SHUTE, MIHALY & WEINBERGER LLP

396 HAYES STREET, SAN FRANCISCO, CA 94102
T: (415) 552-7272 F: (415) 552-5816
www.smwlaw.com

ELLISON FOLK
Attorney
Folk@smwlaw.com

August 25, 2025

Via E-Mail

Tharon Wright, CPUC Project Manager
Power Santa Clara Valley Project; Attn. V. Nez
c/o Environmental Science Associates
575 Market Street, Suite 3700
San Francisco, California 94105
PowerSCV@esassoc.com

Re: Power Santa Clara Valley Draft Environmental Impact Report SCH # 2024090200

Dear Ms. Wright:

On behalf of the Santa Clara Valley Open Space Authority ("OSA"), we submit the following comments on the Draft Environmental Impact Report ("DEIR") for the Power Santa Clara Valley Project ("Project"). OSA has serious concerns about the environmental impacts of the Project as currently proposed. The DEIR substantially understates, and fails to adequately analyze or mitigate, the severity and extent of significant project-related effects on biological and agricultural resources. The environmental documentation for the Project is thus inadequate and violates the minimum standards set forth under the California Environmental Quality Act ("CEQA")[1] and the CEQA Guidelines.[2]

For the reasons stated in more detail below, the Commission cannot lawfully certify this EIR or approve the Project as proposed. Instead, OSA strongly urges the Commission to adopt Alternative Combination 1, which the DEIR identifies as the environmentally superior alternative. Compared to the Project, this alternative will avoid or reduce every environmental impact analyzed in the DEIR. Critically, it will avoid the specific impacts to biological and agricultural resources identified in this letter. Further,

[1] Public Resources Code § 21000 et seq.

[2] California Code of Regulations, title 14, § 15000 et seq.

the DEIR establishes that this alternative is just as feasible, if not more feasible, to build than the proposed Project. In fact, PG&E itself has expressed support for co-location. In March, 2025, PG&E represented to the San José City Council that "PG&E, LS Power, and OSA are pursuing all available options to protect Coyote Valley and allow LS Power to use land at PG&E's Metcalf Station to build the switching station required as part of its Power Santa Clara Valley Project currently pending before the CPUC."[3] Under these circumstances, CEQA requires the Commission to adopt this alternative instead of the Project.[4]

We submit these comments along a report prepared by Tanya Diamond, Wildlife Ecologist, Pathways for Wildlife, Attachment A ("Pathways Report") and a literature review prepared by H. T. Harvey & Associates, Attachment B ("Harvey Report") in association with Peninsula Open Space Trust ("POST"). We refer the Commission to these reports, both here and throughout these comments, for further detail and discussion of the DEIR's inadequacies. We request that the Commission reply to each of the comments in this letter and to each of the comments in the Pathways Report.

I. The DEIR fails to adequately analyze impacts to biological resources.

The DEIR identifies seven thresholds to aid its significance determinations.[5] The Project will have significant impacts under three of these thresholds, but the DEIR fails to properly disclose, analyze or mitigate impacts under the following thresholds:[6]

1. The "Special-Status Species Threshold": whether the Project will "[h]ave a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species . . . by CDFW"

The DEIR ignores impacts to mountain lions in the area, despite their known presence and status as a candidate species for listing under the California Endangered Species Act ("CESA"). If the Commission moves forward with the proposed

---

[3] City of San José, CA, *City Council Special Meeting: San José Municipal Electric Utility Exploration*, at 52:01 (YouTube, Mar. 21, 2025), https://www.youtube.com/live/zNwORsr_s1c?si=5IHy1_A0sFEyqpoC&t=3121.

[4] Pub. Res. Code §§ 21002, 21081(a).

[5] DEIR 3.4-40.

[6] *Id.*

Grove Terminal site, it must revise the DEIR to analyze impacts to this special-status species.

2. The "Wildlife Movement Threshold": whether the Project will "[i]nterfere substantially with the movement of any native resident or migratory . . . wildlife species or with established native resident or migratory wildlife corridors"; and

The DEIR improperly concludes that impacts under the Wildlife Movement Threshold are less than significant because the Project will locate the Grove Terminal on the site of an orchard surrounded by allegedly impermeable fencing.[7] But contrary to the DEIR's assertion, the fencing around the orchard is permeable. Bobcats and other fauna could very well use the orchard for hunting or shelter. Indeed, ample data shows that at least one bobcat has regularly traversed the property in the past. Further, the DEIR fails to consider impacts on wildlife moving just outside the confines of the property. Coyote Creek, which runs just behind the proposed Grove Terminal site, is an active wildlife corridor. Although it is highly fragmented, Coyote Valley is a functioning and critical wildlife corridor. As a result, even small disturbances in this area could have significant impacts on wildlife movement. Increased exposure to artificial light and noise may alter the timing and ability of wildlife to forage, hunt, and breed in the area around the Project.[8] The DEIR fails to analyze these impacts.

In addition to the wildlife corridor, a known blue heron rookery exists immediately behind the proposed Grove Terminal site. The DEIR fails to acknowledge the rookery's presence, analyze the inevitable impacts that construction noise will have on this rookery, or propose mitigations to lessen those impacts.

The DEIR also fails to adequately analyze the Project's cumulative impacts on wildlife movement. The Grove Terminal will occupy a space in close proximity to three wildlife crossings planned by the California High Speed Rail Authority as mitigation for its own project's impacts on wildlife movement. In particular, the Grove Terminal is within hundreds of feet of a wildlife undercrossing planned as part of the High Speed Rail project at Emado Avenue. Converting the existing orchard to industrial uses could very well render this animal crossing useless and deter wildlife movement along Coyote Creek. It may also make it less likely that wildlife would find and use other wildlife crossing locations planned by High Speed Rail north of the Project site, including

[7] DEIR at 3.4-55–3.4-57.

[8] Attachment B, at 2, 5.

at Fisher Creek and south of Metcalf Road at the base of Tulare Hill. Because this Project could defeat the measures designed to mitigate impacts to wildlife movement caused by the High Speed Rail project, the combined effect of impacts caused by both projects is cumulatively considerable. The DEIR's failure to consider those cumulative impacts is unlawful.

3. The "Local Policy Conflict Threshold"—whether the Project will "[c]onflict with any local policies . . . protecting biological resources."

The DEIR fails to consider the Project's conflicts with state plans and policies. California Assembly Bill 2344, passed in 2024, requires Caltrans, in consultation with CDFW and other appropriate agencies, to establish an inventory of wildlife connectivity needs on the state highway system where the implementation of wildlife passage features could reduce wildlife-vehicle collisions or enhance wildlife connectivity.[9] In 2024, Caltrans released its Wildlife Connectivity Program Report, which identifies US 101 in Coyote Valley as a priority wildlife connectivity barrier remediation location.[10] CDFW's Wildlife Movement Barriers Priority List includes US 101 and Monterey Road in Coyote Valley as barriers to wildlife movement requiring remediation.[11] Additionally, California Assembly Bill 1889 "Room to Roam Act" requires cities and counties to update their general plans to include considerations regarding wildlife movement within or around a proposed project area upon the next update of the local government's general plan that occurs on or after January 1, 2028.[12]

Given abundant studies and plans identifying Coyote Valley's value as a landscape linkage, the proposed Project should consider wildlife movement impacts in the context of AB 1889's implementation. Consistent with these policies, the proposed

---

[9] Assem. Bill 2344, 2021-22 Reg. Sess. (Cal. 2022).

[10] Caltrans, *Caltrans Wildlife Connectivity Program Report* (July 1, 2024), at 27, https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/env/caltrans-wildlife-connectivity-report-ally.pdf.

[11] California Dep't of Fish and Wildlife, *Terrestrial Wildlife Connectivity Barriers Data*, https://wildlife.ca.gov/Conservation/Wildlife/Connectivity/Barriers/Data (last visited Aug. 20, 2025).

[12] Nossaman LLP, *Room to Roam Act Becomes Law* (Oct. 3, 2024), https://www.endangeredspecieslawandpolicy.com/gov-newsom-signs-californias-room-to-roam-act-into-law-requiring-wildlife-connectivity-considerations-in-land-use-planning.

site for the Grove Terminal should be opened up to allow wildlife more freedom to move throughout the area, not converted into an industrial site that will further fragment Coyote Valley.

For these reasons, the DEIR both understates the severity of the potential harm to biological resources within and adjacent to the proposed Project site and fails to identify sufficient mitigation to minimize these impacts. Given that analysis and mitigation of such impacts are at the heart of CEQA, these serious deficiencies must be remedied.[13]

A. The DEIR fails to analyze impacts to mountain lions, a special-status species present in the Project area.

As explained in the Pathways for Wildlife Report, the Central Coast North population of mountain lions is present in both the Santa Cruz Mountains and the Diablo Range.[14] They are also present in Coyote Valley, which serves to connect the wildlife populations in both mountain ranges.[15] As shown in Figure 1 below, wildlife camera traps, roadkill documentation, and other observation data show that mountain lions traverse the area close to the proposed Grove Terminal site and utilize Fisher Creek and Coyote Creek as movement corridors. For example, a mountain lion was killed less than a mile away from the proposed Grove Terminal site near Highway 101 and Bailey Avenue.[16] Also, in 2023, a juvenile mountain lion was killed on Santa Teresa Boulevard near the North Coyote Valley Conservation Area, which lies directly across Monterey Road from the proposed Grove Terminal site.[17]

---

[13] *See Sundstrom v. County of Mendocino* (1988) 202 Cal.App.3d 296, 311 ("CEQA places the burden of environmental investigation on government rather than the public.").

[14] Attachment A, at 5.

[15] *Id.*; Santa Clara Valley Open Space Auth. & Conservation Biology Inst., *Coyote Valley Landscape Linkage* (Dec. 2017) ("Linkage Report"), at 7, https://www.openspaceauthority.org/sites/default/files/2024-11/Coyote%20Valley%20Landscape%20Linkage%20Report_Final_lowres.pdf.

[16] Linkage Report at 18.

[17] CBS News Bay Area, *Mountain Lion Found Dead in Conservation Area in South San José* (July 13, 2023), https://www.cbsnews.com/sanfrancisco/news/mountain-lion-found-dead-in-conservation-area-in-south-san-jose/.

