4.0 Pre-construction Migratory Bird and Bat Risk Assessment (USFWS Wind Energy Guidelines – Tiers 1 through 3; WGFC Wind Energy Recommendations – Tiers 1 and 2)

This BBCS is limited in scope to Phase I of the CCSM Project. Phase II of the CCSM Project will have a separate BBCS; however, portions of this chapter describe the monitoring and risk assessment process for the CCSM Project as a whole to provide context.

The WGFC Wind Energy Recommendations and USFWS Wind Energy Guidelines both recommend a tiered approach for assessing risks to migratory birds and bats. *See Section 2.4.* The tiered approach sets out an iterative decision-making process for collecting information in increasing detail; quantifying the possible risks of proposed wind energy projects to species of concern and their habitats; and evaluating those risks to make siting, construction, and operation decisions. *See USFWS 2012a at p. vi.* Each subsequent tier refines and builds upon the issues raised and efforts undertaken in previous tiers. Each tier also offers a set of questions to help evaluate the potential risk to migratory birds and bats associated with developing a wind energy project at a given location. *See USFWS 2012a at p vi.*

The pre-construction tiers, Tiers 1 through 3 of the USFWS Wind Energy Guidelines and Tiers 1 and 2 of the WGFC Wind Energy Recommendations, are designed to identify, avoid, and minimize risks to migratory bird and bat species of concern from proposed wind energy projects. PCW selected the original CCSM Project Site for wind energy development in 2006, approximately six years prior to the 2012 release of the USFWS Wind Energy Guidelines and four years prior to the release of the WGFC Wind Energy Recommendations. According to the USFWS Wind Energy Guidelines, "[p]rojects that are already under development or are in operation are not expected to start over or return to the beginning of a specific tier." *See USFWS 2012a at p. 4.* Instead, the guidelines instruct a developer to consider where it is in the planning process relative to the appropriate tier. When the USFWS Wind Energy Guidelines and WGFC Wind Energy Recommendations were published, the BLM FEIS was already published and PCW was conducting migratory bird and bat studies for the CCSM Project consistent with Tier 3 of the USFWS Wind Energy Guidelines and Tier 2 of the WGFC Wind Energy Recommendations.

While the USFWS Wind Energy Guidelines and WGFC Wind Energy Recommendations were not available, i.e. had not been published, at the time of site selection for the CCSM Project, PCW coordinated extensively with BLM, USFWS, and WGFD throughout the development of the project, including Phase I. PCW has collected detailed data for migratory birds and bats and has followed a robust avoidance and minimization process that complies with the tiered approach recommended in the USFWS Wind Energy Guidelines and WGFC Wind Energy Recommendations. PCW's pre-construction risk identification and avoidance and minimization process for Phase I is documented below. PCW evaluated the CCSM Project and answered the questions posed by the USFWS Wind Energy Guidelines and WGFC Wind Energy Recommendations as it would have if the guidance had been place throughout the CCSM Project development.

4.1 Summary of Risks to Migratory Birds and Bats

Understanding the risks to migratory birds and bats from wind energy projects provides context for the risk evaluation and avoidance and minimization process documented in the remainder of this Phase I BBCS. A summary of the risks to migratory bird and bats from wind energy projects is provided below based on: (1) the USFWS Wind Energy Guidelines; (2) the WGFC Wind Energy Recommendations; and (3) the APLIC Recommendations for Power Pole Configurations at Wind Energy Projects. *See APLIC 2015.* The information provided below is not specific to the CCSM Project or Phase I; instead this is a generalized overview of risks wind energy projects may pose to migratory birds and bats.

The USFWS Wind Energy Guidelines and WGFC Wind Energy Recommendations discuss various risks to migratory birds and bats from wind energy projects, generally including: (1) collisions with wind turbines and associated infrastructure; (2) habitat loss and degradation; (3) fragmentation of large habitat blocks into smaller segments that may not support sensitive species; (4) displacement and behavioral changes; and (5) indirect effects such as increased predator populations or introduction of invasive plants. *See USFWS 2012a at p. 25-26.* In addition, APLIC recognizes additional risks to migratory birds and bats from the electrical system, including electrocutions and nest vulnerability. *See APLIC 2006.* The pre-construction risk evaluation described in this chapter evaluates the risks to migratory birds and bats from Phase I for the purposes of avoiding and minimizing the identified risks to the extent practicable, and developing appropriate conservation measures and post construction monitoring. *See Chapters 5.0 & 6.0.* The types of risks to migratory birds and bats from wind energy projects are described in additional detail below.

4.1.1 Collision

Direct mortality or injury to migratory birds and bats occurs at wind energy projects due to collisions with wind turbines, electric power lines, meteorological towers, and vehicles on project roads.[17] According to USFWS, "[c]ollision likelihood for individual birds and bats at a particular wind energy facility may be the result of complex interactions among species distribution, "relative abundance," behavior, visibility, weather conditions, and site characteristics." *See USFWS 2012a at p. 25.* The likelihood of collision for individual migratory bird and bat species is affected by abundance, ecology, and behavior.

Electric facilities located between feeding and roosting areas of flocking birds may also present an increased collision risk. This is especially true for power lines near rivers, lakes, or wetlands where fog may be common, making lines less visible. Human activity near lines may flush birds, with startled birds potentially colliding with power lines. Heavy-bodied, less agile birds or those within flocks may lack the ability to quickly negotiate obstacles, making them more vulnerable to power line collisions. Collisions

[17] Direct mortality to bats, and potentially some small migratory bird species, may also be caused by barotrauma rather than collision with turbines.

with electric lines occur most often with the overhead static wire, which may be less visible than energized conductors due to its smaller diameter. *See APLIC 2012*.

A detailed description of the current understanding of collision risk to specific types of migratory birds and bats is included in the WGFC Wind Energy Recommendations. *See WGFC 2010 at pp. 2:6,10:12.*

4.1.2 Electrocution

As described in section 2.7, APLIC provides electric utilities, wildlife agencies, and other stakeholders with suggested practices, guidance, and recommendations for managing avian interactions with electric facilities. As part of its guidelines and recommendations, APLIC has identified the primary risks to migratory birds from electric facilities, including those associated with wind energy projects. These risks include electrocution. Bird electrocutions from wind energy project electric facilities may occur due to a combination of biological, environmental, and electrical design factors. Biological and environmental factors include:

- Habitat
- Bird species
- Body size
- Behavior
- Distribution
- Abundance
- Prey availability

The key electrical design factor is the physical separation between energized and or grounded portions of electrical facilities. If the distance between energized conductors or between an energized conductor and grounded hardware is less than that of the head-to-foot or wrist-to-wrist distance of a bird (the wrist is the joint toward the middle of the leading edge of a bird's wing), the bird is at risk of electrocution. Because a bird's feathers provide insulation when dry, contact must typically be made with fleshy parts, such as the skin, feet, or bill, for electrocution to occur.[18]

The majority of electrocutions are associated with low-voltage electric power lines or transformers, rather than high-voltage electric power lines. *See Lehman 2001; Lehman et al. 2007.* Most avian electrocutions occur on low-voltage electric power lines of 35 kV or less. Electric power lines of 69 kV and above pose a very low electrocution because the lines are designed with sufficient spacing between conductors (electric wires or lines) such that phase to phase or phase to ground contact is not generally possible. *See APLIC 2006.* Low-voltage electric power lines have closer conductor spacing, which presents a greater electrocution hazard to avian species. *See APLIC 2006.* Consequently, most electrocutions are of large birds, such as eagles, hawks, and ravens. *See APLIC 2006.*

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[18] APLIC does recognize that "wet weather can increase electrocution risk, as wet feathers are electrically more conductive than dry feathers." *See APLIC 2006*.

4.1.3 Habitat Loss and Degradation

Wind energy projects result in direct habitat loss and habitat modification. *See USFWS 2012a at p. 25.* USFWS acknowledges that "many of North America's native landscapes are greatly diminished or degraded from multiple causes unrelated to wind energy." *See USFWS 2012a at p. 25.* However, species that depend on these landscapes may still be susceptible to further loss and/or degradation of their habitat from wind energy projects. USFWS also states that "while habitat lost due to footprints of turbines, roads, and other infrastructure is obvious, less obvious is the potential reduction of habitat quality." *See USFWS 2012a at p. 25.* Migratory bird and bat species that may be susceptible to habitat loss and modification are also identified in the WGFC Wind Energy Recommendations. *See WGFC 2010 at pp.2:6, 10:12.*

4.1.4 Habitat Fragmentation

Both USFWS and WGFC identify habitat fragmentation as a concern for some migratory bird and bat species. Wind energy projects can cause habitat fragmentation. "Habitat fragmentation separates blocks of habitat for some species into segments, such that the individuals in the remaining habitat segments may suffer from effects such as decreased survival, reproduction, distribution, or use of the area." *See USFWS 2012a at p. 25.* Surface disturbance may displace some species or fragment continuous habitat areas into smaller, isolated tracts. Sensitivity to fragmentation effects varies among migratory bird and bat species, as described in the WGFC Wind Energy Recommendations. *See WGFC 2010 at pp.2:6,10:12.*

4.1.5 Displacement and Behavioral Changes

According to USFWS, "[e]stimating displacement risk requires an understanding of animal behavior in response to a project and its infrastructure and activities, and a pre-construction estimate of presence/absence of species whose behavior would cause them to avoid or seek areas in proximity to turbines, roads, and other components of the project." *See USFWS 2012a at p. 26.* While the science regarding displacement effects continues to evolve, it is generally recognized that each species and individual respond differently. The WGFC Wind Energy Recommendations identify species that occur in Wyoming that are likely to be sensitive to displacement from wind energy projects, including associated infrastructure such as roads and electric facilities. *See WGFC 2010 at pp.2:6,10:12. I*n some cases, displacement and behavioral changes, including potential avoidance of wind energy infrastructure, could create barrier effects that would result in increased energetic losses associated with increased flight times or lengths between foraging, roosting, or nesting locations. Restriction of movement between these locations could create barrier effects that would have localized impacts on resident and non-resident migratory birds and bats.

4.1.6 Indirect Effects

"Indirect effects include reduced nesting and breeding densities and the social ramifications of those reductions; loss or modification of foraging habitat; loss of population vigor and overall population density; increased isolation between habitat patches, loss of habitat refugia; attraction to modified habitats; effects on behavior, physiological disturbance, and habitat unsuitability." *See USFWS 2012a at p. 26*. Indirect effects from wind energy projects, including associated infrastructure such as roads and electric facilities, may be due to a number of factors including the introduction and establishment of invasive plants that affect habitat suitability and quality or changes in the natural fire regime.

4.1.7 Nesting

Raptors and other migratory bird species can benefit from the presence of utility structures, such as power poles, by using them for nesting. Most species that nest on power lines or similar structures inhabit open, arid areas, e.g. red-tailed hawks, great-horned owls, rough-legged hawks and prairie falcons. *See APLIC 2006.* One notable exception is the osprey, which uses utility structures for nesting more than any other North American raptor. Osprey typically select structures that are located near or over waters where fish are abundant.[19] *See APLIC 2006*. A number of non-raptor migratory bird species also nest on utility structures. Latticework power line structures can provide suitable nesting substrate for ravens, herons, cormorants and other large birds. Power poles are also used by smaller birds that build their nests on support brackets, transformers, or capacitors. *See APLIC 2006.*

Utility structures can provide nesting substrates in habitats where natural sites are scarce. Power line structures can facilitate range expansion, increase local density, and offer some protection from the elements. In addition, some avian species have increased their nest success and productivity on power line structures. *See APLIC 2006.* However, some avian species that nest or perch on power poles can experience the following: increased risk of electrocution and collision; susceptibility to nest damage from wind, weather, and fire; disturbance from maintenance or construction, and vulnerability to shooting. Raptors, corvids, and other avian species nesting on power line structures may also impact some prey species and other avian species and can reduce power reliability by contaminating equipment with excrement or nesting material. *See APLIC 2006.*

The activity and noise that occurs during power-line construction and operation can disturb raptors and other migratory bird species. Maintenance operations also temporarily disrupt normal bird nesting, hunting and roosting behavior. *See APLIC 2006.* While electrocution of birds that nest on power line structures during operation is infrequent, the nests themselves can cause operational problems and reduce power reliability creating the need for nest management. For example, nesting material or prey debris can cause interruptions and outages. *See APLIC 2006.*

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[19] Although ospreys are known to use areas adjacent to the North Platte River, there is no suitable osprey nesting habitat within Phase I and no ospreys were observed during Phase I surveys. *See Sections 4.3 & 4.4*.

4.2 Preliminary Site Evaluation (USFWS Wind Energy Guidelines – Tier 1; WGFC Wind Energy Recommendations – Tier 1)

The USFWS Wind Energy Guidelines call for a preliminary site evaluation using a landscape-level assessment of habitat for species of concern based on existing information and literature. *See USFWS 2012a at p. vi.* The preliminary site evaluation (Tier 1 of the USFWS Wind Energy Guidelines) corresponds to the Tier 1 site selection process outlined in the WGFC Wind Energy Recommendations. *See WGFC 2010 at pp. 37:38.* During the preliminary site evaluation and site selection process, the project proponent gathers existing information and literature and then uses this information to select and refine potential project sites by balancing suitability for development with potential risk to protected wildlife and their habitats, in this case migratory birds and bats.

For the CCSM Project, site selection occurred in 2006. In 2006, PCW's potential wind development site included the entire 320,000-acre Ranch owned and operated by PCW's affiliate, TOTCO. PCW did not possess the required property rights to consider or evaluate land located outside of the Ranch boundary for wind energy development. However, within the boundaries of the Ranch, PCW evaluated a number of project designs using different land and development scenarios. This is consistent with the USFWS Wind Energy Guidelines which indicate that the preliminary site evaluation (Tier 1) can be used to: (1) "screen" a landscape to avoid areas with the highest habitat values; or (2) begin to determine if a single potential site poses serious risk to species of concern or their habitats. *See USFWS 2012a at p. 12.*

4.2.1 Site Evaluation Data

In 2006, there was limited data available on migratory birds and bats specific to the Ranch. However, PCW reviewed and evaluated available data including the BLM Rawlins Field Office (RFO) Resource Management Plans (RMP), the BLM nest database, available data from WGFD, and existing vegetation and habitat maps. *See BLM 1990; BLM 2004; WGFD 2005.*

4.2.2 Site Evaluation Questions

Both the USFWS Wind Energy Guidelines and WGFC Wind Energy Recommendations pose a series of questions to guide the site evaluation and site selection process. The site evaluation and site selection questions are intended to help determine potential environmental risks and potential or known conflicts with wildlife resources at the landscape scale. As contemplated in the USFWS Wind Energy Guidelines, the questions are most useful to "screen" the Ranch to identify sites with the highest habitat values and to determine if any areas pose a serious risk to migratory birds and bats or their habitats. *See USFWS 2012a at p. 12.* PCW's response to the site evaluation questions and its risk assessment are based on the information available in 2006 at the time of site selection for the CCSM Project.

USFWS Wind Energy Guidelines[20]

1. *Are there species of concern present on the potential site(s), or is habitat (including designated critical habitat) present for these species?*

   In 2006, PCW evaluated the Ranch for the presence of species of concern or their habitat using existing data, including publically available data from USFWS, WGFD and BLM. In 2006, no federally-listed migratory bird or bat species were known to occur on the Ranch.[21] However, the 1990 RFO RMP, 2004 RFO draft RMP, and the 2005 WGFD list of species of greatest conservation need (SGCN) identified migratory bird and bat species of concern that may occur on the Ranch. *See BLM 1990; BLM 2004; WGFD 2005.* The BLM and WGFD migratory bird and bat species of concern that were identified in 2006 are included in Table 1.1 and Table 1.2 of this Phase I BBCS.

