Female, M = Male, U = Unknown

Height of Flight : 0 - Below eye level

1 - Eye level to about 30 meters

2 - Birds seen easily with unaided eye (eyeglasses not counted as aids)

3 - At limit of unaided vision

4 - Beyond limit of unaided eye but visible with binoculars - to 10X

5 - At limit of binoculars

6 - Beyond limit of binoculars 10X or less, but can detect with binoculars or telescope of greater power (Note magnification in Comments below)

7 - No predominant height.

Color Morph : D = Dark or rufous, L = Light, U = Unknown, N/A = Not Applicable

Direction from the Observers: Direction from the Observation Point to the Migrant

Distance from the Observers: Estimated Distance in meters from the Observation Point

RAPTOR MIGRATION DAILY REPORT FORMS

SPECIES CODES:

Common Name	Code
Black Vulture	BV
Turkey Vulture	TV
Osprey	OS
White-tailed Kite	WK
Mississippi Kite	MK
Bald Eagle	BE
Northern Harrier	NH
Sharp-shinned	SS
Cooper's Hawk	CH
Northern Goshawk	NG
Red-shouldered	RS
Broad-winged	BW
Swainson's Hawk	SW
Red-tailed Hawk	RT
Ferruginous Hawk	FH
Zone-tailed Hawk	ZT
Harris' Hawk	HH
Rough-legged	RL
Golden Eagle	GE
American Kestrel	AK
Merlin	ML
Peregrine Falcon	PG
Gyrfalcon	GY
Prairie Falcon	PR
Crested Caracara	CC
Unid. Vulture	UV
Unid. Accipiter	UA
Unid. Buteo	UB
Unid. Eagle	UE
Unid. Falcon	UF
Unid. Raptor	UU
Other (From Back)	OO

APPENDIX B

Migratory Passerine Survey Data Form

Migratory and General Use Surveys - Point Count Form

Great Basin Bird Observatory, 1755 E. Plumb Ln., Ste. 256, Reno, NV 89502
phone (775) 323-4226; email ammon@gbbo.org

Site #: PS5 **Date:** 10/4/07 **Start Time:** 1654

Surveyor: J. Streit **Helper:** M. Villanueva

UTMx:__________; **UTMy:**__________

Sky code: 0 **Wind code:** 5 **Temp (oF):** <30 30-50 (50-70) 70-90 90-110 >110 68.9

Time	Alpha Code	Sex	Age	Dist. From Obs.	Dir. From Obs.	Flight Height (m)	Activity
1658	HOLA	U	U	100	SE→E	1	observed
1658	HOLA	U	U	100	SE→E	1	observed
1658	HOLA	U	U	100	SE→E	1	observed
1658	HOLA	U	U	100	SE→E	1	observed
1658	HOLA	U	U	100	SE→E	1	observed
1658	HOLA	U	U	100	SE→E	1	observed
1658	HOLA	U	U	100	SE→E	1	observed
1658	HOLA	U	U	100	SE→E	2	observed
1658	HOLA	U	U	100	SE→E	2	observed
1658	HOLA	U	U	100	SE→E	2	observed
1658	HOLA	U	U	100	SE→E	2	observed
1658	HOLA	U	U	100	SE→E	2	observed
1658	HOLA	U	U	100	SE→E	2	observed
1701	CORA	U	U	1600	SE	10	observed
1703	UNBI	U	U	600	SE	1	observed
1703	UNBI	U	U	600	SE	2	observed
see comments 1705	UNBI(??)	U	U	400	W→SW	2	observed
1728	CORA	U	U	800	S→SE	10	observed
1728	CORA	U	U	800	S→SE	10	observed
1740	CORA	U	U	40	NW→SW	5	flyover, observed

Comments: Use back of form. Rarities: List species and description on back of form. Rev: 04/07 JJS

Time	Alpha Code	Sex	Age	Dist. From Obs.	Dir. From Obs.	Flight Height (m)	Activity

Comments: The 77 UNBI are likely HOLA

Comments: Use back of form. Rarities: List species and description on back of form. Rev: 04/07 JJS

PLEASE PRINT THIS SHEET AND TAPE IT TO THE BACK OF YOUR CLIPBOARD

Sky Codes:

0 = clear/few clouds
1 = partly cloudy/variable
2 = cloudy/overcast
3 = fog
4 = drizzle
5 = showers

Wind Codes:

Beaufort Number	avg. wind speed*	Effects
0	< 1 mph	Calm: smoke rises vertically
1	1 – 3 mph	Rising smoke drifts, weather vane inactive
2	4 – 7 mph	Leaves rustle, wind felt on face, weather vane still inactive
3	8 – 12 mph	Leaves and twigs move around in constant motion, light-weight flags extend
4	13 – 18 mph	Moves thin branches, raises dust and loose paper
5	19 – 25 mph	Small trees in leaf begin to sway and moderate-sized branches move
6	25 – 31 mph	Large branches in motion, telegraph wires whistle, umbrellas flip over
7	32 – 38 mph	Whole trees in motion, some difficulty/discomfort walking in the wind
8	39 – 46 mph	Twigs breaking off trees, walking in wind difficult

* not counting gusts

Bird Behavior Codes (listed in order of priority, if several behaviors are observed):

*	= positive breeding evidence
fm	= family group
t	= territorial display
p	= mated pair
• •	= singing
c	= calling
o	= observed only
fy	= flyover
• •	= change in position

APPENDIX C

Point-Count Data Form and General Instructions

Migratory and General Use Surveys - Point Count Form

Great Basin Bird Observatory, 1755 E. Plumb Ln., Ste. 256, Reno, NV 89502
phone (775) 323-4226; email ammon@gbbo.org

Site #: SV C-8 **Date:** 6-14-07 **Start Time:** 0843
Surveyor: T. Sharp **Helper:** J. Strait
UTMx: 719968.29 E; **UTMy:** 4339127N
Sky code: 0 **Wind code :** 1 **Temp (oF):** <30 30-50 50-70 (70-90) 90-110 >110

Time (0-3,3-5,5-10)	Alpha Code	Flight Height (m)	Distance From Observer (# of Individuals) 0-50 m	50-100 m	>100 m	Flyover	Breeding Confirmed (Y/N)*
0-3	VESP	2	1				N
0-3	SAGS	-	1				N
3-5	NOMO	5			1		N
3-5	HOLA	20	1			1	N
3-5	UNBI	-			1		N
3-5	CORA	5			1		N
5-10	UNBI	2			1		N
5-10	NOFL	-			1		N
					Total Number of Birds		8

Incidental Sightings

(Seen/heard on the way to the point, after pointcount time limit, etc.)

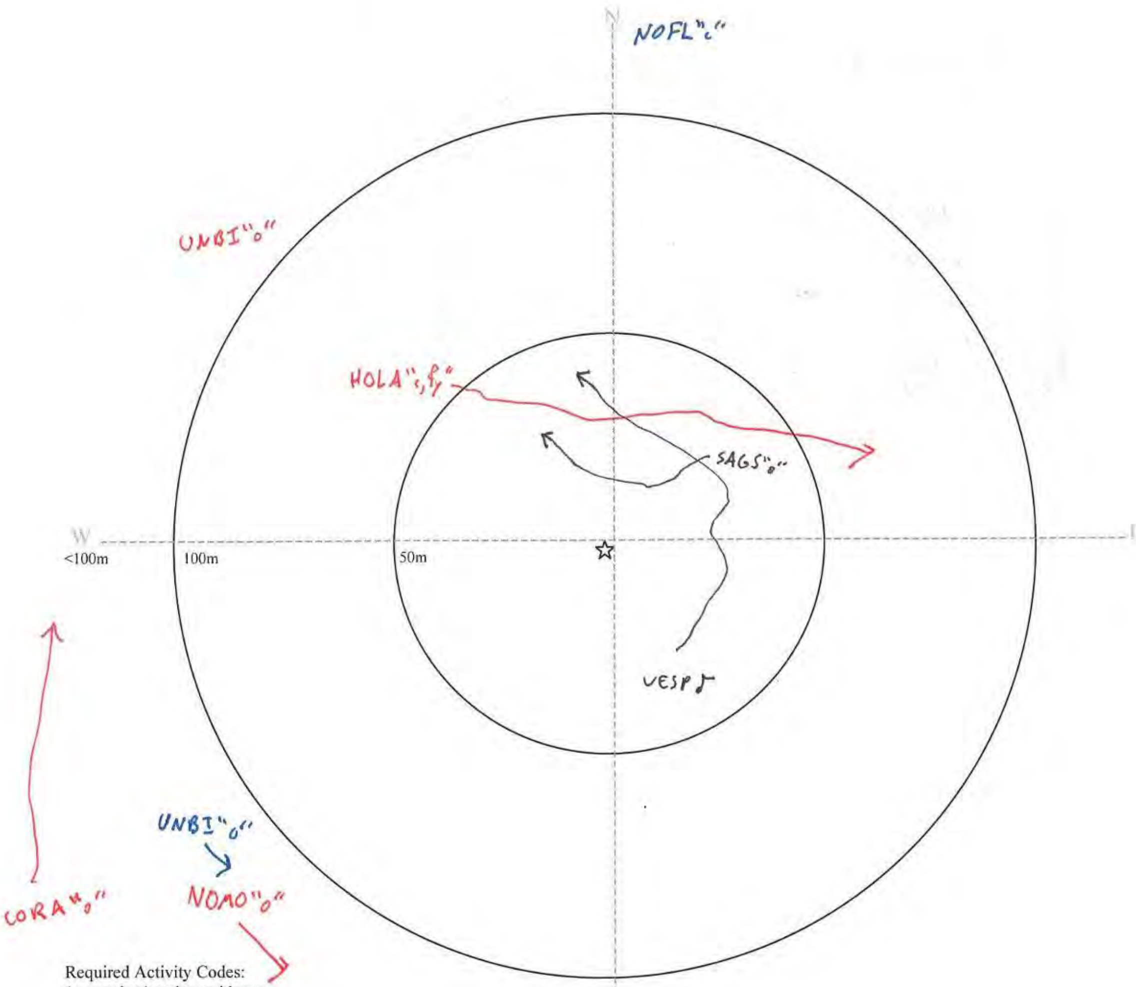
Species Full Name | Breeding Confirmed (Y/N) *

* Nest, nesting material, copulating, carrying food, fledgling

Rev: 04/07 JJS

NEVADA BIRD COUNT 2005 – Point Count Form (Optional)

Great Basin Bird Observatory, 1755 E. Plumb Ln., Ste. 256, Reno, NV 89502
phone (775) 323-4226; email ammon@gbbo.org



Required Activity Codes:
* = mating/nesting evidence
fy = flyover
fm = family group

Other Codes:
♪ = singing
c = calling
t = territorial display
o = observed only
p = mated pair
→ = change in position

TOTAL number of birds observed: 8

PLEASE PRINT THIS SHEET AND TAPE IT TO THE BACK OF YOUR CLIPBOARD

Sky Codes:

0 = clear/few clouds
1 = partly cloudy/variable
2 = cloudy/overcast
3 = fog
4 = drizzle
5 = showers

Wind Codes:

Beaufort Number	avg. wind speed*	Effects
0	< 1 mph	Calm: smoke rises vertically
1	1 – 3 mph	Rising smoke drifts, weather vane inactive
2	4 – 7 mph	Leaves rustle, wind felt on face, weather vane still inactive
3	8 – 12 mph	Leaves and twigs move around in constant motion, light-weight flags extend
4	13 – 18 mph	Moves thin branches, raises dust and loose paper
5	19 – 25 mph	Small trees in leaf begin to sway and moderate-sized branches move
6	25 – 31 mph	Large branches in motion, telegraph wires whistle, umbrellas flip over
7	32 – 38 mph	Whole trees in motion, some difficulty/discomfort walking in the wind
8	39 – 46 mph	Twigs breaking off trees, walking in wind difficult

* not counting gusts

Bird Behavior Codes (listed in order of priority, if several behaviors are observed):

*	= positive breeding evidence	• •	= change in position
fm	= family group		
t	= territorial display		
p	= mated pair		
• •	= singing		
c	= calling		
o	= observed only		
fy	= flyover		

APPENDIX D

AnaBat Site Descriptions

CF-2072 – AnaBat 3413

UTM Coordinates (NAD 83, 11 North): 4336578 N, 717404 E

Location Description

CF-2072 is located at a natural spring surrounded by riparian vegetation consisting of grasses, sedges, and wildflowers, such as monkey flower (*Mimulus guttatus*). Beyond the riparian area, the habitat abruptly transitions into sagebrush (*Artemisia* spp.) and greasewood (*Sarcobatus vermiculatus*) scrub. Vertical structure and canopy cover is limited to the larger shrubs. The unit is oriented to the northeast along the long axis of the spring.

CF-2074 – AnaBat 3411

UTM Coordinates (NAD 83, 11 North): 4340612 N, 719899 E

Location Description

CF-2074 is located on the west side of a large but shallow seasonal pond. The vegetation immediately surrounding the pond consists mainly of grasses such as big galleta (*Pleuraphis rigida*). The surrounding habitat can be described as sagebrush and greasewood scrub interspersed with Rocky Mountain juniper (*Juniperus scopulorum*) trees (juniper trees). These juniper trees are an extension of the northern portion of the Cedar Swamp Natural Area. The microphone is oriented approximately to the northeast to cover the deepest portion of the pond.

CF-2073 – AnaBat 3410

UTM Coordinates (NAD 83, 11 North): 4334162 N, 718361 E

Location Description

CF-2073 is located near a wildlife guzzler that consists of a metal trough approximately 4 feet long × 1 foot wide. The trough is a perennial source of water, and the ground immediately surrounding the trough is saturated. Vegetation is dense surrounding the trough and transitions to sagebrush scrub and juniper. This monitoring station is located north of the trough, with the microphone roughly oriented south to cover the trough and the surrounding wet areas.

CF-2076 – AnaBat 3251

UTM Coordinates (NAD 83, 11 North): 4335251 N, 716226 E

Location Description

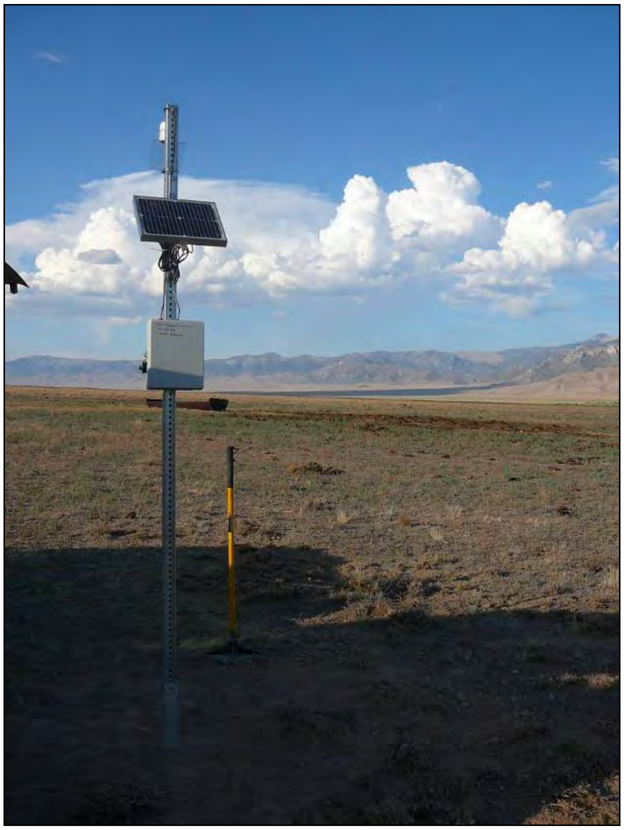
CF-2076 is located at a natural spring with emergent wetland vegetation. This water source is several feet deep and receives substantial use from cattle. Beyond the spring, the vegetation consists of sagebrush and greasewood scrub interspersed with juniper. The monitoring station is located on a hill to the southwest of the spring and is oriented to the northeast, just off-center of the open water.

CF-2077 – AnaBat 3253

UTM Coordinates (NAD 83, 11 North): 4340572 N, 716525 E

Location Description

CF-2077 is located at a watering trough for cattle. This trough has no natural means of being filled, and it is assumed that it would only be filled by substantial rainfall or local ranchers; however, the trough was empty during the majority of visits to this monitoring station. Vegetation surrounding the trough consists of low sagebrush (*Artemisia spinescens*) and grasses that are mostly less than 18 inches tall. Vertical structure is completely lacking at this site. This monitoring station is located on the south side of the trough and is oriented toward the north.



CF-2078 – AnaBat 3216

UTM Coordinates (NAD 83, 11 North): 4336225 N, 721782 E

Location Description

CF-2078 is located on the east side of the project area. The unit is immediately surrounded by sagebrush and greasewood scrub; however, beyond the scrub the area appears to stay wet for long periods, based on the soils and vegetation. The presence of plants such as iodine bush (*Allenrolfea occidentalis*) indicates highly saline soils. Vertical structure is limited to large shrubs within the sagebrush and greasewood scrub. This unit is oriented southeast toward Rose Cave, where a substantial Brazilian free-tailed bat colony resides.

CF-2079 – AnaBat 3415

UTM Coordinates (NAD 83, 11 North): 4334274 N, 716118 E

Location Description

CF-2079 is located near a seemingly ephemeral area of water that is covered with tall grasses and wildflowers such as primrose (*Oenothera* spp.). Although a comprehensive plant list has not been developed for this site, it should be noted that plant diversity at this monitoring station appears to be much greater than the plant diversity at other monitoring stations. Around the expected area of ephemeral water, the vegetation consists primarily sagebrush and greasewood scrub interspersed with juniper. The unit is oriented over the area of densest grass, which is approximately north.

CF-2075 – AnaBat 3250 (60 m), CF-2081 – AnaBat 3466 (30 m), and CF-2092 – AnaBat 3412 (3 m)

UTM Coordinates (NAD 83, 11 North): 4331488 N, 716861 E

Location Description

These monitoring stations are all attached to a single MET tower located at the south end of the project area. The habitat surrounding the MET tower is primarily composed of low-growing sagebrush (*Artemisia spinescens*) with interspersed areas of taller sagebrush and greasewood scrub. Microphones for these three monitoring stations are oriented north-northeast. The microphone for CF-2075 is located approximately 60 m (197 feet) above ground; CF-2081 is located 30 m (98 feet) above ground, and CF-2092 is approximately 3 m (10 feet) above ground.

APPENDIX E

Detailed Index of Activity Data

Table E.1. IA for Each Month at CF-2072

Species	2007												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Antrozous pallidus	0	0	0	0	0	0	5	10	0	0	0	0	**2**
Corynorhinus townsendii	0	0	0	0	0	0	43	0	0	0	0	0	**5**
Eptesicus fuscus	0	0	0	0	0	0	19	0	0	0	0	0	**2**
Lasionycteris noctivagans	0	0	0	0	0	0	0	3	0	32	7	0	**7**
Lasiurus blossevillii	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Lasiurus cinereus	0	0	0	0	0	0	0	10	23	0	0	0	**6**
Myotis ciliolabrum	0	0	0	0	0	0	667	426	57	0	0	0	**166**
Myotis evotis	0	0	0	0	0	0	533	319	37	0	0	0	**128**
Myotis lucifugus	0	0	0	0	0	0	148	126	170	13	0	0	**72**
Myotis volans	0	0	0	0	0	0	0	23	0	0	0	0	**4**
Myotis yumanensis	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Tadarida brasiliensis	0	0	0	0	0	0	281	555	450	52	0	0	**220**
Total	**0**	**0**	**0**	**0**	**0**	**0**	**1,695**	**1,471**	**737**	**97**	**7**	**0**	**612**
	2008												
Antrozous pallidus	0	0	0	0	10	47	19	23	3	3	0	0	**9**
Corynorhinus townsendii	0	0	13	0	6	43	6	26	7	0	0	0	**8**
Eptesicus fuscus	0	0	0	0	0	7	29	0	0	0	0	0	**3**
Lasionycteris noctivagans	0	0	0	10	35	30	0	10	13	39	3	0	**12**
Lasiurus blossevillii	0	0	0	0	0	0	0	3	0	0	0	0	**0**
Lasiurus cinereus	0	0	0	0	0	47	3	16	23	3	0	0	**8**
Myotis ciliolabrum	0	0	0	7	123	2,057	1,081	713	190	3	0	0	**347**
Myotis evotis	0	0	0	0	19	537	468	281	97	0	0	0	**117**
Myotis lucifugus	0	0	0	0	45	683	71	174	370	10	0	0	**112**
Myotis volans	0	0	0	0	19	717	232	26	37	0	0	0	**85**
Myotis yumanensis	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Tadarida brasiliensis	0	0	0	0	13	163	223	435	250	123	0	0	**101**
Total	**0**	**0**	**13**	**17**	**271**	**4,330**	**2,132**	**1,706**	**990**	**181**	**3**	**0**	**802**

Table E.2. IA for Each Month at CF-2073

Species	2007												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Antrozous pallidus	0	0	0	0	0	0	23	0	0	0	0	0	**3**
Corynorhinus townsendii	0	0	0	0	0	0	14	19	17	0	0	0	**8**
Eptesicus fuscus	0	0	0	0	0	0	41	0	0	0	0	0	**5**
Lasionycteris noctivagans	0	0	0	0	0	0	0	0	3	19	10	0	**6**
Lasiurus blossevillii	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Lasiurus cinereus	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Myotis ciliolabrum	0	0	0	0	0	0	909	835	590	3	0	0	**364**
Myotis evotis	0	0	0	0	0	0	827	406	430	6	0	0	**251**
Myotis lucifugus	0	0	0	0	0	0	1,845	810	657	42	0	0	**495**
Myotis volans	0	0	0	0	0	0	0	0	3	0	0	0	**1**
Myotis yumanensis	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Tadarida brasiliensis	0	0	0	0	0	0	55	71	90	16	0	0	**38**
Total	**0**	**0**	**0**	**0**	**0**	**0**	**3,714**	**2,142**	**1,790**	**87**	**10**	**0**	**1,170**
	2008												
Antrozous pallidus	0	0	0	0	23	77	19	39	24	0	0	0	**15**
Corynorhinus townsendii	0	0	0	27	74	140	16	32	28	4	0	0	**27**
Eptesicus fuscus	0	0	0	0	97	220	84	10	0	0	0	0	**35**
Lasionycteris noctivagans	0	0	3	17	26	0	0	23	28	69	7	0	**13**
Lasiurus blossevillii	0	0	0	0	0	0	0	3	0	0	0	0	**0**
Lasiurus cinereus	0	0	0	0	23	3	0	42	0	8	0	0	**6**
Myotis ciliolabrum	0	0	0	67	465	1,783	1274	823	268	0	0	0	**398**
Myotis evotis	0	0	0	0	594	1,673	1,129	1,587	1,016	8	0	0	**501**
Myotis lucifugus	0	0	0	0	1,361	2,080	1,423	1,948	1,164	23	0	0	**671**
Myotis volans	0	0	0	0	116	237	126	13	4	0	0	0	**42**
Myotis yumanensis	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Tadarida brasiliensis	0	0	0	0	35	117	116	171	112	19	0	0	**47**
Total	**0**	**0**	**3**	**110**	**2,813**	**6,330**	**4,187**	**4,690**	**2,644**	**131**	**7**	**0**	**1,757**

Table E.3. IA for Each Month at CF-2074

Species	2007												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Antrozous pallidus	0	0	0	0	0	0	10	6	10	0	0	0	**4**
Corynorhinus townsendii	0	0	0	0	0	0	15	13	13	0	0	0	**6**
Eptesicus fuscus	0	0	0	0	0	0	15	6	3	0	0	0	**3**
Lasionycteris noctivagans	0	0	0	0	0	0	0	0	3	35	10	0	**9**
Lasiurus blossevillii	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Lasiurus cinereus	0	0	0	0	0	0	0	13	20	3	0	0	**6**
Myotis ciliolabrum	0	0	0	0	0	0	480	448	50	3	0	0	**145**
Myotis evotis	0	0	0	0	0	0	135	158	73	0	0	0	**57**
Myotis lucifugus	0	0	0	0	0	0	160	797	710	3	0	0	**285**
Myotis volans	0	0	0	0	0	0	0	0	7	0	0	0	**1**
Myotis yumanensis	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Tadarida brasiliensis	0	0	0	0	0	0	105	974	500	13	0	0	**276**
Total	**0**	**0**	**0**	**0**	**0**	**0**	**920**	**2,416**	**1,390**	**58**	**10**	**0**	**791**
	2008												
Antrozous pallidus	0	0	0	0	13	17	6	0	3	0	0	0	**3**
Corynorhinus townsendii	0	0	0	0	3	7	0	6	6	0	0	0	**2**
Eptesicus fuscus	0	0	0	0	0	10	3	3	0	0	0	0	**1**
Lasionycteris noctivagans	0	0	0	33	16	20	0	0	10	29	3	0	**9**
Lasiurus blossevillii	0	0	0	0	0	0	0	6	0	0	0	0	**1**
Lasiurus cinereus	0	0	0	0	6	17	0	13	6	0	0	0	**4**
Myotis ciliolabrum	0	0	0	3	113	390	687	206	123	0	0	0	**128**
Myotis evotis	0	0	0	0	48	80	106	187	61	10	0	0	**42**
Myotis lucifugus	0	0	0	0	245	770	439	500	681	29	0	0	**223**
Myotis volans	0	0	0	3	3	23	6	6	0	0	0	0	**4**
Myotis yumanensis	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Tadarida brasiliensis	0	0	0	0	6	133	139	694	926	142	0	0	**172**
Total	**0**	**0**	**0**	**40**	**455**	**1,467**	**1,387**	**1,623**	**1,816**	**210**	**3**	**0**	**589**