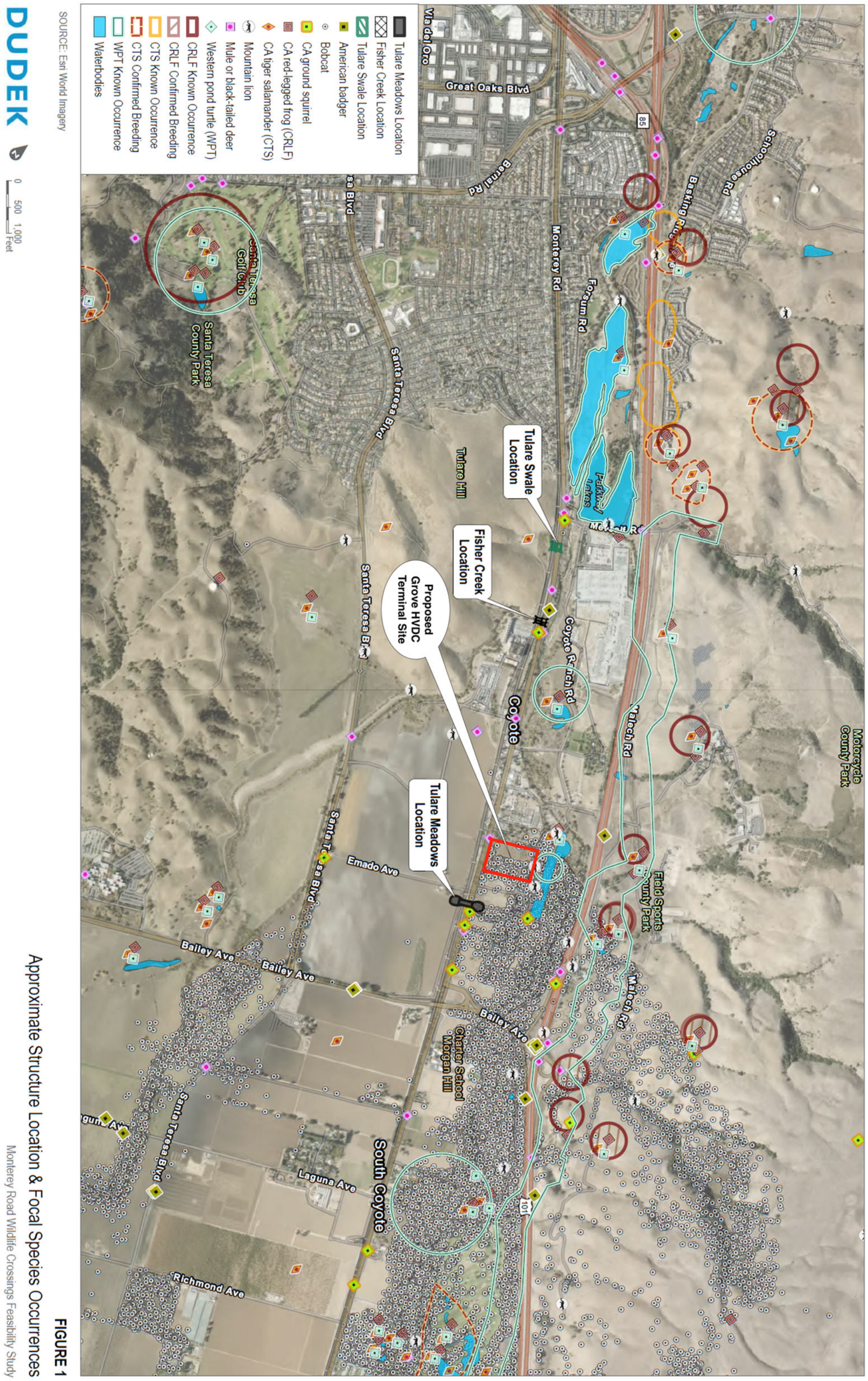
The Central Coast North population of mountain lions are a candidate for listing as a state-threatened species under CESA.[18] A statewide study of mountain lions in 2018 found the species to be dangerously low in genetic diversity.[19] The study noted that mountain lions in the Santa Cruz Mountains have an effective population size of only 16; whereas, an effective population size of 50 is required to prevent inbreeding depression.[20]

[18] Attachment A, at 5-6.

[19] *Id.*

[20] *Id.*

Figure 1: Focal Species Occurrences in the Vicinity of the Project
(Source: RFP S25096: US 101/Monterey Road Wildlife Crossings, Appendix B1—Feasibility Plan and Report for Monterey Road Connectivity Improvements (June 12, 2025), at 4, https://procurement.opengov.com/portal/vta/projects/171738/downloads.)



Under CEQA, if an EIR does not accurately describe the existing environmental setting, it cannot accurately represent how the Project would impact biological resources in that area.[21] Here, the DEIR fails to acknowledge the existence of mountain lions within the vicinity of the Grove Terminal site, despite their known presence in the area. As a result, the DEIR does not analyze the Project's impacts on mountain lions at all. This deficiency renders the DEIR inadequate as a matter of law.

The DEIR also fails to evaluate the significance of the Project's impacts by its own thresholds of significance. Under the Special-Status Species Threshold, the DEIR was required to look at impacts to any species identified as a candidate species for listing by CDFW.[22] As stated above, CDFW has designated the Central Coast North population of mountain lions as a candidate species for listing under the California Endangered Species Act.[23] The DEIR therefore must analyze impacts to mountain lions under its chosen threshold of significance. Further, given that the status of the Central Coast North population of mountain lions is in such dire straits, any impacts on an individual lion, the species' foraging and dispersal habitat, ability to hunt, and ability to travel to linkages connecting to preserved open space could be detrimental to the species' survival.[24]

The DEIR is unlawful because it fails to apply the Special-Status Species Threshold to the Project's impacts on mountain lions at all. As a result, the DEIR improperly forecloses its analysis of the Project's significant environmental impacts and it fails to provide substantial evidence to support its determination that the Project will not have significant impacts on special status species.[25]

---

[21] *See* CEQA Guidelines § 15125 (EIR "must include a description of the environment in the vicinity of the project, from both a local and a regional perspective"); *EPIC,* 131 Cal.App.3d at 354.

[22] DEIR at 3.4-40.

[23] Attachment A, at 5-6.

[24] *See* CEQA Guidelines § 15065(a)(1) (noting that a lead agency must find a significant impact if a project will cause "a fish or wildlife population to drop below self-sustaining levels"); *Kings County Farm Bureau v. City of Hanford* (1990) 221 Cal.App.3d 692, 718 (explaining that even relatively small changes caused by a project could be potentially significant if existing conditions show that conditions are already dire).

[25] *East Sacramento Partnerships for a Livable City v. City of Sacramento* (2016) 5 Cal.App.5th 281, 300, 303.

B. The DEIR's conclusions regarding the Project's impacts on wildlife movement are contrary to law and not supported by substantial evidence.

Coyote Valley ranks as one of the most important conservation areas in the United States.[26] Scientists consider the Valley to be irreplaceable.[27] Large undeveloped tracts of land in Coyote Valley provide habitat for a wide variety of species to move between the Santa Cruz Mountains and the Diablo Range, supporting healthy wildlife populations.[28]

Unfortunately, agricultural and urban development in the Valley have caused precipitous habitat loss and fragmentation, which in turn has threatened the endemic populations of numerous rare animals and other wildlife.[29] These include mountain lions, Tule elk, black-tailed deer, American badgers, coyotes, gray foxes, and bobcats.[30] Clear scientific evidence shows that species are becoming isolated in the Santa Cruz Mountains due to the lack of connectivity, which increases the risk of inbreeding and could lead to physical abnormalities and ultimately extinction within their range.[31]

Since most of the connections for wildlife between the Santa Cruz Mountains and the Diablo Range have been severed due to development, maintaining existing remnant connections for wildlife between the two areas is critical to sustaining the health of wildlife populations.[32] The Project threatens to further fragment the Valley's remaining wildlife connectivity areas.

The proposed Grove Terminal site occupies a critical area for wildlife movement in Coyote Valley. CDFW has designated the area along Monterey Road that

---

[26] Linkage Report at 7.

[27] *Id.*

[28] Tanya Diamond & Ahiga Roger Snyder, *Coyote Valley Linkage Assessment Study Final Report 2015-2016* (Mar. 1, 2016) ("Linkage Assessment"), at 5, https://www.pfwildlife.com/_files/ugd/fa05b5_eb65e7ab46e2464d95cc84568e03d70c.pdf.

[29] Linkage Report at 7-8.

[30] *Id.*

[31] Linkage Assessment at 8.

[32] *Id.* at 8-9.

includes the proposed Grove Terminal site as an Essential Connectivity Area.[33] Coyote Creek, which runs just behind the proposed Grove Terminal site between Monterey Road and Highway 101, also serves as a critical wildlife movement corridor.[34] As shown in Figure 1 and in the Pathways Report, species such as bobcat and mountain lion frequent this area.[35] Evidence of black-tailed deer, coyote, and several other species killed along the stretch of Monterey Road near the proposed Grove Terminal site also shows that animals regularly use this area.[36]

1. The DEIR applies the Wildlife Movement Threshold in a way that ignores potentially significant impacts.

The DEIR considers impacts to be significant under the Wildlife Movement Threshold if "a wildlife movement corridor would be interrupted by a feature that would physically block movement" or if "a suitable habitat . . . would be directly removed during construction or indirectly affected by construction noise or dust."[37] Because the Grove Terminal would be constructed entirely within the footprint of an existing fenced orchard, the DEIR concludes that the Project will have less than significant impacts on wildlife movement.[38] This approach ignores impacts to wildlife that do not traverse the orchard property itself, but instead use the corridor along Coyote Creek in close proximity to the proposed Grove Terminal site.

Agencies cannot choose a threshold of significance that forecloses consideration of potentially significant environmental impacts.[39] Here, the DEIR's chosen threshold for analyzing impacts looks only at whether a Project feature will directly block wildlife movement, whether construction would physically remove suitable

---

[33] DEIR at 3.4-22.

[34] Linkage Assessment at 20.

[35] *See* Laurel E.K. Serieys & Christopher Wilmers, *Coyote Valley Bobcat Habitat Preference and Connectivity Report* (June 2019), at 9-10, https://www.openspaceauthority.org/sites/default/files/2024-11/COVA_FinalReport_05072019_sm.pdf.

[36] Linkage Report at 18.

[37] DEIR at 3.4-55.

[38] DEIR at 3.4-56–3.4.-57.

[39] *Sierra Watch v. County of Placer* (2021) 69 Cal.App.5th 86, 107; *Protect the Historic Amador Waterways v. Amador Water Agency* (2004) 116 Cal.App.4th 1099, 1109.

habitat, or whether construction noise or dust would indirectly affect suitable habitat.[40] But this limited approach ignores potentially significant impacts on wildlife movement in the vicinity of the Grove Terminal site that can occur in numerous other ways.

For example, the Grove Terminal site is currently an orchard, a natural space with no industrial activity. Converting the site from an orchard to industrial use will inevitably result in increased human activity on and around the property, resulting in potential impacts to animals that traverse through the Coyote Creek wildlife corridor. The noise and light generated during construction, along with operational noise and light following the installation of the terminal, will also have an impact that extends beyond the boundaries of the property.[41] For example, wildlife studies have shown that mountain lions and other wildlife reacted strongly when exposed to recordings of human noise, and mountain lions give a wide berth to types of human development that provide a consistent source of human interference.[42]

Wildlife movement in the Coyote Creek corridor, as discussed above, is already significantly constricted by development. Under CEQA, the significance of an activity "depends upon the setting," and any additional minor impacts to an already-stressed area may still be significant.[43] Even small changes in the environment could have significant impacts on Coyote Valley.

The DEIR thus violates CEQA because it applies a threshold that ignores these potentially significant impacts on wildlife movement.

2. The DEIR's conclusion of less than significant impacts on wildlife movement lacks substantial evidentiary support.

Even using the DEIR's chosen methodology, substantial evidence does not support a conclusion of less than significant impacts on wildlife movement.[44]

---

[40] DEIR at 3.4-55.

[41] Attachment A, at 9-10.

[42] Attachment B, at 6; Attachment A, at 9-10.

[43] *Kings County Farm Bureau v. City of Hanford* (1990) 221 Cal.App.3d 692, 718.

[44] *Protect the Historic Amador Waterways,* 116 Cal.App.4th at 1106 (holding that an agency EIR was inadequate under the substantial evidence test because it failed to adequately explain why a project did not constitute a significant effect on biological resources or hydrology).