2. *Does the landscape contain areas where development is precluded by law or areas designated as sensitive according to scientifically credible information?*

   The Ranch does not include areas where development is precluded by law. However, portions of the Ranch are within WGFD's Red Rim-Grizzly WHMA. The Red Rim-Grizzly WHMA is managed by WGFD for the co-existence of wildlife and livestock. *See WGFD 2013.* According to WGFD, the Red Rim-Grizzly WHMA also provides habitat for migratory birds such as ferruginous hawk, red-tailed hawk (*Buteo jamaicensis*), and passerines. *See WGFD 2013.*

3. *Are there known critical areas of wildlife congregation, including, but not limited to: maternity roosts, hibernacula, staging areas, winter ranges, nesting sites, migration stopovers or corridors, leks, or other areas of seasonal importance?*

   No critical areas of wildlife congregation for migratory bird or bat species were known in 2006. WGFD identified big game winter range and greater sage-grouse leks on the Ranch; however, these features are not related to the migratory bird and bat species that are the subject of this Phase I BBCS. *See Section 1.2.*

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[20] *See USFWS 2012a at p. 13.*

[21] In 2006 bald eagles were listed as threatened under the ESA; however, bald eagles are no longer listed under the ESA. Further, potential impacts to bald eagles from Phase I are addressed in PCW's Phase I ECP. Therefore, potential impacts to bald eagles are not discussed in this Phase I BBCS. *See Section 1.2.*

4. *Are there large areas of intact habitat with the potential for fragmentation, with respect to species of habitat fragmentation concern needing large contiguous blocks of habitat?*

   In 2006, species of habitat fragmentation concern were not designated. In addition, there was no detailed habitat information available on the Ranch. Therefore, there was not adequate information in 2006 to evaluate the suitability of the existing habitat and the potential for fragmentation.

WGFC Wind Energy Recommendations[22]

1. *Are there species or habitat(s) of concern present on the site?*

   In 2006, PCW identified migratory bird and bat species designated by WGFD as SGCN that may occur on the Ranch. These species are listed in Table 1.1 and Table 1.2 of this Phase I BBCS. See response to question 1 above under USFWS Wind Energy Guidelines.

2. *Does the landscape contain areas where development is precluded by law, regulation or policy?*

   The Ranch does not include areas where development is precluded by law. However, portions of the Ranch are within WGFD's Red Rim-Grizzly WHMA. See response to question 2 above under USFWS Wind Energy Guidelines.

3. *Are there known crucial areas for wildlife such as hibernacula, winter ranges, migration corridors, or other vital/sensitive habitats?*

   No crucial areas for wildlife congregation for migratory bird or bat species were known in 2006. See response to question 3 above under USFWS Wind Energy Guidelines.

4. *Are there large areas of intact habitat with species where habitat impacts are a concern?*

   There was no detailed habitat information available for the Ranch in 2006. Therefore, there was not adequate information in 2006 to evaluate potential impacts to existing habitat. See response to question 4 above under USFWS Wind Energy Guidelines.

[22] *See WGFC 2012 at pp. 37:38*

5. *Using best available scientific information, has the potential presence of important species or crucial/vital habitat been documented?*

   In 2006, PCW identified migratory bird and bat species designated by WGFD as SGCN that may occur on the Ranch. These species are included in Table 1.1 and Table 1.2 of this Phase I BBCS. See response to question 1 above under USFWS Wind Energy Guidelines.

6. *Which SGCN or interest is likely to use the proposed site based upon known data?*

   The migratory bird and bat SGCN most likely to use the Ranch are listed in Table 1.1 and Table 1.2 of this Phase I BBCS.

4.2.3 Site Evaluation Risk Assessment

As reflected in the responses to the site evaluation questions, there was insufficient information in 2006 to adequately assess risk to migratory birds and bats. Therefore, as recommended in the USFWS Wind Energy Guidelines and in coordination with BLM, USFWS, and WGFD, PCW proceeded to Site Characterization (Tier 2) with a specific emphasis on collecting the additional data necessary to characterize the site and further assess potential impacts to wildlife. *See USFWS 2012a at p. 9.*

4.3 Site Characterization (USFWS Wind Energy Guidelines – Tier 2)

The site characterization process in the USFWS Wind Energy Guidelines (Tier 2) is intended to characterize a potential site in terms of the risk that wind energy development may pose to species of concern and their habitats. According to the USFWS Wind Energy Guidelines, site characterization generally involves one or more visits by a qualified biologist to assess the potential site. Site characterization is an intermediary step in the USFWS Wind Energy Guidelines that has no direct counterpart in the WGFC Wind Energy Recommendations. However, the USFWS Wind Energy Guidelines call for the involvement of state wildlife agencies such as WGFD throughout the site characterization process.

According to the USFWS Wind Energy Guidelines, site characterization should be based on a combination of: (1) existing information; (2) input from federal, state, and local agencies or organizations that have relevant scientific information; and (3) reconnaissance-level site visits by a wildlife biologist. The data collection and agency coordination conducted for the CCSM Project EIS meets the recommendations for the USFWS Tier 2 site characterization process. *See Section 4.3.1.* Therefore, the site characterization and risk assessment process described in this section is based on the information compiled for and contained in the BLM FEIS. *See BLM 2012b.* Data collection for the CCSM Project site characterization process was completed in 2008 and 2009; these data were then incorporated into the 2012 FEIS.

4.3.1 Site Characterization Data

The site characterization and Tier 2 risk assessment for the CCSM Project, including Phase I, is based on the information collected to support the BLM EIS. As described in section 1.3.2, BLM began preparation of its EIS in 2008. In support of the EIS, both PCW and BLM collected existing information on the CCSM Project Site. In addition, PCW collected additional site-specific wildlife data for the original proposed action, including data on migratory birds and bats. Through public outreach and cooperating agency involvement, BLM coordinated with interested parties to insure that local, state, and federal agencies, the public, and non-governmental organizations had an opportunity to provide relevant information and to comment on the EIS analysis. The data and information collected in 2008 and 2009 by PCW and BLM in support of BLM's EIS is consistent with the site characterization data called for in Tier 2 of the USFWS Wind Energy Guidelines.

Vegetation Surveys

PCW completed extensive field mapping and vegetation classification of the Ranch in 2009. Vegetation was sampled at 500 randomly selected 50-meter transects. Dominant vegetation classes and associated plant communities were characterized, and detailed measurements of vegetation structure (e.g., canopy cover, canopy height, understory height) were collected. Using the field survey data, aerial imagery, and remote sensing, a detailed 4-meter resolution vegetation classification was developed for the Ranch and a 3-mile buffer around the Ranch. Thirteen vegetation classes were created to capture the diversity of the landscape. To characterize potential habitat use by bird species, PCW evaluated the potential for migratory bird and bat species to use each of the vegetation communities and habitat types identified. Raptors and other large species such as ravens (*Corvus corax*), American crow (*Corvus brachyrhynchos*), and black-billed magpie (*Pica hudsonia*) can be found in any of the vegetation communities occurring in the Ranch. Many small bird species including vesper sparrow (*Pooecetes gramineus*) and horned lark (*Eremophila alpestris*) and bats can also be found across multiple vegetation assemblages.

Characterizations of the major vegetation types and habitats on the Ranch are below along with descriptions of the migratory bird and bat species most likely to use each habitat.

<u>Sagebrush Steppe Communities</u>

Sagebrush steppe is the most common vegetation type on the Ranch occurring across approximately 63% of the Ranch. Sagebrush habitats within the Ranch consist of a mosaic of sagebrush, allied shrubs and forbs, and grasses and are dominated or co-dominated by one or more *Artemisia* species, such as Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) and basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*). In higher elevations, mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) is present. Sagebrush communities occur across approximately 60% of the Ranch. Migratory bird species found in sagebrush steppe include sagebrush obligates such as sagebrush sparrow, Brewer's sparrow, and sage thrasher. Other species commonly found within sagebrush communities on the Ranch include horned lark and vesper sparrow.

Salt-desert Shrub Communities

Salt-desert shrub communities are the second most common vegetation and occur across approximately 20% of the Ranch. Salt-desert shrub communities are characterized by salt-tolerant plants with a dominant shrub component of one or more *Atriplex* species such as Gardner's saltbush (*Atriplex gardneri*) or shadscale (*Atriplex confertifolia*) and are often co-dominant with birdsfoot sagebrush (*Artemisia pedatifida*), black greasewood (*Sarcobatus vermiculatus*), or other allied shrub and herbaceous species. These communities primarily occur within the northern flats north of the Chokecherry WDA, the Sage Creek Basin, and saline soils in the Lower Miller Hill area. Salt-desert shrub communities also occur in the eastern portions of the Chokecherry WDA. Horned lark is the most commonly observed species within salt-desert shrub communities. Other species characteristic of salt-desert shrub communities include vesper sparrow, killdeer (*Charadrius vociferous*), and rock wren (*Salpinctes obsoletus*).

Sparsely Vegetated and Barren Communities

Sparsely vegetated and barren vegetation communities are scattered and occur across 4-5% of the Ranch. These communities primarily occur in association with salt-desert shrub communities although sparsely vegetated areas also occur in association with sagebrush communities, especially in windswept areas or areas with shallow soils. Vegetation in these areas is generally characterized by a patchy distribution of upland sedges, cushion plants, and mat-forming forbs. Various buckwheat species (*Eriogonum* spp.) and pricklypear (*Opuntia* spp.) often co-dominate these barren landscapes, but cover is minimal. Horned lark are often found within sparsely vegetated communities. Additionally, killdeer may nest in barren locations.

Aspen Mixed-conifer Woodlands and Riparian Communities

Aspen mixed-conifer woodlands and riparian communities occur at elevations greater than 7,500 feet within the southwestern portions of the Ranch below the rim of Miller Hill. These communities occupy less than 2% of the Ranch. The predominant overstory vegetation is an open-canopy of quaking aspen (*Populus tremuloides*) interspersed with a variety of conifers and willows. The dense understory consists of forbs, grasses, and montane shrubs. Migratory bird species associated with this habitat include American robin (*Turdus migratorius*), black-capped chickadee (*Poecile atricapillus*), dark-eyed junco (*Junco hyemalis*), green-tailed towhee (*Pipilo chlorurus*), northern flicker (*Colaptes auratus*), and American goldfinch (*Spinus tristis*).

Mixed Mountain Shrub/ Montane Shrubland Communities

Mixed mountain shrub/ montane shrubland communities cover approximately 1% of the Ranch, predominantly located in the southern and southwestern portions at elevations ranging between 7,200 to 8,100 feet. These systems are typically associated with dry, exposed sites and are often in the uplands adjacent to aspen communities. Inclusions of sagebrush steppe or grassland often occur, but the vegetation is typically dominated by a variety of shrubs including serviceberry (*Amelanchier* spp.), mountain mahogany (*Cercocarpus montanus*), antelope bitterbrush (*Purshia tridentata*), and skunkbush sumac (*Rhus trilobata*). Migratory bird species associated with this habitat type are similar to those found in aspen mixed-conifer woodlands and may also include mountain bluebird (*Sialia currucoides*) and rock wren.

Upland Grassland Communities

Upland grassland communities occur throughout the Ranch, although the Chokecherry WDA has a greater occurrence of contiguous grassland cover. These communities typically occur between 6,500 to 8,400 feet in elevation and occur across approximately 7% of the Ranch. The vegetation is characterized as mixed-grass prairie on gentle to moderate slopes (0–20%), growing on drainage terraces, draws, alluvial flats and plains, escarpments, gulches, hillslopes, knobs, knolls, bluffs, and plateaus. Upland grasslands form a matrix with the surrounding sagebrush steppe, creating a mosaic landscape of rolling grasslands interspersed throughout sagebrush communities.

Generally, upland grassland communities in Phase I are dominated by native bunchgrass and rhizomatous species. Occurrences of this community have multiple plant associations that are dominated by patchy to dense populations of western wheatgrass (*Pascopyrum smithii*), bluebunch wheatgrass (*Pseudoroegneria spicata*), and needle and thread (*Hesperostipa comata*). Other grasses may include Indian ricegrass (*Achnatherum hymenoides*), bottlebrush squirreltail (*Elymus elymoides*), thickspike wheatgrass (*Elymus lanceolatus*), Kentucky bluegrass (*Poa pratense*), Sandberg bluegrass (*Poa secunda*), prairie dropseed (*Sporobolus heterolepis*), and alkali sacaton (*Sporobolus airoides*). Various buckwheat species (*Eriogonum* spp.), phloxes (*Phlox* spp.), stemless mock goldenweed (*Stenotus acaulis*), broom snakeweed (*Gutierrezia sarothrae*), and hairy false goldenaster (*Heterotheca villosa*) are often interspersed throughout the grass cover. Open-canopied shrubs occur sporadically and include big basin sagebrush (*Artemisia tridentata* ssp. *tridentata*), Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*), yellow rabbitbrush (*Chrysothamnus viscidiflorus*), rubber rabbitbrush (*Ericameria nauseosa*), Gardner's saltbush (*Atriplex gardneri*), shadscale (*Atriplex confertifolia*), spiny hopsage (*Grayia spinosa*), and black greasewood (*Sarcobatus vermiculatus*). While most species occurring within the upland grass community are native, non-native species including cheatgrass (*Bromus tectorum*) and crested wheatgrass (*Agropyron cristatum*) may be present in previously disturbed areas.

Migratory bird species associated with this habitat type include western meadowlark, horned lark, vesper sparrow, mourning dove (*Zenaida macroura*), mountain bluebird, and long-billed curlew (*Numenius americanus*).

Avian Use Surveys

PCW completed baseline wildlife surveys, including surveys for raptors and other avian species in 2008 and 2009 for the purposes of characterizing the site. *See Appendix D & E*. The 2008-2009 survey area was based upon the CCSM Project as originally proposed in PCW's POD submitted to BLM in 2008. *See Chapter 5.0.*

The pre-construction avian use surveys were initiated in June 2008 and concluded in June 2009. Nineteen points for fixed-point avian use surveys were selected in habitats and topography representative of the original CCSM Project configuration. *See Figure 4.1*. *See BLM 2011b; BLM 2012b.* While some of these survey points occur outside of Phase I, they were conducted in the same habitat types and similar topographic conditions; therefore, these data can still be used to characterize avian use in Phase I. The fixed-point avian use surveys (variable circular plots) were conducted using methods described by Reynolds *et al.* (1980). Surveys at each 800-meter radius plot consisted of a 20-minute point count conducted approximately bi-weekly during the summer and winter (June 15 to August 31 and November 16 to December 31, respectively) and weekly during the fall and spring (September 1 to October 15 and March 16 to May 31, respectively). All raptors and large bird observations were recorded out to a distance of 800 meters from the point center. Small bird observations were restricted to those within 100 meters. Data were collected for each observation, including species, number of individuals, distance from point center, and altitude above ground, among other variables. Sampling intensity was designed to document bird use and behavior by vegetation community and season.

The 2008-2009 year-long avian use survey data characterize seasonal, spatial, and temporal migratory bird use within the boundaries of the Original Proposed Action (also referred to by BLM as the Study Area), which included portions of Phase I. *See Figure 4.1. See Section 5.1.2*. These data inform site characterization completed as part of Tier 2 of the USFWS Wind Energy Guidelines.