Table E.4. IA for Each Month at CF-2075

Species	2007												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Antrozous pallidus	0	0	0	0	0	0	0	0	0	03	0	0	**1**
Corynorhinus townsendii	0	0	0	0	0	0	0	10	0	0	0	0	**1**
Eptesicus fuscus	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Lasionycteris noctivagans	0	0	0	0	0	0	0	0	0	0	3	0	**1**
Lasiurus blossevillii	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Lasiurus cinereus	0	0	0	0	0	0	0	0	10	23	0	0	**8**
Myotis ciliolabrum	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Myotis evotis	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Myotis lucifugus	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Myotis volans	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Myotis yumanensis	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Tadarida brasiliensis	0	0	0	0	0	0	0	440	662	194	0	0	**219**
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**450**	**671**	**219**	**3**	**0**	**230**
	2008												
Antrozous pallidus	0	0	0	0	0	0	0	0	3	0	0	0	**0**
Corynorhinus townsendii	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Eptesicus fuscus	0	0	0	0	4	0	0	0	0	0	0	0	**0**
Lasionycteris noctivagans	0	0	0	3	0	0	0	0	10	0	0	0	**1**
Lasiurus blossevillii	0	0	0	0	0	4	0	0	0	0	0	0	**0**
Lasiurus cinereus	0	0	0	0	4	0	0	19	27	0	0	0	**4**
Myotis ciliolabrum	0	0	0	0	0	0	0	0	3	0	0	0	**0**
Myotis evotis	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Myotis lucifugus	0	0	0	0	0	7	0	0	13	0	0	0	**2**
Myotis volans	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Myotis yumanensis	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Tadarida brasiliensis	0	0	0	0	0	82	120	485	620	184	0	0	**124**
Total	**0**	**0**	**0**	**3**	**8**	**93**	**120**	**504**	**677**	**184**	**0**	**0**	**132**

Table E.5. IA for Each Month at CF-2076

Species	2007												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Antrozous pallidus	0	0	0	0	0	0	248	23	3	3	0	0	**35**
Corynorhinus townsendii	0	0	0	0	0	0	5	10	0	0	0	0	**2**
Eptesicus fuscus	0	0	0	0	0	0	229	10	0	0	0	0	**29**
Lasionycteris noctivagans	0	0	0	0	0	0	0	0	7	26	17	3	**9**
Lasiurus blossevillii	0	0	0	0	0	0	19	3	0	0	0	0	**3**
Lasiurus cinereus	0	0	0	0	0	0	0	16	10	0	0	0	**5**
Myotis ciliolabrum	0	0	0	0	0	0	8,819	2,803	460	19	0	0	**1,647**
Myotis evotis	0	0	0	0	0	0	781	429	127	0	0	0	**193**
Myotis lucifugus	0	0	0	0	0	0	1,695	1,587	720	26	0	0	**616**
Myotis volans	0	0	0	0	0	0	476	168	97	39	0	0	**111**
Myotis yumanensis	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Tadarida brasiliensis	0	0	0	0	0	0	181	455	137	0	0	0	**126**
Total	**0**	**0**	**0**	**0**	**0**	**0**	**12,452**	**5,503**	**1,560**	**113**	**17**	**3**	**2,776**
	2008												
Antrozous pallidus	0	0	0	3	3	87	448	129	500	0	0	0	**98**
Corynorhinus townsendii	0	0	0	0	0	10	6	0	13	0	0	0	**2**
Eptesicus fuscus	0	0	0	0	142	470	1735	77	43	0	0	0	**208**
Lasionycteris noctivagans	0	0	0	30	158	877	123	29	70	58	3	0	**111**
Lasiurus blossevillii	0	0	0	0	0	10	0	23	3	0	0	0	**3**
Lasiurus cinereus	0	0	0	0	16	13	13	29	3	3	0	0	**7**
Myotis ciliolabrum	0	0	0	190	755	11367	12026	7029	3590	123	0	0	**2930**
Myotis evotis	0	0	0	3	87	703	826	1394	3083	39	0	0	**509**
Myotis lucifugus	0	0	0	87	910	2390	1510	529	1473	32	0	0	**576**
Myotis volans	0	0	0	23	126	1,477	1,000	642	903	26	0	0	**349**
Myotis yumanensis	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Tadarida brasiliensis	0	0	0	0	6	110	177	235	210	71	0	0	**68**
Total	**0**	**0**	**0**	**337**	**2,203**	**17,513**	**17,865**	**10,116**	**9,893**	**352**	**3**	**0**	**4,861**

Table E.6. IA for Each Month at CF-2077

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
	2007												
Antrozous pallidus	0	0	0	0	0	0	5	3	3	0	0	0	**2**
Corynorhinus townsendii	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Eptesicus fuscus	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Lasionycteris noctivagans	0	0	0	0	0	0	0	29	0	13	0	0	**8**
Lasiurus blossevillii	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Lasiurus cinereus	0	0	0	0	0	0	0	0	3	23	0	0	**5**
Myotis ciliolabrum	0	0	0	0	0	0	200	165	20	0	0	0	**56**
Myotis evotis	0	0	0	0	0	0	0	3	13	0	0	0	**3**
Myotis lucifugus	0	0	0	0	0	0	50	261	367	42	0	0	**124**
Myotis volans	0	0	0	0	0	0	5	0	0	0	0	0	**1**
Myotis yumanensis	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Tadarida brasiliensis	0	0	0	0	0	0	200	848	710	29	0	0	**303**
Total	**0**	**0**	**0**	**0**	**0**	**0**	**460**	**1,310**	**1,117**	**106**	**0**	**0**	**501**
	2008												
Antrozous pallidus	0	0	0	0	0	7	3	3	3	0	0	0	**1**
Corynorhinus townsendii	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Eptesicus fuscus	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Lasionycteris noctivagans	0	3	0	18	13	13	0	0	0	26	3	0	**6**
Lasiurus blossevillii	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Lasiurus cinereus	0	0	0	0	0	0	0	0	3	0	0	0	**0**
Myotis ciliolabrum	0	0	0	0	0	137	87	55	7	0	0	0	**25**
Myotis evotis	0	0	0	0	0	17	0	3	10	0	0	0	**3**
Myotis lucifugus	0	0	0	0	29	223	90	132	513	10	0	0	**88**
Myotis volans	0	0	0	0	0	10	0	0	0	0	0	0	**1**
Myotis yumanensis	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Tadarida brasiliensis	0	0	0	0	0	87	94	387	430	206	0	0	**108**
Total	**0**	**3**	**0**	**18**	**42**	**493**	**274**	**581**	**967**	**242**	**3**	**0**	**233**

Table E.7. IA for Each Month at CF-2078

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
	2007												
Antrozous pallidus	0	0	0	0	0	0	29	0	0	0	0	0	**4**
Corynorhinus townsendii	0	0	0	0	0	0	5	3	0	0	0	0	**1**
Eptesicus fuscus	0	0	0	0	0	0	5	3	0	0	0	0	**1**
Lasionycteris noctivagans	0	0	0	0	0	0	0	0	0	13	13	0	**5**
Lasiurus blossevillii	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Lasiurus cinereus	0	0	0	0	0	0	0	13	7	0	0	0	**4**
Myotis ciliolabrum	0	0	0	0	0	0	86	126	7	0	0	0	**36**
Myotis evotis	0	0	0	0	0	0	48	55	23	0	0	0	**21**
Myotis lucifugus	0	0	0	0	0	0	52	65	57	3	0	0	**30**
Myotis volans	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Myotis yumanensis	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Tadarida brasiliensis	0	0	0	0	0	0	143	871	283	26	0	0	**243**
Total	**0**	**0**	**0**	**0**	**0**	**0**	**367**	**1,135**	**377**	**42**	**13**	**0**	**345**
	2008												
Antrozous pallidus	0	0	0	0	19	0	6	6	0	0	0	0	**3**
Corynorhinus townsendii	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Eptesicus fuscus	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Lasionycteris noctivagans	0	7	0	33	39	0	0	0	10	26	3	0	**11**
Lasiurus blossevillii	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Lasiurus cinereus	0	0	0	0	10	0	0	6	3	3	0	0	**2**
Myotis ciliolabrum	0	0	0	0	35	0	29	58	230	0	0	0	**32**
Myotis evotis	0	0	0	0	13	67	41	26	33	0	0	0	**10**
Myotis lucifugus	0	0	0	0	39	200	47	74	287	6	0	0	**43**
Myotis volans	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Myotis yumanensis	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Tadarida brasiliensis	0	0	0	0	0	0	53	413	527	152	0	0	**108**
Total	**0**	**7**	**0**	**33**	**155**	**267**	**176**	**584**	**1,090**	**187**	**3**	**0**	**210**

Table E.8. IA for Each Month at CF-2079

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
	2007												
Antrozous pallidus	0	0	0	0	0	0	33	26	10	0	0	0	**10**
Corynorhinus townsendii	0	0	0	0	0	0	33	10	3	0	0	0	**6**
Eptesicus fuscus	0	0	0	0	0	0	24	10	0	0	0	0	**5**
Lasionycteris noctivagans	0	0	0	0	0	0	0	0	13	42	17	0	**13**
Lasiurus blossevillii	0	0	0	0	0	0	0	3	0	0	0	0	**1**
Lasiurus cinereus	0	0	0	0	0	0	0	35	43	3	0	0	**14**
Myotis ciliolabrum	0	0	0	0	0	0	6,695	3,561	290	45	0	0	**1,501**
Myotis evotis	0	0	0	0	0	0	933	706	1103	3	0	0	**429**
Myotis lucifugus	0	0	0	0	0	0	3,238	2706	3,833	177	0	0	**1,566**
Myotis volans	0	0	0	0	0	0	0	3	0	19	0	0	**4**
Myotis yumanensis	0	0	0	0	0	0	10	0	0	0	0	0	**1**
Tadarida brasiliensis	0	0	0	0	0	0	162	594	520	45	0	0	**223**
Total	**0**	**0**	**0**	**0**	**0**	**0**	**11,129**	**7,655**	**5,817**	**335**	**17**	**0**	**3,772**
	2008												
Antrozous pallidus	3	0	0	0	294	47	16	16	13	0	0	0	**33**
Corynorhinus townsendii	0	0	0	3	3	3	0	3	23	0	0	0	**3**
Eptesicus fuscus	0	0	0	0	497	273	39	13	20	0	0	0	**70**
Lasionycteris noctivagans	0	0	3	20	142	107	13	19	30	74	3	0	**34**
Lasiurus blossevillii	0	0	0	0	0	0	16	0	0	0	0	0	**1**
Lasiurus cinereus	0	0	0	0	45	20	6	29	33	0	0	0	**11**
Myotis ciliolabrum	0	0	0	127	358	2,523	4,177	2,252	587	0	0	0	**840**
Myotis evotis	0	0	0	3	129	1,453	865	371	743	3	0	0	**296**
Myotis lucifugus	0	0	0	33	213	2,247	1,784	1,523	3,547	39	0	0	**779**
Myotis volans	0	0	0	0	29	17	0	0	0	0	0	0	**4**
Myotis yumanensis	0	0	0	0	0	0	3	3	0	0	0	0	**1**
Tadarida brasiliensis	0	0	0	0	0	257	274	271	380	106	0	0	**107**
Total	**3**	**0**	**3**	**187**	**1,710**	**6,947**	**7,194**	**4,500**	**5,377**	**223**	**3**	**0**	**2180**

Table E.9. IA for Each Month at CF-2081

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
	2007												
Antrozous pallidus	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Corynorhinus townsendii	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Eptesicus fuscus	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Lasionycteris noctivagans	0	0	0	0	0	0	0	0	0	3	0	0	**1**
Lasiurus blossevillii	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Lasiurus cinereus	0	0	0	0	0	0	0	61	27	10	0	0	**17**
Myotis ciliolabrum	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Myotis evotis	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Myotis lucifugus	0	0	0	0	0	0	0	22	18	0	0	0	**7**
Myotis volans	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Myotis yumanensis	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Tadarida brasiliensis	0	0	0	0	0	0	0	1,313	618	74	0	0	**336**
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1,396**	**664**	**87**	**0**	**0**	**361**
	2008												
Antrozous pallidus	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Corynorhinus townsendii	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Eptesicus fuscus	0	0	0	3	3	0	0	0	0	0	0	0	**1**
Lasionycteris noctivagans	0	0	0	0	19	5	0	0	40	3	0	0	**5**
Lasiurus blossevillii	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Lasiurus cinereus	0	0	0	0	13	0	0	0	0	0	0	0	**1**
Myotis ciliolabrum	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Myotis evotis	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Myotis lucifugus	0	0	0	0	3	0	0	0	33	0	0	0	**2**
Myotis volans	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Myotis yumanensis	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Tadarida brasiliensis	0	0	0	0	0	19	0	186	1,113	19	0	0	**66**
Total	**0**	**0**	**0**	**3**	**39**	**24**	**0**	**186**	**1,187**	**23**	**0**	**0**	**75**

Table E.10. IA for Each Month at CF-2092

Species	2007												Total
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	
Antrozous pallidus	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Corynorhinus townsendii	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Eptesicus fuscus	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Lasionycteris noctivagans	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Lasiurus blossevillii	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Lasiurus cinereus	0	0	0	0	0	0	0	4	3	0	0	0	**1**
Myotis ciliolabrum	0	0	0	0	0	0	0	65	0	0	0	0	**10**
Myotis evotis	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Myotis lucifugus	0	0	0	0	0	0	0	104	63	3	0	0	**30**
Myotis volans	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Myotis yumanensis	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Tadarida brasiliensis	0	0	0	0	0	0	0	378	270	13	0	0	**119**
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**552**	**337**	**16**	**0**	**0**	**161**
	2008												
Antrozous pallidus	0	0	0	0	0	0	6	0	3	0	0	0	**1**
Corynorhinus townsendii	0	0	0	0	0	0	0	6	0	0	0	0	**1**
Eptesicus fuscus	0	0	0	0	3	7	13	3	0	0	0	0	**2**
Lasionycteris noctivagans	0	0	0	0	6	17	0	13	7	10	0	0	**4**
Lasiurus blossevillii	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Lasiurus cinereus	0	0	0	0	3	0	0	3	0	0	0	0	**1**
Myotis ciliolabrum	0	0	0	3	45	257	216	165	43	0	0	0	**61**
Myotis evotis	0	0	0	0	0	0	0	123	0	0	0	0	**10**
Myotis lucifugus	0	0	0	0	6	60	42	335	147	0	0	0	**49**
Myotis volans	0	0	0	0	0	7	0	0	0	0	0	0	**1**
Myotis yumanensis	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Tadarida brasiliensis	0	0	0	0	0	13	71	374	63	29	0	0	**46**
Total	**0**	**0**	**0**	**3**	**65**	**360**	**348**	**1,023**	**263**	**39**	**0**	**0**	**176**

APPENDIX F

Raptor Migration Data by Survey Day

Table F.1. Raptor Migration Data by Survey Day

Date	Hours of Observation	AMKE	BAEA	COHA	FEHA	GOEA	NOHA	PRFA	RLHA	RTHA	SSHA	SWHA	TUVU	UNAH	UNBH	UNFA	UNRA	Total	Raptors/Hr
11-Apr-07	7.0														2			2	0.29
12-Apr-07	7.0						1	1	1									3	0.43
13-Apr-07	7.0				1							1	1		3			6	0.86
26-Apr-07	7.0											2	1		1			4	0.57
25-Apr-07	7.0						1			1	1		1	2	1			7	1.00
27-Apr-07	6.0							1		1		1	2		1		1	7	1.17
7-May-07	6.0														1			1	0.17
8-May-07	6.0												1		2			3	0.50
9-May-07	7.0					1			1	1	1	1	1	1	2			9	1.29
11-Sep-07	6.50						1			1				1				3	0.46
12-Sep-07	5.75	1											1					2	0.35
13-Sep-07	6.00																	0	0.00
3-Oct-07	5.75														1			1	0.17
4-Oct-07	5.00																	0	0.00
5-Oct-07	5.00									1			2					3	0.60
30-Oct-07	4.25			2	1	1			2	3	1				2			12	2.82
31-Oct-07	4.75		1															1	0.21
1-Nov-07	4.50	1				2				4					2			9	2.00
25-Mar-08	6.50												3	1		1	3	8	1.23
26-Mar-08	5.00	1					1			1			3	1	1	1	1	10	2.00
27-Mar-08	5.75				1								1					2	0.35
15-Apr-08	5.75				1		1						1					3	0.52
16-Apr-08	4.75	1											7					8	1.68
17-Apr-08	4.00					1					1	4	1					7	1.75
6-May-08	7.00																	0	0.00
7-May-08	7.00						1											1	0.14
8-May-08	6.00	2											2					4	0.67
17-Sep-08	5.50	1				1		1						1				4	0.73

Table F.1. Raptor Migration Data by Survey Day (Continued)

Date	Hours of Observation	AMKE	BAEA	COHA	FEHA	GOEA	NOHA	PRFA	RLHA	RTHA	SSHA	SWHA	TUVU	UNAH	UNBH	UNFA	UNRA	Total	Raptors/ Hr
18-Sep-08	6.00	2		2		1		1		1	3						1	11	1.83
19-Sep-08	5.25																	0	0.00
7-Oct-08	4.25	1								2	1		5	3				12	2.82
8-Oct-08	5.00			2			1			4	3			4	1			15	3.00
9-Oct-08	5.00																	0	0.00
28-Oct-08	4.25				1		2								1			4	0.94
29-Oct-08	4.50				1		1	1										3	0.67
30-Oct-08	4.75					1												1	0.21
Spring Totals	111.75	4	0	0	3	2	5	2	2	4	3	9	25	5	14	2	5	85	0.76
Fall Totals	92.00	6	1	6	3	6	5	3	2	16	8	0	8	9	7	0	1	81	0.88
Project Totals	203.75	10	1	6	6	8	10	5	4	20	11	9	33	14	21	2	6	166	0.81

APPENDIX G

All Species Recorded during Passerine Surveys

Table G.1. Species Recorded

Species	Number of Observations	Overall Species Comp (%)	Frequency (% Surveys Observed)	Risk Index
American Crow	3	0.06	0.6	–
American Kestrel	58	1.23	21.9	–
American Robin	81	1.72	8.8	–
American Wigeon	9	0.19	1.3	–
Ash-throated Flycatcher	1	0.02	0.6	–
Bald Eagle	1	0.02	0.6	–
Barn Swallow	18	0.38	5.0	–
Black-billed Magpie	49	1.04	16.9	0.4
Belted Kingfisher	1	0.02	0.6	–
Blue-gray Gnatcatcher	18	0.38	6.3	0.4
Bohemian Waxwing	380	8.07	1.3	–
Brewer’s Blackbird	71	1.51	6.9	1.8
Brewer's Sparrow	18	0.38	5.0	–
Black-throated Sparrow	5	0.11	1.9	–
Bufflehead	10	0.21	2.5	–
Bullock's Oriole	14	0.30	3.8	–
Blue-winged Teal	1	0.02	0.6	–
California Gull	9	0.19	1.3	–
Canada Goose	64	1.36	9.4	4.8
Chipping Sparrow	3	0.06	1.9	–
Cinnamon Teal	70	1.49	5.6	–
Clark’s Nutcracker	3	0.06	0.6	–
Cliff Swallow	2	0.04	0.6	–
Common Grackle	1	0.02	0.6	–
Cooper’s Hawk	2	0.04	1.3	0.7
Common Nighthawk	7	0.15	0.6	–
Common Raven	543	11.53	74.4	5.2
Common Yellowthroat	1	0.02	0.6	–
Eared Grebe	2	0.04	1.3	–
European Starling	130	2.76	3.1	–
Ferruginous Hawk	2	0.04	1.3	0.7
Franklin’s Gull	1	0.02	0.6	–
Gadwall	14	0.30	1.3	–
Golden Eagle	13	0.28	8.1	2.9
Great Egret	4	0.08	1.3	–
Gray Flycatcher	6	0.13	3.8	–
Green-winged Teal	33	0.70	3.1	–
House Finch	2	0.04	0.6	0.6
Horned Lark	1158	24.59	46.3	2.0

Table G.1. Species Recorded (Continued)

Species	Number of Observations	Overall Species Comp (%)	Frequency (% Surveys Observed)	Risk Index
Juniper Titmouse	5	0.11	2.5	–
Killdeer	15	0.32	6.9	0.5
Lark Sparrow	10	0.21	5.6	–
Long-billed Curlew	13	0.28	3.1	1.0
Least Sandpiper	1	0.02	0.6	–
Lincoln’s Sparrow	1	0.02	0.6	–
Loggerhead Shrike	45	0.96	15.6	–
Mallard	89	1.89	6.9	–
MacGillivray’s Warbler	1	0.02	0.6	–
Mountain Bluebird	242	5.14	25.0	2.5
Mountain Chickadee	6	0.13	2.5	–
Mourning Dove	15	0.32	5.0	2.7
Nashville Warbler	1	0.02	0.6	–
Northern Flicker	71	1.51	28.8	–
Northern Harrier	29	0.62	15.0	0.5
Northern Mockingbird	6	0.13	1.9	–
Northern Pintail	2	0.04	0.6	–
Northern Rough-winged Swallow	12	0.25	3.1	–
Northern Shoveler	10	0.21	0.6	–
Orange-crowned Warbler	2	0.04	1.3	–
Pinyon Jay	194	4.12	11.3	2.2
Prairie Falcon	2	0.04	1.3	–
Ruby-crowned Kinglet	2	0.04	1.3	–
Ring-necked Duck	2	0.04	0.6	–
Red-naped Sapsucker	1	0.02	0.6	–
Red-tailed Hawk	3	0.06	1.9	1.3
Red-winged Blackbird	23	0.49	2.5	–
Sandhill Crane	6	0.13	1.9	0.3
Sage Sparrow	34	0.72	10.0	–
Say’s Phoebe	2	0.04	1.3	–
Sage Thrasher	32	0.68	6.9	0.2
Savannah Sparrow	25	0.53	1.9	–
Snow Goose	33	0.70	0.6	–
Song Sparrow	2	0.04	1.3	–
Sharp-shinned Hawk	5	0.11	3.1	–
Swainson's Hawk	25	0.53	9.4	3.0
Townsend’s Solitaire	34	0.72	10.0	–
Tree Swallow	34	0.72	6.3	0.2

Table G.1. Species Recorded (Continued)

Species	Number of Observations	Overall Species Comp (%)	Frequency (% Surveys Observed)	Risk Index
Turkey Vulture	4	0.08	0.6	0.6
Unidentified Empidonax Flycatcher	1	0.02	0.6	–
Unidentified Buteo Hawk	1	0.02	0.6	–
Unidentified Bird	380	8.07	40.6	4.7
Unidentified Blackbird	65	1.38	6.3	2.3
Unidentified Crow	10	0.21	3.8	0.4
Unidentified Duck	12	0.25	1.9	–
Unidentified Flycatcher	1	0.02	0.6	–
Unidentified Gull	33	0.70	1.9	0.1
Unidentified Hawk	17	0.36	10.0	1.9
Unidentified Hummingbird	5	0.11	3.1	–
Unidentified Sapsucker	2	0.04	0.6	–
Unidentified Sparrow	47	1.00	16.9	–
Unidentified Swallow	48	1.02	8.8	1.1
Unidentified Teal	10	0.21	0.6	–
Unidentified Warbler	3	0.06	1.3	–
Unidentified Woodpecker	1	0.02	0.6	–
Unidentified Piranga Tanager	1	0.02	0.6	–
Vesper Sparrow	6	0.13	3.1	–
White-crowned Sparrow	20	0.42	6.3	–
Western Kingbird	7	0.15	3.8	–
Western Meadowlark	148	3.14	23.8	–
Western Scrub-Jay	1	0.02	0.6	–
Willet	3	0.06	0.6	–
Yellow-headed Blackbird	2	0.04	1.3	0.7
Yellow Warbler	8	0.17	3.8	–
Yellow-rumped Warbler	31	0.66	9.4	–