The DEIR alleges that the existing fencing around the orchard where the Grove Terminal will be built does not allow wildlife to move throughout the property.[45] Substantial evidence does not support that assertion.

Substantial evidence requires "facts, reasonable assumptions predicated upon facts, and expert opinion supported by facts," but not "[a]rgument, speculation, unsubstantiated opinion, [or] clearly erroneous" evidence.[46] Here, the EIR's assertion that the existing fencing around the orchard property is impermeable is "clearly erroneous" and speculative.

A review of the fencing around the orchard property found a significant hole in the fencing.[47] Animals could easily make their way through this hole in the fence and utilize the orchard area for hunting, breeding, or shelter. In addition, telemetry data shows that at least one bobcat has been present within the fence lines of the orchard.[48]

Since substantial evidence does not support the conclusion that the existing fencing around the orchard is impermeable, the DEIR's conclusion is inadequate and violates CEQA.

3. The DEIR ignores the Project's potentially significant noise impacts on the neighboring blue heron rookery.

In addition to wildlife movement concerns, the DEIR fails to acknowledge the presence of a blue heron rookery and the impacts that construction noise will have on their nesting habitat. The blue heron rookery is within 600 feet of the proposed Grove Terminal site.[49]

Under CEQA, if an EIR does not accurately describe the existing environmental setting, it cannot accurately represent how the Project would impact biological resources in that area.[50] Here, the DEIR fails to acknowledge the existence of

---

[45] DEIR at 3.4-57.

[46] CEQA Guidelines § 15384(a), (b).

[47] Attachment A, at 4.

[48] Attachment A, at 3.

[49] Attachment A, at 14.

[50] *See* CEQA Guidelines § 15125 (EIR "must include a description of the environment in the vicinity of the project, from both a local and a regional perspective"); *EPIC,* 131 Cal.App.3d at 354.

the blue heron rookery within the vicinity of the Grove Terminal site, despite its known presence in the area. As a result, the DEIR does not analyze the Project's impacts on the rookery at all. This deficiency renders the DEIR inadequate as a matter of law.

This failure to describe the environmental setting means that there is a failure to describe potential impacts to the blue heron population. Here, impacts on the blue heron rookery from noise will cause significant impacts.[51] A significant increase in noise can disrupt the breeding and nesting habits of the herons, displacing them from the nearby habitat.[52] A failure to consider these impacts renders the DEIR invalid as a matter of law.

If the Project moves forward with the proposed Grove Terminal as planned, the Project must mitigate impacts by halting construction during the heron's nesting and breeding season to reduce impacts to less than significant levels.[53]

4. The DEIR fails to properly consider the Project's cumulative impacts.

The DEIR does not consider the cumulative impact of the Project combined with the High-Speed Rail Authority project to install new rail lines in the area and its mitigation strategy.

A cumulative impact is one "created as a result of the combination of the project evaluated in the EIR together with other projects causing related impacts."[54] For a specific project, it is the "change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects."[55]

Environmental impacts of probable future projects must be analyzed because "consideration of the effects of a project or projects as if no others existed would encourage the piecemeal approval of several projects that, taken together, could overwhelm the natural environment and disastrously overburden the man-made

---

[51] Attachment A, at 14.

[52] *Id.*

[53] *Id.*

[54] CEQA Guidelines § 15130(a)(1)

[55] *Id.* § 15355(b).

infrastructure and vital community services. This would effectively defeat CEQA's mandate to review the actual effect of the projects upon the environment."[56]

The High Speed Rail Authority's San José to Merced Project Section will provide high speed rail service from San José to Merced, and is an instrumental part of California's plan to provide intercity, high-speed service on more than 800 miles of track throughout the state.[57] The High Speed Rail alignments would follow the Monterey Road and Highway 101 transportation corridor to a dedicated rail station in Gilroy, including passing through the Coyote Valley.[58] As a part of the mitigation strategy, the High Speed Rail Authority committed to designing "wildlife crossings to facilitate wildlife movement" in coordination with wildlife agencies and local stakeholders, including OSA and POST.[59]

As a result of this coordination, the High Speed Rail Authority ("HSRA") has developed plans to place a wildlife crossing within a few hundred feet of the Grove Terminal location.[60] This wildlife crossing for the HSRA project would increase wildlife traffic within the immediate vicinity of the Grove Terminal, and its success is directly tied to the ability of wildlife to freely use the corridor.

The DEIR ignores the Project's impacts on the wildlife crossing for the High Speed Rail project, even though the proposed location of the Grove Terminal will effectively nullify the key purpose of this crossing—to attract wildlife and ensure their safe transit across the High Speed Rail Corridor and Highway 101. Even apparently small impacts from the Grove Terminal location will be magnified by the Project's proximity to the wildlife crossing. For example, construction noise, lighting and ongoing operations at the site will discourage wildlife from traversing the area in the vicinity of the Grove Terminal and would effectively nullify essential mitigation measures for the High Speed

---

[56] *Golden Door Properties, LLC v. County of San Diego* (2020) 50 Cal.App.5th 467, 527 (quoting *Las Virgenes Homeowners Federation v. County of Los Angeles* (1986) 177 Cal.App.3d 300, 306).

[57] California High-Speed Rail Authority, *San José to Merced Project Section: Final Environmental Impact Report* (Feb. 2022) ("HSRA FEIR"), at S-3, https://hsr.ca.gov/programs/environmental-planning/project-section-environmental-documents-tier-2/san-jose-to-merced-project-section-final-environmental-impact-report-environmental-impact-statement/.

[58] *Id.* at 1-11.

[59] *Id.* at 3.7-195–3.7-196.

[60] HSRA FEIR at 3.7-195.

Rail project. The DEIR also fails to recognize the combined impacts of the High Speed Rail project and the Grove Terminal location, even though both will affect wildlife movement.

The DEIR's failure to consider the combined effect of these projects together violates CEQA. Since the DEIR did not include "sufficient detail to enable those who did not participate in its preparation to understand and to consider meaningfully the issues the proposed project raises," the DEIR violates CEQA.[61]

C. The DEIR conflicts with numerous local policies designed to protect and enhance the Coyote Valley wildlife corridor.

The DEIR concludes that the Project does not significantly conflict with any local policies or ordinances protecting biological resources.[62] However, the DEIR only addresses potential inconsistencies with the City of San José General Plan, Santa Clara County General Plan, and local tree ordinances.[63] It fails to acknowledge important legislative enactments and projects that are designed to support wildlife linkages and protect biological resources in the area.

In 2019, Governor Newsom signed AB 948 and recognized the Coyote Valley as a "resource of statewide significance."[64] The Act declared that the valley "is in need of restoration, conservation, and enhancement."[65] The Legislature highlighted the importance of the region for wildlife, noting that "Coyote Valley provides a critical corridor for wildlife migrating between the Santa Cruz Mountains and Diablo Range."[66] The area is also in the California Department of Fish and Wildlife's Movement Barriers Priority List and listed as a priority remediation location by Caltrans, indicating that it is a critical barrier to wildlife connectivity.[67]

---

[61] *Sierra Club v. County of Fresno* (2018) 6 Cal. 5th 502, 510.

[62] DEIR at 3.4-57.

[63] *Id.* at 3.4-57–3.4.58.

[64] Public Resources Code § 35180.

[65] *Id.* § 35182(b)

[66] *Id.* § 35182(d).

[67] California Dep't of Fish and Wildlife, *Restoring California's Wildlife Connectivity* 2022 (Dec. 2022), at 4, https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=204648&inline; Caltrans,

In support of the powers granted by AB 948, the Coyote Valley Wildlife Connectivity Planning Project ("CVWCPP"), being led by POST, has identified potential wildlife crossings and other wildlife corridor enhancements along Monterey Road and Highway 101.[68] The CVWCPP has secured a $5M planning grant from the California Wildlife Conservation Board to design and environmentally clear one or more wildlife crossings in Coyote Valley.[69] The CVWCPP has completed a feasibility study for the Monterey Road and Rail Corridor and is advancing planning for a wildlife crossing at the Fisher Creek/Coyote Creek confluence. The Santa Clara Valley Transportation Authority ("VTA") is the project delivery partner for the project, leading planning and eventual construction for the wildlife crossing and future crossings. In addition to POST and VTA, the CVWCPP team includes multiple government and non-profit organizations, including the City of San José, Caltrans, California High-Speed Rail Authority, OSA, and others.

The CVWCPP work is already underway. POST and other organizations have coordinated multiple studies and assessments to support additional wildlife linkages in Coyote Valley, and wildlife crossing locations have been identified.[70] The DEIR fails to disclose how the Project may negatively impact the WCPP, a critical initiative that furthers local policies.

Since the DEIR did not include "sufficient detail to enable those who did not participate in its preparation to understand and to consider meaningfully the issues the proposed project raises," the DEIR is unlawful.[71]

Caltrans Wildlife Connectivity Program Report (July 1, 2024), at 27, https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/env/caltrans-wildlife-connectivity-report-ally.pdf.

[68] Marian Vernon, *Restoring Wildlife Connectivity in Coyote Valley*, POST (Aug. 22, 2023), https://www.scv-habitatagency.org/DocumentCenter/View/1880.

[69] California Grants Portal, *Wildlife Corridor and Fish Passage*, https://www.grants.ca.gov/grants/wildlife-corridor-and-fish-passage/ (last updated June 11, 2024).

[70] *See, e.g.*, RFP S25096: US 101/Monterey Road Wildlife Crossings, Appendix B1—Feasibility Plan and Report for Monterey Road Connectivity Improvements (June 12, 2025), at 4, https://procurement.opengov.com/portal/vta/projects/171738/downloads.

[71] *Sierra Club,* 6 Cal. 5th at 510.

II. The DEIR fails to disclose significant agricultural impacts.

Santa Clara County has seen substantial conversion of agricultural land to non-agricultural uses since the 1950s.[72] Just in the last 20 years, farmland has declined by 45 percent.[73] Half of the county's remaining farmland is at risk of conversion over the next 30 years.[74]

The Legislature has repeatedly recognized agricultural lands' value to food production, open space, and California's economic health[75] and has particularly emphasized CEQA's importance to mitigating the loss of agricultural land.[76] Under CEQA, a project will cause a significant impact if it converts farmland to non-agricultural uses.[77] Here, the DEIR discloses that the Project will convert approximately 14 acres of Prime Farmland at the Grove Terminal site to non-agricultural uses.[78] The DEIR concludes, however, that LSPGC Mitigation Measure 3.2-1, which calls for LS Power to provide a financial donation to purchase agricultural conservation easements in Santa Clara County, will reduce these impacts to less than significant levels.[79]

This analysis violates CEQA. Agricultural easements, "operating by themselves, . . . do not replace the converted [agricultural] land or otherwise result in no net loss of agricultural land."[80] As the court explained in *King & Gardiner Farms, LLC v. County of Kern*, "entering into a binding agricultural conservation easement does not create new agricultural land to replace the agricultural land being converted to other uses."[81] A conservation easement prevents the future conversion of the agricultural land subject to the easement, but it does not make up for the loss caused by the project itself.[82]

---

[72] *See* DEIR at 3.2-1.

[73] DEIR at 3.2-2.

[74] *Id.*

[75] Gov. Code § 51220; Civ. Code §§ 815; Pub. Resources Code §§ 10201, 10331.