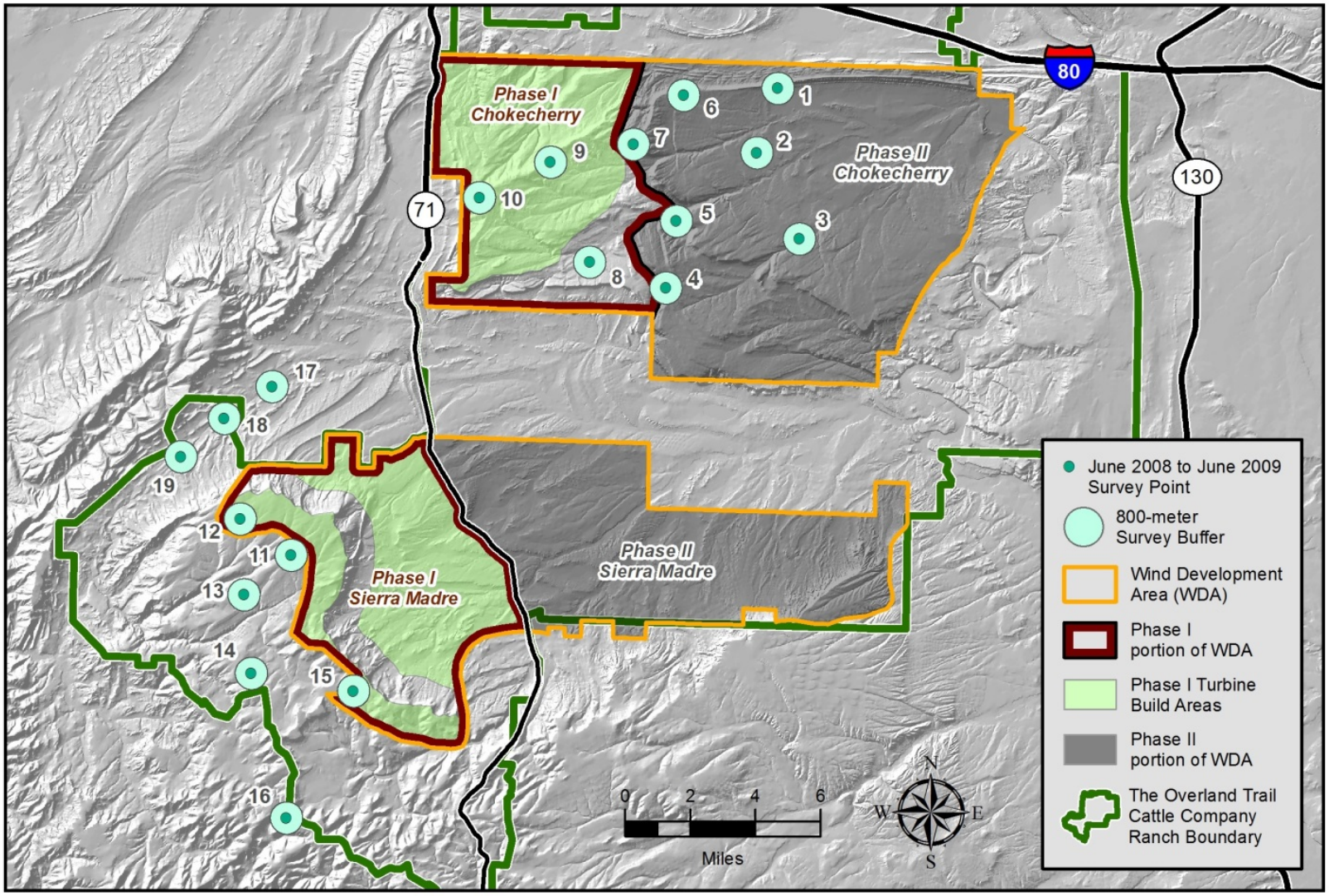

Figure 4.1. Avian Use Survey Locations, June 2008 to June 2009.

During the June 2008 to June 2009 avian use surveys, 1,903 migratory birds representing over 50 species were recorded. *See Table 4.1.* Detailed data from the 2008-2009 avian use surveys is included in Appendix E. In summary, small birds (i.e., those within 100 meters) were detected more frequently than raptors accounting for 1,484 individuals or 78% of all individuals. Horned lark accounted for 805 individuals or 42% of all detections followed by common raven (175 detections; 9%) and vesper sparrow (121 detections; 6%). The most frequently observed non-eagle raptors were American kestrel (*Falco sparverius*), northern harrier (*Circus cyaneus*), and red-tailed hawk representing approximately 6% of all detections (115 individuals). Avian use was greatest in spring, summer, and fall when migratory bird species were present. Approximately 99% of all individuals (1,883 individuals) were observed during these three seasons. During the winter season, most species migrate south away from Wyoming and the CCSM Project. Only 20 individuals or 1% of all individuals were observed during winter surveys.

When considering only small birds (i.e., those within 100 meters), horned lark accounted for 54% of the 1,484 small birds detected. Other small birds, in order of prevalence, were vesper sparrow (8%; 121 individuals), Brewer's sparrow (5%; 80 individuals), western meadowlark (5%; 69 individuals), and sage thrasher (4%; 65 individuals). The total number of small bird detections was similar in spring (593 individuals) and summer (632 individuals), but more than 50% lower in fall (255 individuals) and almost non-existent in winter (4 individuals). The only small bird identified during winter surveys was a single horned lark. The remaining individuals were unidentified.

The predominance of the five small bird species listed above (horned lark, vesper sparrow, Brewer's sparrow, western meadowlark, and sage thrasher) is primarily due to high numbers of each recorded during the spring and summer season. Dominant species composition varied during the spring and fall seasons, with Brewer's blackbird (*Euphagus cyanocephalus*) (spring), mountain bluebird (spring and fall), and sagebrush sparrow (spring) among the species contributing higher numbers during those seasons.

The most frequently observed non-eagle raptors during the 2008-2009 avian use surveys were American kestrel (43 individuals), northern harrier (42 individuals), and red-tailed hawk (30 individuals). The total number of non-eagle raptors was similar for summer (86 individuals) and fall (88 individuals), but more than 38% lower during the spring (53 individuals) and almost nonexistent in the winter (1 individual). The only non-eagle raptor recorded during winter surveys was one ferruginous hawk.

Table 4.1. Migratory Bird Observations, 2008-2009 Avian Use Surveys.

Species/Species Group	Spring	Summer	Fall	Winter	Total
Corvids					
American crow	16	49	---	---	**65**
common raven	44	16	102	13	**175**
Other Corvids	---	1	3	2	**6**
Passerines					
Brewer's blackbird	26	9	---	---	**35**
Brewer's sparrow	18	57	5	---	**80**
horned lark	368	264	172	1	**805**
mountain bluebird	14	4	16	---	**34**
sagebrush sparrow	52	7	---	---	**59**
sage thrasher	8	55	2	---	**65**
vesper sparrow	38	79	4	---	**121**
western meadowlark	28	34	7	---	**69**
Other Passerines	36	90	49	3	**178**
Non-eagle Raptors, Owls, and Allies					
American kestrel	16	25	2	---	**43**
ferruginous hawk	1	1	2	1	**5**
northern harrier	5	15	22	---	**42**
prairie falcon	4	1	1	---	**6**
red-tailed hawk	8	16	6	---	**30**
rough-legged hawk (*Buteo lagopus*)	2	---	9	---	**11**
Swainson's hawk	1	8	---	---	**9**
Other Non-Eagle Raptors, Owls, and Allies	3	1	8	---	**12**
Waterfowl, Waterbirds, and Wading Birds					
American white pelican (*Pelecanus erythrorhynchos*)	14	---	---	---	**14**
Other Waterfowl, Waterbirds, and Wading Birds	3	---	---	---	**3**

Species/Species Group	Spring	Summer	Fall	Winter	Total
Other Birds					
common nighthawk (*Chordeiles minor*)	---	6	---	---	**6**
mourning dove	---	10	---	---	**10**
northern flicker	1	1	---	---	**2**
unidentified hummingbird	---	2	---	---	**2**
white-throated swift (*Aeronautes saxatalis*)	3	13	---	---	**16**
Totals	**709**	**764**	**410**	**20**	**1903**

Raptor Nest Surveys

Understanding the use of raptor nests and identifying appropriate measures to avoid and minimize impacts to those nests requires an evaluation of the occupancy of the nest as well as the type of activity that is occurring at the nest location. *See Chapter 5.0.* For purposes of determining nest status during raptor nest surveys, PCW used the following definitions that are consistent with those used in PCW's Phase I ECP[23]:

- **Occupied Nest.** An occupied nest is a nest used for breeding in the current year by a pair of raptors. Presence of an adult, eggs, or young, freshly molted feathers or plucked down, or current year's mutes (whitewash) suggest site occupancy. In years when food resources are scarce, it is not uncommon for a pair of raptors to occupy a nest yet never lay eggs; such nests are considered occupied. *See PCW 2015a; USFWS 2013b*.
- **Unoccupied Nest.** Unoccupied nests are "those nests not selected by raptors for use in the current nesting season." *See PCW 2015a; USFWS 2013b*.

BLM has collected information on raptor nests within the CCSM Project Site since 1980 (a 33-year period). Prior to 1996, BLM mapped raptor nest locations opportunistically. Since 1996, both aerial and ground-based surveys have been conducted to map raptor nests within the RFO. BLM's records have been supplemented with raptor nests located as part of the permitting process for other development activities such as pipelines and oil and gas development. *See BLM 2012b*. In addition, PCW conducted helicopter-based aerial nest surveys between May 14 and 30, 2008. These aerial surveys for raptor

[23] The definitions of occupied and unoccupied nests are consistent between the Phase I ECP and Phase I BBCS for purposes of determining nest occupancy during raptor nest surveys. However, the avoidance and minimization measures for occupied and unoccupied nests developed in the Phase I ECP are specific to eagle nests and are not intended to be applied to the non-eagle raptor nests described in this Phase I BBCS. Further, the MBTA uses the term "active" to describe nest status. Consistent with the MBTA, the avoidance and minimization measures in this Phase I BBCS were developed to address "active" nests. The term "active" is defined in section 5.2.1 of this Phase I BBCS.

nests were completed within a 1600-meter (1-mile) buffer of the Original Proposed Action, surveying a total of approximately 270 square miles. *See Johnson et al. 2008. See Appendix F.* The surveys documented nest species and occupancy to the extent it could be determined. Surveys were conducted by flying over suitable nesting habitat (e.g., cliff bands, rocky areas, and stands of trees) and recording a geospatial location and noting the status for all known or potential raptor nests. The 2008 surveys also documented nests located incidental to other surveys and project activities. These aerial surveys for raptor nests identify species composition and relative abundance and are appropriate for site characterization purposes.

As described above, BLM has collected information on nests within the CCSM Project Site since 1980 (a 33-year period) and helicopter-based aerial nest surveys were completed for the CCSM Project, including Phase I in 2008. For the CCSM Project Site, red-tailed hawk, prairie falcon, and ferruginous hawk were the most commonly recorded species in the BLM nest database. Nest occupancy was not always recorded and there is a large variance in the current condition of the historic raptor nests in BLM's database. Many of the historic nests recorded by BLM are in poor condition as observed and documented during aerial flights conducted by PCW. Nests in poor condition are less likely to be used for nesting because they require an extensive rebuild in order to be used for future nesting activities and because nearby alternate nests in good condition are often available.

During the 2008 nest surveys, a total of 21 occupied non-eagle raptor nests (11 red-tailed hawk, 5 prairie falcon, and 5 great horned owl [*Bubo virginianus*]) were located within the survey area, of which only 7 were located within the Phase I Development Area. *See Figure 4.2 and Figure 4.3*. The majority of the nests detected in 2008 were red-tailed hawk nests located outside of the CCSM Project Site. Within the Phase I portion of the Sierra Madre WDA there were 2 red-tailed hawk nests and 2 great horned owl nests. Within the Phase I portion of the Chokecherry WDA there were 2 prairie falcon nests and 1 red-tailed hawk nest.[24]

[24] The red-tailed hawk nest is not visible on Figure 4.2 due to scale. The nest is located on the Bolten Rim in the Chokecherry WDA in close proximity to the prairie falcon nest; therefore, only the prairie falcon nest point is visible.

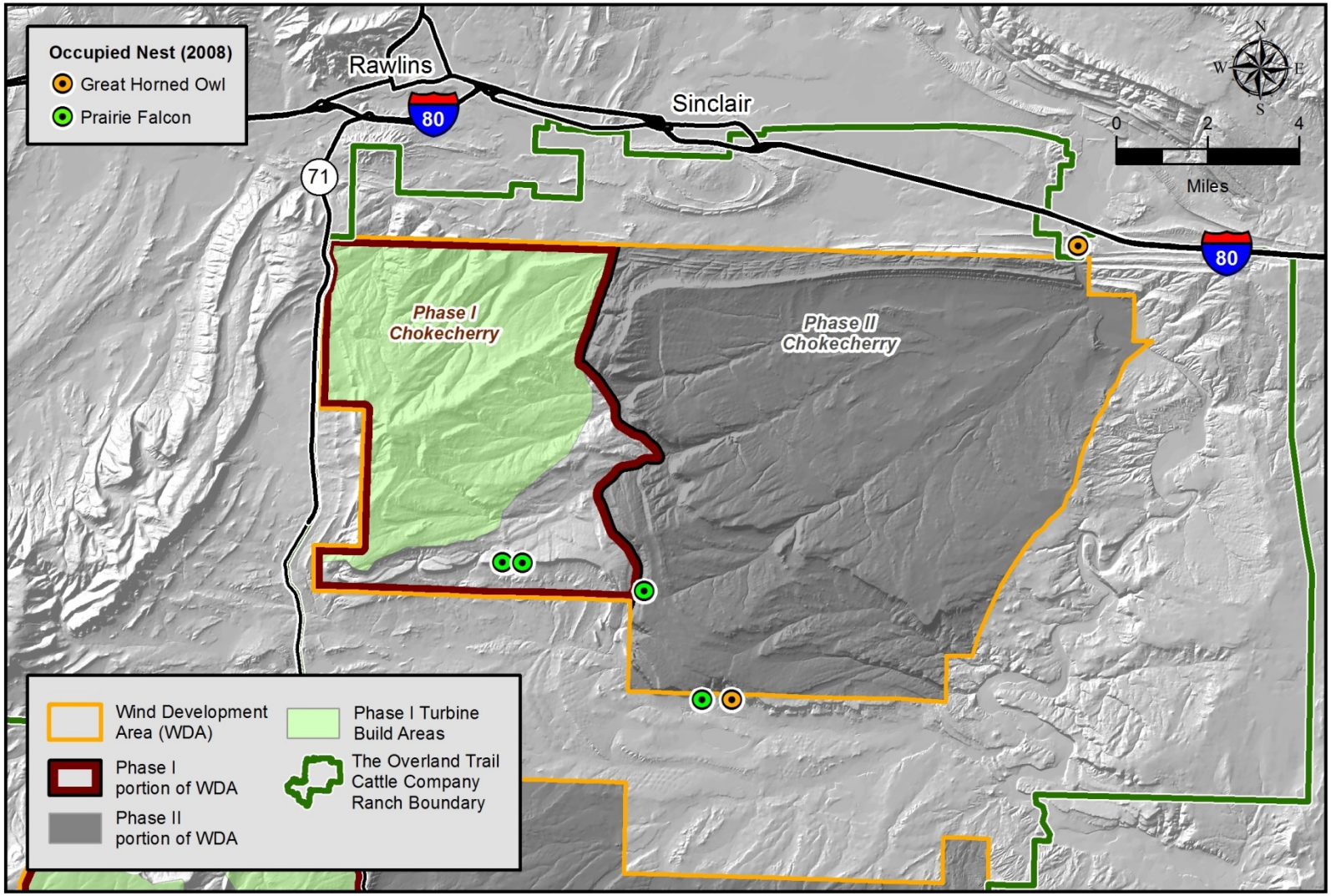

Figure 4.2. Chokecherry WDA Occupied Non-eagle Raptor Nests, 2008.

