COLORADO
Parks and Wildlife
Department of Natural Resources

Colorado Parks and Wildlife Best Management Practices for Solar Energy Development

Colorado Parks and Wildlife has a statutory responsibility to manage all wildlife species in Colorado. As such, we encourage protection for Colorado's wildlife species and habitats through responsible energy development and land use planning. Protection of core wildlife areas, quality fisheries and habitat, big game production and winter range, and other sensitive wildlife habitats are of highest importance. CPW is not a decision-maker with regard to energy development permitting. Instead, CPW provides recommendations to local, state, and federal regulatory agencies on ways to *avoid, minimize, and mitigate* impacts from development and land use changes, with the goal of providing for the long-term conservation of wildlife and wildlife habitats across the State of Colorado.

Impacts to wildlife will result from all forms of development. However, projects that are large in scale, expand development into remote or previously undisturbed areas, displace wildlife from crucial habitat, or cause a significant loss of habitat are of greater concern. Due to the large land requirements and the projected rate of development, utility-scale solar has the potential to significantly impact wildlife populations in Colorado. CPW encourages a scientific approach to siting decisions and careful consideration of the impacts to habitat necessary to sustain Colorado's wildlife populations. The recommendations in this document are intended to promote responsible development of large scale solar projects, upholding Colorado's responsibility to wildlife while supporting the renewable energy and climate change goals and standards set forth by the State of Colorado.

1. **Assessment of Potential Adverse Effects.** *The development of utility-scale solar energy facilities results in large-scale land use and potentially significant impacts to habitat and wildlife. The impacts to wildlife are influenced by the project size, location, and type of solar technology installed.* CPW takes a site-specific approach to assessing impacts of large-scale solar project development and presumes that habitat within the project footprint will become inaccessible to most wildlife and a functional loss within the larger landscape. In collecting information for a new solar project CPW recommends that the proponent conduct pre and post-development surveys that assess and measure wildlife utilization of the site in order to evaluate how the lost habitat may impact wildlife species.

2. **Alignment and Compliance with Colorado Public Utilities Commission (CPUC) Rule 3668-Environmental Impacts.** New renewable energy projects are required to follow CPUC Rule 3668 and conduct pre-development wildlife surveys, use these surveys to avoid, minimize and mitigate potential impacts to wildlife and their habitats, and work with CPW in the design of their project.

3. Avoiding/Minimizing Impacts. *In selecting sites for construction, focus on options that avoid high priority wildlife habitats over the use of mitigation strategies*. Impacts to wildlife will be lessened when solar development occurs on lands that have been previously disturbed and at locations within and adjacent to developed areas. Areas that exhibit high levels of wildlife use within the project area would benefit greatly by not placing facility infrastructure, including transmission lines, adjacent to or over such areas. Locally, micro-siting of infrastructure may be effective in minimizing losses to habitat and wildlife. If all measures for avoiding impacts are taken and prove insufficient to adequately protect wildlife and their habitat, then CPW recommends appropriate minimization and mitigation strategies be identified and implemented in consultation with CPW.

4. Habitat Loss and Fragmentation. *Habitat loss and fragmentation are significant concerns regarding solar development.* Minimizing the project footprint can help reduce the impacts to wildlife. CPW recommends that the developer consolidate facilities and roads to the extent possible to minimize the amount of land that is disturbed and fragmented. Perimeter fencing of the facility is of particular concern in addition to the extensive infrastructure of solar projects as a whole. Early consultation with CPW is recommended to identify high priority habitat that could be impacted by a project. CPW maintains a list of species-specific high priority habitats (HPH) in Colorado along with recommendations for management actions that may be implemented to avoid, minimize, and mitigate impacts to wildlife during land use development. CPW's recommendations were developed internally by a team of subject matter experts, are reviewed regularly, and are publicly available on CPW's website. High priority habitats include those that support state species of concern and Species of Greatest Conservation Need (SGCN) identified in Colorado's State Wildlife Action Plan and habitats that support wildlife during critical life stages. Because riparian areas are important habitats for a variety of wildlife and provide important wildlife movement corridors, a layout that maintains riparian access and connectivity for wildlife is preferred. Riparian areas within the proposed project area may be of particular concern given the limited availability of this habitat in some areas and the proportionally high use by many different species. Similarly, playas provide important habitat for waterfowl and other bird species, reptiles, bats, and amphibians. Placement of infrastructure within or near playas could impact wildlife habitat, increase avian collision risk, and alter playa hydrology. CPW recommends that projects with impacts to large playas and high priority playa clusters follow the Best Management Practices as put forth by Playa Lakes Joint Venture. If site development equates to a significant loss of habitat for any wildlife and/or a barrier to wildlife movement across the landscape, CPW may recommend project-specific compensatory mitigation. CPW recommends that any compensatory mitigation, including projects funded with monetary compensation, occur in the same geographical area as the impacts. A comprehensive statewide standard compensatory mitigation program would help address the significant habitat impacts resulting from anticipated future solar development throughout the state.