[76] Stats. 1993, ch. 812, § 1, p. 4428.

[77] CEQA Guidelines, Appx. G, § II(a); *see* DEIR at 3.2-15.

[78] DEIR at 3.2-16. Prime Farmland is "[f]armland with the best combination of physical and chemical features able to sustain long term agricultural production." DEIR at 3.2-7.

[79] DEIR 3.2-17.

[80] *V Lions Farming, LLC v. County of Kern* (2024) 100 Cal.App.5th 412, 437.

[81] (2020) 45 Cal.App.5th 814, 875,

[82] *Id.*

Thus, LS Power's purchase of agricultural easements cannot reduce the Project's impacts to less than significant levels. The DEIR thus fails as an informational document because it fails to disclose the significant agricultural impacts that the Project will continue to have, even after implementation of LSPGC Mitigation Measure 3.2-1.[83]

III. The Commission should adopt Alternative Combination 1, which will reduce or avoid every environmental impact compared to the proposed Project.

Under CEQA, public agencies may not approve projects if there are feasible alternatives that would substantially lessen the project's significant environmental effects.[84] For this reason, the discussion of alternatives lies at "[t]he core of an EIR" and "must contain analysis sufficient to allow informed decision making."[85] Moreover, an agency must support its rejection of an alternative both by an "explanation . . . sufficient to enable meaningful public participation and criticism" and by substantial evidence in the record.[86]

Here, the DEIR identifies three feasible alternatives to the proposed Project that meet most basic Project objectives and avoid or substantially reduce one or more significant environmental impacts.[87] The first of these alternatives—Grove Terminal Alternative 3—would co-locate the Grove Terminal at PG&E's Metcalf Substation, rather than locating the terminal south of Metcalf Substation in the middle of an active wildlife movement area on Prime Farmland.[88] The other two alternatives would change the alignment of the proposed 320 kV transmission line connecting the Skyline and Grove terminals.[89] The DEIR also considers combinations of these three alternatives.[90] The alternative identified as Alternative Combination 1 combines the Project's proposed alignment for the 320 kV transmission line connecting Skyline and Grove terminals with

---

[83] *See King & Gardiner Farms*, 45 Cal.App.5th at 876.

[84] Pub. Res. Code §§ 21002, 21081(a).

[85] *Citizens of Goleta Valley v. Board of Supervisors* (1990) 52 Cal.3d 553, 564; *Laurel Heights Improvement Assn. v. Regents of University of California* (1988) 47 Cal.3d 376, 380.

[86] *Save Round Valley Alliance v. County of Inyo* (2007) 157 Cal.App.4th 1437, 1458, 1461-62.

[87] *See* DEIR at 4-5, 4-21–4-29.

[88] *Id.* at 4-22.

[89] *Id.* at 4-27–4-28.

[90] *Id.* at 4-29–4-31.

Grove Terminal Alternative 3.[91] The DEIR identifies Alternative Combination 1 as the environmentally superior alternative.[92]

The DEIR does not identify a single environmental impact for which Alternative Combination 1 will cause more environmental harm than the proposed Project. The DEIR acknowledges that Alternative Combination 1 would eliminate or reduce the Project's potentially significant impacts on aesthetics, agricultural and forestry resources, air quality, biological resources, energy, geology, soils, and paleontological resources, greenhouse gas emissions, hazards and hazardous materials, hydrology and water quality, noise, recreation, transportation, utilities, and wildfire.[93] And it states that Alternative Combination 1 would have the same impact as the proposed Project on cultural resources, tribal cultural resources, and utilities.[94]

Critically, Alternative Combination 1 will entirely avoid the significant environmental impacts to biological and agricultural resources identified in this letter. Studies have shown that one of the most effective ways to minimize light and noise impacts to wildlife is to "focus development where infrastructure is already present."[95] Because this alternative would locate the Grove Terminal at PG&E's Metcalf Substation, the Grove Terminal would not interfere with the planned wildlife crossing over Monterey Road in close proximity to the proposed site south of Metcalf Substation. It would also not disturb the blue heron nesting site immediately to the east of the proposed Grove terminal site. Further, because Metcalf Substation is already an industrial site, locating the Grove Terminal there would not convert any farmland to non-agricultural uses.[96]

The DEIR contains several inconsistent statements regarding certain environmental impacts for Alternative Combination 1, which must be corrected. The DEIR first states that Alternative Combination 1 "would potentially result in greater environmental impacts related to cultural resources, tribal cultural resources, and

---

[91] *Id.* at 4-29. Alternative Combination 1 is therefore functionally identical to Grove Terminal Alternative 3. The DEIR's analysis and conclusions for Grove Terminal Alternative 3 apply equally to Alternative Combination 1.

[92] *Id.* at 4-32–4-33.

[93] *Id.* at 4-32.

[94] *Id.*

[95] Attachment B, at 9.

[96] DEIR at 4-32.

utilities."[97] However, the DEIR later acknowledges that Alternative Combination 1 would have similar impacts for all tribal cultural resources and utilities.[98]

In fact, with respect to cultural and tribal cultural resources, the DEIR states that constructing the Grove Terminal at Metcalf Substation carries the same risk of uncovering tribal human remains as constructing this terminal at the proposed site south of the substation.[99] By the DEIR's own terms, the impacts of the Project and Alternative Combination 1 are therefore functionally the same with respect to cultural and tribal cultural resources. With respect to utilities, Alternative Combination 1 will have *lesser* impacts because, by placing the Grove Terminal at Metcalf Substation, this alternative would result in shorter lengths for both the 320 kV Grove to Skyline and 500 kV Metcalf to Grove transmission lines.[100]

For this same reason, Alternative Combination 1 should also have lesser impacts on tribal cultural resources. This alternative will completely eliminate the 1.2 miles of trenching required to underground the 500 kV Metcalf to Grove transmission line.[101] It would similarly reduce the length of the Grove to Skyline 320 kV transmission line by 1.2 miles. Alternative Combination 1 will thus require less trenching and excavation, which means less risk of uncovering human remains that may be present in the area. The DEIR should be updated to reflect this analysis and conclusion.

In addition to reducing or avoiding every environmental impact identified in the DEIR, Alternative Combination 1 is eminently feasible to implement. Construction for this alternative will take approximately the same time to complete as the Project.[102] This alternative would also require significantly less material to be excavated and disposed of than the Project.[103] PG&E would need to relocate the existing "yard" at Metcalf Substation where the Grove Terminal would be located under Alternative Combination 1.[104] But PG&E has already identified two properties that could replace the

[97] *Id.*

[98] *See id* ("[Alternative Combination 1] would have *similar* impacts related to tribal cultural resources . . . and to utilities as the Project." (emphasis added)).

[99] *See id.* 4-40, 4-54.

[100] *See id.* at 4-54–4-55.

[101] DEIR at 4-22.

[102] DEIR at 4-25.

[103] *Id.*

[104] *Id.*

yard—a 3.5-acre site in South San José and a roughly 8-acre site in Gilroy.[105] In fact, PG&E recently procured the 3.5-acre site in South San José.[106]

In sum, Alternative Combination 1 would avoid or reduce every type of environmental impact analyzed in the DEIR. Further, the record shows that this alternative is just as feasible, if not more feasible, to build than the Project. Under CEQA, the Commission must therefore adopt this alternative.[107]

IV. Conclusion

For the reasons stated above, the DEIR violates CEQA in numerous respects, and the Project cannot be approved as proposed. OSA urges the Commission to instead approve Alternative Combination 1, the environmentally superior alternative, which will avoid the significant impacts detailed in this letter and reduce or avoid every other impact identified in the EIR. This sensible alternative will allow Santa Clara County to fulfill its power needs while continuing to preserve Coyote Valley as a critical ecological resource connecting millions of acres of core habitat and natural areas in the Santa Cruz and Diablo Range mountains.

Very truly yours,

SHUTE, MIHALY & WEINBERGER LLP

Ellison Folk

1953530.5

---

105 *Id.*

106 *See* George Avalos, *PG&E Buys San José Building to Bolster South Bay Operations*, SiliconValley.com (July 29, 2025), https://www.siliconvalley.com/2025/07/23/san-jose-pge-property-economy-build-electric-gas-energy-real-estate/ (discussing PG&E's purchase of the 3.5-acre property at 1851 South Seventh Street in San José).

107 Pub. Res. Code §§ 21002, 21081(a).

ATTACHMENT A

Tanya Diamond, Co-Owner & Wildlife Ecologist.

MS in Conservation Biology and Ecology.

Contact info: tanya@pfwildlife.com

Phone: (408) 891-9833.

Letter of Regarding: LS Power Grid California's Power Santa Clara Project DEIR.

Date: August 21, 2025

To: Shute, Mihaly & Weinberger LLP

From: Tanya Diamond, co-owner and wildlife ecologist at Pathways for Wildlife.

Below are our comments regarding statements within the LS Power Grid California's Power Santa Clara Project DEIR about the impacts on wildlife connectivity in the proposed project area and the impacts of the proposed project within the regional Santa Cruz Mountains to Diablo Range: Coyote Valley Wildlife Corridor/Linkage.

Main issue #1: The DEIR states that the Impact 3.4-4: The Project would not interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors or impede the use of native wildlife nursery sites.

Comment #1: The statement is incorrect and the claim that the project would not interfere with wildlife movement or impact migratory corridors is false. From 2017-2019, Pathways for Wildlife conducted the Coyote Valley Bobcat and Gray Fox Habitat Use and Connectivity Study with the UCSC Puma Project. We conducted a bobcat telemetry study in which we collared 26 bobcats with GPS collars to monitor and record their movement to identify habitats being used as wildlife corridors/habitat linkages along with identifying which routes various species were using to travel across the landscape (Serieys, L. E. K., & Wilmers, C. (2019), Coyote Valley Linkage Assessment Study 2015-2016 Annual Report).

This data collection resulted in a comprehensive understanding of the regional corridor/linkage that wildlife are utilizing to travel across the valley floor. A critical part of this wildlife corridor/ linkage is Coyote Creek County Park and adjacent properties, such as the Grove Terminal location, which is currently an orchard. In Figure 1, we recorded 7 bobcats routinely traveling along Coyote Creek and adjacent habitats. **A collared bobcat,**

B23M, traveled within the proposed development area at the Grove Terminal location (Figure 1). Furthermore, multiple species of wildlife have also been recorded on Monterey Road at the Grove Terminal location (Figure 1).

This is why we claim that the statement: Project would not interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors or impede the use of native wildlife nursery sites, is false. Wildlife have been documented utilizing the proposed development habitat at the Grove Terminal and routinely are traveling through Coyote Creek and adjacent habitats, which are critical components of the cross-valley wildlife corridor for multiple species.