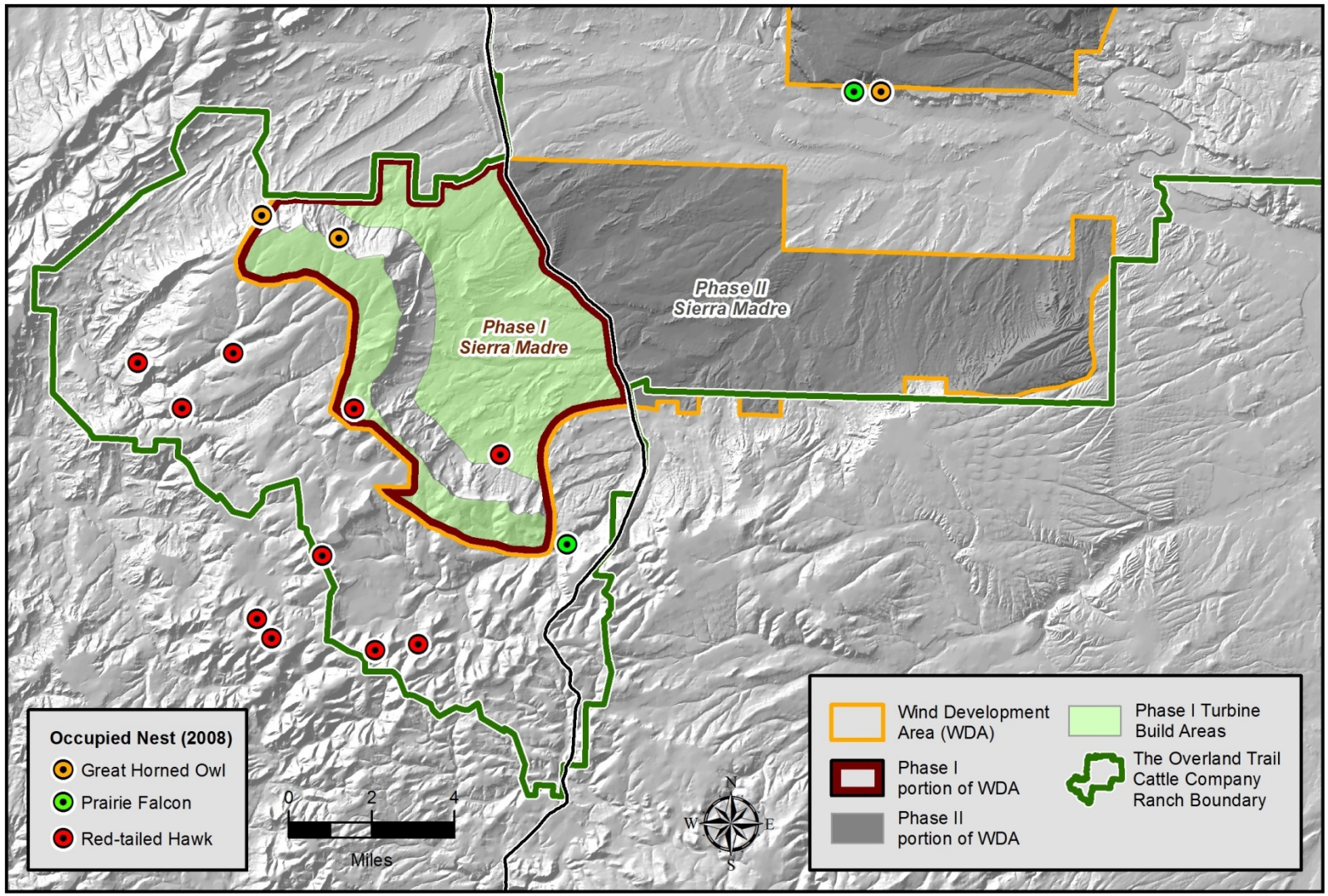

Figure 4.3. Sierra Madre WDA Occupied Non-eagle Raptor Nests, 2008.

Acoustic Bat Surveys

AnaBat detection systems manufactured by Titley Electronics were used for acoustic bat surveys conducted on the CCSM Project Site. Bat species produce echolocation vocalizations based on their ecological niche requirements, which may demand different frequency bandwidth, pulse duration, and other characteristics discernible in sonograms. AnaBat systems are capable of detecting and recording these ultrasonic sounds and producing sonograms, individual pulses on a frequency graph plotted against time. AnaBat sonograms generally have enough information to label a pulse sequence to a group of bats with similar acoustic characteristics (e.g., 25-kilohertz [kHz] bats) and even allow for identification of acoustically distinctive species (e.g., hoary bat). *See Kunz et al. 2007.* In North America, Myotis bat species are generally recognized as being the most difficult to differentiate due to similarities in vocalization characteristics; therefore these pulses are often placed within a frequency group (e.g., 40-kHz Myotis).

For acoustic bat surveys conducted for the CCSM Project in 2008, a standard index of bat activity was generated by counting the number of bat passes per detector-night at each survey location. *See Hayes 1997; Kunz et al. 2007.* A bat pass is defined as a pulse sequence (commonly referred to as a "call") consisting of at least one individual pulse that was separated by more than 1 second from the next pulse. *See White and Gehrt 2001*. Individual bats are not identifiable in an acoustical dataset since pulses may have been produced by the same or different individuals over the course of a single night survey period; therefore, an index of activity is used because the exact number of bats cannot be quantified from acoustic data. *See Hayes 2000; Kunz et al. 2007.*

All bat passes were categorized through assessment of both qualitative (e.g., shape) and quantitative (e.g., characteristic frequency) qualities as demonstrated by Weller and Baldwin (2012). Bat passes were classified as pertaining to low (<35 kilohertz [kHz]) or high (>35 kHz) characteristic frequency groups. Diagnostic call sequences in the datasets were labeled only for hoary bat as that species has a unique call pattern easily distinguished from other bat species.

Passive acoustic bat surveys were conducted from July 13 to October 13, 2008. While some of these survey points were located outside of Phase I, they were conducted in the same habitat types and similar topographic conditions; therefore, these data can be used to characterize bat use in Phase I. *See Solick et al. 2008*. Six sites were surveyed with eight AnaBat units, two of which were placed on meteorological towers approximately 45 meters above the ground, with the remaining six AnaBat units being ground-based. *See Figure 4.4.* The study resulted in 3,021 bat passes across 669 detector-nights for an average of 4.52 bat passes/detector-night. However, this mean value is heavily influenced by site A3 located in Hugus Draw, which comprised 63% of all bat passes recorded during 2008 (average 20.62 passes/detector-night). *See Figure 4.4.* Site A3 is located near a wetland/stock pond outside of the Phase I Turbine Build Area. *See Figure 4.4.* As no impacts to bats will occur at site A3 because of its location, it was removed from the dataset as an outlier. After removal of site A3, the remaining seven AnaBat sites demonstrated more consistent bat use with an average of 1.9 bat passes per detector-night. *See Table 4.2.*

Bat activity in 2008 was highest from July 13 through the end of August, with activity peaks on July 27 and August 22. Very low activity was recorded in September and October. Temporal variation was similar among AnaBat sites across the CCSM Project.

Approximately 63% of all bat passes recorded were of high-frequency bats. Ground-based AnaBat units recorded similar ratios of low- and high-frequency bats, though there was variation between sites and across the survey period. However, elevated units deployed on meteorological towers consistently recorded disproportionately high numbers of low-frequency bat passes than high-frequency, with hoary bat comprising 7% of all bat passes. Trends in activity for hoary bat were consistent with patterns observed for all bat frequency groups, including a peak in activity on August 22.

Table 4.2. 2008 Acoustic Bat Survey Data.

Characteristic	Value
High Frequency Bat Passes	1909
Low Frequency Bat Passes	895
Hoary Bat Passes	217
Total Bat Passes	**3,021**
Total Bat Passes (Excluding Site A3)	1124
Total Detector Nights (Excluding Site A3)	577
Bat Passes per Detector Night Excluding Site A3	**1.9**

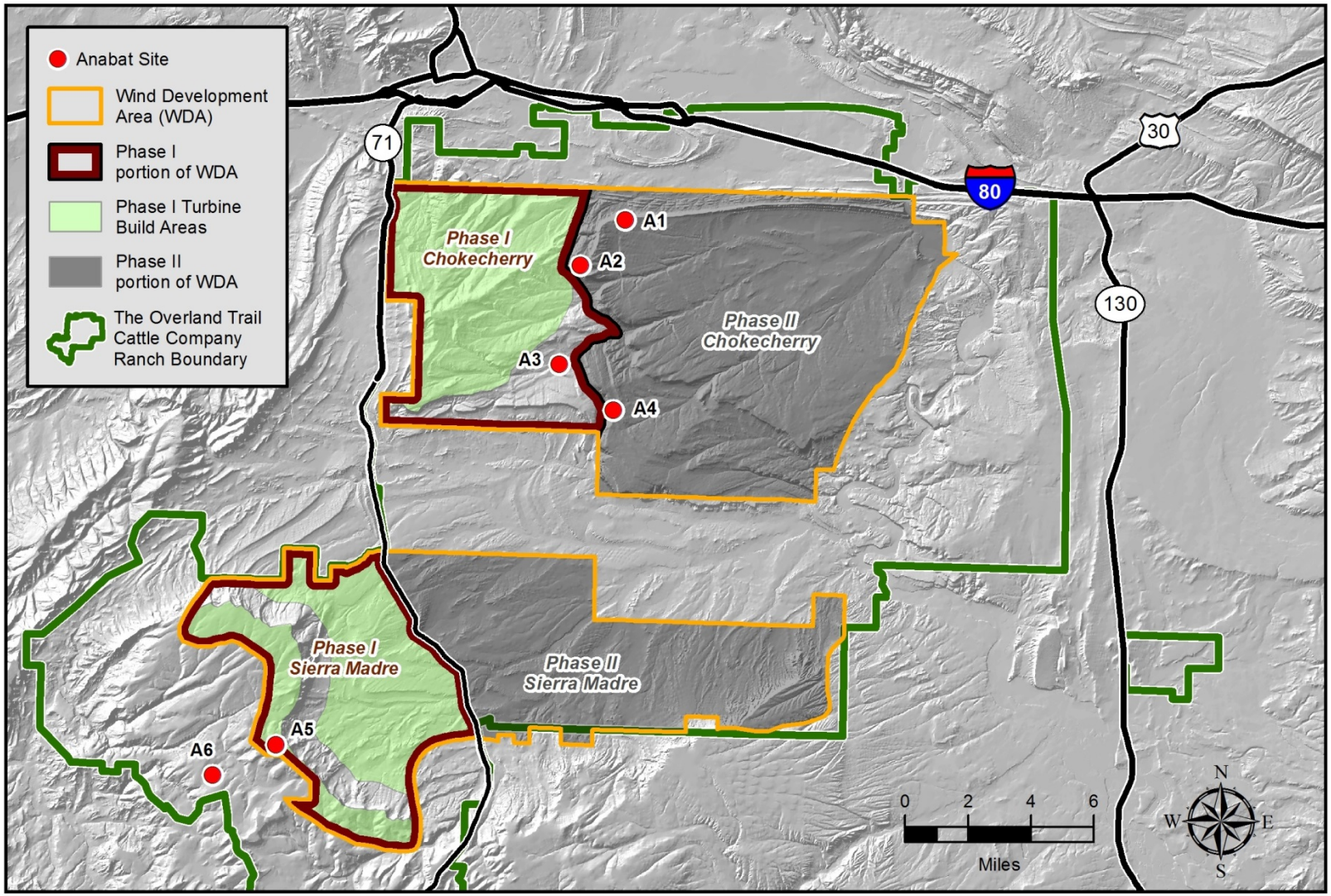

Figure 4.4. 2008 Acoustic Bat Survey Sites.

4.3.2 Site Characterization Questions

As described above, the site characterization and risk assessment process for the CCSM Project, including Phase I, is based on the information compiled for and contained in the BLM FEIS. *See BLM 2012b.* Consistent with the USFWS Wind Energy Guidelines, the BLM FEIS reviewed available data from: (1) existing data sources, such as peer-reviewed literature, agency technical reports, CCSM Project-specific technical reports, Wyoming Geographic Information Science Center datasets, and Wyoming Natural Diversity Database records; (2) other federal, state and local agencies, non-governmental organizations, and the public; and (3) site-specific field data collected by qualified wildlife biologists.

1. *Are there species of concern[25] present on the potential site(s), or is habitat (including designated critical habitat) present for these species?*

   As discussed in section 1.2, PCW has identified 117 species of migratory birds within the CCSM Project Site, including Phase I. *See Appendix B.* In addition, 13 bat species have been observed, acoustically detected, or documented in the vicinity of the CCSM Project. *See Orabona et al. 2012; BLM 2012b.* Of these species, the BLM FEIS identified 11 migratory bird and 3 bat species listed on the BLM Wyoming Sensitive Species Policy and List that have the potential to occur on the CCSM Project Site. *See BLM 2012b at p. 3.15-5. See Appendix B.* In addition, data supporting the analysis in the BLM FEIS identified 21 migratory bird and 8 bat species included in the SWAP as SGCN that have the potential to occur on the CCSM Project Site. *See WGFD 2010. See Appendix B.* Some of the BLM and WGFD species of concern are the same; when this redundancy is removed there are a total of 22 migratory bird and 9 bat species of concern that have the potential to occur on the CCSM Project Site. *See Table 1.1 & Table 1.2.*

2. *Does the landscape contain areas where development is precluded by law or areas designated as sensitive according to scientifically credible information?*

   Consistent with the site evaluation, the Red Rim-Grizzly WHMA is the only avian-related sensitive area in the vicinity of the CCSM Project Site identified in the BLM FEIS. The Grizzly portion of the WHMA is managed for several raptor species. *See WGFD and BLM 1992.* At the time of the CCSM Project Site characterization, development was proposed for a small portion of the Red Rim-Grizzly WHMA. However, as discussed in section 5.1, the CCSM Project was ultimately reconfigured to eliminate development in the Red Rim-Grizzly WHMA. *See BLM 2012a.*

[25] This Phase I BBCS adopts this definition of species of concern from the USFWS Wind Energy Guidelines. However, in recognition of agency management priorities, this Phase I BBCS is primarily focused on special status species that have been identified by federal and state agencies. *See Section 1.2.*

In addition to the Red Rim-Grizzly WHMA, the 2008 BLM RFO RMP designated the Upper Muddy Creek Watershed/Grizzly WHMA on BLM lands adjacent to the Red-Rim Grizzly WHMA. *See BLM 2008a.* However, the Upper Muddy Creek Watershed/Grizzly WHMA was designated for purposes of managing habitat for Colorado River fish species and crucial winter habitat for elk and mule deer. As the Upper Muddy Creek Watershed/Grizzly WHMA is not designated for purposes of managing migratory birds and bats, this WHMA is not discussed further in this Phase I BBCS.