5. Study Protocols and Monitoring. *Consult with CPW for review and comment on wildlife and habitat survey protocol before the protocol is finalized.* CPW recommends that surveys be conducted to determine the site use and temporal and spatial distribution for wildlife that are potentially impacted by the development. The minimum recommended length of study for both pre and post-construction surveys for utility-scale solar projects is one year. It is recommended that pre-construction and construction/post-construction monitoring be conducted using similar methods, so that valid comparisons can be made. CPW requests the opportunity to comment on baseline or impact surveys, as well as amendments made to infrastructure/facility placement, county permit requirements, or recommendations. CPW encourages developers to be proactive in bringing plans for additional phases or developments to our attention prior to establishing infrastructure placement and routing. Proactive, cooperative efforts will identify concerns early in the project so that they may be appropriately addressed prior to final planning and construction. CPW requests the developer/operator provide pre-construction and post-construction reports with all forms of raw data collected at onset, during, and post construction surveys to CPW's Regional Energy Liaison in a timely manner.

6. Wildlife Protection. The development of new solar energy project sites could impact wildlife diversity and regionally unique habitat types. CPW recommends that sensitive wildlife species and high priority habitat features be identified and buffered when considering infrastructure placement and operation, especially during critical nesting periods. We suggest continued contact with CPW representatives throughout the planning process to determine specific sensitive areas for each of these species.

The species listed below are suggested as examples only. Please consult with CPW regional staff for site-specific impacts and recommendations.

o **Big Game Species.** *It is recommended that developers work with CPW to identify high priority habitat for ungulate species within the proposed project area.* CPW recommends avoiding development in big game winter range, parturition areas, and migration pathways or pinch points. Loss of habitat elsewhere within the range of big game species should be evaluated for impacts, including implications for wildlife management.

o **Raptors.** *Identify raptor nests within the project area and implement an appropriate buffer from solar infrastructure and transmission lines. During nesting periods, observe timing stipulations for construction activities located near nests.* Raptor species included in CPW's high priority habitat list include bald and golden eagles, Ferruginous hawks, prairie and peregrine falcons, goshawks, and Mexican spotted owls. Raptors are likely to use any trees or larger rock escarpments for nesting or perching. Prairie dog towns located in the project area provide excellent foraging habitat for numerous resident and migratory raptors as well as shelter and nesting habitat for burrowing owls. By affording these areas a buffer when considering infrastructure placement, impacts to raptor species can be greatly reduced. Species-specific recommendations are available in CPW's Recommended Buffer Zones and Seasonal Restrictions for Colorado Raptors (attached).

o **Migratory Birds.** *Consultation with the US Fish & Wildlife Service (USFWS) is recommended to ensure compliance with the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act.* The best way to avoid impacts on the nesting efforts of migratory birds is to focus construction activities outside of the breeding season. For the majority of species that breeding season would be within the time frame April 1 to August 31. If construction must occur during the breeding season, CPW recommends surveys for active nests be conducted prior to ground disturbance. All migratory birds are protected under the MBTA and removal or disturbance of any active migratory bird nest requires consultation with USFWS prior to disturbance.