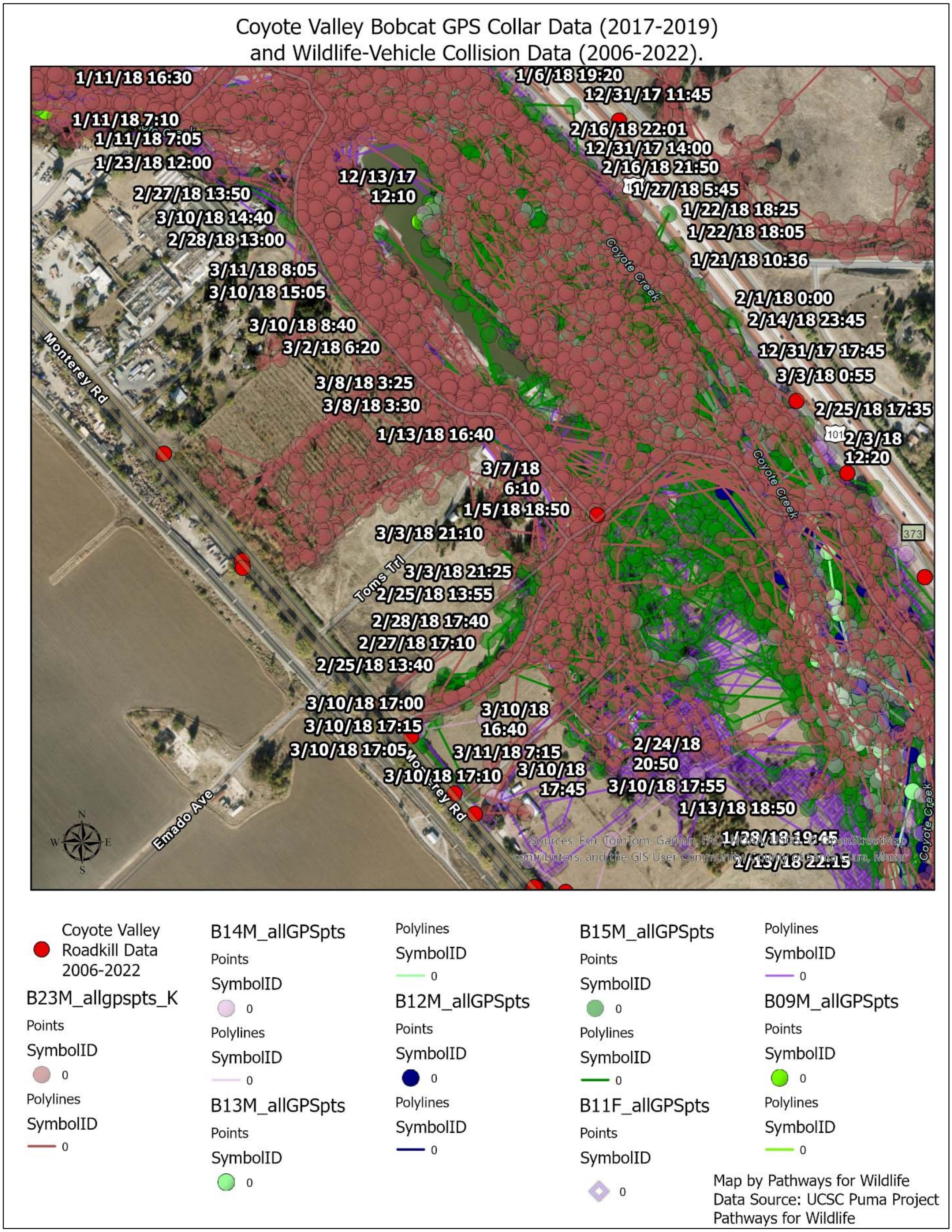


Figure 1: Bobcat GPS collar data within the vicinity of the Grove terminal location.

The DEIR states that the property is impermeable to wildlife movement because of a chain link fence that is set up along the entire perimeter of the property. However, upon inspection in August 2025, there is a large hole in the fence line.

Comment 2: From 2021-2022, Pathways for Wildlife conducted the North Coyote Valley Road Ecology Study. We monitored multiple fence lines along Santa Teresa Blvd. and Bailey Ave. in Coyote Valley. **The camera data documented that multiple species, including deer, were traveling through a hole in the chain link fence at Santa Teresa Blvd. by Fisher Creek (Figure 2).**

Question 1 & 2 regarding the fencing: How did the DEIR come to the conclusion that chain link fencing is acting as an impediment? What data were collected to support this conclusion?

Comment 3: We have documented wildlife movement through fences using camera data, see wildlife movement through chain link fence at Fisher Creek at Santa Teresa Blvd. in Coyote Valley in Figure 2. These are the type of data that need to be documented to warrant or prove the comment that the fencing is an impediment.

Question 3: Will the final DEIR include adequate wildlife surveys to make the statement that the fence is impermeable to wildlife movement?

Figure 2. Deer traveling through a hole in the chain link fence at Santa Teresa Blvd. by Fisher Creek.

Mountain lion candidate listing

Currently the Central Coast North population of mountain lions is under review as a candidate species for listing. **With this candidate review, mountain lions have all the protections of a listed species and all environmental impact reports (DEIR/FEIRs) created for proposed developments, must include the impacts to mountain lions along with an impact analysis.**

Comment 4: The DEIR did not include an impact analysis or impacts on mountain lion movement or loss of habitat. All DEIRs must treat mountain lions as a listed species and include a CEQA analysis of impacts on mountain lion habitat loss and impacts to the population during this candidacy listing period.

The Central Coast North population consists of Santa Clara and Santa Cruz counties (Figure 3). In 2018, a publication revealed that the Santa Cruz Mountain lion population has an effective population size of 16.6, while an effective population of 50 is needed to prevent inbreeding depression in the short term (Figure 4). <u>The loss of wildlife corridor habitat at the Grove Terminal location will further constrain the Santa Cruz Mountains-Diablo Range linkage as an impact to regional wildlife connectivity.</u>

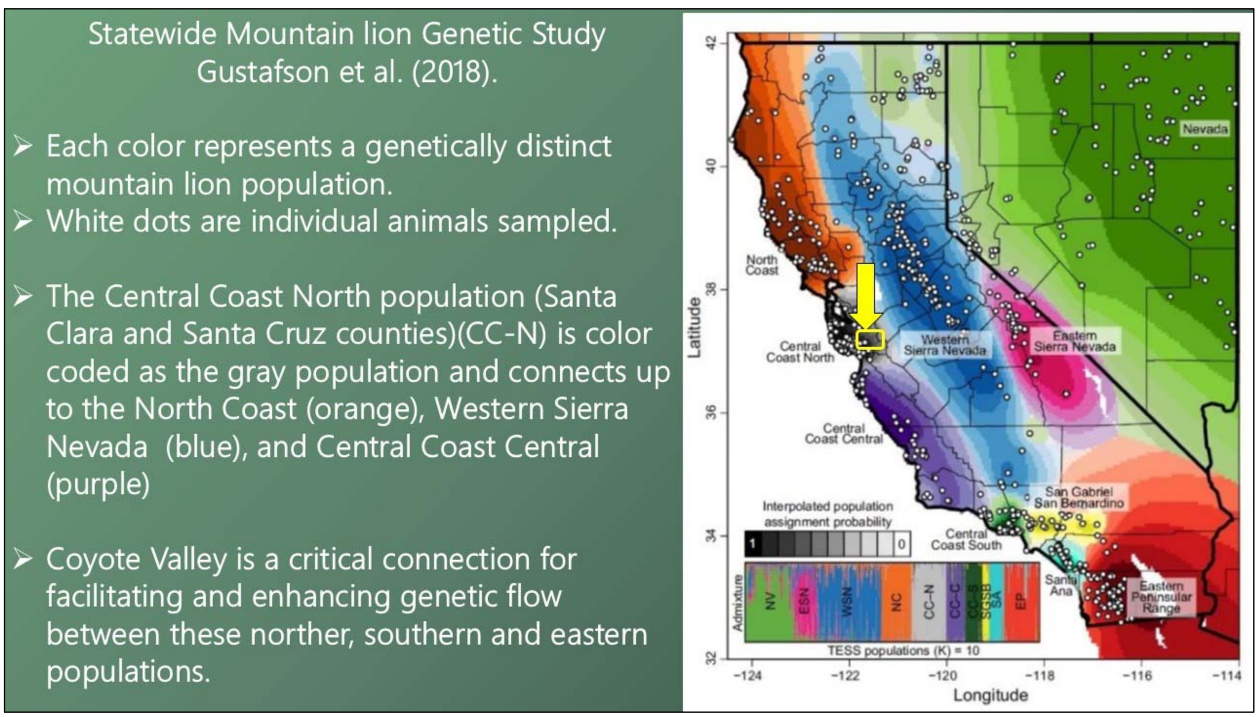


Figure 3. Coyote Valley Wildlife Corridor in relation to mountain lion genetics and regional connectivity.

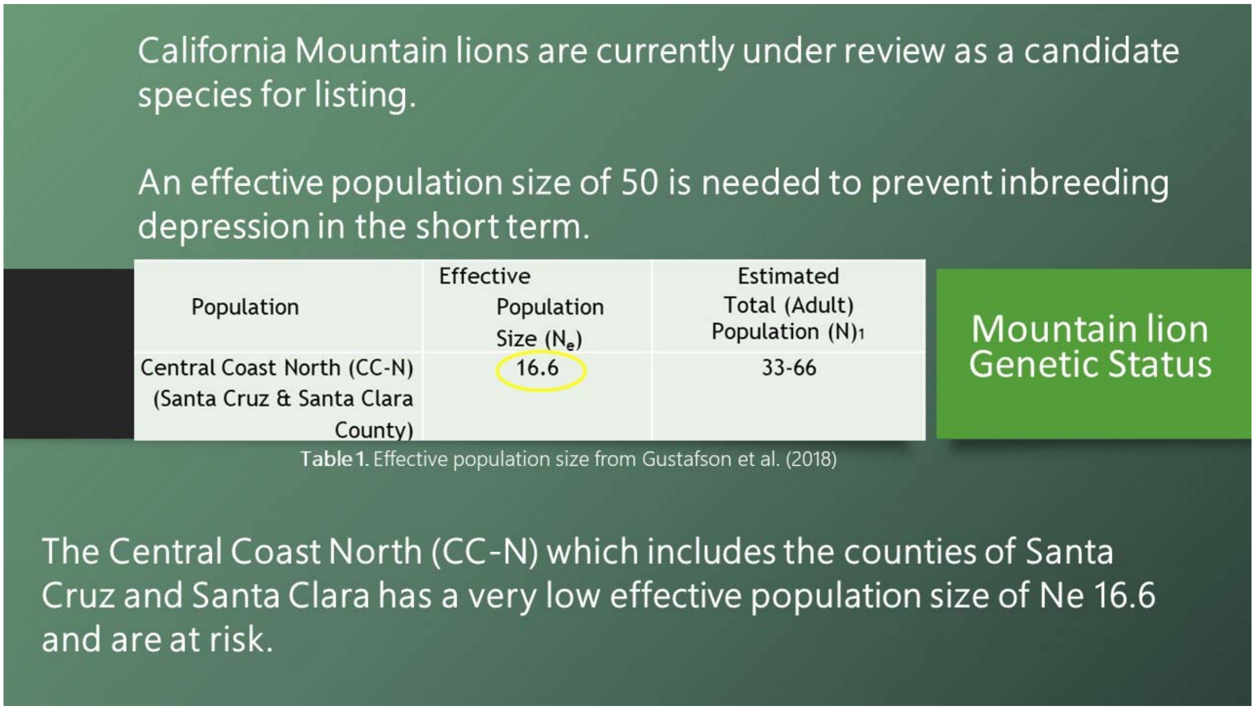


Figure 4. Mountain lion candidate listing and Santa Clara County genetic status information.