3. *Are there known critical areas of wildlife congregation, including, but not limited to: maternity roosts, hibernacula, staging areas, winter ranges, nesting sites, migration stopovers or corridors, leks, or other areas of seasonal importance?*

   Based on the results of migratory bird point count surveys, acoustic bat monitoring, and other wildlife surveys across the CCSM Project Site, the BLM FEIS did not identify any maternity roosts, hibernacula, staging areas, winter ranges, nesting sites, migration stopovers or corridors for migratory birds and bats within the CCSM Project Site or surrounding areas. *See BLM 2012b at pp. 13.14-1 & 13.15-1.* Areas of seasonal importance were identified including nesting sites and several small reservoirs that may provide habitat and stopover sites for waterfowl and wading birds. Some of these areas were originally proposed for development; however, the majority of these areas were eventually eliminated from the CCSM Project, including Phase I, as described in section 5.1. WGFD identified big game winter range and greater sage-grouse leks within the CCSM Project Site, including Phase I. However, these features are not related to the migratory bird and bat species that are the subject of this Phase I BBCS. *See Section 1.2.*

4. *Are there large areas of intact habitat with the potential for fragmentation, with respect to species of habitat fragmentation concern needing large contiguous blocks of habitat?*

   BLM analyzed the impacts of the CCSM Project on sagebrush obligate species (sage thrasher, sagebrush sparrow, Brewer's sparrow). This species group is generally believed to be sensitive to fragmentation of sagebrush ecosystems. *See Rich et al. 2005*. The BLM FEIS also identified large tracts of rangelands and other agricultural use areas across the CCSM Project Site. These habitats are relatively intact but are regularly bisected by state highways, county roads, ranch roads, electrical transmission and distribution lines, oil and gas pipelines, and communications facilities. As described in the BLM FEIS, the CCSM Project would result in increased potential for fragmentation or displacement. *See BLM 2012b at p. 3.14-1*. However, BLM identified that impacts to sagebrush obligate species (sage thrasher, sagebrush sparrow, Brewer's sparrow) would not be significant. In addition, based on the site-specific data, PCW has developed a number of measures to minimize impacts to sagebrush steppe communities and other habitats in Phase I. These measures are described in chapter 5.0.

5. *Using best available scientific information has the developer or relevant federal, state, tribal, and/or local agency identified the potential presence of a population of a species of habitat fragmentation concern?*

   As identified in the vegetation surveys and BLM FEIS, the CCSM Project Site contains several intact patches of sagebrush steppe that support sagebrush-obligate species. As described above, BLM did not identify any significant impacts to sagebrush-obligate species from the CCSM Project in its EIS.

   In addition to sagebrush obligates, the Wyoming SWAP specifically mentions habitat fragmentation as a concern for ferruginous hawk and Swainson's hawk.[26] *See WGFD 2010.* BLM's FEIS considered effects to these species, including direct effects and indirect effects such as habitat fragmentation, displacement, and collision with wind turbines. *See BLM 2012b at p. 4.14-8.* The BLM FEIS concluded that the development and implementation of this Phase I BBCS and the associated adaptive management process would avoid and minimize impacts to all migratory bird and bat species, including those of habitat fragmentation concern. *See BLM 2012b at pp. 4-14-17 & 4.14-24.*

6. *Which species of birds and bats, especially those known to be at risk by wind energy facilities, are likely to use the proposed site based on an assessment of site attributes?*

   Common non-eagle raptor species identified in the avian use surveys include American kestrel, northern harrier, red-tailed hawk, and Swainson's hawk. *See Section 4.3.1.* The most common passerine species within the CCSM Project Site include horned lark, western meadowlark, vesper sparrow, Brewer's sparrow, sagebrush sparrow, and sage thrasher. *See Section 4.3.1.* Given that passerines make up the largest proportion of birds observed in the avian use surveys, the BLM FEIS found that passerine species (e.g., small songbirds) are most likely to be at risk of fatalities from wind energy development. *See BLM 2012b at p. 4.14-24.* Therefore, it is anticipated that horned lark, western meadowlark, vesper sparrow, Brewer's sparrow, sagebrush sparrow, and sage thrasher would be the species most likely to be impacted by the CCSM Project, including Phase I.

   The BLM FEIS found that there was low potential for impacts from the CCSM Project to the three BLM sensitive bat species (long-eared myotis, fringed myotis, and Townsend's big-eared bat) from the CCSM Project. *See BLM 2012b at p.4.14-18.* The BLM FEIS also determined that the species of bats most likely to be impacted by wind energy development in the western United

[26] The USFWS and other federal agencies have yet to designate species of habitat fragmentation concern for Wyoming. It is possible that there are other species of habitat fragmentation concern in Phase I. However, as they have not been identified, they cannot be specifically addressed in this Phase I BBCS. If additional species of habitat fragmentation concern are identified by the agencies, they may be addressed through the adaptive management process described in Section 8, as appropriate.

States are the hoary bat and the silver-haired bats. *See BLM 2012b at p. 4.14-17.* However, hoary bats were detected in just 7% of all bat passes recorded on the CCSM Project Site, or 217 bat passes out of a total of 3,021. *See Section 4.3.1.* The low occurrence of hoary bats on the CCSM Project Site indicates that impacts to this species will be minimal. As described in the FEIS, it is likely that hoary bat and silver-haired bat would have the greatest risk for impacts resulting from the CCSM Project. *See BLM 2012b at p. 4.14-16*. However, the overall risk to bats remains low. *See Appendix D.*

7. *Is there a potential for significant adverse impacts to species of concern based on the answers to the questions above, and considering the design of the proposed project?*

   As identified in the CCSM Project avian use surveys, certain migratory bird and bats species of concern may be present on the CCSM Project Site. *See Section 4.3.1.* The BLM FEIS analyzed potential impacts to these species from the CCSM Project and concluded that no significant impacts would occur to sagebrush obligate bird species or BLM-sensitive bat and WGFD SGCN bat species. *See BLM 2012b at pp. 4.14-17 & 4.14-25*. The FEIS found that, while adverse impacts may occur to some bird species on a localized basis, the avoidance and minimization measure in this Phase I BBCS would likely substantially reduce impacts to migratory bird and bat species. *See BLM 2012b at pp. 4.14-17 & 4.14-24*.

   The migratory bird and bat species and habitats most likely to be impacted by the CCSM Project, including Phase I, are ubiquitous throughout south-central Wyoming and much of the western United States. As such, localized impacts associated with the CCSM Project are not likely to have significant impacts to the availability of habitats or populations of the migratory bird and bat species observed during survey efforts and addressed in this Phase I BBCS. In addition, PCW has developed extensive avoidance, minimization and conservation measures in this Phase I BBCS to avoid and minimize impacts to migratory birds and bats. *See Chapter 5.0.*

4.3.3 Site Characterization Risk Assessment

The site characterization process for the CCSM Project, including Phase I, concluded that there are no threatened or endangered migratory birds or bat species present on the CCSM Project Site. However, PCW determined that migratory bird or bat species of concern may be present. *See Appendix B.* Therefore, consistent with the USFWS Wind Energy Guidelines, PCW identified additional measures to avoid and minimize impacts to migratory bird and bat species. *See USFWS 2012a at p. 49.* The avoidance and minimization measures included a substantial re-design of the entire CCSM Project, and specifically Phase I. The Phase I avoidance and minimization process and the conservation measures and best management practices identified for migratory birds and bats are described in chapter 5.0.

Following completion of the site characterization process and development of the associated avoidance and minimization measures, PCW determined that the answer to one or more of the site characterization (Tier 2) questions was still inconclusive. Therefore, PCW conducted additional in-depth field studies on migratory bird and bat use based on the issues raised during site characterization.

4.4 Field Studies and Impact Prediction (USFWS Wind Energy Guidelines – Tier 3; WGFC Wind Energy Recommendations – Tier 2)

As discussed above, after completion of the CCSM Project site characterization process, PCW determined that additional field studies were appropriate to assess the potential risk to migratory birds and bats from the CCSM Project, including Phase I. The completion of additional field studies, i.e. additional data collection, is consistent with Tier 3 of the USFWS Wind Energy Guidelines and Tier 2 of the WGFC Wind Energy Recommendations.

Tier 2 of the WGFC Wind Energy Recommendations and Tier 3 of the USFWS Wind Energy Guidelines recommend the collection of quantitative data using scientifically rigorous studies. The intent of these studies is to assess the potential risk of a proposed project to migratory bird and bat species and to inform appropriate measures to avoid and minimize that risk. The field studies are also intended to inform the duration and level of effort of post-construction monitoring. *See Chapter 6.0.*

In compliance with Tier 2 of the WGFC Wind Energy Recommendations and Tier 3 of the USFWS Wind Energy Guidelines, PCW conducted additional site-specific, scientifically rigorous migratory bird and bat field studies following completion of the 2008-2009 site characterization surveys. The field studies were designed in coordination with USFWS, WGFD, and BLM based on data collected during the site characterization process. *See Section 4.3.*

4.4.1 Field Study Data

To assess the potential risk to migratory birds and bats from the CCSM Project, including Phase I, PCW conducted numerous field studies and surveys. *See Table 4.3.* These studies and surveys include:

1. Raptor use surveys designed to characterize raptor use and identify important raptor-use areas;
2. Raptor nest surveys designed to characterize local area nesting population;
3. Migratory bird surveys to assess the diversity and abundance of migratory birds;
4. Avian radar surveys to identify patterns of migratory bird and bat use;
5. Breeding bird surveys to document use of habitats during nesting season;
6. Waterbird/ waterfowl surveys to document the diversity and abundance of waterbirds and waterfowl using reservoirs in the vicinity of the CCSM Project; and
7. Acoustic bat surveys to document bat activity at additional locations within the CCSM Project Site.

Table 4.3. CCSM Project Migratory Bird and Bat Surveys.

Survey	Date
Raptor Use Surveys	
Long-watch Raptor Use and Migration Surveys	April 2011 - July 2012
800-meter Raptor Count Surveys	August 2012 - August 2013
Raptor Nest Surveys	
Raptor Nest Surveys	May 2008 May - July 2011 April - July 2012 April - July 2013 April - July 2014
Migratory Bird Use Surveys	
Migratory Bird Surveys	April 2011 - April 2012
Avian Radar Surveys	March 2011 - March 2013
Bats	
Acoustic Bat Surveys	April, August, October 2011
Other	
Breeding Bird Density Surveys	June 2011
Waterbird/ Waterfowl Surveys	April, August, October 2011

Following the site characterization process described in section 4.3, PCW initiated discussions with USFWS, BLM, and WGFD to begin development of a BBCS for the CCSM Project. During this collaborative process, USFWS and BLM reviewed the existing data and determined that additional data would be useful for more detailed risk assessments and siting efforts consistent with Tier 3 of the USFWS Wind Energy Guidelines. Therefore, USFWS and BLM recommended that PCW conduct additional surveys to identify high avian use areas and requested that PCW develop survey protocols to assess site-specific risk within the WDAs. USFWS emphasized the importance of identifying high avian use areas within the WDAs that might be avoided during development of final wind turbine layouts and micrositing of facilities. Specifically, USFWS and BLM identified avian radar technology in combination with long-watch raptor surveys and standard point counts as a desired method to map areas of high avian use.

In December 2010, PCW circulated draft survey protocols to the USFWS, BLM and WGFD for review and comment. PCW incorporated USFWS, BLM and WGFD recommendations and comments into the final survey protocols in March 2011. *See Appendix D*. PCW provided the March 2011 survey protocols to USFWS and received USFWS's concurrence with and endorsement of the protocols.[27] PCW implemented the March 2011 protocols and completed a full year of surveys from April 2011 to March 2012. These surveys included long-watch raptor surveys, avian radar studies, raptor nest surveys, migratory bird surveys, breeding bird surveys, and waterbird/ waterfowl surveys.

In April 2012, working with the USFWS, PCW identified an additional long-watch raptor survey protocol and new survey locations to: (1) refine important avian use areas; (2) identify additional avian use areas; and (3) inform the implementation of appropriate avoidance and minimization approaches to reduce risks to migratory bird and bat species. *See Appendix D.* Surveys were conducted under the additional protocol between April 2012 and July 2012. During this period, PCW also completed raptor nest surveys and continued avian radar surveys. The 2011 and 2012 protocols were implemented to provide site-specific data to identify important raptor use areas including those related to nesting activity, migration, foraging, and roosting as well as to provide the data necessary to complete a risk assessment for the CCSM Project, including Phase I. The data collected from these comprehensive surveys, were used to redesign the CCSM Project and develop the final wind turbine layout for Phase I. *See Chapter 5.0*.

During implementation of the 2011 and 2012 protocols, PCW worked closely with the USFWS to identify additional data collection and survey needs. During a meeting on July 24, 2012, USFWS recommended that raptor survey protocols be revised again for the CCSM Project to focus on 800-meter radius surveys to collect data that would be compatible with upcoming USFWS guidance. PCW revised its survey protocols as recommended by USFWS, and on August 20, 2012, 800-meter raptor count surveys began at 40 locations across the CCSM Project Site. After further coordination with USFWS, the 800-meter raptor count surveys were expanded again on November 12, 2012, to cover 60 locations within the CCSM Project Site to aid in the further refinement of important raptor use areas and inform avoidance and minimization measures. *See Appendix D*. Surveys continued at the 60 point locations through the end of August 2013.

[27] In a March 3, 2011 email, Mr. Sanderson, a USFWS employee, stated "[a]s we have stated all along, we are 100% behind the monitoring protocols . . . ." On May 5, 2011, Mr. Sanderson reiterated the USFWS's approval of the monitoring protocols and BBCS/ECP development approach in an email stating "[a]s discussed previously, the Service is entirely on-board with the proposed monitoring protocols . . . ."

Long-watch Raptor Surveys

Between April 4, 2011, and July 24, 2012, biweekly long-watch raptor surveys were completed throughout the CCSM Project Site. From April 2011 through March 2012, surveys were completed at 15 locations. From April 2012 through July 2012, surveys were completed at 14 locations. *See Figure 4.5. See Appendix E & F*. The duration and frequency of long-watch raptor surveys varied by season in accordance with the recommendations of the federal and state agencies; however, survey minutes were evenly distributed across all daylight hours and between sites within each season.

Long-watch raptor surveys were conducted for 4–8 hours at each location, with summer and winter surveys having the shortest duration, based on agency recommendations. Data collected for each raptor detected included species, number of individuals, age, sex, distance from observer, bearing to the bird, heading of the bird, height, and flight behavior. Flight paths were also recorded on aerial maps for each raptor detected. Long-watch raptor surveys were conducted in 4,000-meter radius plots strategically distributed across the WDAs to maximize coverage for the purposes of identifying high use areas and potential migratory pathways and other raptor use areas while maintaining observer confidence in species identification. While data were collected on raptor use out to 4,000 meters, for purposes of comparison with other raptor data collected for the CCSM Project, only those raptors observed within 800 meters of each long-watch raptor survey location are reported here. *See Table 4.4*. This is necessary because small raptors such as kestrels have a lower probability of detection beyond 800 meters than large raptors such as ferruginous hawks.

From April 2011 through July 2012, 430 surveys were conducted for a total of 146,876 minutes (2,447.9 hours) or more than 40% of the daylight minutes during this period. The entirety (100%) of the Phase I wind turbine layout was covered during the long-watch raptor surveys between April 2011 and July 2012. The data collected through the long-watch surveys was used to identify areas of high raptor use within the CCSM Project Site for the purposes of micrositing wind turbines and other facilities to avoid and minimize impacts to raptors and other migratory bird and bat species. In addition, the results were used to identify Turbine No-Build Areas in which wind turbines would not be constructed to further avoid impacts to raptors and other migratory bird and bat species using those areas. *See Chapter 5.0*.