o **Grouse species (Gunnison sage-grouse, Greater sage-grouse, Columbian sharp-tailed grouse, Plains sharp-tailed grouse, Greater prairie-chicken, Lesser prairie-chicken).** *Consult with CPW to site infrastructure, including transmission lines, away from breeding and production areas.* Grouse species are known to avoid areas of man-made disturbance, including tall structures, such as transmission towers and buildings. Roads contribute traffic noise and the possibility of collision. Such infrastructure could be a factor in the abandonment of leks, failure of nests, and reduced brood-rearing success, and thus, appropriate setbacks are recommended. Consult with CPW for species-specific recommendations for buffers from leks, buffers from brood rearing habitat, and any associated timing stipulations. ***Gunnison sage-grouse:*** *The Gunnison sage-grouse is listed as a threatened species by the USFWS. The USFWS has produced a map of Critical Habitat for the species. In some situations (where the landowner has a federal nexus) the landowner (and perhaps the operator) may need to consult with the USFWS.*

o **Mountain plover and long billed curlew.** *Identify habitat and plover/curlew nests within the project area, and plan construction activity outside of critical nesting periods, April 1st through August 15 where these species are found.* Mountain plovers can nest in short-grass prairie, dryland cultivated farms, and prairie dog towns. Long billed curlews can nest in short grass prairie. *Mountain Plover and Long Billed Curlew are Colorado species of special concern.*

o **Burrowing owls.** *All prairie dog towns within and adjacent to the proposed project should be located prior to construction. If any prairie dog colonies are located within the project area and development in prairie dog towns will occur between February 1 and October 31, CPW recommends surveys to determine the presence/absence of burrowing owls.* If nesting burrowing owls are present, CPW recommends no permitted or authorized surface disturbing activities within 660 feet of a burrowing owl nest during the nesting season (March 15 - August 31) and buffers of 0.25 mile for large industrial disturbances. If burrowing owls merely occupy the site, it is recommended that earthmoving and other disturbance activities be delayed until late fall after they have migrated. *Burrowing Owls are protected under the MBTA and are a State Threatened Species.*

o **Bats**. *Acoustic monitoring of bats is recommended for areas with habitat for bats, near water bodies, and near where bats roost.* Acoustic monitoring is recommended for spring and fall seasons. It is recommended that all survey data collected be accessible and provided to CPW.

o **Kit fox:** *Identify and avoid maternal kit fox den sites.* CPW recommends surveys of suitable kit fox habitat for active dens prior to surface disturbance. If dens are present, we recommend the operator avoid surface disturbance within 0.25 mile of den sites while young are den dependent (approximate dates: Feb 1 to May 1). Any disturbance or destruction of dens while young are dependent would be detrimental to the species.

- **Reptiles and amphibians.** *Identify high priority reptile and amphibian habitat, including escarpments, ephemeral ponds, and wetlands, and avoid during construction and when siting infrastructure*. With an increase in roads and traffic, reptiles and amphibians could be negatively impacted within the project area. CPW recommends the "construction and operational considerations" portion of this document be considered to minimize impacts to these species.

7. Construction and Operational Considerations. During construction and operations, CPW recommends limiting vehicle speeds to 25 mph on project roads. CPW also recommends that the construction plan minimize the amount of exposed or open trenches. If spans of trenching will be open for extended periods of time CPW recommends the installation of trench plugs, earthen ramps, or other means as necessary to ensure that open trenches do not trap wildlife or impair wildlife movements. During operations, CPW may have site-specific suggestions on limits for on-site visit frequency and timing by service personnel, especially during critical nesting periods, to minimize impacts to wildlife. In consultation with CPW, projects should include training for construction and operations personnel on wildlife laws and enforcement. We also recommend providing education on wildlife issues, such as where species might be found, and at what time of day. During the operational phase, CPW recommends the operator provide staff training in documenting wildlife mortalities and notifying local wildlife officials in a timely manner.