As a candidate for listing under the California Endangered Species Act, mountain lions in the Central Coast will require additional consideration and mitigation to adequately mitigate proposed development project impacts on this species, which is vulnerable to population declines due to reduced genetic diversity as a result of habitat fragmentation (Gustafson et al. 2018, Yap, TA, et al. 2019).

It is critical to provide connectivity between the Santa Cruz Mountains and within the Diablo Range to facilitate gene flow for mountain lions and other species to keep the greater metapopulations intact and healthy.

Impacts to Mountain lion movement by the proposed Grove Terminal site.

The location of the Grove Terminal is within the core of the Santa Cruz Mountains to the Diablo Linkage within Coyote Valley (Figure 5). At this location, there have been three records of mountain lions traveling adjacent to the Grove Terminal location (Figure 6). These data document mountain lion use of this section of the wildlife corridor.

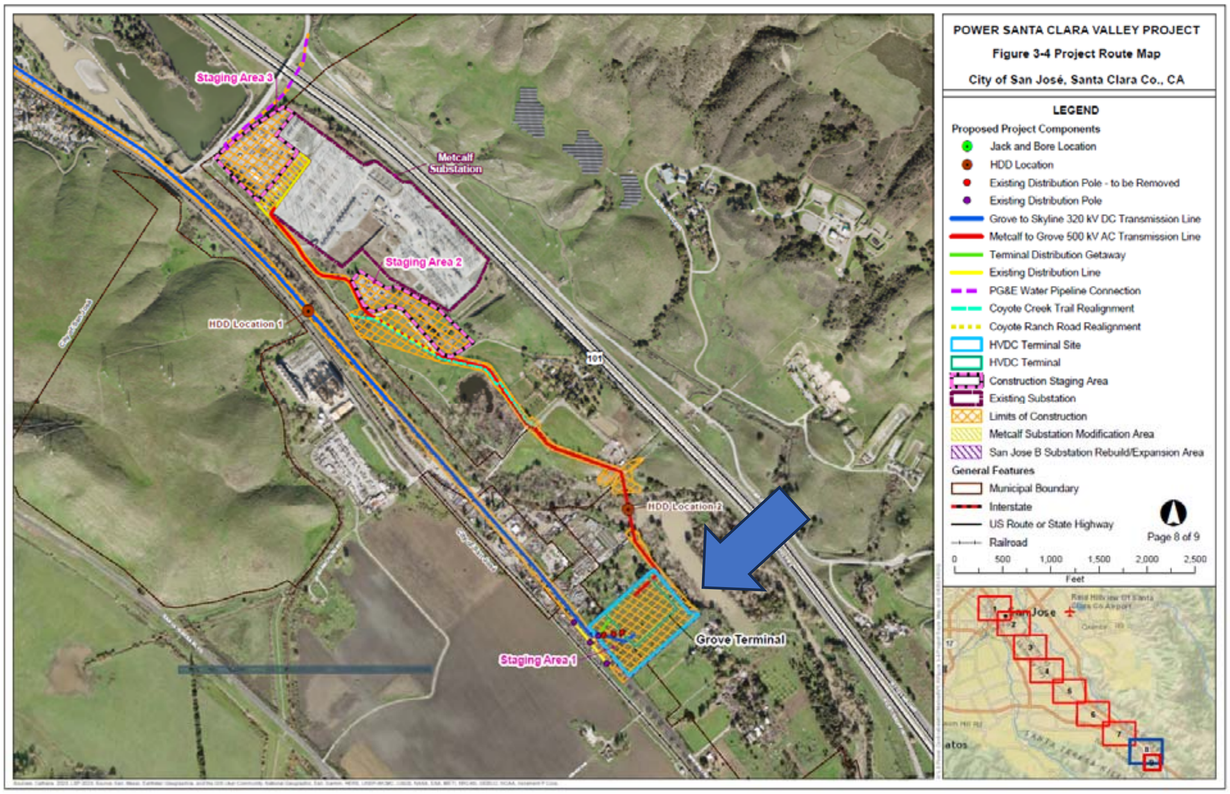


Figure 5. Grove Terminal location within the proposed LS Power Grid California's Power development footprint.

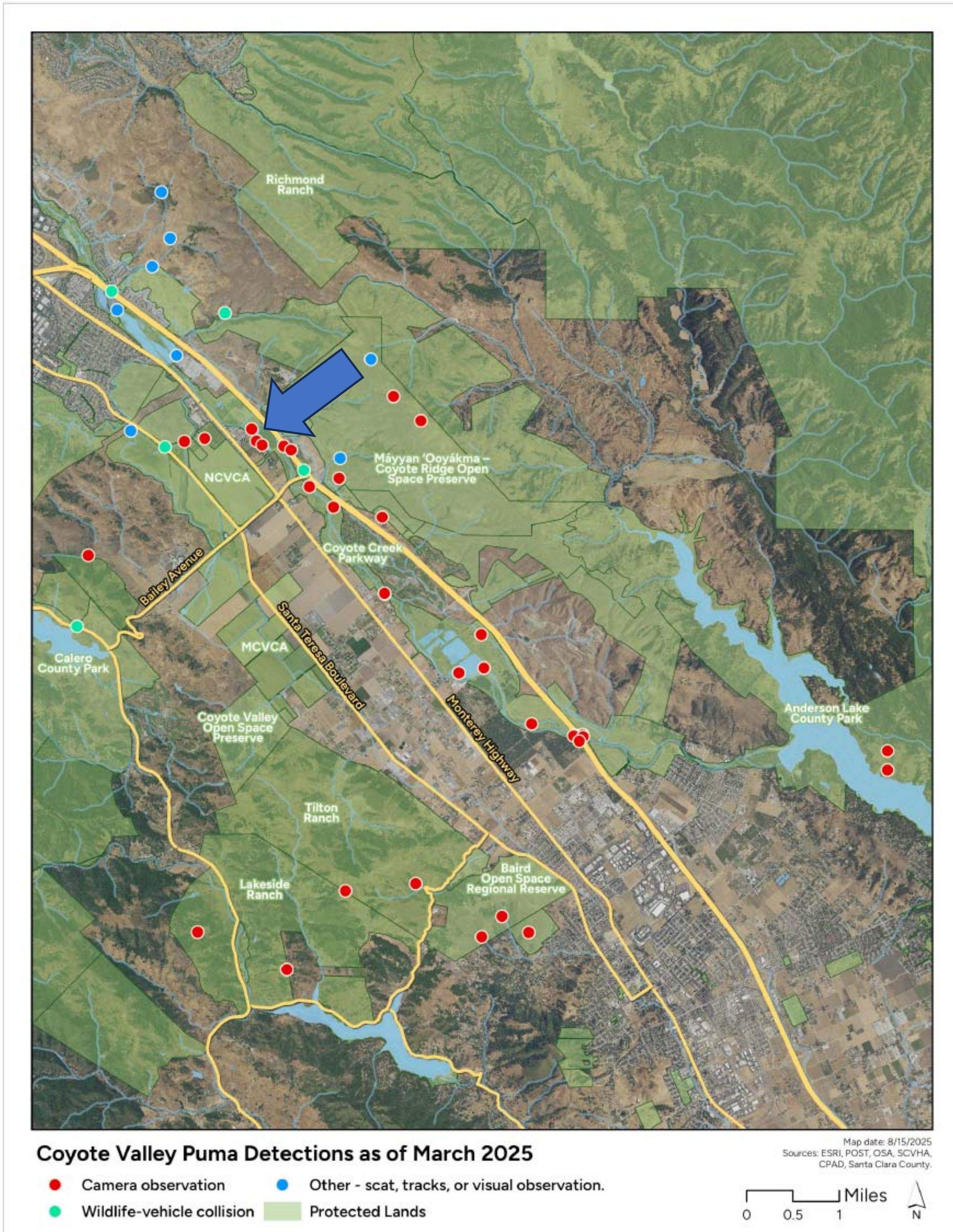


Figure 6. Aggregated mountain lion occurrences in southern Santa Clara County, specific to the Coyote Valley region. Occurrences include camera trap, wildlife-vehicle collision, wildlife sign (scat/tracks), or visual observation from multiple studies and other verified sources.

Comment 5: The DEIR states that: Impact 3.13-1: Project construction would generate a substantial temporary increase in ambient noise levels in excess of standards established in the local general plan or noise ordinance.

The mitigation measures only include modification of evening and nighttime work to reduce construction noise. However, we have recorded mountain lions traveling during the day through Coyote Creek (Figure 7).

Figure 7. Mountain lion in Coyote Creek County Park by Golf Course Drive on 7-25-18.

Mountain lions have been documented to be sensitive to noise and light and will avoid human disturbance (Suraci et al. 2019). Studies also show that mountain lions are sensitive to human disturbance, including both human development and human activity, and may adjust their behavior in response. A study conducted in the Santa Cruz Mountains found that mountain lions avoided human voices and moved more cautiously when hearing humans, suggesting that passive recreation as well as human development may impact mountain lion behavior (Suraci et al. 2019). This study included employing playback of human and frog sounds, Suraci et al. (2019) found that mountain lions avoided entering the 1 km2 study site when human voices were broadcast from a grid of speakers at 80 dB at 1m.

Another study suggested that reproductive behaviors (communications and denning) require a buffer from human development at least four times larger than non-reproductive behaviors (movement and feeding), and mountain lions give a wide berth to types of human development that provide a consistent source of human interference, such as neighborhoods (Wilmers et al. 2013).

Lastly, a study conducted in the Santa Cruz mountains quantified the energetic cost of movement using GPS collars mounted with accelerometers and found that animals expend more energy moving near human development. More specifically, they found pumas moving through identical physical terrain in moderately developed exurban habitat would spend 13% more calories than if moving through the same terrain in wildland habitat (Nickel et al. 2021).

The dynamic between larger predators and prey may be altered by artificial light at night (ALAN). In an analysis of GPS data collected from mountain lions (Puma concolor) across the Sierra Nevada and Great Basin, Ditmer et al. (2021) found that mule deer (Odocoileus hemionus) were more active at night in areas where ALAN was greater compared to areas where it was less prevalent. Although mountain lions still hunted deer within areas of high ALAN, they preferentially selected to make kills in the darkest parts of those areas (Light, Noise, and Development Impacts on Wildlife Literature Review and Recommendations, prepared by HT Harvey for POST, 2024).

The impact of ALAN, noise, and development may vary depending upon the level of exposure over time. Acute but temporary exposure may result in strong momentary responses, whereas consistent exposure may cause more permanent changes in behavior, including temporal shifts in when wildlife use habitat, habituation, increased alertness, or avoidance (Light, Noise, and Development Impacts on Wildlife Literature Review and Recommendations, prepared by HT Harvey for POST, 2024).

Question 4: Will there be mitigations included for reducing daytime construction noise levels that will not impact mountain lion movement through Coyote Creek, which is adjacent to the Grove terminal location, where mountain lions have been documented traveling along (Figure 6)?

The High Speed Rail (HSR) DEIR also did not include an impact analysis on mountain lions. With the mountain lion candidacy review for listing, HSR then had to do an additional DEIR and CEQA analysis for mountain lions.

The CA Department of Fish & Wildlife wrote a comment letter, which includes the following information, that applies to this proposed development and DEIR and comments that the proposed project might anticipate receiving from CDFW regarding the impacts to mountain lions:

1. CDFW offers the following comments and recommendations to assist the HSR Authority in adequately identifying and/or mitigating the Project's significant, or potentially significant, direct and indirect impacts on mountain lions.