A total of 452 hours of survey were completed at the Phase I long-watch raptor survey sites located in the Chokecherry WDA and 661 hours of survey were completed for the Sierra Madre WDA Phase I long-watch raptor survey sites. While portions of some of these 800-meter survey locations overlap with Turbine No-Build Areas, or are outside of the Phase I Turbine Build Area, they were conducted in the same habitat types and similar topographic conditions; therefore, these data can still be used to assess avian use in Phase I.

A total of 303 non-eagle raptor observations were recorded within 800 meters of Phase I long-watch raptor survey locations. Non-eagle raptor use was relatively consistent during spring, summer, and fall survey periods across Phase I. Slightly higher numbers of raptors were observed during spring presumably as a result of increased use during migration. Non-eagle raptors were not observed during winter surveys conducted in 2011-2012. *See Table 4.4*.

During surveys of the Phase I portion of the Chokecherry WDA, American kestrel was the most commonly observed non-eagle raptor within 800 meters of the long-watch raptor survey locations comprising 42 of 76 total non-eagle raptors (55%), followed by red-tailed hawk (9 individuals, 12%), and prairie falcon (9 individuals, 12%).

During surveys of the Phase I portion of the Sierra Madre WDA, red-tailed hawk was the most commonly observed non-eagle raptor within 800 meters of the long-watch raptor survey locations accounting for 80 of the 227 individuals (35%), followed by American kestrel (50 individuals, 22%), northern harrier (28 individuals, 12%), Swainson's hawk (19 individuals, 8%), and prairie falcon (18 individuals, 8%).

Table 4.4. Phase I Non-eagle Raptor Observations, 2011-2012 Long-watch Raptor Surveys.

Species	Spring 2011	Summer 2011	Fall 2011	Winter 2011-2012	Spring 2012	Total
Phase I Chokecherry WDA						
American Kestrel	32	8	---	---	2	**42**
Ferruginous Hawk	1	---	2	---	---	**3**
Merlin (*Falco columbarius*)	---	---	2	---	---	**2**
Northern Harrier	4	---	2	---	---	**6**
Prairie Falcon	9	---	---	---	---	**9**
Red-tailed Hawk	1	4	4	---	---	**9**
Sharp-shinned Hawk (*Accipiter striatus*)	1	---	1	---	1	**3**
Turkey Vulture (*Cathartes aura*)	---	---	---	---	1	**1**
Unknown Buteo	1	---	---	---	---	**1**

Species	Spring 2011	Summer 2011	Fall 2011	Winter 2011-2012	Spring 2012	Total
Phase I Sierra Madre WDA						
American Kestrel	14	16	9	---	11	**50**
Cooper's Hawk	3	---	2	---	1	**6**
Ferruginous Hawk	2	3	---	---	---	**5**
Merlin	---	---	1	---	2	**3**
Northern Goshawk	---	---	---	---	1	**1**
Northern Harrier	18	4	6	---	---	**28**
Peregrine Falcon	---	1	1	---	---	**2**
Prairie Falcon	7	7	3	---	1	**18**
Rough-legged Hawk	---	---	1	---	---	**1**
Red-tailed Hawk	58	5	8	---	9	**80**
Sharp-shinned Hawk	2	---	4	---	---	**6**
Swainson's Hawk	3	10	---	---	6	**19**
Turkey Vulture	---	2	1	---	---	**3**
Unknown Accipiter	1	---	---	---	---	**1**
Unknown Buteo	1	---	1	---	---	**2**
Unknown Raptor	1	---	---	---	1	**2**
Total	**159**	**60**	**48**	**0**	**36**	**303**

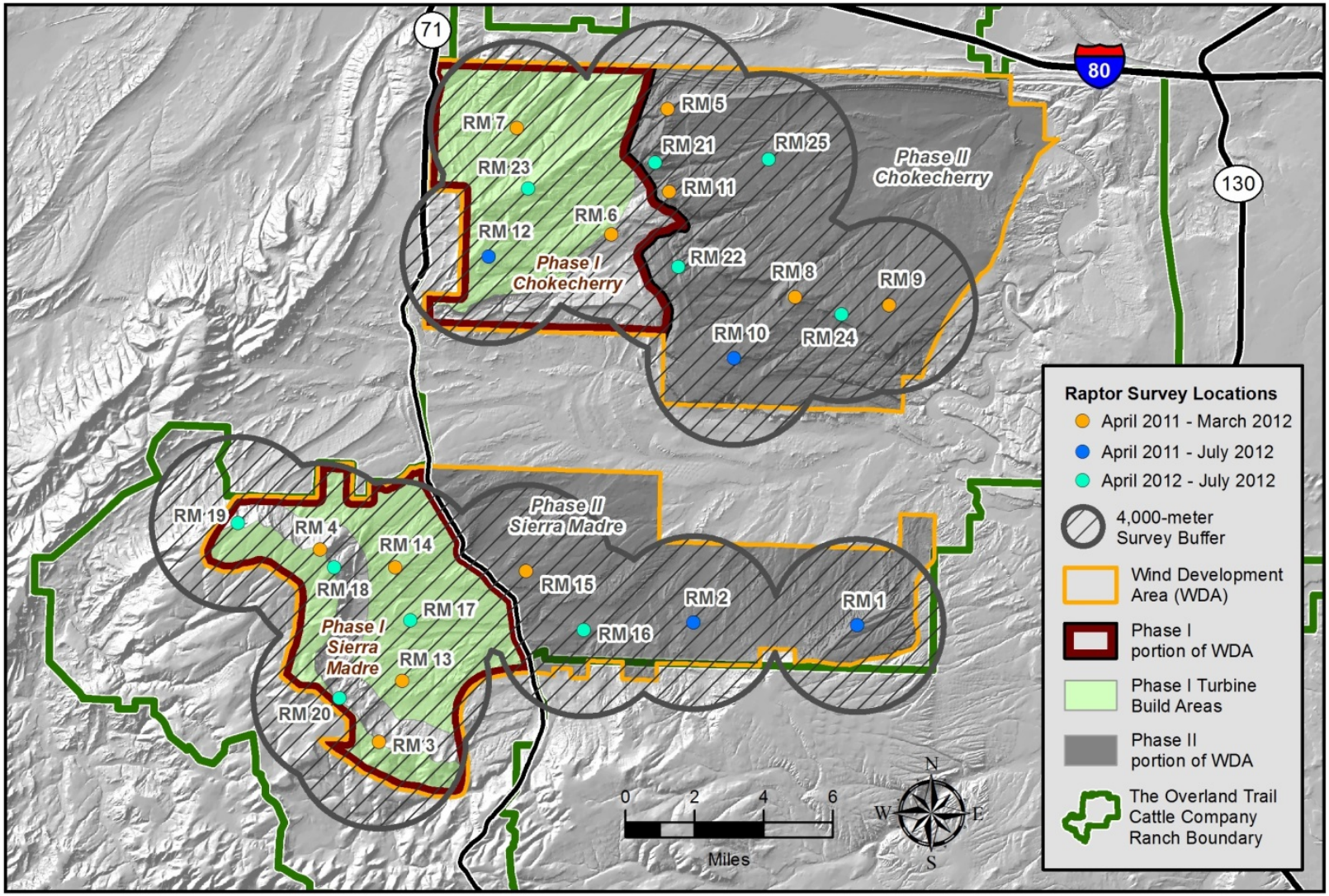

Figure 4.5. Long-watch Raptor Survey Locations, April 2011 to July 2012.

800-meter Raptor Count Surveys

Between August 20, 2012, and November 9, 2012, 1,382 biweekly 800-meter raptor count surveys were conducted at 40 locations within the CCSM Project Site. *See Figure 4.6*. Following discussion with USFWS, the biweekly 800-meter raptor count surveys were increased to 60 sites between November 12, 2012, and August 30, 2013, to achieve additional coverage. *See Figure 4.7. See Appendix E & F*.

PCW's 800-meter raptor count surveys provide more than 30% coverage of the Phase I wind turbine layout. To obtain the desired coverage, minimum convex polygons (MCPs) were placed around potential wind turbine construction areas in the WDAs and were evaluated for differences in habitat characteristics, forage potential, and topography. Using the Geostatistical Analyst tools in ArcGIS, spatially balanced 800-meter raptor count survey locations were sequentially selected to capture the variability in habitat conditions, terrain features, and wind turbine numbers and densities, while ensuring that no overlap occurred between survey locations. The total number of sampling locations per MCP was based on the relative surface area, number of wind turbines, and wind turbine densities in each MCP.

The 800-meter raptor count surveys were generally conducted for 1 hour at each site (on rare occasions weather conditions and visibility truncated the 1 hour survey time), and data collected for each raptor observed during these surveys included species, number of individuals, age, sex, distance from observer, bearing to the bird, heading of the bird, height, flight behavior, and number of flight minutes. Flight paths were also recorded on aerial maps for each raptor detected. The 800-meter raptor count surveys were conducted within 800-meter radius plots in order to maintain high confidence in detection and identification of raptors, and in the recording of their flight paths.

From August 2012 to August 2013, 800-meter raptor count surveys were conducted across the CCSM Project Site for a total of 97,573 minutes (1,626 hours), covering 35.5% of the total daylight minutes during this period. Of these surveys, 51,964 minutes (866 hours) of survey were conducted within the Phase I Development Area. Fifteen survey locations in the Phase I portion of the Chokecherry WDA were surveyed for a total of 21,364 minutes. Eighteen survey locations in the Phase I portion of the Sierra Madre WDA were surveyed for a total of 30,600 minutes. Data from the 800-meter raptor count surveys were used to further identify high raptor use areas for the purpose of micrositing Phase I to avoid and minimize impacts to raptors and other migratory bird and bat species.

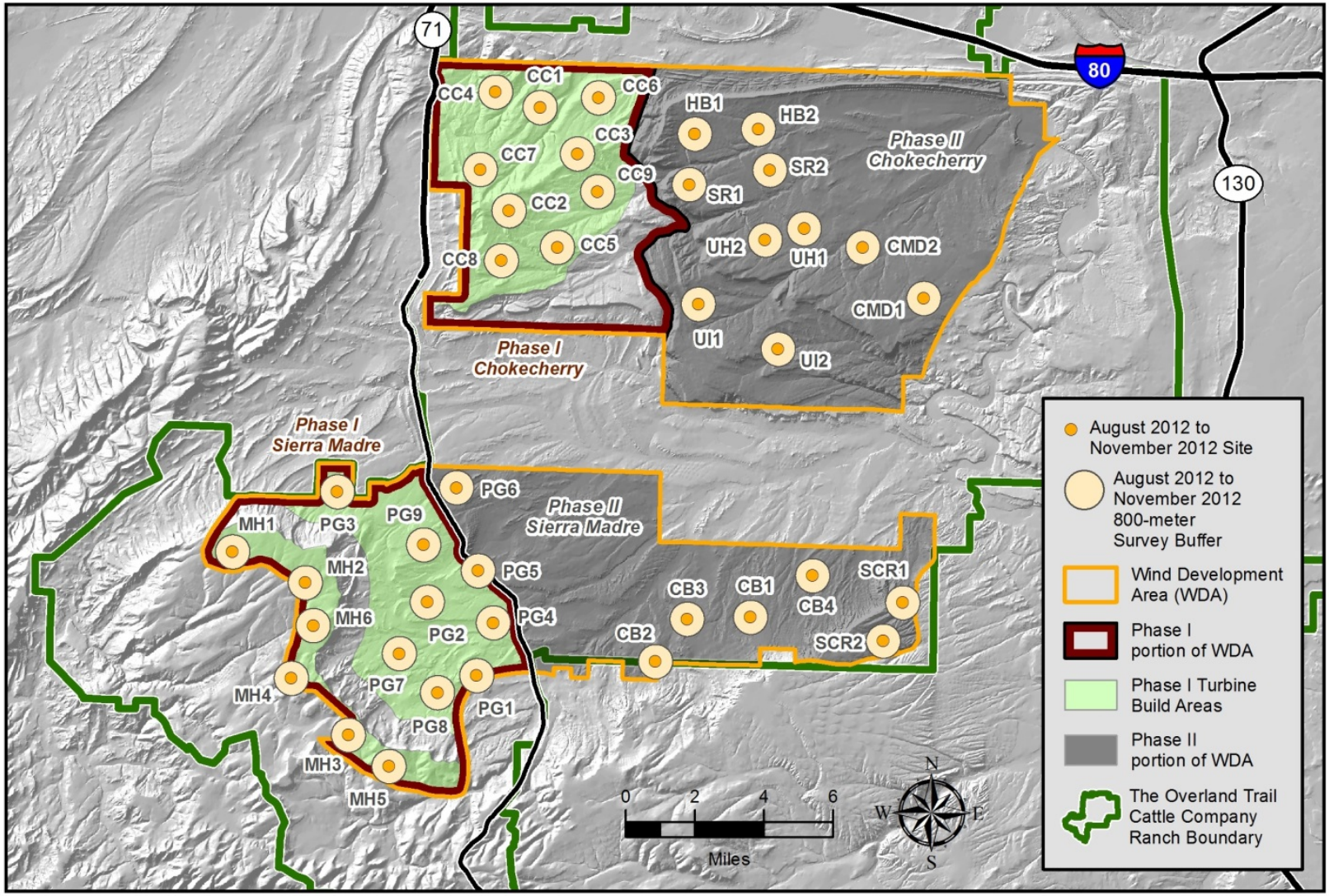

Figure 4.6. 800-meter Raptor Count Locations, August 2012 to November 2012.