APPENDIX H

Alpha Codes for North American Species Recorded in Spring Valley

Table H.1. Alpha Codes for North American Species Recorded in Spring Valley

4-Letter Code	English Name	Scientific Name
AMCR	American Crow	*Corvus brachyrhynchos*
AMKE	American Kestrel	*Falco sparverius*
AMRO	American Robin	*Turdus migratorius*
AMWI	American Wigeon	*Anas americana*
ATFL	Ash-throated Flycatcher	*Myriarchus cinerascens*
BAEA	Bald Eagle	*Haliaeetus leucocephalus*
BARS	Barn Swallow	*Hirundo rustica*
BBMA	Black-billed Magpie	*Aphanotriccus audax*
BEKI	Belted Kingfisher	*Ceryle alcyon*
BGGN	Blue-gray Gnatcatcher	*Polioptila caerulea*
BOWA	Bohemian Waxwing	*Bombycilla garrulus*
BRBL	Brewer’s Blackbird	*Euphagus cyanocephalus*
BRSP	Brewer's Sparrow	*Spizella breweri*
BTSP	Black-throated Sparrow	*Amphispiza bilineata*
BUFF	Bufflehead	*Bucephala albeola*
BUOR	Bullock’s Oriole	*Icterus bullockii*
BUOW	Western Burrowing Owl	*Athene cunicularia hypugaea*
BWTE	Blue-winged Teal	*Anas discors*
CAGU	California Gull	*Larus californicus*
CANG	Canada Goose	*Branta canadensis*
CHSP	Chipping Sparrow	*Spizella passerina*
CITE	Cinnamon Teal	*Anas cyanoptera*
CLNU	Clark’s Nutcracker	*Nucifraga columbiana*
CLSW	Cliff Swallow	*Petrochelidon pyrrhonota*
COGR	Common Grackle	*Quiscalus quiscula*
COHA	Cooper’s Hawk	*Accipiter cooperii*
CONI	Common Nighthawk	*Chordeiles minor*
COPO	Common Poorwill	*Phalaenoptilus nuttallii*
CORA	Common Raven	*Corvus corax*
COYE	Common Yellowthroat	*Geothlypis trichas*
EAGR	Eared Grebe	*Podiceps nigricollis*
EUST	European Starling	*Sturnus vulgaris*
FEHA	Ferruginous Hawk	*Buteo regalis*
FRGU	Franklin’s Gull	*Larus pipixcan*
GADW	Gadwall	*Anas strepera*
GOEA	Golden Eagle	*Aquila chrysaetos*
GHOW	Great Horned Owl	*Bubo virginianus*
GREG	Great Egret	*Ardea alba*
GRFL	Gray Flycatcher	*Empidonax wrightii*
GWTE	Green-winged Teal	*Anas crecca*

Table H.1. Alpha Codes for North American Species Recorded in Spring Valley (Continued)

4-Letter Code	English Name	Scientific Name
HOFI	House Finch	*Carpodacus mexicanus*
HOLA	Horned Lark	*Eremophila alpestris*
JUTI	Juniper Titmouse	*Baeolophus ridgwayi*
KILL	Killdeer	*Charadrius vociferus*
LASP	Lark Sparrow	*Chondestes grammacus*
LBCU	Long-billed Curlew	*Numenius minutus*
LEOW	Long-eared Owl	*Asio otus*
LESA	Least Sandpiper	*Calidris minutilla*
LISP	Lincoln's Sparrow	*Melospiza lincolnii*
LOSH	Loggerhead Shrike	*Lanius ludovicianus*
MALL	Mallard	*Anas platyrhynchos*
MGWA	MacGillivray's Warbler	*Oporornis tolmiei*
MOBL	Mountain Bluebird	*Sialia currucoides*
MOCH	Mountain Chickadee	*Poecile gambeli*
MODO	Mourning Dove	*Zenaida macroura*
NAWA	Nashville Warbler	*Vermivora ruficapilla*
NOFL	Northern Flicker	*Colaptes auratus*
NOHA	Northern Harrier	*Circus cyaneus*
NOMO	Northern Mockingbird	*Mimus polyglottos*
NOPI	Northern Pintail	*Anas acuta*
NRWS	Northern Rough-winged Swallow	*Stelgidopteryx serripennis*
NSHO	Northern Shoveler	*Anas clypeata*
OCWA	Orange-crowned Warbler	*Vermivora celata*
PIJA	Pinyon Jay	*Gymnorhinus cyanocephalus*
PRFA	Prairie Falcon	*Falco mexicanus*
RCKI	Ruby-crowned Kinglet	*Regulus calendula*
RLHA	Rough-legged Hawk	*Buteo lagopus*
RNDU	Ring-necked Duck	*Aythya collaris*
RNSA	Red-naped Sapsucker	*Sphyrapicus nuchalis*
RTHA	Red-tailed Hawk	*Buteo jamaicensis*
RWBL	Red-winged Blackbird	*Agelaius phoeniceus*
SACR	Sandhill Crane	*Grus canadensis*
SAGS	Sage Sparrow	*Amphispiza belli*
SAPH	Say's Phoebe	*Sayornis saya*
SATH	Sage Thrasher	*Oreoscoptes montanus*
SAVS	Savannah Sparrow	*Passerculus sandwichensis*
SNGO	Snow Goose	*Chen caerulescens*
SOSP	Song Sparrow	*Melospiza melodia*
SSHA	Sharp-shinned Hawk	*Accipiter striatus*
SWHA	Swainson's Hawk	*Buteo swainsoni*

Table H.1. Alpha Codes for North American Species Recorded in Spring Valley (Continued)

4-Letter Code	English Name	Scientific Name
TOSO	Townsend's Solitaire	*Myadestes townsendi*
TRES	Tree Swallow	*Tachycineta bicolor*
TUVU	Turkey Vulture	*Cathartes aura*
UNAH	Unidentified Accipiter	*Accipiter sp.*
UNBH	Unidentified Buteo Hawk	*Buteo sp.*
UNFA	Unidentified Falcon	*Falco sp.*
UNRA	Unidentified Raptor	
VESP	Vesper Sparrow	*Pooecetes gramineus*
WCSP	White-crowned Sparrow	*Zonotrichia leucophrys*
WEKI	Western Kingbird	*Tyrannus verticalis*
WEME	Western Meadowlark	*Sturnella neglecta*
WESJ	Western Scrub-Jay	*Aphelocoma californica*
WILL	Willet	*Tringa semipalmata*
YHBL	Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*
YRWA	Yellow-rumped Warbler	*Dendroica coronata*
YWAR	Yellow Warbler	*Dendroica petechia*

APPENDIX I

Summary of Sampling Dates

Table I.1. Summary of Sampling Dates by AnaBat Monitoring Station by Month

Monitoring Station	2007											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
CF-2072	–	–	–	–	–	–	11–31	1–31	1–30	1–31	1–30	1–31
CF-2073	–	–	–	–	–	–	10–31	1–31	1–30	1–31	1–30	1–31
CF-2074	–	–	–	–	–	–	12–31	1–31	1–30	1–31	1–30	1–31
CF-2075	–	–	–	–	–	–	–	9–15, 23–25	10–30	1–31	1–30	1–19
CF-2076	–	–	–	–	–	–	11–31	1–31	1–30	1–31	1–30	1–31
CF-2077	–	–	–	–	–	–	12–31	1–31	1–30	1–31	1–30	1–31
CF-2078	–	–	–	–	–	–	11–31	1–31	1–30	1–31	1–30	1–19
CF-2079	–	–	–	–	–	–	11–31	1–31	1–30	1–31	1–30	1–31
CF-2081	–	–	–	–	–	–	–	9–31	1, 10–30	1–31	1–30	1–31
CF-2091	–	–	–	–	–	–	–	9–31	1–30	1–31	1–30	1–31
Monitoring Station	**2008**											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
CF-2072	1–31	1–29	1–31	1–30	1–31	1–30	1–31	1–31	1–30	1–31	1–30	1–31
CF-2073	1–31	1–29	1–31	1–30	1–31	1–30	1–31	1–31	1–25	6–31	1–30	1–31
CF-2074	1–31	1–29	1–31	1–30	1–31	1–30	1–31	1–31	1–30	1–31	1–30	1–31
CF-2075	8–31	1–29	1–31	1–30	1–25	3–30	1–11, 16–24, 27–31	1–5, 11–31	1–30	1–31	1–30	1–31
CF-2076	1–31	1–29	1–31	1–30	1–31	1–30	1–31	1–31	1–30	1–31	1–30	1–31
CF-2077	1–31	1–29	1–20	14–30	1–31	1–30	1–31	1–31	1–30	1–31	1–30	1–31
CF-2078	9–31	1–29	1–31	1–30	1–31	1–3	15–30	1–31	1–30	1–31	1–30	1–31
CF-2079	1–31	1–29	1–31	1–30	1–31	1–30	1–31	1–31	1–30	1–31	1–30	1–31
CF-2081	1–31	1–29	1–31	1–30	1–31	1–21	16–17	11–17	16–30	1–31	1–30	1–31
CF-2091	1–31	1–29	1–31	1–30	1–31	1–30	1–31	1–31	1–30	1–31	1–30	1–31

APPENDIX J

Species Accounts

Pallid bat (*Antrozous pallidus*)

Pallid bats are year-round residents found throughout Nevada. In late spring to early summer, females form small maternity colonies of up to 200 adults that sometimes include males (NatureServe 2008). In winter, they hibernate in narrow crevices of caves, during which they periodically becomes active to search for food or water. This species is mainly found at low to mid-elevations around 1,800 m (5,906 feet), but has been documented at elevations over 3,100 m (10,171 feet) (Bradley et al. 2006). These bats have been recorded within pinyon-juniper, blackbrush, creosote, sagebrush, and salt desert scrub habitats. They are often found near rocky outcrops and water sources. Pallid bats are colonial roosting species using rock outcrops, mines, caves, hollow trees, buildings, and bridges. These bats forage in and among vegetation and will land to seize prey. Their diet consists of large, ground-dwelling arthropods, such as scorpions, centipedes, and millipedes and includes various insects, such as large moths.

Townsend’s big-eared bat (*Corynorhinus townsendii*)

Townsend’s big-eared bats are year-round residents found throughout Nevada. In late spring to early summer, maternity colonies of up to several hundred females form, although solitary pregnant females are frequently encountered (NatureServe 2008). During this season, males roost individually. This bat is typically distributed in low deserts to high mountains ranging between 210 to 3,500 m (689–11,483 feet) in elevation (Bradley et al. 2006). They are found mainly in areas where caves and abandoned mines are available. This species has been documented in pinyon-juniper-mahogany, white fir, blackbrush, sagebrush, and salt desert scrub habitats, although they commonly occur in agricultural, rural, and urban areas as well. Townsend’s big-eared bat is a colonial species, forming roosts of up to 200 individuals in mines, caves, trees, and buildings (Bradley et al 2006). Foraging occurs in forested areas where Townsend’s big-eared bat navigates through narrow passages of foliage to feed on various flying insects (NatureServe 2008).

Big brown bat (*Eptesicus fuscus*)

Big brown bats are year-round residents found throughout Nevada. In late spring to early summer, nursery colonies form with up to 200 females (Bradley et al. 2006). In winter, these bats hibernate and periodically become active to forage or drink. Hibernation typically occurs in caves, mines, buildings, and other human-made structures. This species has been recorded in elevations ranging from 300 to 3,000 m (984–9,843 feet) (Bradley et al. 2006). They have been found in pinyon-juniper, blackbrush, creosote, and sagebrush habitats. These bats habituate to humans better than most species and are also found in agricultural and urban areas (Bradley et al. 2006). Big brown bats are colonial, gathering in groups up to several hundred to roost in buildings, mines, bridges, caves, and trees. The big brown bat may travel 1 to 2 km (0.6–1 mile) from roost sites to forage (NatureServe 2008). This species forages in a variety of locations ranging from clearings to above water, where they feed on a wide range of insects that includes beetles and caddisflies. These bats may not become active until five hours after sunset, but most activity occurs within two hours after sunset (NatureServe 2008).

Silver-haired bat (*Lasionycteris noctivagans*)

Silver-haired bats are found throughout Nevada during summer but migrate south for winter, although migratory patterns are not well understood. In summer, females form maternity colonies that typically consist of a few individuals, but they may roost in colonies as large as 75 individuals. This species is found at elevations ranging from 480 to 2,520 m (1,575–8,268 feet) (Bradley et al. 2006). Although this species is predominantly found in riparian habitats in southern Nevada, it is also found in both woodland and riparian habitats in central and northern Nevada. It is considered a forest-associated species and is more common in mature forests at higher latitudes and elevations (Bradley et al. 2006). Typical habitat includes coniferous and mixed deciduous/coniferous forests of pinyon-juniper, subalpine fir, white fir, limber pine, aspen, cottonwood, and willow. Silver-haired bat is usually a solitary species but occasionally roosts in groups of three to six in tree foliage or cavities, under loose bark, and sometimes in buildings (NatureServe 2008). This species will travel up to 15 km (9 miles) from roost sites to foraging areas (Bradley et al. 2006) that consist of wooded areas along edges of streams or above water bodies. Their diets consist of a variety of insects, although they mainly eat moths.

Western red bat (*Lasiurus blossevillii*)

Western red bat has a limited distribution in Nevada that includes only a few known localities. Although its resident status is not well understood, it is thought to migrate over winter. This species is found at elevations ranging from 420 to 2,010 m (1,378–6,595 feet) (Bradley et al. 2006). Western red bats are found primarily in wooded habitats, including mesquite bosques and cottonwood-willow riparian areas. These bats roost individually within tree foliage and may sometimes use leaf litter on the ground for cover. Western red bat tends to forage above the tree canopy, feeding on a variety of insects.

Hoary bat (*Lasiurus cinereus*)

Hoary bats have a patchy distribution throughout Nevada during the summer and then migrate during winter; however, migration and hibernation patterns are not well known (Bradley et al. 2006). These bats occur in valley basins and forested uplands at elevations ranging from 570 to 2,520 m (1,870–8,268 feet) (Bradley et al. 2006). This tree-associated species is found in forested, riparian, and Rocky Mountain juniper habitats and is also found in agricultural and urban areas. The solitary hoary bat roosts within tree foliage from 3 to 12 m (10–39 feet) above the ground (NatureServe 2008). This species will travel up to 40 km (25 miles) from its roost to forage (Bradley et al. 2006). Hoary bats forage above tree canopies and along water courses, where they eat a variety of insects, including moths, dragonflies, and beetles. Evening emergence varies from one hour after sunset to midnight (Bradley et al. 2006).

Western small-footed myotis (*Myotis ciliolabrum*)

Western small-footed myotis is a year-round resident found throughout Nevada. During winter, this species hibernates individually or in large colonies numbering more than 100 individuals. They are tolerant of drier and colder hibernacula than other bat species (Bradley et al. 2006). During summer, small nursery colonies are formed with generally less than 30 females. Central and northern Nevada populations are commonly found in valley bottoms below 1,800 m (5,906 feet) (Bradley et al. 2006). Western small-footed myotis uses a variety of habitats, including desert scrub, grasslands, sagebrush, steppe, blackbrush, greasewood, pinyon-juniper, and pine-fir forests, although it can be found in agricultural and urban areas, as well. Roosts are commonly located in caves, mines, and trees. These bats forage for insects (small moths, flies, ants, and beetles) in open areas above rocks or along cliffs and rocky slopes at 1 to 3 m (3–10 feet) above ground (NatureServe 2008).

Long-eared myotis (*Myotis evotis*)

Long-eared myotis are year-round residents found throughout Nevada. In summer, small maternity colonies are formed from generally less than 40 females, and winter hibernation sites are local. This species is found at elevations ranging from 690 to 3,090 m (2,264–10,138 feet) (Bradley et al. 2006). It is a forest-associated species that is predominantly found at the higher elevations, coupled with coniferous forests, although they have also been noted in other habitats such as ponderosa pine, pinyon-juniper, sagebrush, and desert scrub. Long-eared myotis is usually a solitary species, occasionally roosting in small groups within hollow trees, under exfoliating bark, in crevices of small rock outcrops, and sometimes in mines, caves, and buildings (NatureServe 2008). Long-eared myotis forages near vegetation, along rivers and streams, or above ponds while hunting moths, small beetles, and flies.

Little brown bat (*Myotis lucifugus*)

Little brown bats are found throughout northern Nevada, although little is known of their distribution and abundance. They are presumed to be a resident species that hibernates near their summer range. Large maternity colonies form in summer and may contain 100 to several thousand females (Bradley et al. 2006). During this time, males roost individually or in small groups. This species is found at higher elevations and northern latitudes and is associated with coniferous forests. Roosts are located near water sources and include hollow trees, rock outcrops, buildings, and occasionally mines and caves. They are also commonly found in human-made structures (Bradley et al. 2006). Foraging occurs in clearings near vegetation, along water margins, and above open water. Little brown bats feed mainly on small aquatic insects, including caddisflies, midges, and mayflies. These bats are most active two to three hours after sunset (NatureServe 2008).

Long-legged myotis (*Myotis volans*)

Long-legged myotis are found throughout Nevada but are most common in northern Nevada. Although little is known of their migration and hibernation patterns, they are presumed to be a year-round resident. Females form nursery colonies during summer that number from 200 to 500 females. This species occurs at elevations ranging from 930 to 3,420 m (3,051–11,221 feet) (Bradley et al. 2006), commonly in pinyon-juniper, Joshua tree woodland, montane-coniferous forest, and occasionally in salt desert scrub. Long-legged myotis roost in hollow trees, rock crevices, caves, mines, and buildings. They typically hunt in open areas above tree canopies, where they eat a variety of insects, such as moths, beetles, flies, and termites. Long-legged myotis remain active throughout most of the night, with peak activity typically occurring three to four hours after sunset (NatureServe 2008).

Yuma myotis (*Myotis yumanensis*)

Yuma myotis are found in southern and western Nevada and are considered a year-round resident, although no large winter aggregations have been found in Nevada (Bradley et al. 2006). Large maternity colonies form in spring and summer and contain a few hundred to several thousand females. During this time, males roost individually or in small groups. This species occurs at elevations ranging from 450 to 2,340 m (1,476–7,677 feet) (Bradley et al. 2006). Although this species is found near open water (NatureServe 2008) more often than other North American bats, a variety of habitats are used, including salt desert scrub, playa, sagebrush, moist woodlands, and forests, as well as agricultural and urban areas. Roosts are typically found in buildings, trees, mines, caves, bridges, and rock crevices. Foraging typically occurs over relatively still water and occasionally above vegetation. Prey includes emergent aquatic insects, such as midges and caddisflies.

Brazilian free-tailed bat (*Tadarida brasiliensis*)

Brazilian free-tailed bats are found throughout Nevada during summer but migrate south for winter; however, evidence suggests that pockets of year-round residents occur in southern Nevada (Bradley et al. 2006). During summer, females form maternity colonies, whereas males form bachelor colonies. This species is mainly found in low-elevation desert habitat but has also been recorded in mountains up to 3,500 m (11,483 feet) in elevation (Bradley et al. 2006). Brazilian free-tailed bats are a colonial species, forming roosts of up to 20 million individuals in mines, caves, cliff faces, buildings, bridges, and hollow trees. This species will travel up to 80 km (50 miles) from its roost site in order to forage (NatureServe 2008). Foraging can occur at heights of 750 m (2,400 feet) above ground level (McCracken 1996), where the Brazilian free-tailed bat uses high-speed pursuit in open air to feed on moths, their preferred prey item.

APPENDIX K

Seasonal and Nightly Activity Patterns for Bats of Spring Valley

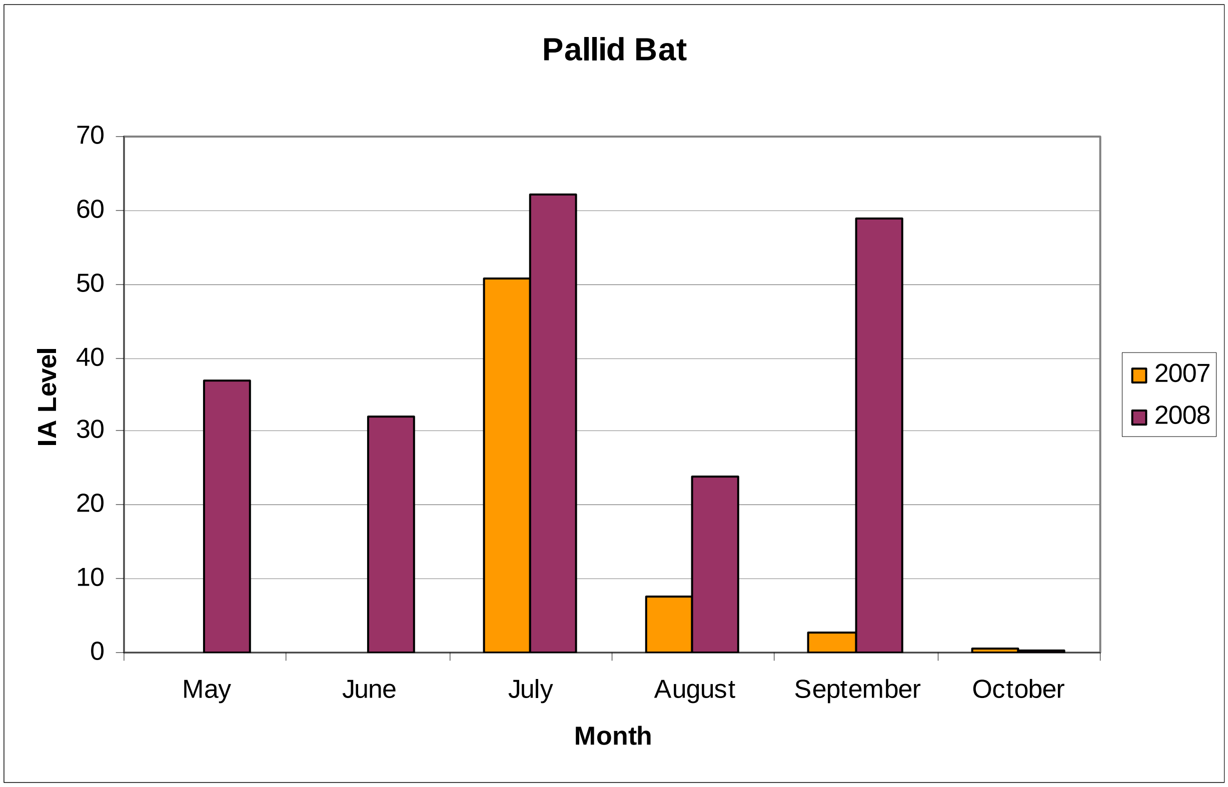


Figure K1. Seasonal IA patterns of pallid bats, 2007–2008.

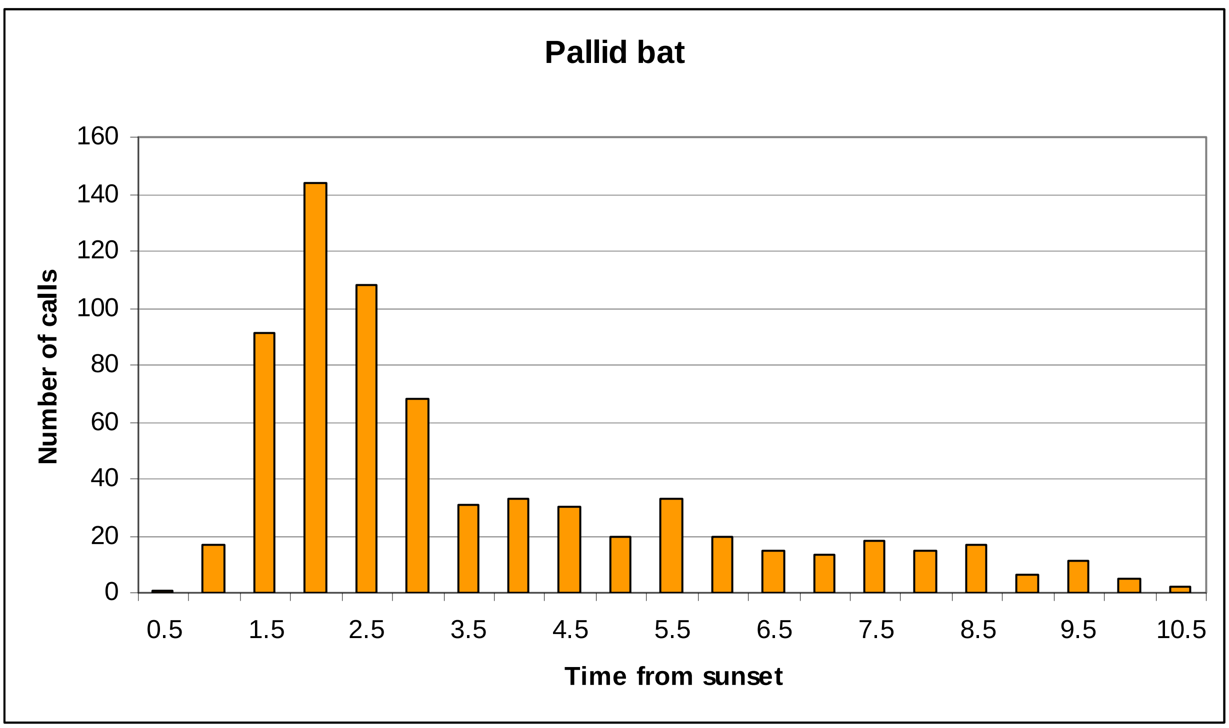


Figure K2. Nightly activity patterns of pallid bats, 2007–2008.