2. The RDEIR/SDEIS does not address the Project related impacts of potentially worsening gene flow disruption between these subpopulations, nor does it address how impacts to the population genetic source would impact the subpopulations.

3. Highway 101 is a significant barrier for mountain lion movement between the CC-N and CC-C subpopulations and the Project will very likely further compound this issue absent conservation strategies to ensure mountain lion movement opportunities. Opportunities for the Project to enhance other nearby areas and facilitate, design, and fund movement opportunities and wildlife corridor repairs or enhancement should be pursued as mitigation strategies.

4. Because the RDEIR/SDEIS identifies the potential for mountain lion to occur within the Project footprint, CDFW recommends conducting the following evaluation of the Project, updating the RDEIR/SDEIS to include the following measures, and that these measures be made conditions of approval for the Project. CDFW recommends quantitative and enforceable measures that will reduce the impacts to less than significant levels. (Please see comment letter for these measures).

5. CDFW believes the proposed ratios of 2:1 for permanent impacts on breeding/foraging habitat and high priority foraging and dispersal habitat; and 1:1 for low priority foraging and dispersal habitat do not sufficiently account for loss of habitat and is not well supported based on the RDEIR/SDEIS analysis of the impacts, which was a coarse level spatial modeling exercise. Overall, the analysis of direct, indirect, permanent, and temporal impacts appears to be underestimated, including the impact to loss of gene flow between subpopulations and impacts to ESUs due to the loss of connectivity.

6. Comment 42: APPENDIX 3.7-F: SUPPLEMENTAL ARTIFICIAL LIGHT ANALYSIS ON TERRESTRIAL WILDLIFE SPECIES 1.5

Question 5: Will the final FEIR include an adequate analysis of the proposed development impacts on mountain lion connectivity within Coyote Valley along with the impacts to regional mountain lion corridor habitat?

Comment 6: Furthermore, Monterey Road has been identified by the CA Department of Fish & Game as a Terrestrial Wildlife Connectivity Barrier (Figure 8). Caltrans has also identified US 101 in Coyote Valley as a wildlife connectivity barrier . The state awarded WCB funds to POST to conduct a planning project to determine the best locations for installing wildlife crossings along these two barriers and to plan, design, and environmentally clear one or more crossing structures.

Through this analysis, the project area is within close vicinity to where multiple wildlife crossings are proposed to help address and mitigate the high rate of wildlife-vehicle collisions on this stretch of Monterey Road by Tulare Meadows, including at Tulare Meadows (within a couple hundred feet of the Grove Terminal location), Fisher Creek, and the base of Tulare Hill near Metcalf Rd (Monterey Road Feasibility and Existing Conditions Report, produced by Dudek 2025). POST is moving forward with planning, engineering design, and environmental review for a wildlife crossing at the Fisher Creek/Coyote Creek confluence at Monterey Rd, which is within a mile of the Grove Terminal location.

The Grove Terminal location would increase traffic volumes along Monterey Road, which could result in increasing wildlife vehicle collisions on this stretch of Monterey Road. The Grove Terminal location could also deter wildlife from using a future wildlife crossing at Tulare Meadows and deter wildlife from moving along Coyote Creek to access the planned wildlife crossing at Fisher Creek.

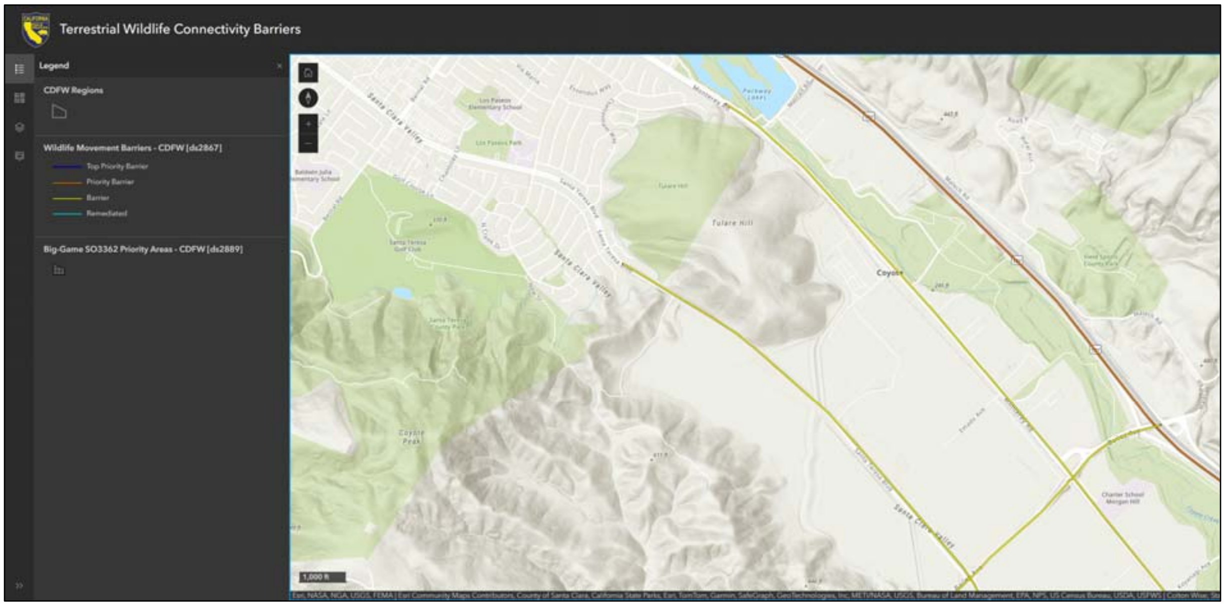


Figure 8. CA Department of Fish & Game as a Terrestrial Wildlife Connectivity Barrier map for Coyote Valley. https://cdfw.maps.arcgis.com/apps/instant/sidebar/index.html?appid=c4017d600c06489aa115b6c8196975c0

Question 6: Will the final FEIR include an adequate analysis and mitigation for the increased traffic volume along Monterey Road that could result in increasing wildlife-vehicle collisions?

Question 7: Will the final FEIR include an adequate analysis and mitigation for potentially negatively impacting a wildlife crossing and wildlife use of the crossing at the Grove Terminal location?

Comment 7: In summary, the proposed project will impact this functional part of the linkage in which multiple species of wildlife have been documented to travel through. The DIER has done no analysis and provided no mitigation measures for these impacts that have been included in this comment letter. This wildlife corridor has been well documented, heavily studied, and millions of dollars have been invested into protecting this wildlife linkage, included funding from the City of San Jose.

Question 8: Why were there no mitigation measures or impact analyses conducted for the wildlife corridor. Will the FDEIR include a proper analysis of the impacts to multiple species movement by the proposed development?

Comment 8: There is a blue heron rookery very close to the proposed Grove terminal property, located on the other side of Coyote Creek on the backside of the property as shown below in blue in Figure 9. The construction noise would affect this rookery. Mitigation measures to avoid impacting this rookery should include that construction at the Grove terminal site should not occur during the blue heron nesting season from approximately January 15 through the end of August.

Figure 9. Blue heron rookery circled in blue in relation to the Grove Terminal, circled in red.

Comment 9: We highly recommend avoiding development and conversion of the orchard at the Grove Terminal site and moving the proposed development to the already existing PG&E substation to significantly reduce impacts on the wildlife corridor.

Sincerely,

Tanya Diamond
Pathways for Wildlife

Literature Cited

Serieys, L. E. K., & Wilmers, C. (2019). Coyote Valley bobcat habitat preference and connectivity report. *Santa Cruz, California*.

Coyote Valley Linkage Assessment Study 2015-2016 Annual Report, produced by Pathways for Wildlife for the CA Department of Fish & Wildlife, Santa Clara Valley Open Space Authority.

Barry A. Nickel, BA, JP Suraci, AC Nisi and CC Wilmers. 2021. Energetics and fear of humans constrain the spatial ecology of pumas. PNAS. 118 (5) e2004592118https://doi.org/10.1073/pnas.2004592118

Light, Noise, and Development Impacts on Wildlife Literature Review and Recommendations, prepared by HT Harvey for POST, 2024.

North Coyote Valley Road Ecology Study 2021-2022, produced by Pathways for Wildlife for the CA Department of Fish & Wildlife, POST, and the Santa Clara Valley Habitat Agency.

Monterey Road Feasibility and Existing Conditions Report, produced by Dudek 2025.

Suraci, JP, M Clinchy, LY Zanette, and CC Wilmers. 2019. Fear of humans as apex predators has landscape-scale impacts from mountain lions to mice. *Ecology Letters* 22(10): 1578– 1586.

Suraci, JP, BA Nickel, and CC Wilmers. 2020. Fine-scale movement decisions by a large carnivore inform conservation planning in human-dominated landscapes. *Landscape Ecology* 35(7): 1635–1649.

Wilmers, CC, Y Wang, B Nickel, P Houghtaling, and Y Shakeri. 2013. Scale dependent behavioral responses to human development by a large predator, the puma. *PLOS ONE* 8(4): e60590.

Yap, TA, JP Rose, and B Cummings. 2019. *A petition to list the southern California/central coast evolutionarily significant unit (ESU) of mountain lions as threatened under the California Endangered Species Act (CESA).* Center for Biological Diversity, Tucson, AZ and the Mountain Lion Foundation, Sacramento, CA.

ATTACHMENT B

H. T. HARVEY & ASSOCIATES
Ecological Consultants
50 years of field notes, exploration, and excellence

Light, Noise, and Development Impacts on Wildlife
Literature Review and Recommendations

Project #4842-01

Prepared for:
Peninsula Open Space Trust
222 High Street
Palo Alto, CA 94301

Prepared by:

H. T. Harvey & Associates

July 2, 2024

983 University Avenue, Building D • Los Gatos, CA 95032 • Ph: 408.458.3200 • F: 408.458.3210

Table of Contents

List of Preparers

Steve Rottenborn, Ph.D., Principal/Senior Wildlife Ecologist

Ben Pearl, M.S., Project Manager/Senior Wildlife Ecologist

Dani Christensen, B.S., Wildlife Ecologist

Section 1. Introduction

H. T. Harvey & Associates has prepared this literature review for the Peninsula Open Space Trust (POST) to summarize existing information on issues related to wildlife-compatible land use. POST's Wildlife Linkages Program is working to create a network of resilient, connected ecosystems that enable wildlife to move, adapt, and thrive in the midst of a changing landscape and climate, using strategies such as land protection, habitat restoration, wildlife crossing structures, and compatible land use. The need to accommodate future human growth while meeting the needs of wildlife necessitates an understanding of how development might impact terrestrial wildlife species, whether some land uses might be compatible with wildlife, and best management practices to guide land use adjacent to or within areas of core wildlife habitat and wildlife movement corridors.

We have synthesized the scientific literature regarding the impacts of developed land uses, including built structures and associated light, noise, and human activity, on different mammal, amphibian, and reptile species. Based on this synthesis, we have prepared a summary of best management practices that would reduce such impacts.

Section 2. Light and Noise Impacts from Built Structures

2.1 Impacts of Artificial Light on Wildlife

Wildlife exposure to artificial light at night (ALAN), whether temporary or chronic, can have physiological impacts. ALAN may impair nocturnal mammals to varying degrees, with loss of vision being most severe in smaller mammals. Exposure to ALAN may also disrupt the circadian rhythm of wildlife, causing alterations in the hormone cycle of amphibians and mammals that may both alter the timing and ability of wildlife to forage and breed.