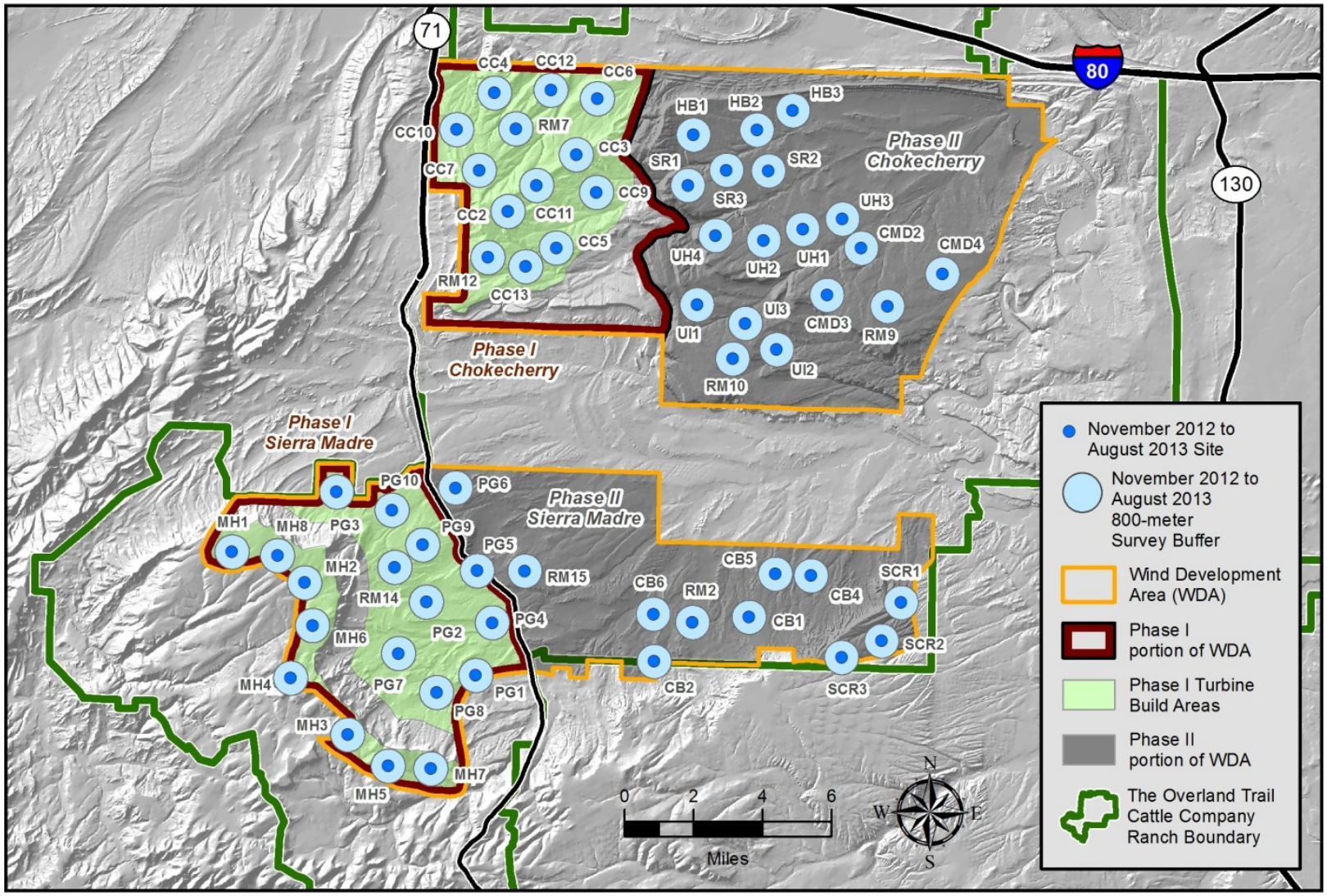

Figure 4.7. 800-meter Raptor Count Locations, November 2012 to August 2013.

A total of 104 non-eagle raptors were observed during the 2012-2013, 800-meter raptor counts. The number of non-eagle raptors observed was highest during the fall of 2012 with slightly fewer individuals observed during the spring and summer months of 2013. Very low use was observed during winter 2012-2013, with only 3 individual non-eagle raptors observed. American kestrel was the most commonly observed species in the Phase I portions of both the Chokecherry and Sierra Madre WDAs and made up 28% (29 of 104 observations) of all non-eagle raptor observations. Other common non-eagle raptor species in order of abundance included Swainson's hawk (24 observations, 23%), northern harrier (15 observations, 14%), and red-tailed hawk (14 observations, 13%). While Swainson's hawk was the second most abundant species based on number of individuals observed, 13 of the 24 individuals (54%) were observed in a single migrating group on September 11, 2012. *See Table 4.5*.

During the fall of 2012 (August 20 to November 9, 2012), over 281.6 hours of survey were completed within the Phase I Development Area. American kestrel, Swainson's hawk, red-tailed hawk, and northern harrier were the most commonly observed non-eagle raptor species in both the Sierra Madre and Chokecherry WDAs. As described above, 13 of the 18 (72%) of the Swainson's hawks observed during fall 2012 were associated with a single migrating group. Ferruginous hawk, merlin, prairie falcon, rough-legged hawk, and sharp-shinned hawk were also observed, primarily in the Sierra Madre WDA, but accounted for a small percentage of total observations and use.

During the winter of 2012-2013 (November 12, 2012, to March 29, 2013), over 267.5 hours of survey were completed within the Phase I Development Area. Use of the Phase I Development Area by raptors was very low during the winter months. Rough-legged hawk was the only non-eagle raptor observed during winter months. A single ferruginous hawk was recorded in late March 2013 (March 21), likely an early spring migrant. During winter months, there was no observed non-eagle raptor use in the Phase I portions of the Sierra Madre WDA. All winter non-eagle raptor use across the Phase I Development Area occurred in the Chokecherry WDA.

During the spring of 2013 (April 1 to June 21, 2013), over 178 hours of survey were completed within the Phase I Development Area. American kestrel, red-tailed hawk, northern harrier, and Swainson's hawk were the most commonly observed species. Additional species observed during this period included prairie falcon, rough-legged hawk, ferruginous hawk, and merlin.

During the summer of 2013 (June 24 to August 30, 2013), over 160 hours of survey were completed within the Phase I Development Area. Species observed included American kestrel, northern harrier, red-tailed hawk, prairie falcon, and Swainson's hawk.

Table 4.5. Phase I Non-eagle Raptor Observations, 2012-2013 800-meter Raptor Count Surveys.

Species	Fall 2012	Winter 2012-2013	Spring 2013	Summer 2013	Total
Phase I Chokecherry WDA					
American Kestrel	2	---	2	1	5
Ferruginous Hawk	---	1	---	---	1
Northern Harrier	1	---	1	---	2
Prairie Falcon	---	---	1	---	1
Rough-legged Hawk	---	2	1	---	3
Red-tailed Hawk	---	---	1	---	1
Swainson's Hawk	1	---	---	---	1
Unknown Buteo	---	---	1	---	1
Phase I Sierra Madre WDA					
American Kestrel	10	---	3	11	24
Ferruginous Hawk	2	---	3	---	5
Merlin	1	---	1	---	2
Northern Harrier	3	---	5	5	13
Prairie Falcon	1	---	1	4	6
Rough-legged Hawk	1	---	---	---	1
Red-tailed Hawk	5	---	4	4	13
Sharp-shinned hawk	1	---	---	---	1
Swainson's Hawk	17	---	4	2	23
Unknown Buteo	---	---	1	---	1
Totals	**45**	**3**	**29**	**27**	**104**

Raptor Nest Surveys

As discussed in section 4.3.1, BLM has collected information on nests within the CCSM Project Site since 1980 (a 33-year period) and in May of 2008 PCW conducted aerial surveys for raptor nests within a 1-mile buffer of the Original Proposed Action. To provide further site-specific data to assess potential impacts to raptors from the CCSM Project, PCW conducted additional aerial raptor nest surveys in May and early-June of 2011, and April and May of 2012, 2013 and 2014. Nest surveys were completed in accordance with the survey recommendations provided by the BLM and USFWS at the time of survey. Generally, protocols required surveys to occur prior to leaf-out to allow most raptors to initiate their nests while maintaining maximum detectability for nests located in trees. While this approach may have prevented the detection of some early season nesting attempts, the data are sufficient to quantify relative abundance of nesting raptors, identify interannual variability in nesting effort, and characterize nesting patterns across Phase I.

PCW's 2011 through 2014 raptor nest surveys were conducted in suitable nesting habitats within the CCSM Project Site and a 8-kilometer (5-mile) buffer surrounding the CCSM Project (approximately 700 square miles), which includes all of Phase I. *See Figure 4.8. See Appendix F.* An 8-kilometer-wide (5-mile-wide) buffer was determined to be appropriate for the CCSM Project in coordination with USFWS and BLM based on calculated golden eagle inter-nest distances in the CCSM Project vicinity. Within the survey area, all previously recorded nest locations identified in BLM's nest database were visited. Additionally, surveys were structured to cover all suitable raptor nesting habitat (e.g., cliff bands, rock outcrops, riparian zones, stands of aspen, etc.) located within the 5-mile buffer to facilitate detection of new nests that were not previously identified in BLM's nest database or as part of 2008 raptor nest surveys. Ground surveys were conducted for all ferruginous hawk nest locations identified in BLM's nest database within the 8-kilometer survey buffer.

Location, nesting substrate, condition, and nesting status were recorded for each observed nest. For occupied nests, species, adult activity, and nestling activity were also recorded. Unoccupied nests were marked as unknown stick nests as it is not possible to determine what species may have built the nest, or what species may use the nest in the future. The quality of unoccupied nests was also assessed and placed into categories of good, fair, poor, or non-functional. Good nests were those that could support nesting activity with minimal rebuild or maintenance. Fair nests were those that would require substantial rebuild or maintenance. Poor nests were those that had evidence of nest structure but would require an entire rebuild of the nest. Non-functional nests were those that had only marginal evidence of past nesting (a few sticks on a ledge), had been destroyed, or had completely fallen from the nest substrate.

Ground surveys were conducted to monitor the status of occupied nests located during the aerial nest surveys and to search areas that were inaccessible during aerial surveys due to high winds or other weather conditions. For all occupied nests, ground surveys were conducted once every three weeks until a nest was determined to have fledged or failed at which time the nest was reclassified as unoccupied. During each visit, nests were surveyed for four hours or until current status was determined. Data collected included date and time of visit, condition of the nest, number of adults/eggs/nestlings present at the nest, behavior of the birds present, and any other notes pertinent to the current activity or status of the nest.

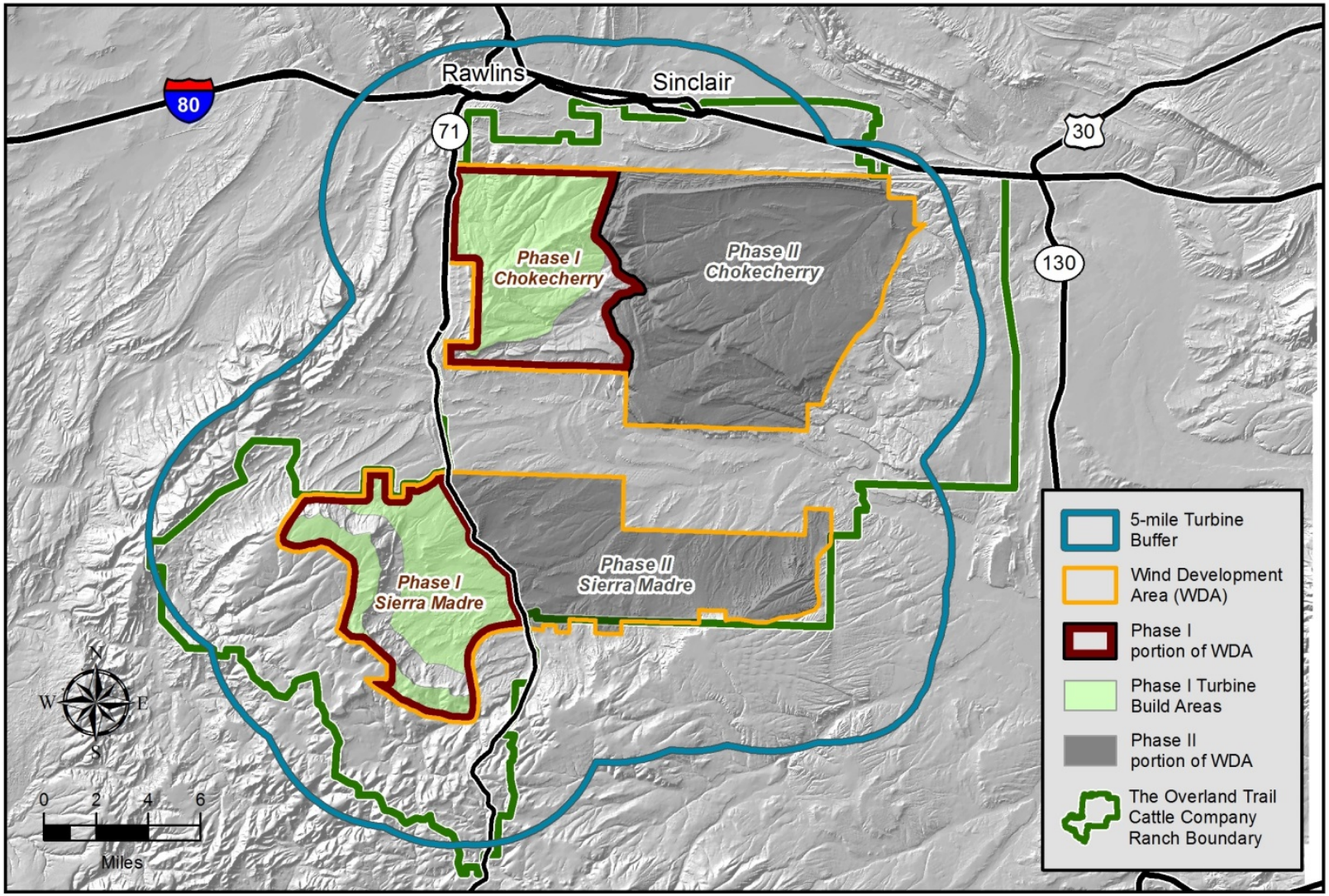

Figure 4.8. Aerial Raptor Nest Survey Area, 2011 through 2014.

2011 Nest Surveys

In 2011, aerial raptor nest surveys were conducted for the CCSM Project on May 25 and June 10 to assess nest activity. Follow-up ground surveys were completed between July 5 and August 2, 2011, to monitor the status of occupied nests. A total of 10 occupied non-eagle raptor nests (6 red-tailed hawk, 2 prairie falcon, 1 unknown *Buteo*, and 1 American kestrel) were located within the raptor nest survey area primarily outside of the CCSM Project WDAs. One additional prairie falcon nest was identified outside of the western boundary of the raptor nest survey area and therefore is not included in this analysis. *See Appendix F*. One occupied red-tailed hawk nest was located within the Phase I portion of the Chokecherry WDA, and one occupied American kestrel nest was located near the Phase I portion of the Chokecherry WDA. One occupied red-tailed hawk nest was located within the Phase I portion of the Sierra Madre WDA. *See Figure 4.9 & Figure 4.10.* Of the three nests located in Phase I, one red-tailed hawk nest fledged two nestlings; however, the fledging status of the other two nests (red-tailed hawk and American kestrel) could not be determined at the time of the final visits. Detailed information on nesting attempts and productivity is included in Appendix F.

In 2011, PCW also visited all historic ferruginous hawk nests within the raptor nest survey area that were recorded in the BLM nest database. These nests were surveyed to determine the current status and condition. Data collected included presence/absence of a nest at each site; a description of the condition of the nest (if a nest was detected); a description of the habitat surrounding the site; photographs of the nest and surrounding habitat; and the presence of other features that could suggest recent ferruginous hawk activity (e.g., feathers, whitewash, fresh nesting materials, etc.). All historic ferruginous hawk nests in the survey area were unoccupied in 2011, and many of the nests were categorized as non-functional. Of the 40 nests in the BLM database, only 15 nests were located, many with almost no structure remaining and only 2 to 3 in a condition that suggests they have recently supported nesting activities. *See Appendix F.*

2012 Nest Surveys

Aerial raptor nest surveys were conducted for the CCSM Project on April 25-26 and May 8, 2012, with follow-up ground surveys from May 24 to July 27, 2012

A total of 22 occupied non-eagle raptor nests (10 red-tailed hawk, 9 prairie falcon, 2 American kestrel, and 1 great horned owl) were located within the raptor nest survey area primarily outside of the CCSM Project WDAs. *See Figure 4.11 & Figure 4.12.* No occupied nests were located within the Phase I portion of the Chokecherry WDA. Two occupied red-tailed hawk nests were located within the Phase I portion of the Sierra Madre WDA. *See Figure 4.11 & 4.12*. No occupied ferruginous hawk nests were located in 2012. *See Appendix F*. Of the two nests (both red-tailed hawk) located in Phase I, one fledged one nestling, and the fledging status of the other nest could not be determined at the time of the last check. Detailed information on nesting attempts and productivity is included in Appendix F.