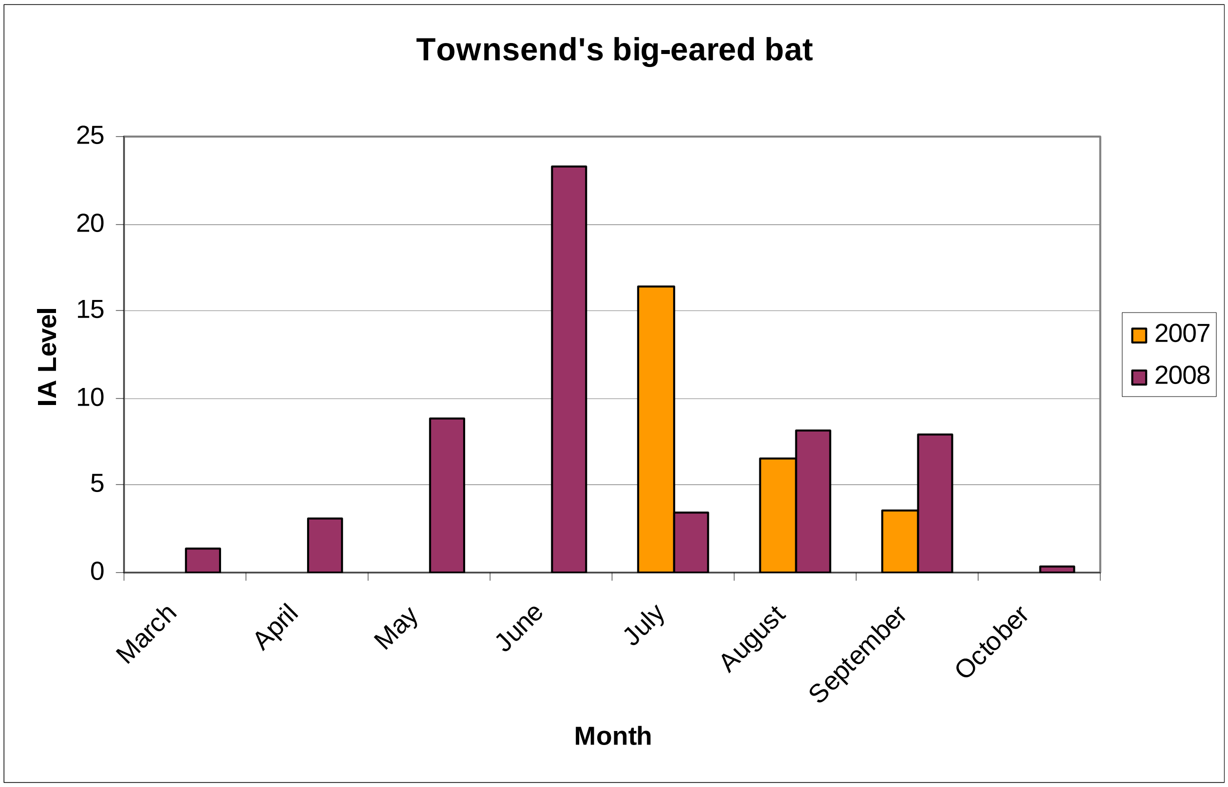


Figure K3. Seasonal IA patterns of Townsend's big-eared bats, 2007–2008.

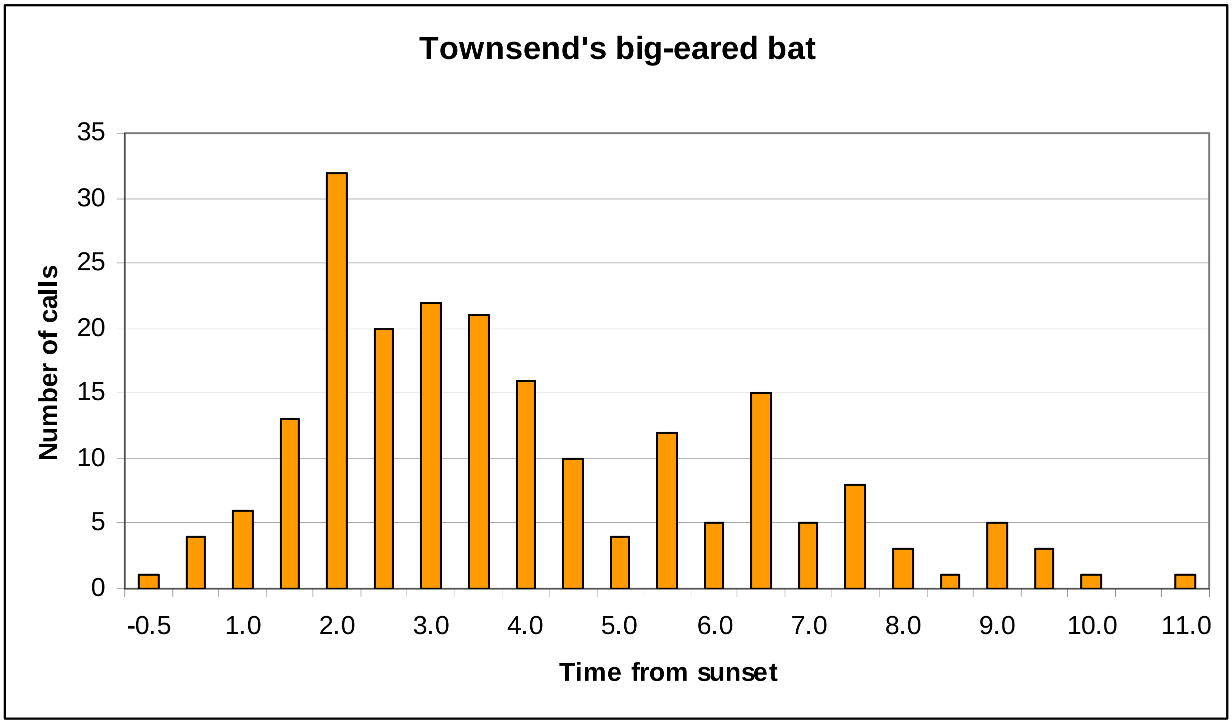


Figure K4. Nightly activity patterns of Townsend's big-eared bats, 2007–2008.

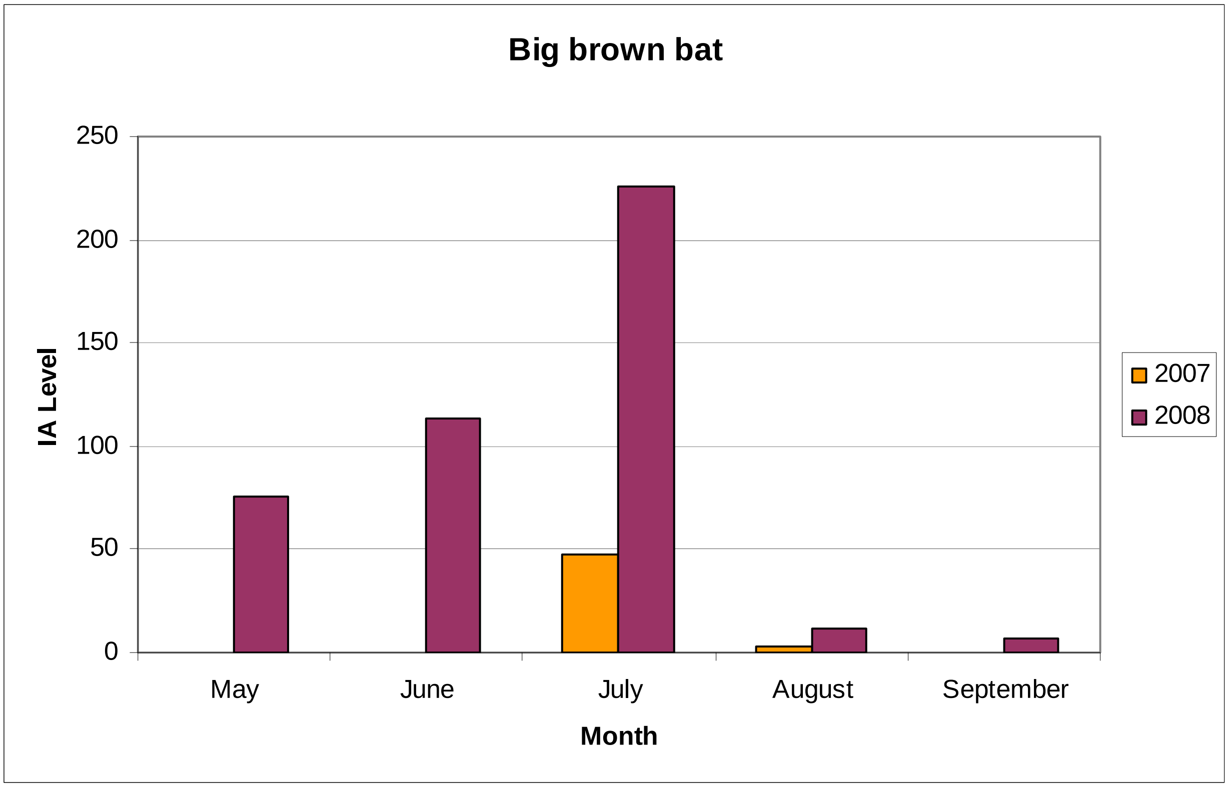


Figure K5. Seasonal IA patterns of big brown bats, 2007–2008.

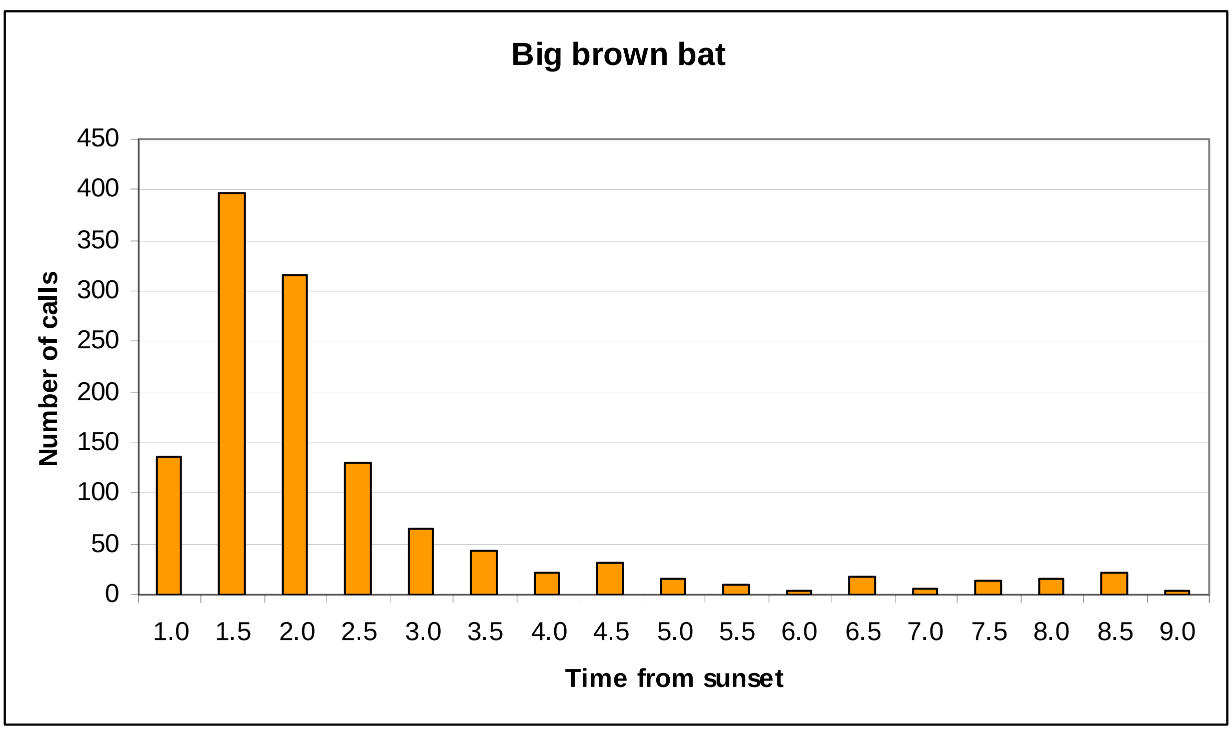


Figure K6. Nightly activity patterns of big brown bats, 2007–2008.

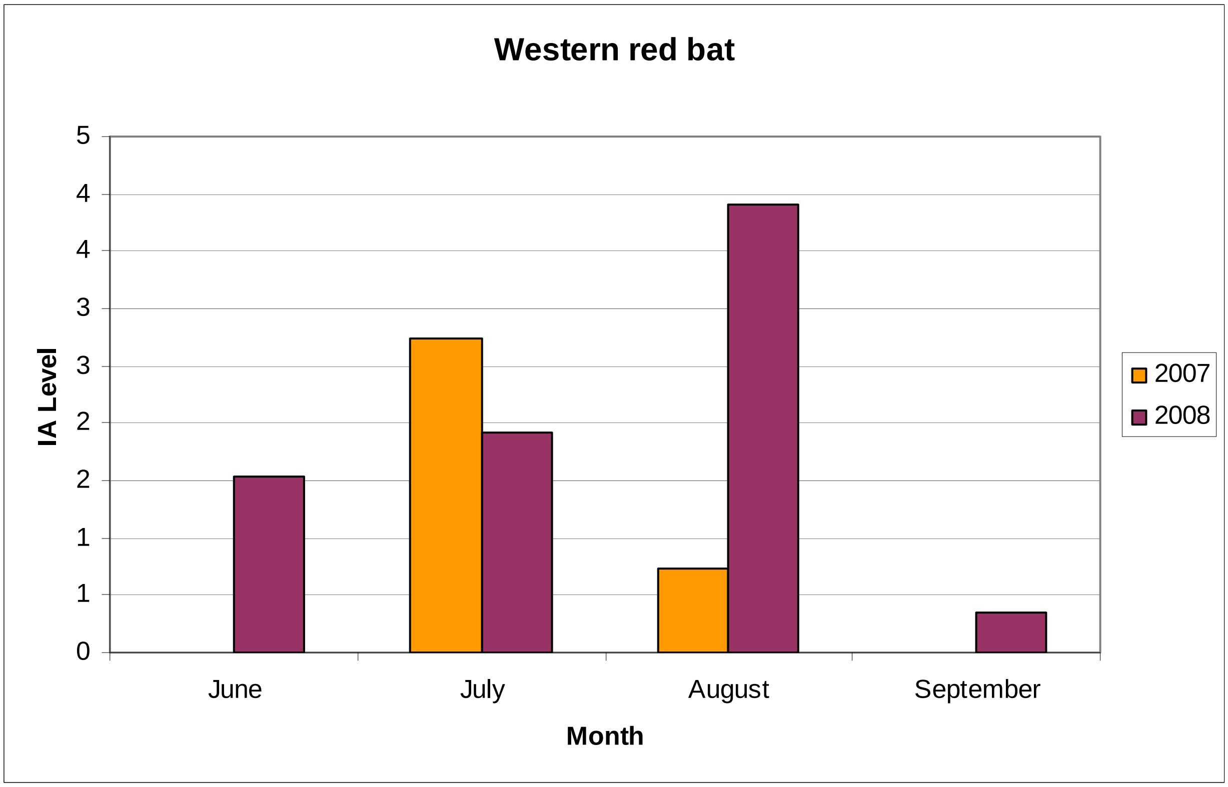


Figure K7. Seasonal IA patterns of western red bats, 2007–2008.

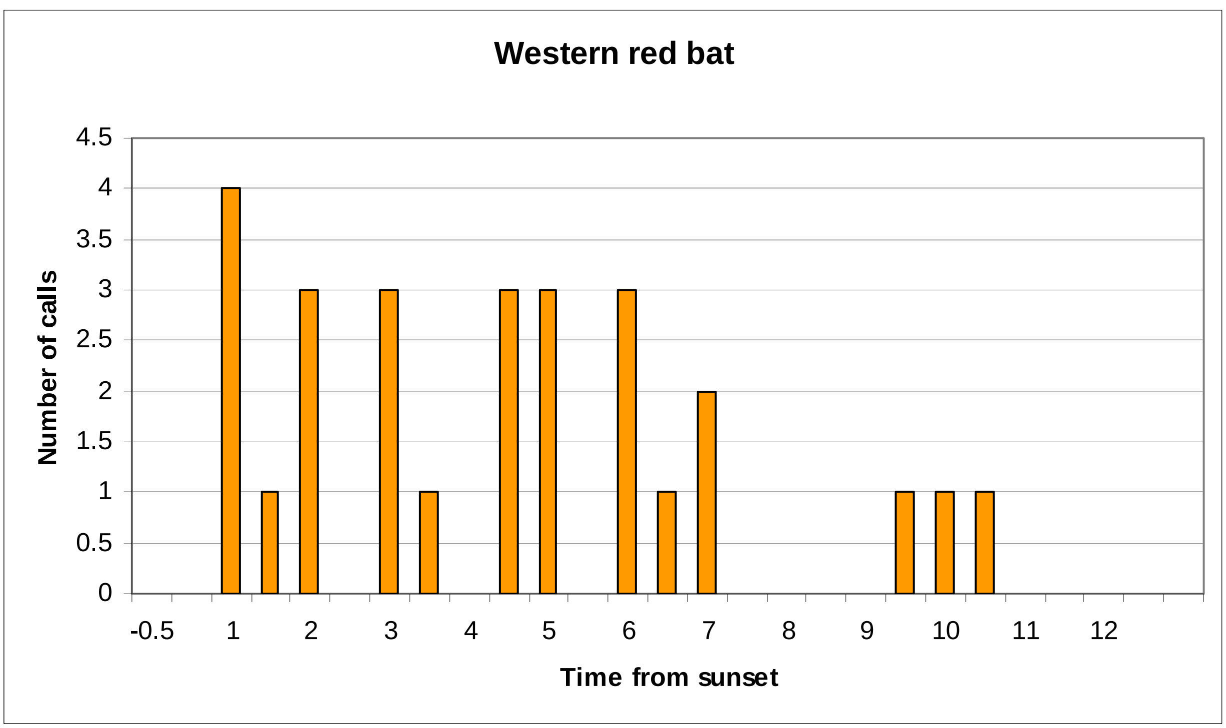


Figure K8. Nightly activity patterns of western red bats, 2007–2008.

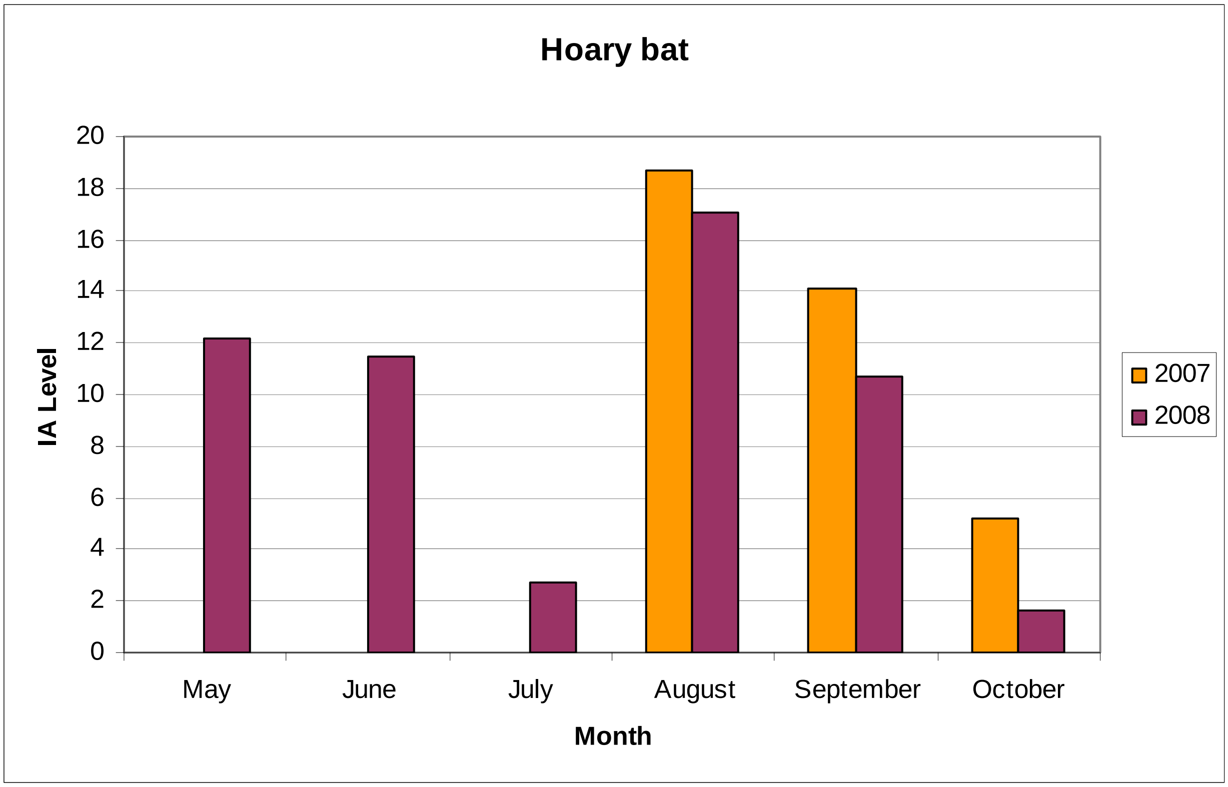


Figure K9. Seasonal IA patterns of hoary bats, 2007–2008.

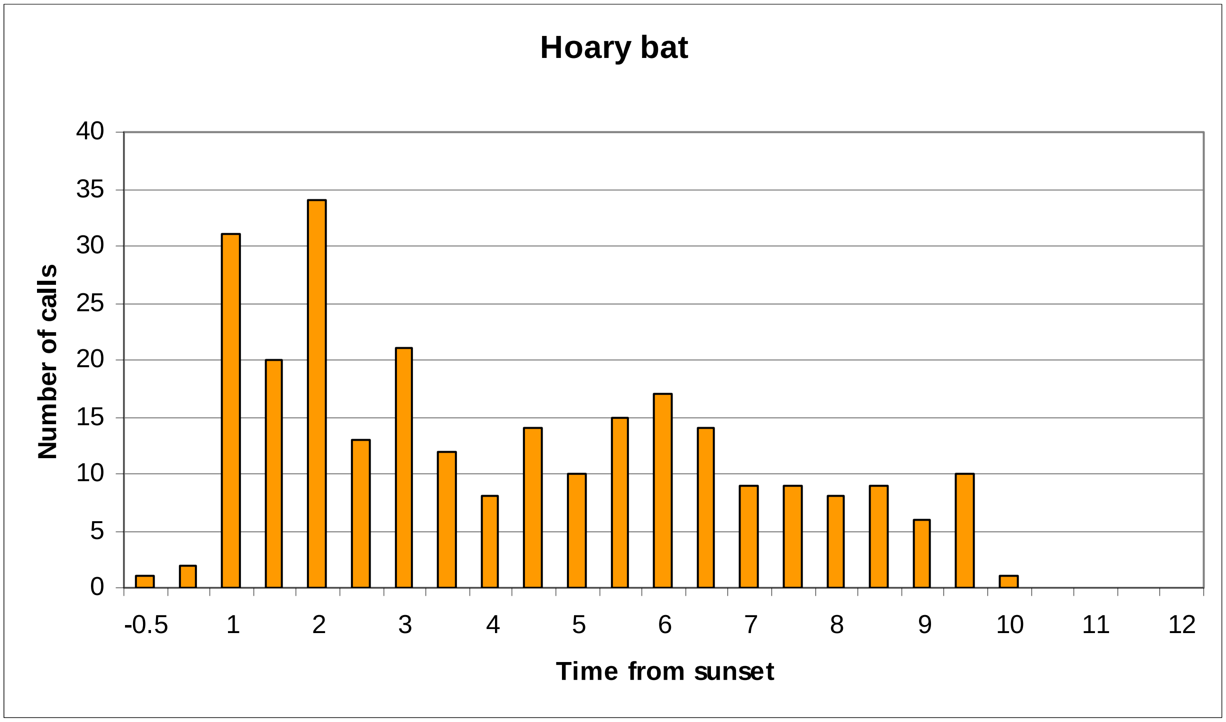


Figure K10. Nightly activity patterns of hoary bats, 2007–2008.