8. Weed Management. *Weed control measures should be conducted in compliance with the Colorado Noxious Weed Act, C.R.S. §35-5.5-115 and the current rules pertaining to the administration and enforcement of the Colorado Noxious Weed Act.* CPW recommends the developer actively eradicate noxious weeds, and develop and implement a noxious weed and re-vegetation management plan where there will be disturbance due to construction or maintenance activities. Care should also be taken to avoid the spread of noxious weeds, and all construction equipment should be cleaned prior to leaving the site. CPW would appreciate the opportunity to review the project's Noxious Weed Management Plan prior to the start of construction.

9. Security Fencing and Lighting. *The CPW publication "Fencing with Wildlife in Mind" is available for your consideration and review when designing fencing for a project.* CPW is aware that the solar project may include security fencing. The typical specifications for security fencing make this fence type exclusionary for most wildlife. In these cases CPW requests that the project design adhere to the recommendations for exclusionary fencing that are safe for wildlife. If wildlife exclusion fencing is installed, CPW requests that efforts be taken to avoid entrapping wildlife within the facility during construction of the fence and that the solar facility be checked regularly or structures installed to allow animals to escape, in the unlikely event that a deer or other wildlife becomes trapped in the facility. CPW recommends any non-security fencing on the project site be wildlife friendly. CPW also recommends that any security lighting be designed to minimize light pollution and take into consideration lighting initiatives that aim to reduce impacts to wildlife.

10. Transmission Line Development. *CPW recommends new transmission lines be co-located with existing transmission lines or infrastructure corridors whenever possible to minimize additional impacts on wildlife and reduce habitat fragmentation.* Of high concern regarding electrical transmission lines is the potential for collisions and raptor electrocution. The Edison Electric Institute and the Avian Power Line Interaction Committee, in cooperation with the USFWS, have developed Best Management Practices to minimize impacts to avian species. CPW recommends that both the *"Suggested Practices for Avian Protection on Power Lines, the State of the Art in 2006"* and the *"Reducing Avian Collisions with Power Lines: The State of the Art in 2012"* documents be consulted for proper design considerations to minimize raptor electrocution. These documents can be ordered at the Edison Electric Institute website (www.eei.org) or can be downloaded at the Avian Power Line Interaction Committee website (www.aplic.org). This recommendation is applicable to all segments included in the project.

11. Avian Fatality Risk. *Proximity of the project site to rivers, reservoirs, migratory stop-over habitat, and habitat for wintering roosts for bald eagles may be a factor in the overall risk to birds.* Waterfowl and other avian species that utilize the area during migration may be at risk of collision with solar panels. There are also technology-specific factors associated with avian fatality risk at solar facilities and the final site plans could influence the potential risk for birds at the location. Any industrial surface water or evaporation ponds associated with the site could increase the risk to wildlife on the installation either due to toxicity issues or by acting as an attractant. CPW recommends a site design that prevents wildlife access to any artificial water sources associated with the project that could be a risk to wildlife. In locations with high avian migration and use and where there is a potential risk to avian species, CPW recommends development of a post-construction monitoring program in accordance with the USGS 2016 report Mortality Monitoring Design for Utility-Scale Solar Power Facilities. Design adjustments or additional features to mitigate collision or other fatality risks may be requested if fatalities related to on-site concerns are identified during monitoring.

12. Reclamation and Decommissioning. *Reclaim areas disturbed by construction and develop long-term decommissioning and reclamation plans in the event that it is decided to decommission any infrastructure of the facility.* CPW prefers that native vegetation be retained on site during the operational lifespan of the project, both as habitat for wildlife and to ensure successful reclamation of the project area. Proper reclamation, from a wildlife perspective, involves not only stabilizing the soil and establishing ground cover, but fostering plant communities with a diversity of species and plant types -grasses, woody plants, and broadleaf forbs- which will fully serve the nutritional and hiding cover needs of wildlife. Areas should be reclaimed with seed for native vegetation appropriate for the site, as recommended by CPW and the local Natural Resources Conservation Service office. CPW recommends that decommissioning plans include (but not be limited to) timing of decommissioning individual or project wide infrastructure and plans to reclaim areas back to pre-construction conditions.