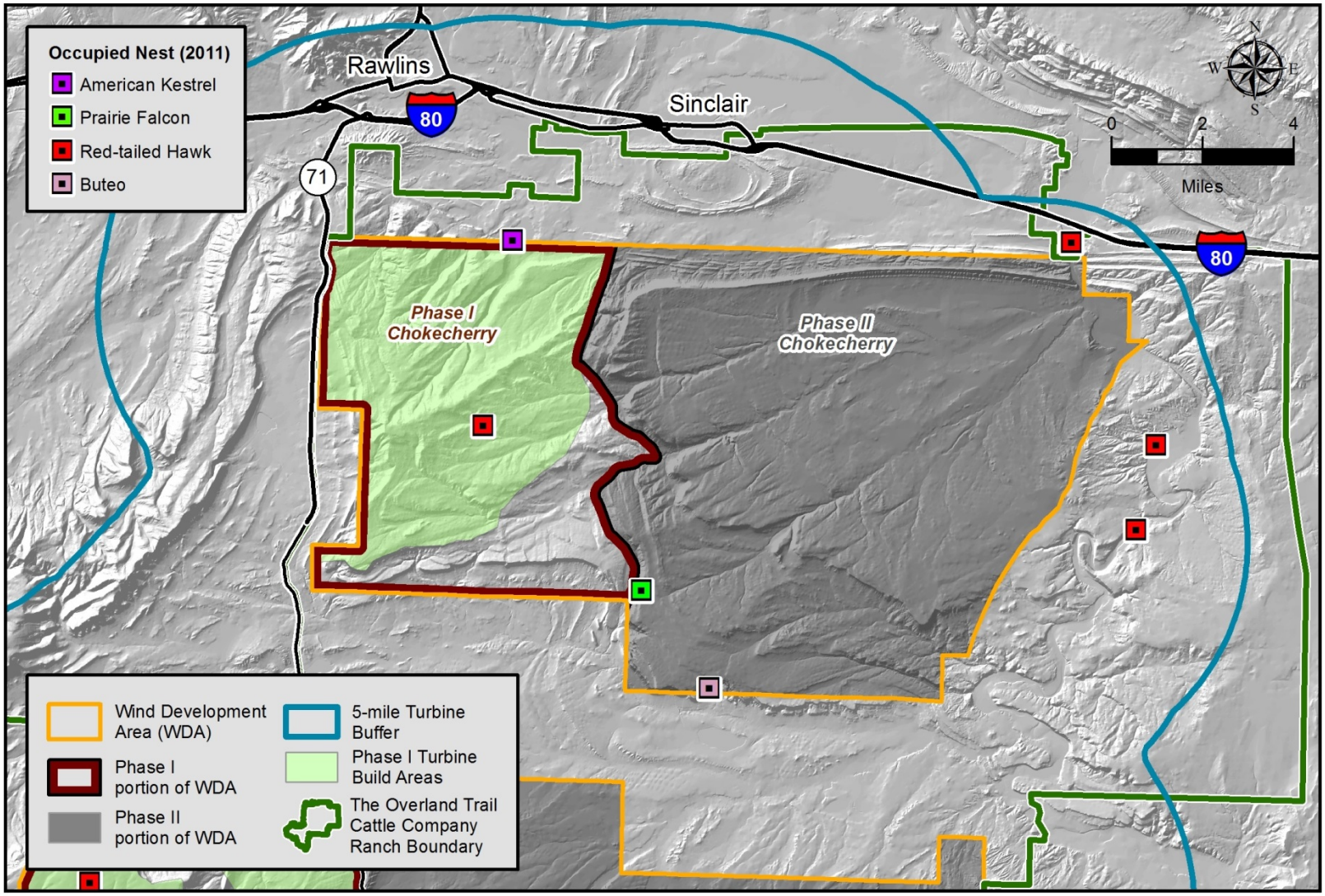

Figure 4.9. Chokecherry WDA Occupied Non-eagle Raptor Nests, 2011.

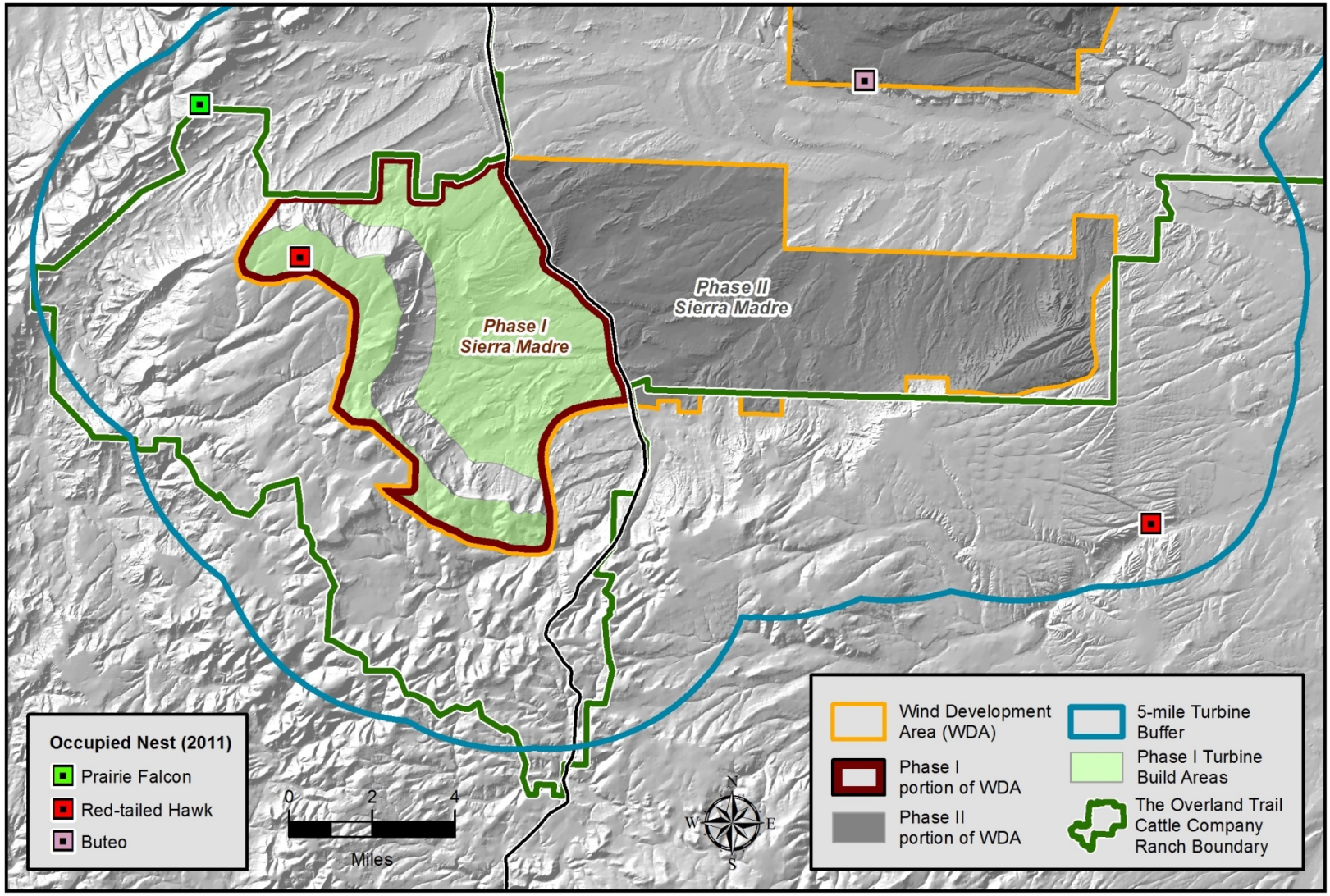

Figure 4.10. Sierra Madre WDA Occupied Non-eagle Raptor Nests, 2011.

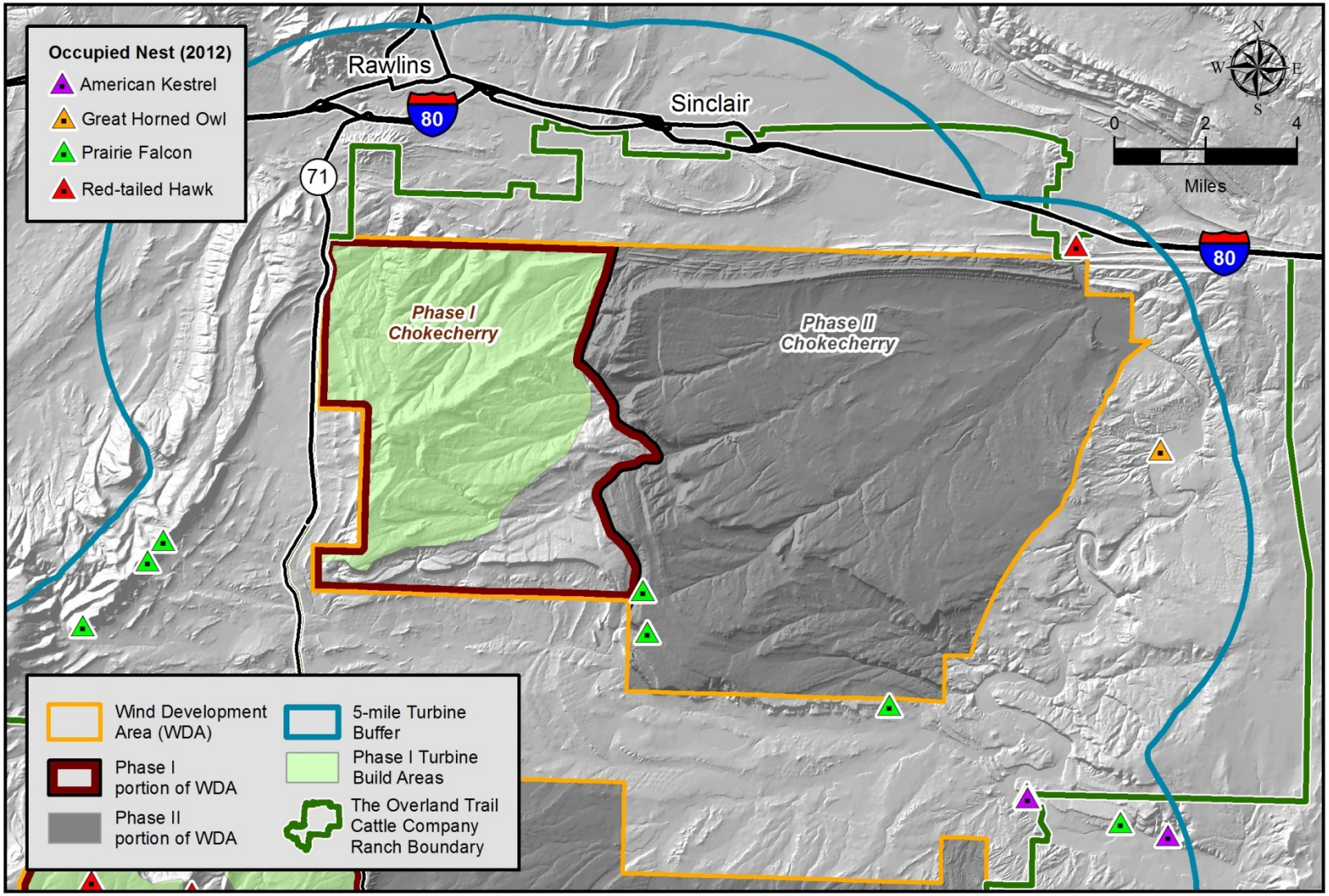

Figure 4.11. Chokecherry WDA Occupied Non-eagle Raptor Nests, 2012.

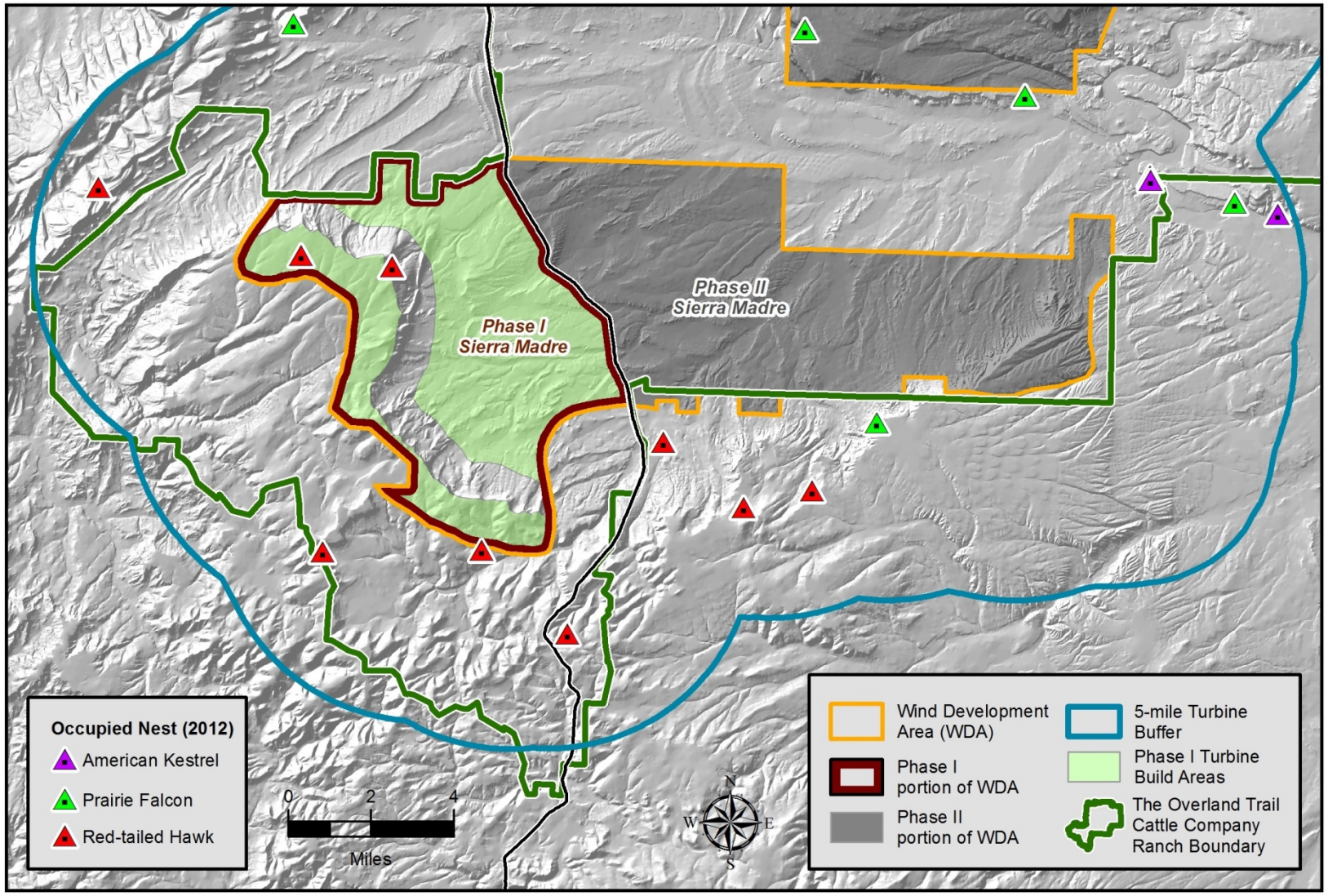

Figure 4.12. Sierra Madre WDA Occupied Non-eagle Raptor Nests, 2012.