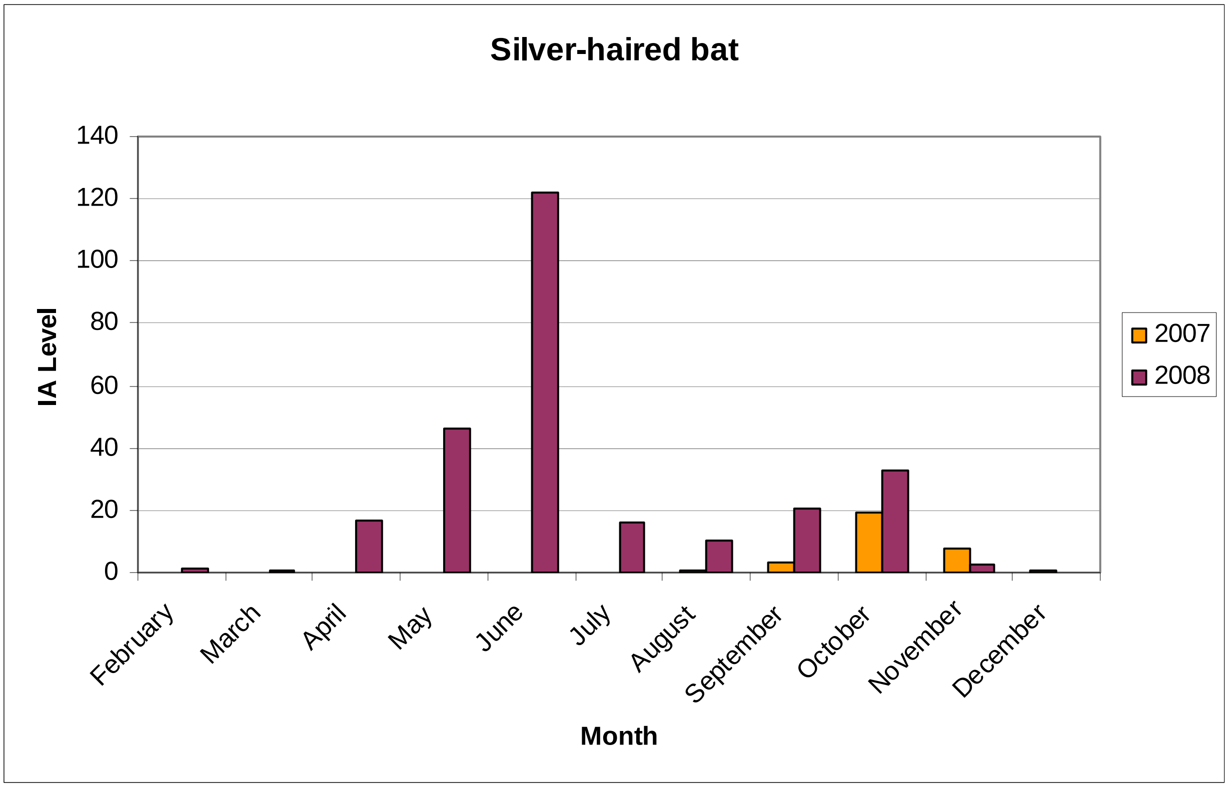


Figure K11. Seasonal IA patterns of silver haired bats, 2007–2008.

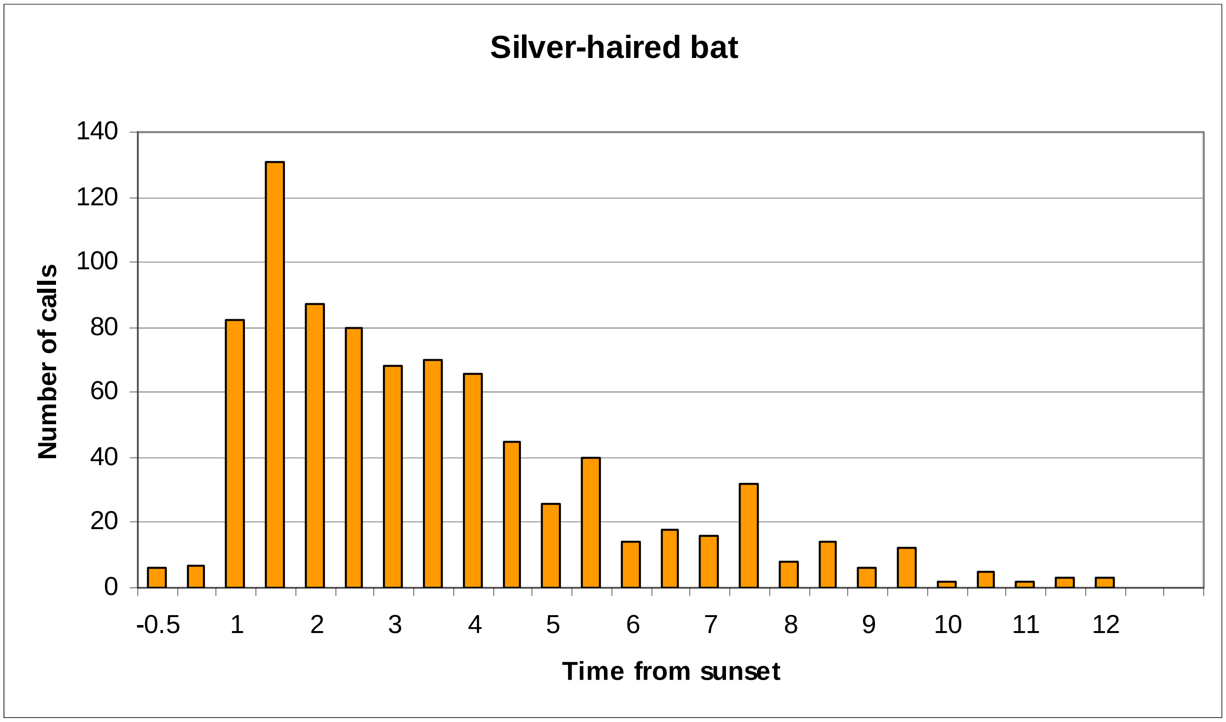


Figure K12. Nightly activity patterns of silver-haired bats, 2007–2008.

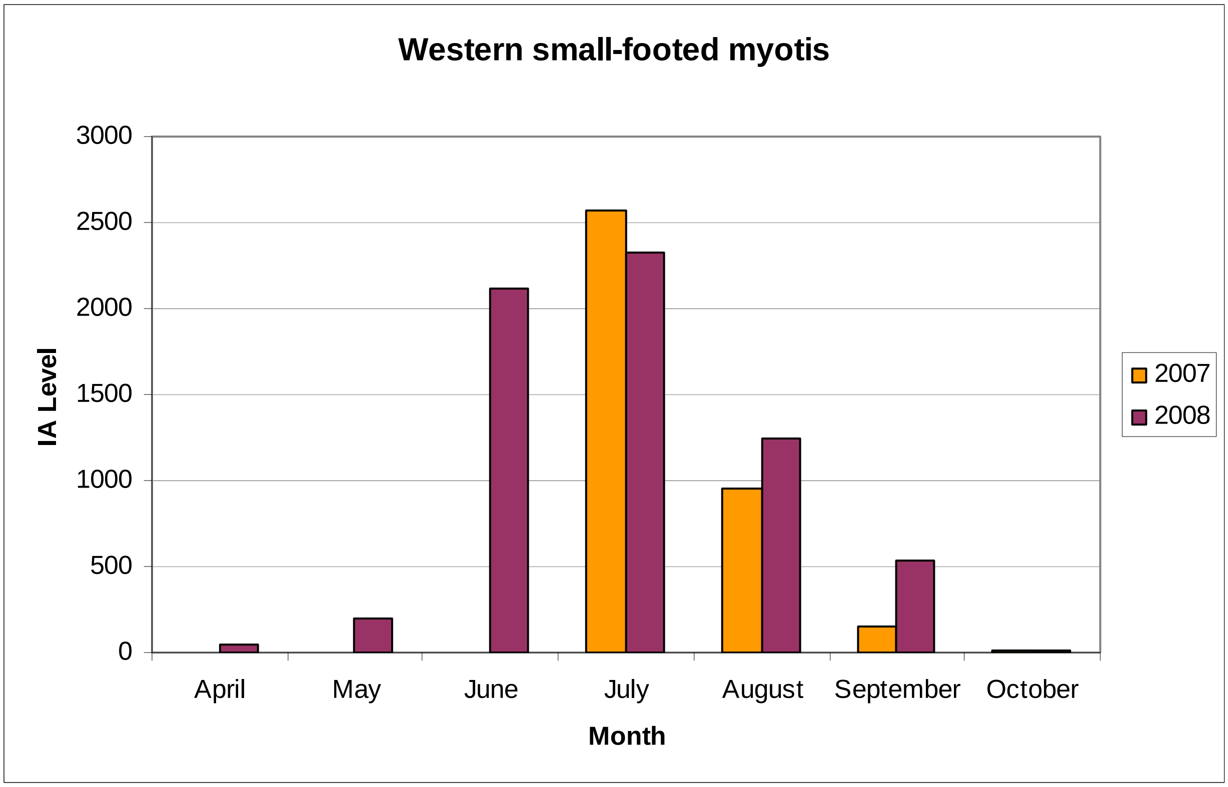


Figure K13. Seasonal IA patterns of western small-footed myotis, 2007–2008.

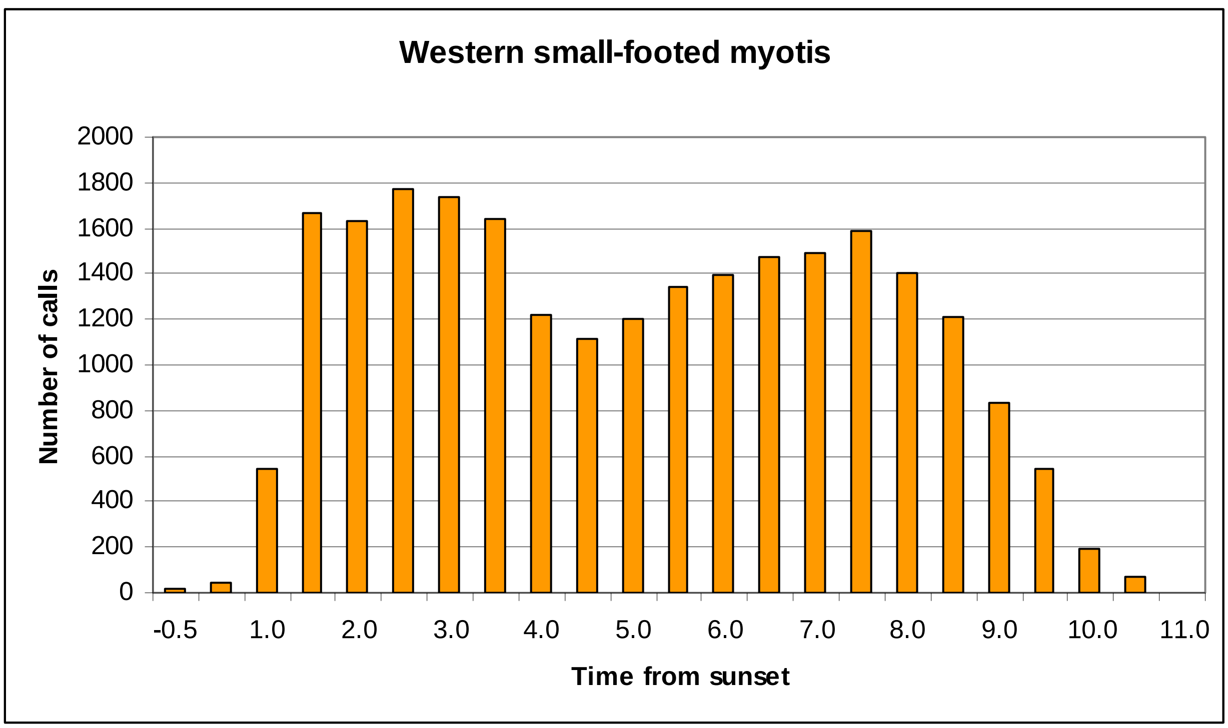


Figure K14. Nightly activity patterns of western small-footed myotis, 2007–2008.

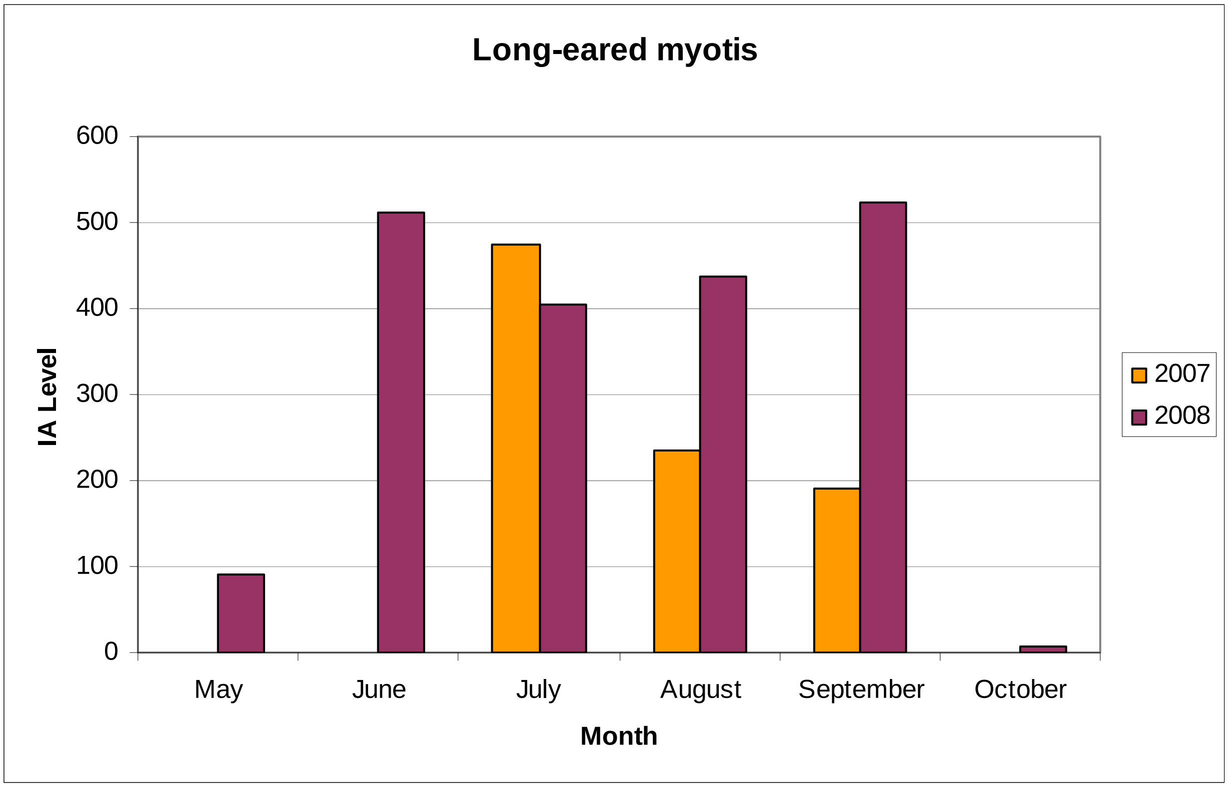


Figure K15. Seasonal IA patterns of long-eared myotis, 2007–2008.

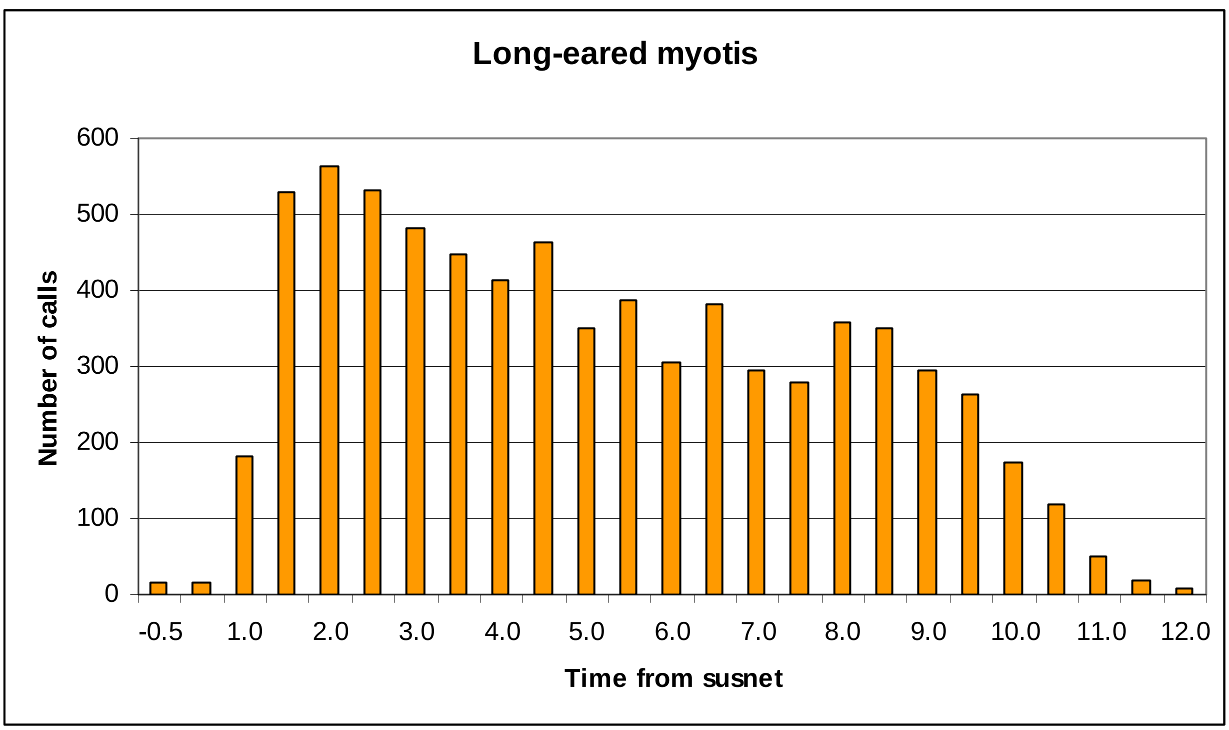


Figure K16. Nightly activity patterns of long-eared myotis, 2007–2008.

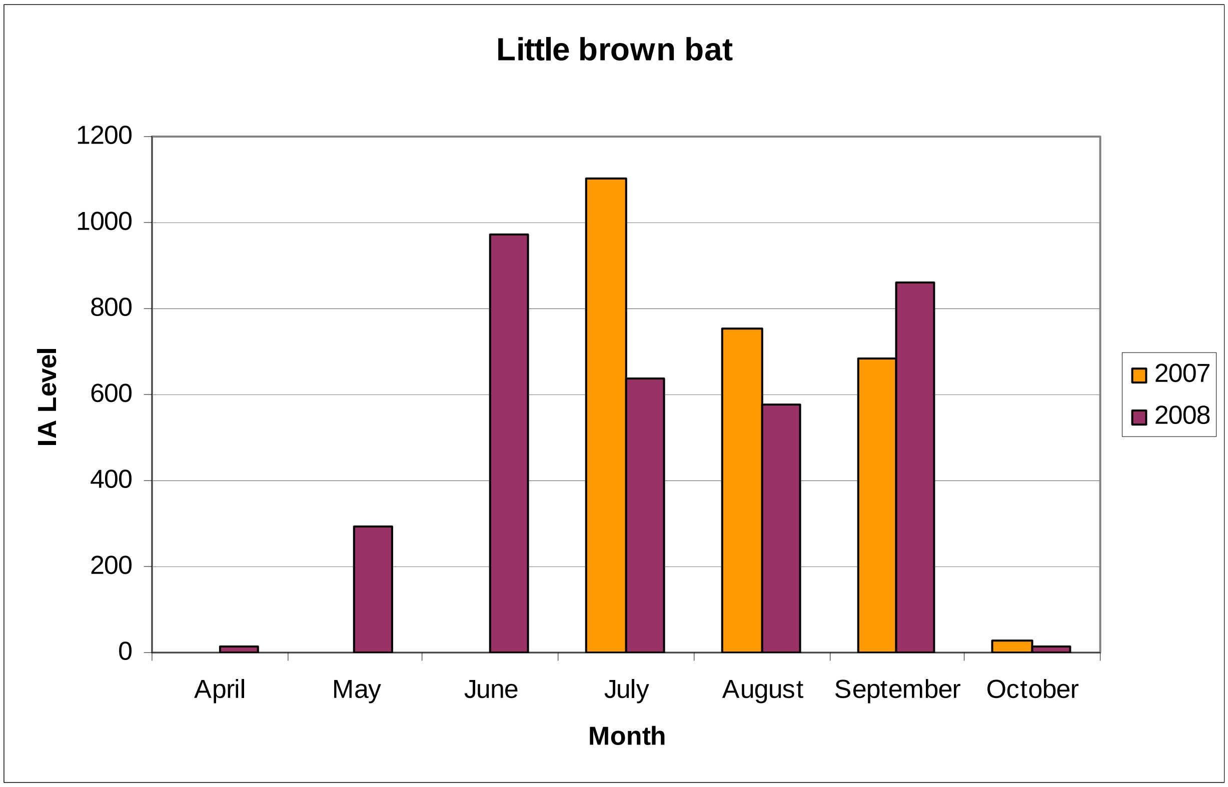


Figure K17. Seasonal IA patterns of little brown bats, 2007–2008.

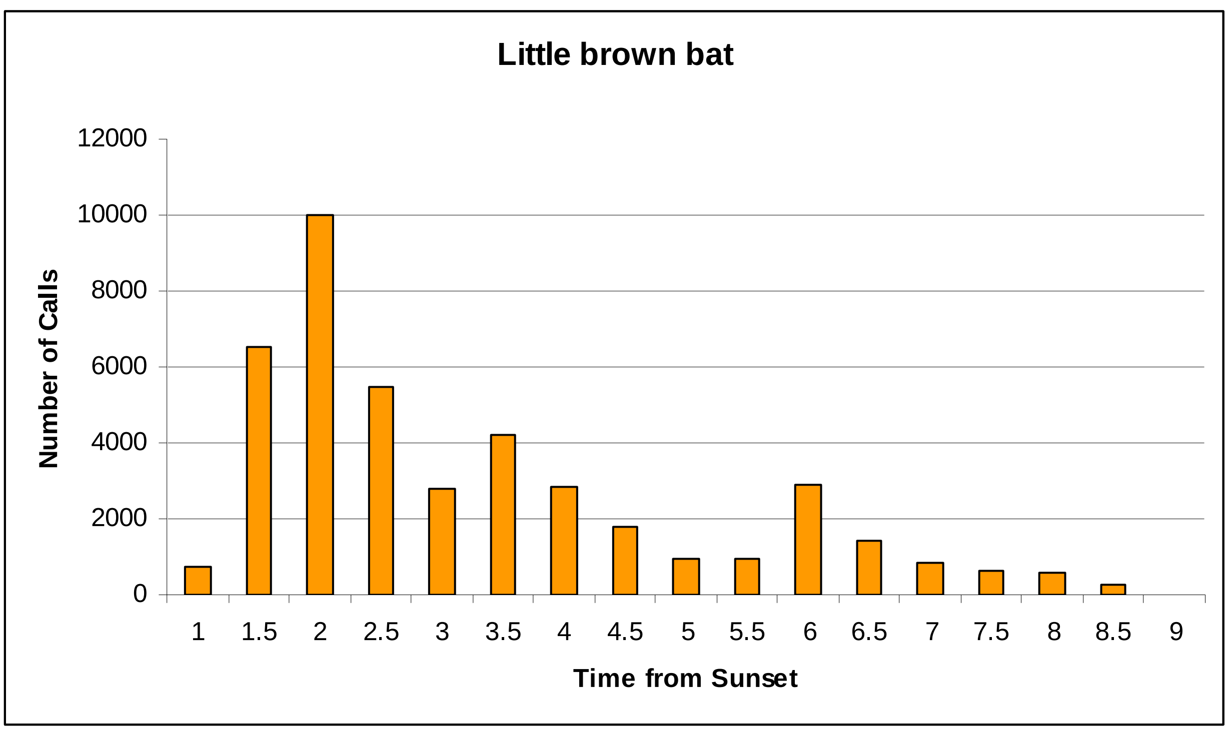


Figure K18. Nightly activity patterns of little brown bats, 2007–2008.

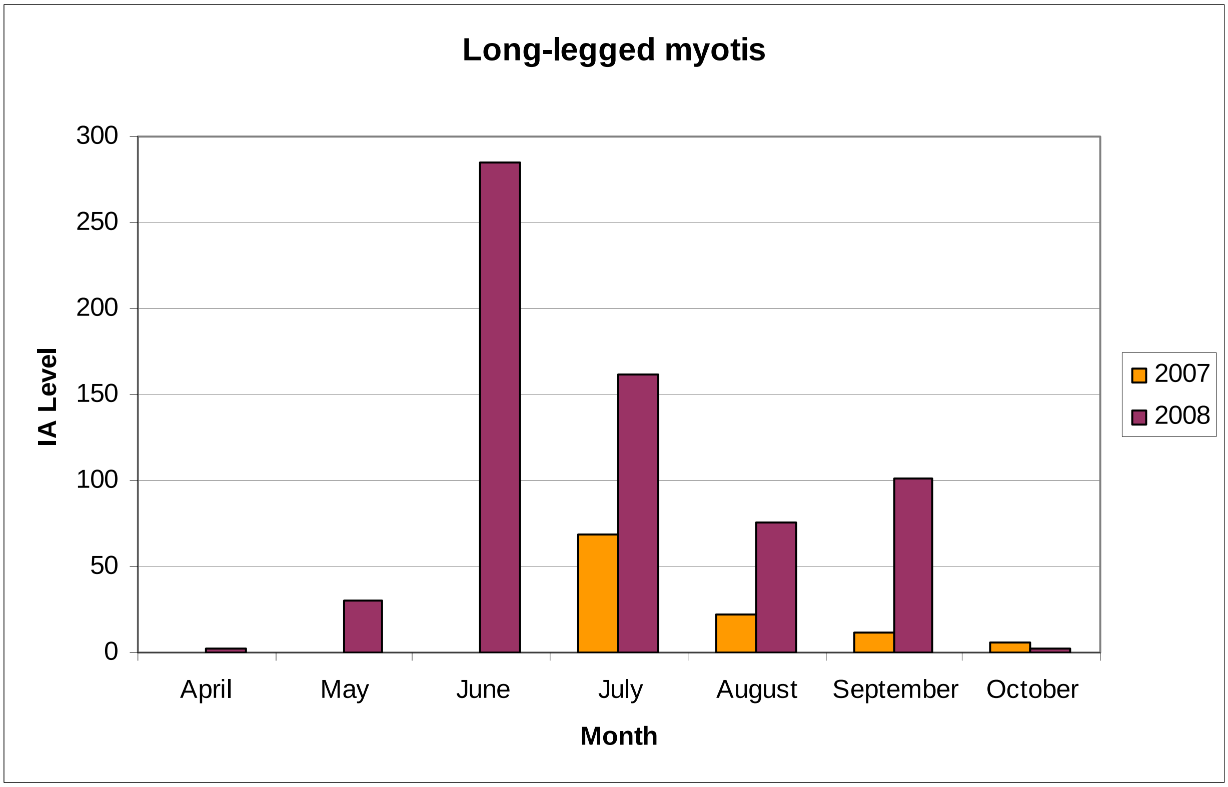


Figure K19. Seasonal IA patterns of long-legged myotis, 2007–2008.

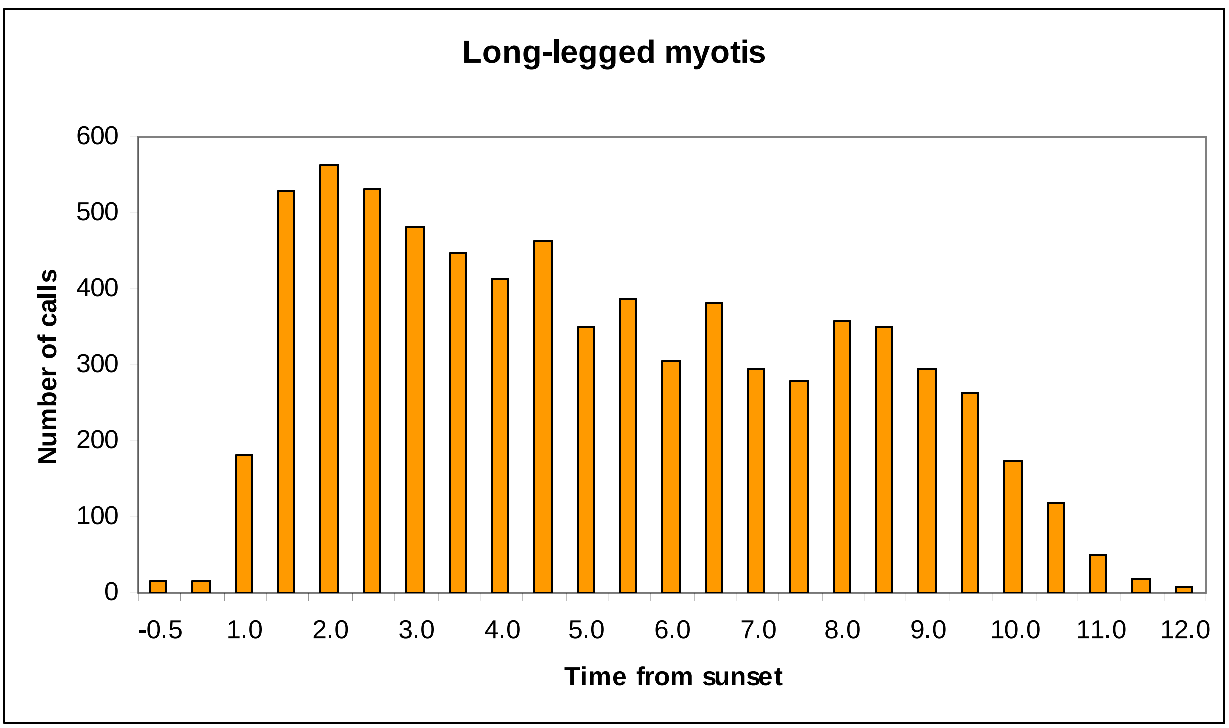


Figure K20. Nightly activity patterns of long-legged myotis, 2007–2008.

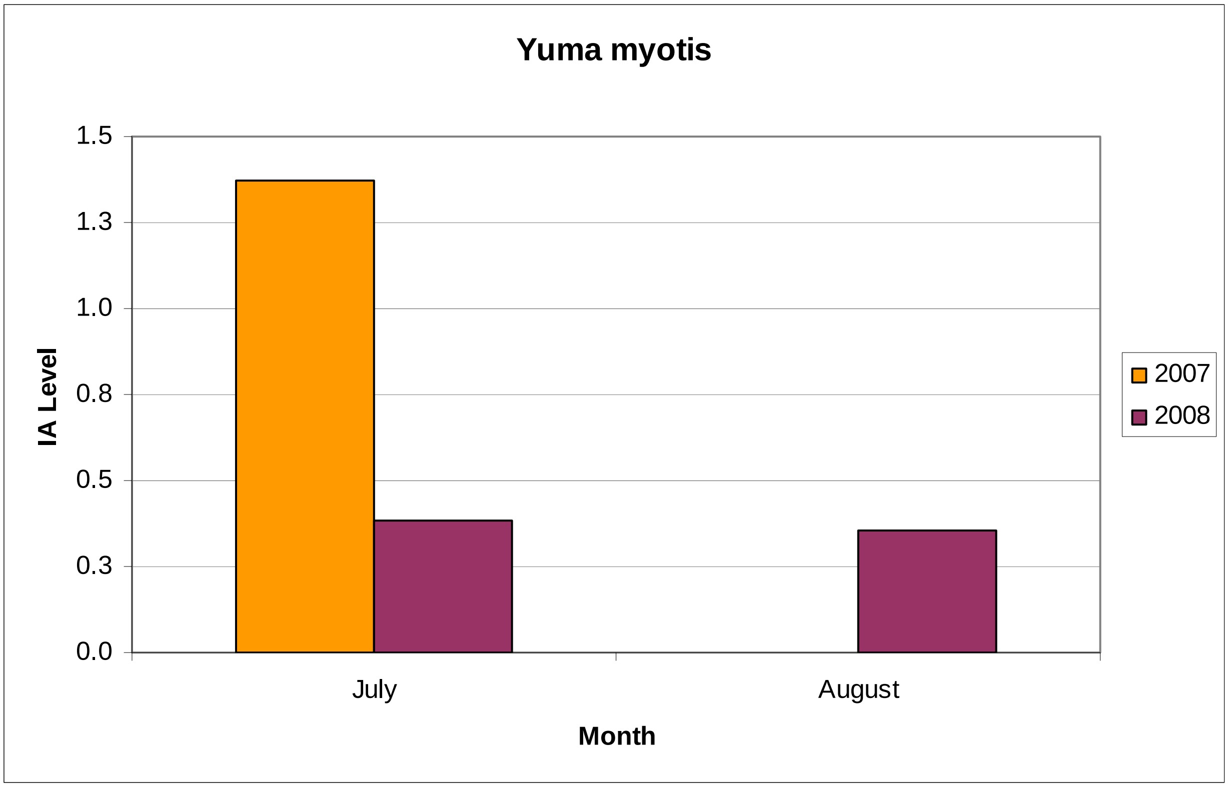


Figure K21. Seasonal IA patterns of Yuma myotis, 2007–2008.

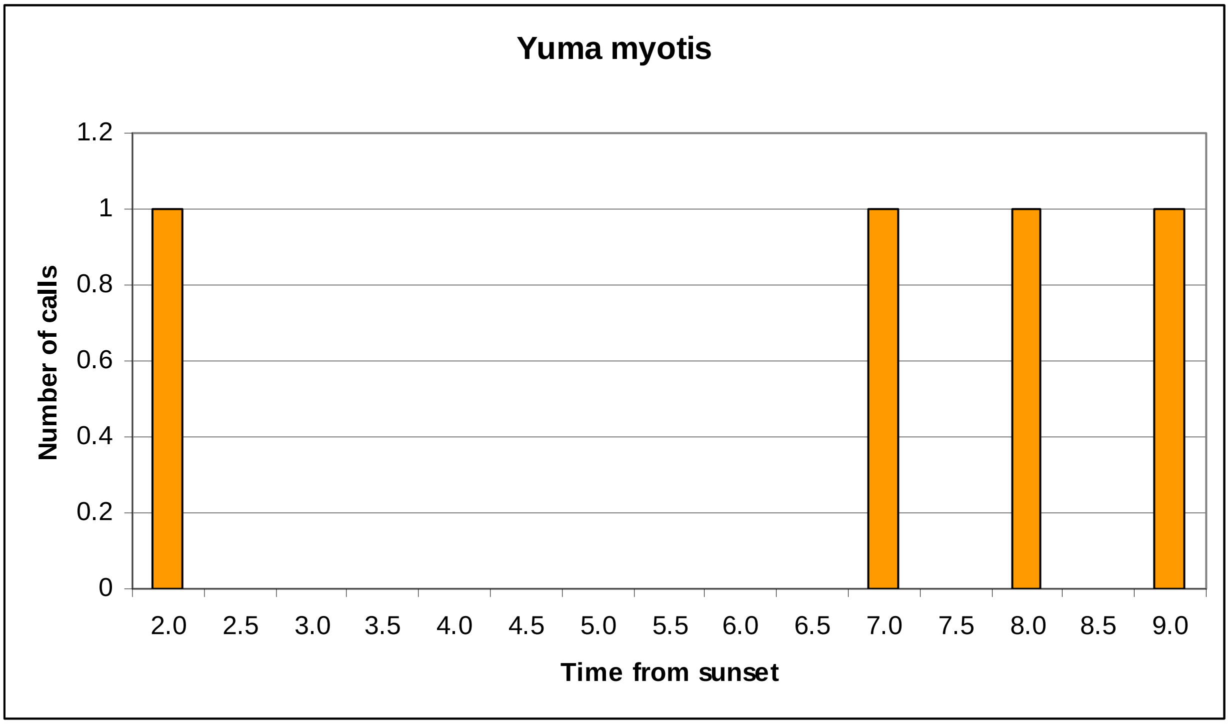


Figure K22. Nightly activity patterns of Yuma myotis, 2007–2008.

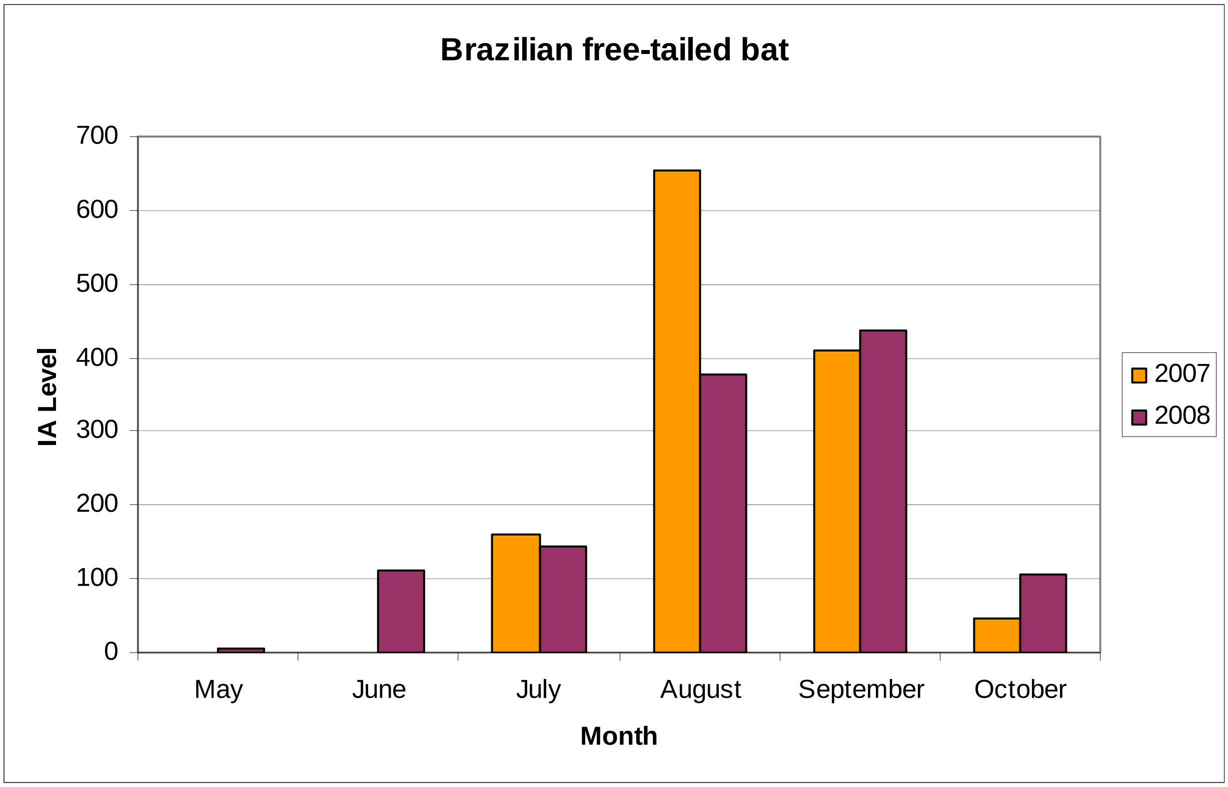


Figure K23. Seasonal IA patterns of Brazilian free-tailed bats, 2007–2008.

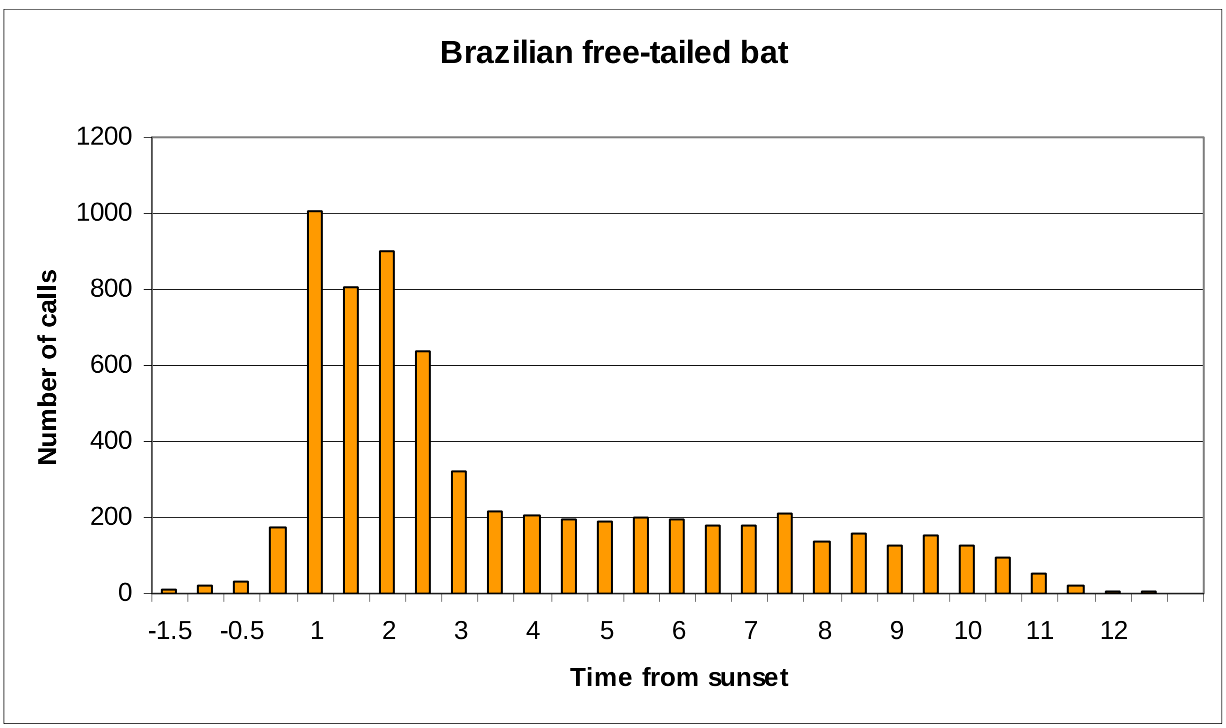


Figure K24. Nightly activity patterns of Brazilian free-tailed bats, 2007–2008.

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Spring Valley Wind Visual Resource Assessment

Prepared for

Spring Valley Wind, LLC

and

U.S. Bureau of Land Management
Schell Field Office

Prepared by

SWCA Environmental Consultants

September 2009

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1.0 INTRODUCTION

1.1 BACKGROUND

Spring Valley Wind, LLC is proposing the development of a 150 Megawatt (MW) Wind Generating Facility (WGF) along with associated roads, rights-of-way (ROWs), and ancillary facilities within Spring Valley, which is located approximately 40 km (25 miles) southeast of Ely, Nevada. Development of this project is motivated by growing electrical power needs within the State of Nevada and will help to satisfy the State of Nevada goal of achieving not less than 20% of electrical energy generation from renewable resources by 2015 (NRS 704.7821). Development of the WGF will include placement of up to 75 wind turbines, which have an anticipated life span of 30 years.

Spring Valley is situated between the Schell Creek Range to the west and the Snake Range to the east (Figure 1). The project area is 7,820 acres and is comprised of Federal lands. The project is located in White Pine County, Nevada within Township 15 N, Range 66 E, Sections 25 and 36, Township15 N, Range 67 E, Sections 30, 31 and 32, Township 14N, Range 66 E, Sections 1 and 12; Township 14N, Range 67 E, Sections 5, 6 and 7-9 found on the South Bastion Spring, Yellowwood Dry Lake, Hogum, and Cave Mountain Nevada, USGS Quadrangles. The project area is generally bounded on the west side by Nevada State Highway 893 and on the south and east sides by U.S. Highway 6\50 (Figure 1).

This visual resource assessment describes both the current condition of the landscape within and surrounding the project area and the potential effects to the landscape from the proposed action in order to support future documentation for the National Environmental Policy Act. Visual resources were identified by the BLM as one of the issues of concern regarding this project during a pre-project meeting between SWCA Environmental Consultants (SWCA) and the BLM Ely District Office on April 2, 2008. SWCA's analysis of effects to the landscape is three tiered. The first level of analysis consists of a general discussion of changes to the landscape resulting from the proposed action. The second level of analysis consists of an assessment of impacts resulting from those same actions as seen from five key observation points (KOPs). The KOPs are critical viewpoints of typical landscapes of the project area that have been selected to represent the views of disturbances throughout the life of the project and that are encountered by the greatest number of people. The location and rationale for the selection of KOPs are identified below. The third level of analysis consists of an assessment of whether the proposed changes to the landscape would meet the BLM's objectives for management of visual resources, as prescribed in the BLM-Ely RMP/ROD (BLM 2008). This assessment is presented in the conclusion.

1.2 ENVIRONMENTAL SETTING

The proposed action would occur within a classic basin and range landscape which consists of broad, open valleys flanked by north-south trending mountain ranges that define and contain the views. The dominant landscape characteristic within and surrounding the proposed project area is common of the basin and range with the broad valley floor extending north and south to the horizons flanked by the steep rugged Schell Creek range to the west and the Snake range to the east. Vegetation typical of the Great Basin environment occurs throughout the project area. Sagebrush is interspersed with greasewood, shadscale, rabbitbrush and other shrubs and grasses that contribute to the scenic quality of the area. Naturally exposed white, buff and tan-colored soils also add scenic contrasts and scenic quality to the area. Additional vegetation consists of the darker green rocky mountain juniper – or swamp cedars, present on the valley floor. The existing landscape has been only somewhat modified through past and current human habitation, highway and road development, ranching and mining activities, and transmission lines.

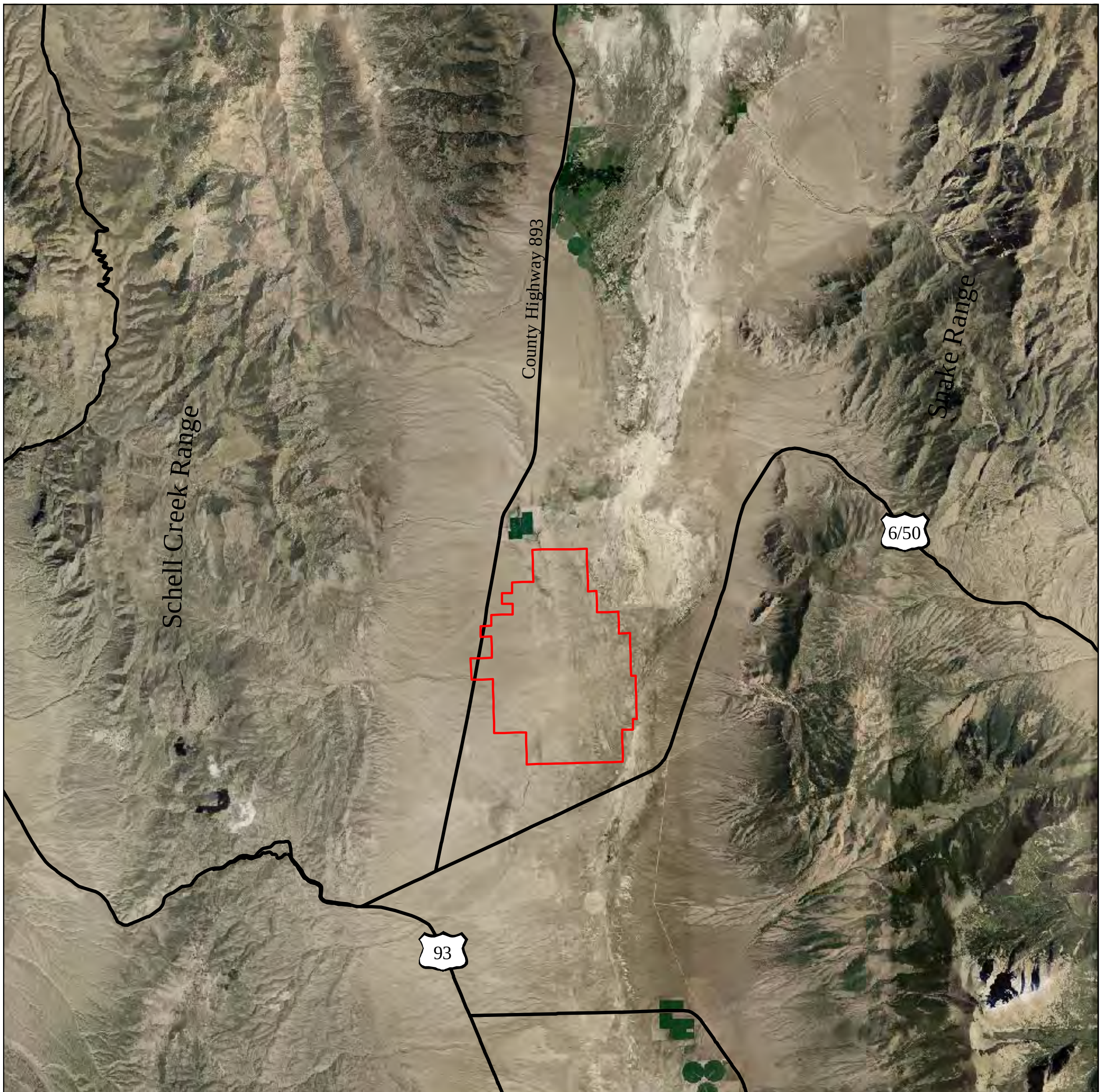


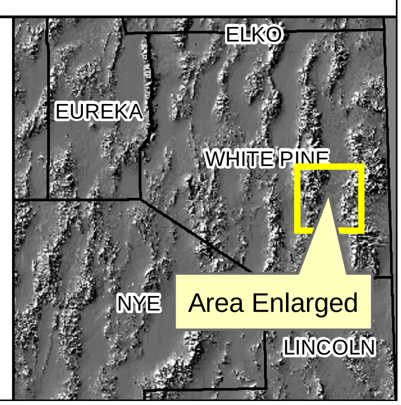
Figure 1. Project area overview.

Project Area
Highway

0 3.75 7.5 15 Kilometers
0 2.5 5 10 Miles

N

Basemap taken from USGS 24K series topographic quadrangles.



1.3 BLM Visual Resource Management Program

Visual resources (i.e. the landscape) consist of landform (topography and soils), vegetation, bodies of water (lakes, streams, and rivers), and human-made structures (roads, buildings, and modifications of the land, vegetation, and water). These elements of the landscape can be described in terms of their form, line, color, and texture. Normally, the more variety of these elements there is in a landscape, the more interesting or scenic the landscape becomes, especially if the elements exist in harmony with each other (BLM 1992). The BLM manages landscapes for varying levels of protection and modification, giving consideration to other resources values and uses and the scenic quality of the landscape.

The BLM uses a Visual Resource Inventory (VRI) system to inventory and manage visual resources on public lands. VRI classes are visual ratings that describe an area in terms of visual or scenic quality and viewer sensitivity to the landscape (the degree of public concern for an area's scenic quality). The VRI system uses four classes to describe different degrees of modification allowed to the landscape; classes I and II being the most valued, class III representing moderate value, and class IV representing the least value. The VRI provides the basis for considering visual values in the resource management planning (RMP) process. Visual Resource Management (VRM) classes are established through the RMP process, during which time the VRI class boundaries and assignments may be adjusted to reflect resource allocation decisions made in the RMP. The VRM objectives can then be used to analyze and determine visual impacts of proposed activities and to gauge the amount of disturbance an area can tolerate before it exceeds the visual management objectives of its VRM class (BLM 1980).

VRM class designations are based on the area's visual sensitivity and are a result of a combination of factors, including the degree of visitor interest in and public concern for the area's visual resources, the area's public visibility, the level of use by the public, and the type of visitor use the area receives. The BLM designated the project area as VRM Class III (BLM 2008). The Class III management objective is "to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention, but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape" (BLM 1980).

2.0 Methodology

2.1 Viewshed Delineation

The visual area of analysis for the landscape is considered to be lands where potential visual effects to the landscape from the proposed action may be discerned. To better define the area of analysis, a viewshed delineation was prepared. The viewshed delineation reveals those areas from which the proposed action would have a clear line of sight, and is a useful tool in defining the final area of analysis and facilitating the selection of KOPs. To generate the 3D environment necessary for the viewshed delineation, Digital Elevation Model (DEM) data files from the USGS were joined into a mosaic with an extent expansive enough to include the area of analysis and potential KOPs (Figure 2). The "Visible" and "Not Visible" areas resulting from the analysis indicate which areas an observer may be able to see the project area from. The area of analysis for the Spring Valley Wind Project consists of an 11-mile radius around the project area which roughly marks the maximum distance away that an observer could clearly distinguish the turbine structures. This includes Wheeler Peak in Great Basin National Park.

2.2 KOP SELECTION

The method BLM uses to determine whether proposed projects conform to VRM class objectives is a contrast rating system that evaluates effects of proposed projects on visual resources. Contrast rating is done from critical viewpoints, known as KOPs, which are usually along commonly traveled routes, such as highways, access roads, or hiking trails. A KOP can either be a single point of view that an observer/evaluator uses to rate an area or panorama, or a linear view along a roadway, trail, or river corridor. SWCA worked with the BLM visual resource specialist to select KOPs for the proposed project based on the following considerations:

- The viewshed delineation
- Distance from the proposed project
- High degree of visibility to the project area
- Angle of observation or slope of the proposed project area
- The vast open area of the landscape
- Number of potential viewers of the project area
- Length of time that the project would be in view
- Relative size of the project
- Light conditions

The primary public views of the proposed action would be from two travel routes, U.S. 50 and County Road 893. SWCA worked with the BLM to select Key Observation Points (KOPs) to represent effects of the project as seen from public areas that permit a high degree of visibility to the project area. Potential static KOPs that were considered included the campground at Cleve Creek, the private property at Sacramento Pass, and Wheeler Peak within Great Basin National Park. After evaluation of the three static points, it was determined that the proposed action would only be visible from Wheeler Peak. For that reason, the KOPs at Sacramento Pass and Cleve Creek were dropped from further evaluation. Ultimately, five KOPs were identified to represent typical views of the project area to people traveling through Spring Valley, and views from Wheeler Peak.

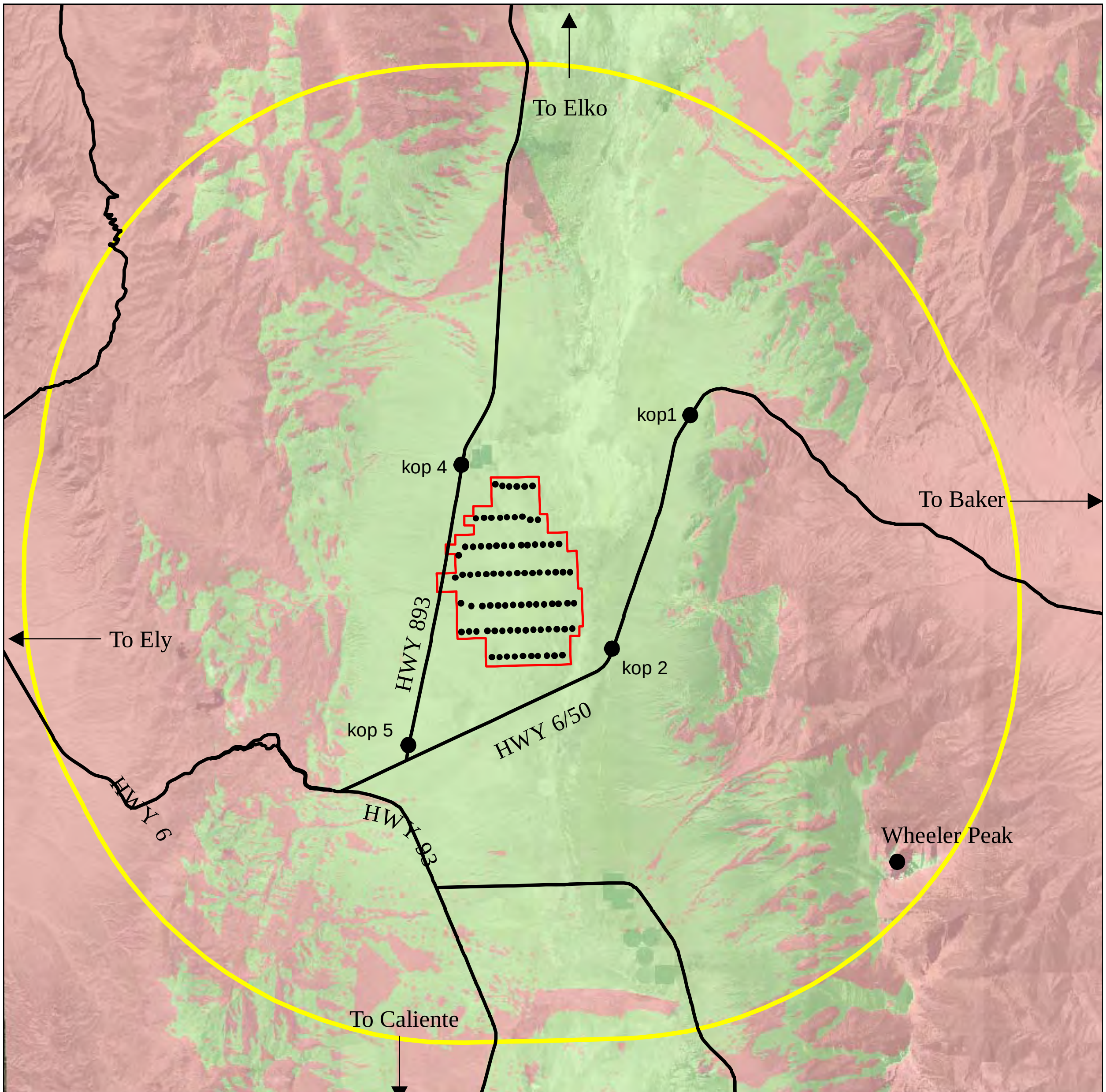
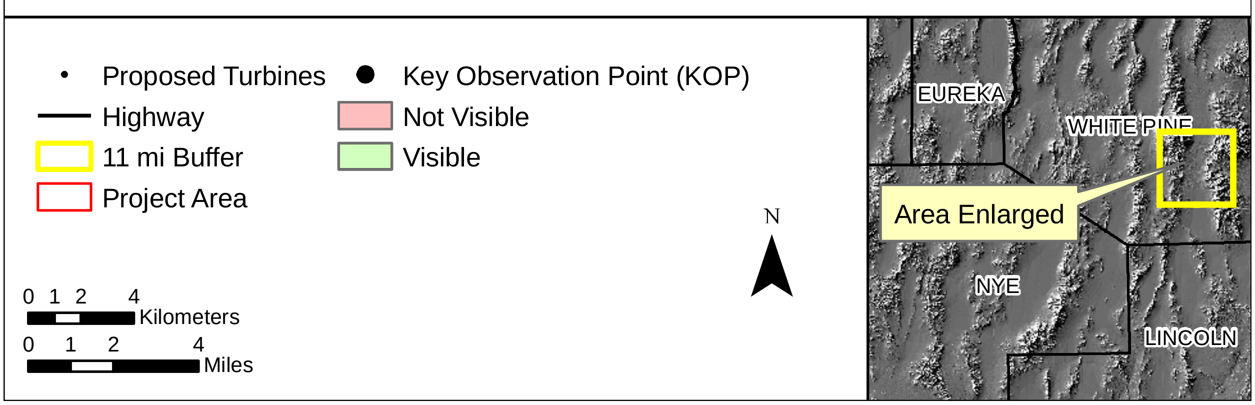


Figure 2. Viewshed delineation and KOP locations.



2.3 VISUAL CONTRAST RATINGS

VRM analysis involves determining if the visual impacts of the elements of the proposed project would meet the management objectives established for the project area in the RMP. The BLM has established a visual contrast rating process to complete this analysis. Using BLM form 8400-4-Visual Contrast Rating Worksheet, visual resource specialists evaluated the degree of visual contrasts from each KOP, based on the form, line, color, and texture changes between the existing landscapes and how the landscapes would look after implementation of the proposed action. Forms were completed in the field from each KOP on August 5 and 6, 2009 and are included in Appendix A.

2.4 VISUAL SIMULATIONS

Visual simulations provide an excellent tool to evaluate a proposed project's impact on the landscape. There are several steps to complete accurate simulations for the proposed action; still photographs were taken, Google SketchUp was used to create and dimension the wind turbine model, Google Earth was used for the placement of the wind turbines in a 3D environment, and Photoshop Elements was used to bring these together to create and edit the final image.

The location of each KOP was recorded in the field with mapping grade GPS receivers. From each KOP, a series of photos was taken in the direction of the proposed turbine locations with a 50mm (Normal) lens and merged together into panoramic views (Figure 3) using Adobe Photoshop Elements. An object with a known height and location was included in the foreground of each photo frame to help confirm accurate turbine heights in the photographic simulation. To do this, a 15 foot tall marker was placed in the foreground of each photo and the location of the marker was recorded using a mapping grade GPS receiver (Figure 3).

Figure 3. Panoramic photo with marker

The geographic coordinates for the photo point locations, marker location and proposed turbine locations were imported to Google Earth. A human model (height ~5.6 ft) was imported from SketchUp and placed at each photo point. By tilting and panning in Google Earth, the view from each point was adjusted to line up with the model's head (Figure 4). This was done to mimic the camera height, angle and direction used while taking the photos. Additionally, Google SketchUp was used to create the marker model and wind turbine model that was imported for each of the proposed turbine locations. Google SketchUp allows the user to define the dimensions of the turbine including height and width.

Figure 4. Image from Google Earth showing a properly aligned view

The lighting in Google Earth was adjusted to approximate the time of day and year that the panoramic photos were taken, casting appropriate shading on the turbine models. An image of the adjusted view of the turbines, 15ft marker and surrounding terrain was exported from Google Earth (Figure 5).

Figure 5. Example of exported image of turbines with simulated shading

Using Photoshop Elements, the exported image from Google Earth was superimposed on the panoramic photo. The size of the exported image was increased to the point at which the marker height in the export matched that of the marker height in the photo. The terrain size in both images was used to further assist scaling (Figure 6). This method scales the turbines to provide a close approximation of the turbine size that would be observed from the photo points. Once aligned, the turbines were extracted from the Google Earth export and merged with the actual photo. Further image enhancements were made using the tools available in Photoshop Elements. These included softening the hard imagery of the export and correcting for losses and errors from pixilation.

Figure 6. Image exported from Google Earth superimposed photo

A small amount of turbine size error can be expected for any one of the simulated images due to the inexact method of manually lining up and scaling the superimposed images. However, this error was minimized through the use of the markers of known height and location.

3.0 VISUAL CONTRAST ANALYSIS

3.1 OVERVIEW

Turbines and associated facilities and infrastructure are planned for the flat terrain of the valley floor set against the mountains as a backdrop. There would be only minor changes to the existing topography and landform within Spring Valley, and to the existing vegetation and soil surfaces. However, the wind energy turbines would be the largest human made structures to occur within Spring Valley. There would be up to 75 vertical towers approximately 127.5 meters tall. The rotor blades would have a slow, circular movement. The towers would be set against the solid backdrop of the valley floor, alluvial fans, or the Schell Creek and Snake ranges, and against the sky.

3.2 KEY OBSERVATION POINTS

A visual simulation and Visual Contrast Rating Form (Appendix A) were completed for each KOP and the findings are summarized below. SWCA visual resource specialists evaluated the degree of visual contrasts from each KOP based on the form, line, color, and texture changes between the existing landscapes and how the landscapes would look after implementation of the proposed action.

KOP 1 is located on highway 50 just west of Sacramento Pass (Figure 2). From this location, the view is to the southwest and looks out over the wide open valley floor. Low shrubs and grasses cover the valley floor interspersed with patches of darker green juniper. The rugged horizon line of the Schell Creek Range occurs in the middle ground and background. Figure 7 provides a view from the KOP. This location represents the views of people traveling south and west on highway 50 through Spring Valley. The Spring Valley Wind Project repeats some of the basic elements of line and texture, but not color and form of the existing conditions within Spring Valley. The nearest proposed turbine is located approximately 4.6 miles from the KOP. At this distance, the turbines are clearly visible, and there is a moderate contrast with the surrounding landscape (Figure 8). From this section of highway 50, the project would be in view for approximately 7 miles against the backdrop of the Schell Creek Range. Viewers traveling at the 70 mph posted speed limit would view the project for no more than 10 minutes.

Figure 7 – View from KOP 1

Figure 8 – Visual Simulation from KOP 1

KOP 2 is located on highway 50 south of KOP #1 (Figure 2). From this location, the view of the project area is to the northwest and looks up the valley floor and the higher peaks of the Schell Creek range. Low shrubs and grasses cover the valley floor. Although the darker green swamp cedars are visible, they occur outside the primary view of the project area. The rugged horizon line of the Schell Creek Range occurs in the background. Figure 9 provides a view from the KOP. This location represents the views of people traveling north and east on highway 50 through Spring Valley. The Spring Valley Wind Project repeats some of the basic elements of line and texture, but not color and form of the existing conditions within Spring Valley (Figure 10). The nearest proposed turbine is located approximately 1.3 miles from the KOP. From this section of highway 50, the turbines of the proposed project would be clearly visible for several miles against the backdrop of the Schell Creek Range and a moderate contrast in form and line would occur. Viewers traveling at the 70 mph posted speed limit would view the project for no more than 10 minutes.

KOP 4 is located on 893 just south of the SNWA ranch property (Figure 2). From this location, the view is to the southeast and looks out over the wide open valley floor. Low shrubs and grasses cover the valley floor interspersed with patches of darker green juniper. The rugged horizon line of the Snake range occurs in the background. Figure 11 provides a view from the KOP. This location represents the views of people traveling south on route 893. The turbines of the proposed project are clearly visible and a moderate linear contrast would result. Additionally, moderate contrasts in form and color would occur (Figure 12). The nearest proposed turbine is located approximately one mile from the KOP. From this section of 893, the project would be in view for approximately 5 miles against the backdrop of the Schell Snake Range. Viewers traveling at 65 mph would view the project for no more than 8 minutes.

KOP 5 is located on 893 just south of KOP#4 (Figure 2). From this location, the view is to the east and northeast and looks out over the wide open valley floor. Low shrubs and grasses cover the valley floor interspersed with patches of darker green juniper. The rugged horizon line of the Snake Range occurs in the background. Figure 13 provides a view from the KOP. This location represents the views of people traveling north on route 893 and would consist of local residents, hunters, and visitors to Cleve Creek. The proposed action repeats some of the basic elements of line and texture, but not the color and form of existing conditions within Spring Valley. The majority of turbines are set against the darker background of the mountains. The nearest proposed turbine is located approximately 3.2 miles from the KOP, at this distance; the turbines are clearly visible and moderate contrasts to form, line and color would occur (Figure 14). From this section of 893, the project would be in view for approximately 5 miles against the backdrop of the Schell Creek Range. Viewers traveling at 65 mph would view the project for no more than 8 minutes.

Wheeler Peak is located approximately 11 miles southeast of the project area (Figure 2). The valley floor is covered in vegetation and crisscrossed with roads and transmission lines. The rugged horizon line of the Schell Creek Range occurs in the background. Figure 15 provides a view from the summit. This location represents the views of people looking directly at the project area from the summit. Although the turbines are visible, the apparent visual contrast is minor as a result of the distance (11 miles) and the high angle of observation. At this distance, the turbines appear as points on the valley floor connected by the faint linear lines of the access roads (Figure 16). Additionally, the valley floor is not the dominant view from the summit. Views to the south, east and north of the rugged Snake Range are more scenic to visitors at the summit.

Figure 9 – View from KOP 2

Figure 10 – Simulation from KOP 2

Figure 11 – View from KOP 4

Figure 12 – Simulation from KOP 4

Figure 13 – View from KOP 5

Figure 14 – Simulation from KOP 5

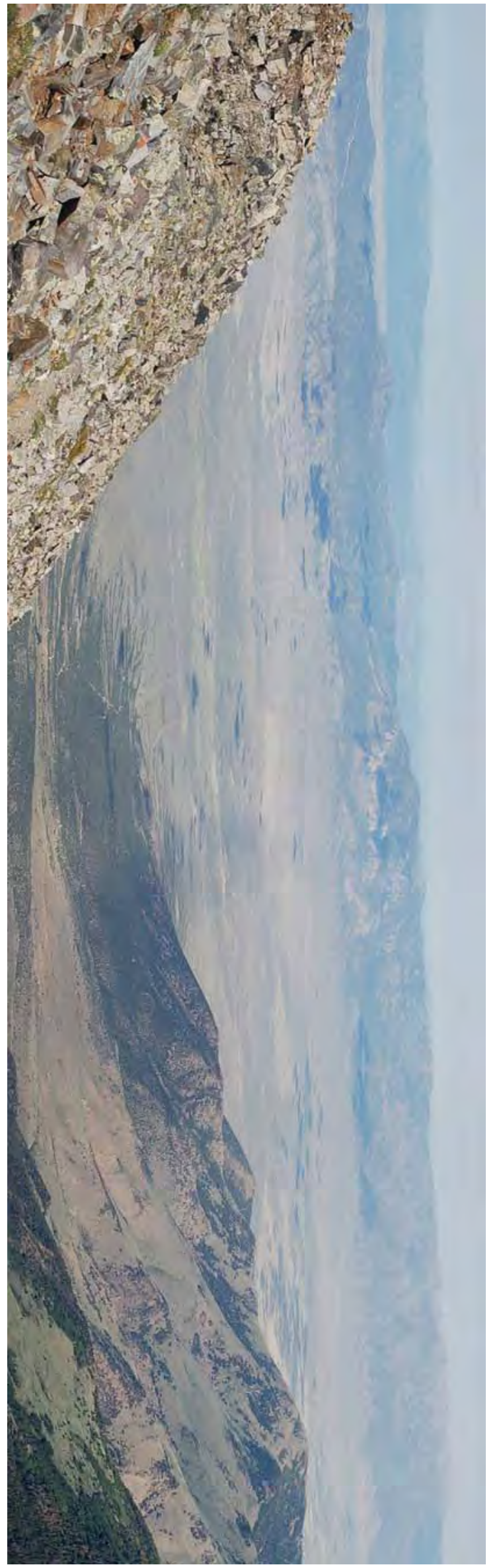


Figure 15 – View from Wheeler Peak

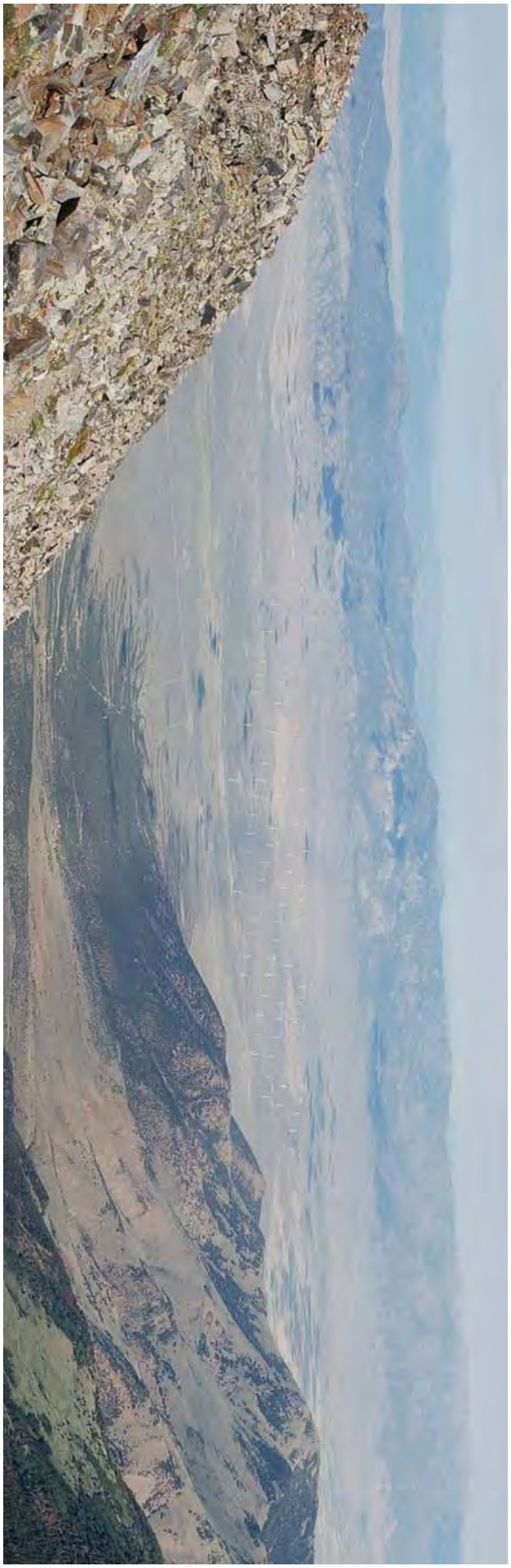


Figure 16 – Simulation from Wheeler Peak

4.0 CONCLUSIONS

The level of change to the landscape apparent from KOPs 1, 2, 4 and 5 would be moderate based on the visual resource contrast analysis. Moderate contrasts in the elements of the environment are consistent with BLM's objectives for VRM Class III. The level of change to the landscape apparent from Wheeler Peak would be weak based on the visual resource contrast analysis. Although there are visible contrasts apparent from each of the KOPs, because they occur primarily along high speed travel routes, the contrasts would be visible for limited periods of time, no more than 10 minutes. Typical vehicle travel time from the city of Ely to the town of Baker is one hour. Additionally, the project would not be visible from the private residences at Sacramento Pass or the Cleve Creek Campground. When considering the contrast ratings cumulatively, implementation of the project would attract the attention of viewers traveling through Spring Valley, and would result in moderate contrasts to the existing landscape. The conclusion that the Spring Valley Wind Project would attract attention and be seen, but would not dominate the view of the casual observer from those KOPs is consistent with class III management objectives.

5.0 REFERENCES

Bureau of Land Management (BLM). 1980. Visual Resource Management Program. U.S. Government Printing Office, Washington, D.C.

BLM. 1986. Visual Resource Contrast Rating. BLM Manual Handbook 8431-1.

BLM. 1992. BLM Handbook 8400 – Visual Resource Management.

BLM. 2008. Ely Resource Management Plan and Final Environmental Impact Statement. Ely, Nevada: U.S. Bureau of Land Management, Ely District Office

APPENDIX A - VISUAL CONTRAST RATING WORKSHEETS

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date (of field work)	08.05.2009
District	Ely District Office
Resource Area	Schell Field Office
Activity (program)	Lands and Realty

SECTION A. PROJECT INFORMATION

1. Project Name Spring Valley Wind	4. Location: See the Spring Valley Wind Visual Resource Assessment for a map of the location. Elevation 6,300 feet	5. Location Sketch See the Spring Valley Wind Visual Resource Assessment for photographic simulations of the project.
2. Key Observation Point #1 Sacramento Pass – looking south and west		
3. VRM Class III		

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	The broad, open valley extends north and south. Across the valley, wide triangular alluvial fans sweep down from the steep and rugged terrain of the Schell Creek Range. A complex pattern of bold, irregular limestone faces break up the long variable and undulating ridgeline.	The valley and fans are covered in low, rounded shrubs interspersed with spiky perennial grasses, dense mats of invasive annual grasses. Stands of tall irregular Swamp Cedar fill portions of the valley floor to the south with long strings of trees extending outward. Strings of Juniper and larger trees are apparent along the small ridges and fans across the valley.	Numerous short vertical fence poles parallel the roadway connected by several faint barbed wire lines. U.S. 50 is a wide smooth band extending south from the viewing point.
LINE	Triangular lines of alluvial fans are visible west of the valley. The long, irregular horizon line of the Schell Creek Range extends to the north and south.	The Swamp Cedars form a diffuse line extending into the shrub and grass covered valley floor. There is a long straight line of varying vegetation parallel to U.S. 50.	The fence line consists of a series of single vertical posts connected by horizontal lines. Faint vehicle tracks crisscross the valley floor. U.S. 50 is a straight band.
COLOR	The valley floor and alluvial fans are densely covered in vegetation. Some gray and tan soils and gravels are visible. The Schell Creek Range is a combination of muted blacks, tans and grays. The light at the time was flat resulting in muted visible colors.	Vegetation adjacent to the roadways are tan and light gray-green. The shrubs and grasses along the fans and valley floor are a dull gray green mixed with tans and browns. The Junipers and Swamp Cedars are a dark green and appear black due to the distance and haziness. The dense trees of the Schell Creek Range also appear black in the distance.	Brown poles are flat and non reflective. U.S. 50 is a flat gray surface. The transmission line poles are flat, non reflective metallic colored.
TEX-TURE	The texture of the soils are not readily apparent, though what is visible is medium density and coarse-grained. The mountains in the BG are smooth, fine grained.	Most of the vegetation appears dense and coarse textured. The further away from the KOP in the BG, the smoother the texture.	The fence line and highway 50 are ordered, directional, and occur in a continuous line on the landscape. Materials of the fence line and the surface of Highway 50 appear smooth.

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Excavations for the turbine and facility foundations would be apparent in the short term during the construction period. Trenching along roads for collector lines would be visible.	Increased patchiness would result from vegetation removal along access roads, laydown areas and foundations.	There would be numerous vertical towers. Due to the distance, the towers appear 2-dimensional against the backdrop of the Schell Creek Range. Rotor blades would have a slow, circular movement.
LINE	Angular geometric lines would result from trenching, road and foundation excavations throughout the project area. Contrast is diminished due to distance (3 ¾ miles).	Irregular, blocky and linear breaks in the shrubs and grasses across the valley floor would occur.	Turbines would be straight, vertical lines and a maximum of 128 meters tall with rotors. The vertical lines of the turbines would be repeated throughout the project area (up to 75 turbines) and would repeat the basic vertical line of fence posts and the existing transmission line, and they would be at an angle to the existing roads.

COLOR	Exposed soils will be white, gray to tan.	Color would vary over time in temporary disturbance areas as new growth occurs.	The turbines would be painted a flat, matte gray. Roads will be tan to gray. The O&M building and substation would be painted a non-reflective color and fenced in behind non-reflective wire fencing.
TEX-TURE	Exposed soils would appear smooth grained. Due to distance, there would be no apparent change in texture.	Vegetation would be patchier as new growth fills in temporary disturbance areas. Texture would remain smooth due to distance.	The turbines would be smooth textured with no internal contrast. Access roads would appear smooth textured.

SECTION D. CONTRAST RATING ___ SHORT TERM _X_ LONG TERM

1. DEGREE OF CONTRAST	FEATURES: LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
ELEMENT: Form			X				X			X		
Line			X			X				X		
Color			X				X			X		
Texture			X				X				X	

2. Does project design meet visual resource management objectives? _X_ Yes __ No (Explain on reverse side)

3. Additional mitigating measures recommended? __ Yes _X No (Explain on reverse side)

Evaluators Name(s) Date

Steve Leslie 08.05.2009
SWCA Environmental Consultants

SECTION D. (Continued)

Comments from item 2.

The Spring Valley Wind Project repeats the basic elements of line and texture but not color and form of the existing conditions within Spring Valley. The project is located approximately 3 ¾ miles from the KOP within the middleground of the viewshed. At this distance, the turbines are clearly visible, although they appear small, and the apparent contrast with the surrounding landscape is moderate.

From this section of highway 50, the project would be in view for approximately 7 miles against the backdrop of the Schell Creek Range. Additionally, viewers traveling north and south at the 70 mph posted speed limit would view the project for no more than 10 minutes. Moderate contrasts in the elements of the environment are consistent with BLM's objectives for VRM Class III landscapes. The conclusion that the Spring Valley Wind Project would be seen, but would not dominate the view of the casual observer is consistent with the management objective.

Additional Mitigating Measures (See item 3).

Measures that are currently in place that would minimize the visual contrast consist of re-vegetating temporarily disturbed areas and using towers and facilities that are a flat, non reflective, gray.

No additional mitigation measures are recommended.

. S. GOVERNMENT PRINTING OFFICE: 1985-461-988/33094

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date (of field work)
08.05.2009

District
Ely District Office

Resource Area
Schell Field Office

Activity (program)
Lands and Realty

SECTION A. PROJECT INFORMATION

1. Project Name Spring Valley Wind 2. Key Observation Point #2 – U.S. 50, looking west and north towards the project area. 3. VRM Class III	4. Location See the Spring Valley Wind Visual Resource Assessment for a map of the location. Elevation 5,854 feet	5. Location Sketch See the Spring Valley Wind Visual Resource Assessment for photographic simulations of the project.

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	The broad, open valley extends north and south. Across the valley, wide triangular alluvial fans sweep down from the Schell Creek Range. The Schell Creek Range has a long and variable and undulating ridgeline.	The valley and fans are covered in low, rounded shrubs interspersed with spiky perennial grasses. Stands of irregular Swamp Cedar occur to the east and north. Strings of larger trees are faintly apparent along the small ridges and fans across the valley.	Numerous short vertical fence poles parallel the roadway connected by several faint barbed wire lines. U.S. 50 is a wide strip extending north and south west from the viewing point. A series of vertical, wooden power poles cross the valley in an east west direction.
LINE	Triangular lines of alluvial fans are visible west of the valley. The long, irregular ridgeline of the Schell Creek Range extends to the north and south. A straight, horizontal line occurs where the valley floor rises up to the range.	The Swamp Cedars form a diffuse line extending into the shrub and grass covered valley floor. There is a long straight line of varying vegetation parallel to U.S. 50.	The fence line consists of a series of single vertical posts connected by faint horizontal lines. U.S. 50 is a straight band. The distribution line consists of a series of single vertical poles connected by very faint horizontal lines.
COLOR	The valley floor and alluvial fans are densely covered in vegetation. Some gray and tan soils and gravels are visible. The Schell Creek Range is a combination of muted blacks, tans and grays. Snow occurs on the mountains at the time of the field work, and would be a common occurrence for up to six months of the year.	Vegetation adjacent to the roadways is tan and light green. The shrubs and grasses along the fans and valley floor are a dull gray green mixed with tans and browns. The Junipers and Swamp Cedars are a dark green and appear black due to the distance and haziness. The dense trees of the Schell Creek Range also appear black in the distance.	Brown poles are flat and non reflective. U.S. 50 is a flat gray surface.
TEX-TURE	The textures of the soils are not readily apparent, though what is visible is smooth and fine grained. Because of the distance, the rock outcrops of the mountains in the background are smooth.	Most of the shrubs and grasses in the foreground appear dense and coarse textured. Vegetation extending into the background appears smoother the texture.	The fence line, distribution line and highway 50 are ordered, directional, and occur in a continuous line on the landscape. Materials of the fence line and the surface of Highway 50 appear smooth.

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Excavations for the turbine and facility foundations would be apparent in the short term during the construction period. Trenching for collector lines would be visible.	Increased patchiness would result from vegetation removal along access roads, laydown areas and foundations.	There would be numerous vertical towers. The towers would be set against the backdrop of the Schell Creek Range. Rotor blades would have a slow, circular movement.
LINE	Angular geometric lines would result from trenching, road and foundation excavations throughout the project area.	Irregular, blocky and linear breaks in the shrubs and grasses across the valley floor would occur.	Turbines would be straight, vertical lines. Apparently taller than the exiting distribution poles and fence posts. Vertical lines would be repeated throughout the project area.

COLOR	Exposed soils will be white, gray to tan.	Color would vary over time in temporary disturbance areas as reclamation occurs.	The turbines would be painted a flat, matte gray. Access roads will be tan to gray. The O&M building and substation would not be visible from this KOP.
TEX-TURE	Exposed soils would appear smooth and fine grained.	Uneven and irregular – Changes in the texture of vegetation would not be apparent.	The turbines would be smooth textured with no internal contrast. Access roads would appear smooth textured.

SECTION D. CONTRAST RATING ___ SHORT TERM _X_ LONG TERM

1. DEGREE OF CONTRAST		FEATURES												2. Does project design meet visual resource management objectives? _X__ Yes __ No (Explain on reverse side)
		LAND/WATER BODY (1)				VE GETATION (2)				STRUCTURES (3)				3. Additional mitigating measures recommended? __ Yes _X_ No (Explain on reverse side)
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Evaluators Name(s) Date
ELEMENT	**Form**				X			X			X			Steve Leslie 08.05.2009 SWCA Environmental Consultants
	Line		X				X				X			
	Color			X				X			X			
	Texture				X				X				X	

SECTION D. (Continued)

Comments from item 2.

The Spring Valley Wind Project repeats the basic elements of line and texture but not color and form of the existing conditions within Spring Valley. The project is located approximately less than two miles from the KOP within the middleground of the viewshed. At this distance, the turbines are clearly visible, although they appear small, and the apparent contrast with the surrounding landscape is moderate. From this section of highway 50, the project would be in view for approximately eight miles against the backdrop of the Schell Creek Range. Viewers traveling at the 70 mph posted speed limit would view the project for no more than 11 minutes.

The speed of travelers along highway 50 minimizes the apparent visual contrast. Moderate contrasts in the elements of the environment are consistent with BLM's objectives for VRM Class III landscapes. The conclusion that the Spring Valley Wind Project would be seen, but would not dominate the view of the casual observer is consistent with the management objective.

Additional Mitigating Measures (See item 3).

Measures that are currently in place that would minimize the visual contrast consist of re-vegetating temporarily disturbed areas and using towers and facilities that are a flat, non reflective, gray.

No additional mitigation measures are recommended.

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Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date (of field work)	08.05.09
District	Ely District Office
Resource Area	Schell Field Office
Activity (program)	Lands and Realty

SECTION A. PROJECT INFORMATION

1. Project Name Spring Valley Wind 2. Key Observation Point #4 Route 893, south of SNWA property looking south and east. 3. VRM Class III	4. Location See the Spring Valley Wind Visual Resource Assessment for a map of the location. Elevation 5,846 feet	5. Location Sketch See the Spring Valley Wind Visual Resource Assessment for photographic simulations of the project.

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	The broad, open valley extends to the north and a long, flat horizon line. East of the valley floor, angular alluvial fans and foothills sweep down from the long, jagged ridgeline of the Snake Range.	The valley and fans are covered in large patches of low, rounded shrubs and dense mats of invasive annual grasses and weeds. Patches and strings of rounded Swamp Cedar are visible across the valley floor.	The long straight band of route 893 extends in a straight line to the north. A series of vertical, wooden power poles parallel the roadway connected by several faint horizontal power lines.
LINE	The southern visible end of the valley is a long, straight horizontal line. Angular lines of alluvial fans are visible to the east of the valley. The long, irregular horizon line of the Snake Range extends to the north and south.	The irregular line of Swamp Cedar patches is very distinctive against the dull background the shrub and grass covered valley floor. There is a long straight line of varying vegetation parallel to route 893.	The power line consists of a series of single vertical poles connected by horizontal lines. Route 893 is a straight line extending north through the valley.
COLOR	The valley floor and alluvial fans are densely covered in vegetation. Some gray and tan soils and gravels are visible. The Snake Range is a combination black, tan and gray. The light at the time was flat and hazy resulting in muted visible colors.	The shrubs and grasses along the fans and valley floor are a dull gray green mixed with tans and browns. The vegetation along the mountain range is a dark green and appears black due to the distance and haziness. The Invasive plants adjacent to the roadways are tan and light green.	Brown wooden poles are flat and non reflective. Route 893 is a dull light gray.
TEX-TURE	The texture of the soils are medium density and coarse-grained. The mountains in the background are smooth, fine grained.	Most of the vegetation appears dense and coarse textured. The further away from the KOP in the BG, the smoother the texture.	The power line and road are ordered, directional, and occur in a continuous line on the landscape.

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Excavations for the turbine and facility foundations would be apparent in the short term during the construction period. Trenching for collector lines would be visible.	Increased patchiness would result from vegetation removal along access roads, laydown areas and foundations.	There would be numerous vertical towers. The towers visible in the foreground would be set against the sky while those in the background would be set against the Snake Range. Rotor blades would have a slow, circular movement.
LINE	Angular geometric lines would result from trenching, road and foundation excavations throughout the project area.	Irregular, blocky and linear breaks in the shrubs and grasses across the valley floor would occur.	Turbines would be straight, vertical lines. Apparently taller than the exiting distribution poles and fence posts. Vertical lines would be repeated throughout the project area.
COLOR	Exposed soils will be white, gray to tan.	Color would vary over time in temporary disturbance areas as reclamation occurs.	The turbines would be painted a flat, matte gray. Access roads will be tan to gray. The O&M building and substation would not be visible from this KOP.

TEX-TURE	Exposed soils would appear smooth grained.	Uneven and irregular – Vegetation would be patchier as new growth fills in temporary disturbance areas.	The turbines would be smooth textured with no internal contrast. Access roads would appear smooth textured.

SECTION D. CONTRAST RATING ___ SHORT TERM _X_ LONG TERM

1. DEGREE OF CONTRAST		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
ELEMENT	Form			X				X			X		
	Line		X				X				X		
	Color			X				X			X		
	Texture			X				X					X

2. Does project design meet visual resource management objectives? ___ Yes _X_ No (Explain on reverse side)

3. Additional mitigating measures recommended? __ Yes _X_ No (Explain on reverse side)

Evaluators Name(s) Date

Steve Leslie 08.05.2009
SWCA Environmental Consultants

SECTION D. (Continued)

Comments from item 2.

The Spring Valley Wind Project repeats the basic elements of texture but not form, line, and color of the existing conditions within Spring Valley. A moderate linear contrast would result from the proposed action. Additionally, moderate contrasts in form and color would occur. As a result of the rolling topography across Spring Valley, the ancillary facilities, including roads and substations, are not easily seen from KOP 4. Additionally, the color contrast would vary across different seasons, and different times of day. Afternoon lighting may result in darker shadows on the turbines reducing contrast with a darker mountainous backdrop. In winter, turbines in shadow may have a greater contrast against a white, snow covered mountainous backdrop.

The nearest turbines of the project are located approximately one mile from the KOP within the foreground and middleground of the viewshed. At this distance, the turbines are clearly visible and the apparent contrast with the surrounding landscape is moderate.

From this section of 893, the project would be in view for approximately 5 miles. Viewers traveling at the 50 mph posted speed limit would view the project for no more than 10 minutes. Moderate contrasts are consistent with BLM's objectives for VRM Class III landscapes. Because visual contrast diminishes with distance, greater contrasts with the elements of the environment would only be apparent while the traveler is within 1 mile of the project area. The conclusion that the Spring Valley Wind Project would be seen but would not dominate the view of the casual observer from this KOP is consistent with Class III management objectives.

Additional Mitigating Measures (See item 3).

Measures that are currently in place that would minimize the visual contrast consist of re-vegetating temporarily disturbed areas and using towers and facilities that are a flat, non reflective, gray. The turbine locations have been set back further from 893 from the original proposal.

No additional mitigation measures are recommended.

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Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date (of field work)
08.05. 2009

District
Ely District Office

Resource Area
Schell Field Office

Activity (program)
Lands and Realty

SECTION A. PROJECT INFORMATION

1. Project Name / 2. Key Observation Point / 3. VRM Class	4. Location	5. Location Sketch
1. Project Name Spring Valley Wind 2. Key Observation Point #5 –U.S. 50/893, looking north and east towards the project area. 3. VRM Class III	See the Spring Valley Wind Visual Resource Assessment for a map of the location. Elevation - approximately 6,157 feet	See the Spring Valley Wind Visual Resource Assessment for photographic simulations of the project.

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	The broad, open valley extends to the north and a flat horizon line. East of the valley floor, angular alluvial fans and foothills sweep down from the long horizontal ridgeline of the northern Snake Range. The rocky and undulating ridgelines of both the Snake and Schell Creek Ranges extend far to the north fading into the hazy sky.	The valley is covered in low, rounded shrubs interspersed with spiky perennial grasses, dense mats of invasive annual grasses and weeds. Patches and stringers of rounded Swamp Cedar are faintly visible across the valley floor.	Route 893 is a long directional band that extends in a straight line to the north. A series of vertical, power transmission poles traverse the valley in an east west direction. A mineral materials site just off 893 is a bold geometric shape cut
LINE	The northern visible end of the valley is a long, straight horizontal line. Angular lines of alluvial fans are visible to the east of the valley. The long, irregular horizon line of the Snake Range extends to the north and south.	The irregular line of Swamp Cedar patches is very distinctive against the dull background the shrub and grass covered valley floor. There is a long straight line of varying vegetation parallel to route 893.	The power line consists of a series of single vertical poles connected by horizontal lines. Route 893 is a straight line extending north through the valley.
COLOR	The valley floor and alluvial fans are densely covered in vegetation. Some gray and tan soils and gravels are visible. The Snake Range is a combination black shadows, reddish, tan and gray rocky outcrops. The light at the time was flat and hazy resulting in muted visible colors.	The shrubs and grasses along the fans and valley floor are a dull gray green mixed with tans and browns. The Junipers and Swamp Cedars are a dark green and appear black due to the distance and haziness. The rabbitbrush adjacent to the roadway is a brighter, light green.	Brown wooden poles are flat and non reflective. Route 893 is a dull light gray.
TEX-TURE	The texture of the soils are not readily apparent, though what is visible is medium density and coarse-grained. The mountains in the background are smooth, fine grained.	Most of the vegetation appears dense and coarse textured. The further away from the KOP in the back ground, the smoother the texture.	The power line and road are ordered, directional, and occur in a continuous line on the landscape.

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Excavations for the turbine and facility foundations would be apparent in the short term during the construction period. Trenching for collector lines would be visible.	Increased patchiness would result from vegetation removal along access roads, laydown areas and foundations.	The tops of the closest vertical towers would be just visible over the horizon line of the mountains and valley floor. The full sweep of rotor blades would be visible and have a slow, circular movement.
LINE	Angular geometric lines would result from trenching, road and foundation excavations throughout the project area.	Irregular, blocky and linear breaks in the shrubs and grasses across the valley floor would occur.	Turbines would be straight, vertical lines repeating throughout the project area.
COLOR	Exposed soils will be white, gray to tan.	Color would vary over time in temporary disturbance areas as reclamation occurs.	The turbines would be painted a flat, matte gray with very low refelectivity.

TEX-TURE	Excavations for the turbine and facility foundations would be apparent in the short term during the construction period. Trenching for collector lines would be visible.	Increased patchiness would result from vegetation removal along access roads, laydown areas and foundations.	The turbines would be smooth textured with no internal contrast. Access roads would appear smooth textured.

SECTION D. CONTRAST RATING ___ SHORT TERM _X_ LONG TERM

1. DEGREE OF CONTRAST		LAND/WATER BODY (1)				VE GETATION (2)				STRUCTURES (3)			
		FEATURES											
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
ELEMENT	**Form**			X				X				X	
	Line		X				X				X		
	Color		X					X			X		
	Texture				X				X				X

2. Does project design meet visual resource management objectives? _X__ Yes __ No (Explain on reverse side)

3. Additional mitigating measures recommended? __ Yes _X_ No (Explain on reverse side)

Evaluators Name(s)	Date
Steve Leslie SWCA Environmental Consultants	08.05.2009

SECTION D. (Continued)

Comments from item 2.

The project is located approximately 2 miles from the KOP in the middleground of the viewshed. From this section of 893, the project would be in view for approximately 5 miles. Viewers traveling north and south at the 50 mph posted speed limit would view the project for no more than 10 minutes. At this distance, the turbines are clearly visible set against the mountainous backdrop of the Snake Range. As a result of the rolling topography across Spring Valley, the ancillary facilities, including roads and substations, are not easily visible. Although the Spring Valley Wind Project repeats some of the basic elements of line and texture it does not repeat color and form of the existing conditions within Spring Valley. The color contrast would vary across different seasons, and different times of day. Different lighting conditions may result in darker shadows on the turbines reducing contrast with a darker mountainous backdrop. Conversely, in winter, turbines in shadow may have a greater contrast against a white, snow covered mountainous backdrop. Overall, the project would result in moderate contrasts to the existing elements of the environment. Moderate contrasts in the elements of the environment are consistent with BLM’s objectives for VRM Class III landscapes. The conclusion that the Spring Valley Wind Project would be seen, but would not dominate the view of the casual observer is also consistent with BLM class III management objectives.

Additional Mitigating Measures (See item 3).

Measures that are currently in place that would minimize the visual contrast consist of re-vegetating temporarily disturbed areas and using towers and facilities that are a flat, non reflective, gray.

No additional mitigation measures are recommended.

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Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date (of field work)	08.06.2009
District	Ely District Office
Resource Area	Schell Field Office
Activity (program)	Lands and Realty

SECTION A. PROJECT INFORMATION

1. Project Name Spring Valley Wind	4. Location See the Spring Valley Wind Visual Resource Assessment for a map of the location. Elevation 13,064 feet	5. Location Sketch See the Spring Valley Wind Visual Resource Assessment for photographic simulations of the project.
2. Key Observation Point Wheeler Peak		
3. VRM Class III		

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Spring Valley is one of the largest basins in eastern Nevada. It is a broad, open valley extending north to south. Across the valley, triangular alluvial fans sweep down from the rugged terrain of the surrounding mountain ranges.	The valley and fans are covered in vegetation. At this distance, all vegetation appears a flat cover on the ground.	Roads, small towns, campgrounds, ranches, agricultural fields, and mining activities are all visible throughout the area. No structures are clearly visible.
LINE	Long, straight horizontal lines are apparent where the alluvial fans and foothills come up against the valley floor. Angular lines of alluvial fans are visible across the valley. In the BG is the long, irregular horizon line of the Schell Creek Range.	The irregular line of Swamp Cedar patches is very distinctive against the dull background the shrub and grass covered valley floor.	Highway 50 is curving line sweeping across the valley floor. Other dirt roads appear faintly on the valley floor.
COLOR	The valley floor and alluvial fans are densely covered in vegetation. Some gray and tan soils and gravels are visible. The Snake Range is a combination black, tan and gray. The light at the time was flat and hazy resulting in muted visible colors.	Multiple shades of green. Bright green of riparian vegetation growing along some of the drainages in the surrounding mountain ranges. Trees are a more muted green. The shrubs and grasses along the fans and valley floor are a dull gray green mixed with tans and browns. The Junipers and Swamp Cedars are a dark green and appear black due to the distance and haziness.	All structures are flat and made up of muted colors. The highway is a dull gray band.
TEXTURE	The texture of the soils are not readily apparent, though what is visible is medium density and coarse-grained. The mountains in the background are smooth, fine grained.	Most of the vegetation appears dense and smooth textured.	Due to the distance and angle of observation, all structures appear smooth surfaced with little internal contrast.

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Excavations for the turbine and facility foundations would be apparent in the short term during the construction period.	Increased patchiness would result from vegetation removal along access roads, laydown areas and foundations.	There would be numerous vertical towers. The towers would be set against the valley floor. Rotor blades would have a slow, circular movement.
LINE	Angular geometric lines would result from trenching, road and foundation excavations throughout the project area.	Irregular, blocky and linear breaks in the shrubs and grasses across the valley floor would occur.	Turbines would appear as rows of short vertical points. Access roads would be faintly visible along the arrays.
COLOR	Exposed soils will be white, gray to tan.	Color would vary over time in temporary disturbance areas as reclamation occurs.	The turbines would be painted a flat, matte gray. Access roads will be tan to gray. The O&M building and substation would not be visible.
TEXTURE	Exposed soils would appear smooth and fine grained.	Changes in the texture of vegetation would not be apparent.	The turbines would be smooth textured with no internal contrast. Access roads would appear smooth textured.

SECTION D. CONTRAST RATING ___ SHORT TERM _X_ LONG TERM

1. DEGREE OF CONTRAST		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
ELEMENT	Form			X					X			X	
	Line			X					X			X	
	Color								X			X	
	Texture								X				X

2. Does project design meet visual resource management objectives? _X_ Yes __ No
(Explain on reverse side)

3. Additional mitigating measures recommended?
__ Yes _X_ No (Explain on reverse side)

Evaluators Name(s) Date

Steve Leslie 08.06.2009
SWCA Environmental Consultants

SECTION D. (Continued)

Comments from item 2.

Although the project is visible, it occurs in the background view from Wheeler Peak and makes up only a small portion of the overall panoramic viewshed from the summit. Dominant views from the summit include the jagged mountain range extending to the north and south.

Measures that are currently in place that would minimize the visual contrast consist of re-vegetating temporarily disturbed areas and using towers and facilities that are a flat, non reflective, gray.

No additional mitigation measures are recommended.

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