Exposure to ALAN may also cause altered foraging behavior and changes to predator-prey dynamics. Some altered foraging may benefit ambush predators (e.g., snakes) such as when small mammals avoid foraging in ALAN. In other cases, small mammals may seek out light as a tradeoff between predation risk from ambush predators in darker areas and active nocturnal predators (e.g., owls) in lighter areas. Larger mammals may also seek out ALAN to lower predation risk, forcing nocturnal predators to hunt in lighter conditions than preferred. ALAN-induced changes in foraging behavior may also result in increased risk of roadway mortality.

2.1.1 Physiological Impacts of Light

2.1.1.1 Impaired Vision for Nocturnal Animals

Wildlife have evolved with, and are adapted to, a specific suite of habitat and environmental conditions, including photoperiod, the time each day during which an organism receives illumination. When photoperiod is disrupted by ALAN, this can cause a range of physiological impacts to wildlife, including impacts to vision. Nocturnal mammals such as bats and rodents have very few cones, which provide high resolution imagery during daylight, but make up for it with many rods in their eyes, allowing them high sensitivity to light at night (Beier 2006). While this adaptation is critical to their ability to forage and evade predators at night, the lack of cones is problematic for them in an environment filled with artificial lights, as cone-poor animals may experience temporary blindness when exposed to artificial light (Beier 2006). Some nocturnal species may mediate this effect by narrowing pupils, but this does not completely eliminate the impacts (Perlman and Normann 1998). The absolute size of the retinal image is more important than the relative size of the image in adapting to artificial light, and therefore smaller nocturnal mammals may be physically unable to adapt to artificial light at night (Beier 2006).

In mammals that have "24-hour vision", such as ungulates and medium and large carnivores, their retina has a large amount of rods for night vision, but also enough cones to adjust to artificial night lights within approximately 2 seconds of exposure (Perlmann and Normann 1998). In contrast, most diurnal mammals have an abundance of cones specialized for high-quality vision during the day (Beir 2006). In the case of smaller mammals such as squirrels, they are nearly blind at night, while larger mammals, including humans, have moderate vision at night due to a larger retinal image. When animals transition back to darkness after being exposed to ALAN, rod sensitivity and function may increase by up to 100 fold within 10 minutes, with up to an additional 10 fold increase in sensitivity after 40 minutes of transitioning (Lythgoe 1979). However, for as long as animals remain exposed to any level of light and are not in full darkness, rods will not regain their full function. As such, smaller nocturnal animals that rely upon rods for nighttime vision may suffer impaired vision for an extended amount of time wherever ALAN is present.

2.1.1.2 Disrupted Endocrine System and Circadian Rhythm

Photoperiod plays an important role in vertebrates adapting to changing conditions on a daily and annual cycle, providing cues for the endocrine and metabolic systems (Hazlerigg and Wagner 2006). Amphibians are largely nocturnal, and due to their mode of transportation and need for moisture, may be unable to avoid ALAN. Anthropogenic breeding habitat, such as roadside ditches and artificial ponds, may expose them to continuous ALAN from cars, streetlights, security lighting, sports complexes, roadway lighting, illuminated signs, and other sources (Buchanan 2006). As with many other species, amphibians rely upon seasonal photoperiod cues for both development and to adapt to changing conditions throughout the year (Wise 2007). These cues trigger hormonal changes that aid in adaptation, but constant exposure to ALAN disrupts the timing of hormonal changes, affecting amphibian's ability to survive throughout the year (Buchanan 2006; Wise 2007).

Even a small amount of light as perceived by humans may result in a major shift in ambient conditions. For instance, Buchanan (2006) found that 1 lux (the equivalent of 1 lumen/m^2) projected into a marsh in New York from adjacent roadway lighting resulted in illumination conditions 100,000 to 1 million times greater than ambient conditions. ALAN can have profound impacts on breeding cycles as well. Many animals rely upon natural cues from seasonal photoperiod changes to time breeding to coincide with favorable conditions for foraging and parental care. Robert et al. (2015) found that ALAN can disrupt these cues in a nocturnal marsupial, resulting in suppressed melatonin levels, delayed breeding, and potentially reduced breeding success.

2.1.2 Behavioral Impacts of Light

2.1.2.1 Altered Foraging and Predator-Prey Dynamics

ALAN may provide extended foraging opportunities for reptiles; however, this advantage may be mitigated by prey reducing or altering activity in response. Kotler (1984) found that several species of mice, which serve as prey for a variety of snakes and other predators, in the Mojave Desert decreased foraging on seeds in response to the presence of a camping lantern when cover was unavailable. ALAN may also increase predation risk and decrease foraging success for reptiles (Perry and Fisher 2006). In a study of interactions between two species of kangaroo rat (*Dipodomys* spp.) and sidewinder (*Crotalus cerastes*) in the Mojave Desert, Bouskila (1995) found that sidewinders adjusted their ambush sites at night depending upon the intensity of moonlight to reduce predation risk from owls and mammals, and were most effective in catching kangaroo rats on dark nights. Thus, increased ALAN may reduce the hunting success of sidewinders and expose them to greater predation risk, impacting their population dynamics in those two important ways.

Amphibians may be attracted to ALAN, particularly streetlights where insects often congregate, but this may also increase the likelihood that they are run over by cars. Farhig et al. (1995) found that the density of amphibians was greatly reduced due to roadway mortality, with the density decreasing with increasing traffic intensity.

The dynamic between larger predators and prey may be similarly altered by ALAN. In an analysis of GPS data collected from mountain lions (*Puma concolor*) across the Sierra Nevada and Great Basin, Ditmer et al. (2021) found that mule deer (*Odocoileus hemionus*) were more active at night in areas where ALAN was greater compared to areas where it was less prevalent. Although mountain lions still hunted deer within areas of high ALAN, they preferentially selected to make kills in the darkest parts of those areas.

2.1.2.2 Variation in Impacts of ALAN by Intensity and Distance

The intensity at which ALAN impacts wildlife can vary depending upon the species. In a study of wildlife use of a wildlife crossing structure (WCS), Bliss-Ketchum et al. (2016) found that the intensity of ALAN impacted species' willingness to use the WCS, with reactions varying by species. Using experimental manipulation of three light intensities (High=172 lux; Low=54 lux; and Zero=<1 lux) in a crossing structure at the wildland-urban interface of Portland, Oregon, they found that Columbia black-tailed deer (*Odocoileus hemionus columbianus*) were sensitive to all intensities of light, deer mice (*Peromyscus maniculatus*) were sensitive to both low and high intensities, and opossums (*Didelphis virginiana*) were sensitive to high-intensity lighting. Raccoons (*Procyon lotor*), striped skunks (*Mephitis mephitis*), and Pacific tree frogs (*Pseudacris regilla*), which are all well adapted to the anthropogenic environment, did not show a response to any of the light intensities. Another study of the impact of ALAN on wildlife use of crossing structures was less definitive. Shilling et al. (2018) analyzed camera trap data and measured light intensity using a wide-angle lens and software to measure total illumination and light frequency at 8 locations in the Bay Area and Sierra Nevada. Although the data suggested that increasing total illumination resulted in reduced species richness, there was no significant effect observed.

The distance at which wildlife avoid ALAN may also depend upon the intensity of the light. In an experiment conducted in southwestern Riverside County, Stephens kangaroo rats (*Dipodomys stephensi*) were found to avoid foraging in ALAN (Shier et al. 2020). Three linear resource patches with three levels of light (high intensity floodlight, low intensity bug light, and control new moon light) were monitored, showing that the Stephens kangaroo rat depleted less of the resource patches near the artificial lights. In addition, they foraged a greater amount near the bug light compared to the floodlight, indicating that the intensity of ALAN may influence the behavior of foraging individuals. Perhaps most importantly, Stephens kangaroo rat foraging behavior was impacted beyond the detectable reach of the artificial light (25 m), indicating that ALAN has impacts beyond the light spectrum visible to humans.

2.2 Impacts of Noise on Wildlife

Wildlife exposed to high levels of anthropogenic noise in the short term may experience increased stress responses that impact their ability to conduct routine behaviors, while wildlife exposed to similarly loud noises repeatedly may experience permanent impairment and possibly loss of hearing. Animals may alter their behavior due to anthropogenic noise, becoming more vigilant of predators where sounds are masked and reducing time spent foraging and hunting in areas due to fear of encountering humans.

2.2.1 Characteristics of Anthropogenic Noise

In the same way that wildlife has evolved with certain photoperiods, animals are also adapted to the natural sounds in their environment. Sounds in the natural environment, either from abiotic (e.g., wind, rain) or biotic (other animals) sources, provide information to wildlife to assess threats, find food, locate mates, and navigate terrain. Wildlife are adapted to these natural sounds, but are not as well-adapted to anthropogenic noise (Blickley and Patricelli 2010). Anthropogenic noise (i.e., sounds produced by human activity or the operation of human-made devices) is often in lower frequencies (under 250 Hz) than natural sounds, meaning it can travel farther through the environment before dissipating (McKenna et al. 2016; Blickley and Patricelli 2010). The following sections discuss the effects of anthropogenic noise, often simply referred to as "noise", on the physiology and behavior of reptiles, amphibians, and terrestrial mammals.

2.2.2 Physiological Impacts

Noise pollution at or above 85 decibels (dB) can have direct, adverse effects on the physiology of wildlife. Exposure at these levels may result in hearing loss, temporary or permanent threshold shift (change in hearing sensitivity), impaired or eliminated ability to hear environmental cues, and increased heart rate and breathing (Arcangeli et al. 2023; Dooling and Popper 2007). Wistar rats (*Rattus norvegicus domestica*) experimentally exposed to 100 dB of frequencies ranging from 0-20 Hz of noise daily showed increased stress hormones, decreased motor coordination, memory and cognitive impairment, and potentially even cell-damage and cell-death (Akefe et al. 2020).

The average ambient decibel level at a turbine site in the Altamont Pass, CA was between 93 and 118 dB, well above the threshold at which noise can cause physical impacts (Rabin et al. 2006). California ground squirrels (*Spermophilus beecheyi*) exposed to this noise displayed higher levels of vigilance, leading researchers to conclude that they may have suffered partial hearing loss (Rabin et al. 2006). Although the squirrels appeared to have some hearing ability based upon responses to playback of squirrel alarm calls, their tendency to move closer to the burrow and post (the most vigilant behavior in the experiment) may have been an attempt to mediate a reduced ability to detect the sounds of approaching terrestrial predators. Other forms of energy production and storage may have lower levels of noise emission, but depending upon the system, may still cause physiological issues. For instance, a Battery Energy Storage System (BESS) in Tennessee emits a maximum noise of 75 dB at 10 feet (ft), similar to the level of a vacuum cleaner or average radio volume (Tennessee Valley Authority 2018). The loudest components of the BESS are the inverters, which reach 75 dB, while the transformers (55.5 dB) and HVAC systems (67.1 dB) are often quieter (Tennessee Valley Authority 2018). By comparison, other BESS may have louder operational noise. It was estimated that a BESS planned in Morro Bay could have noise emissions of approximately 85 dBA from generator step-up units at a distance of three ft from the unit, and 80 dBA from power conversion system units at a distance of three ft from the unit (City of Morro Bay 2024).

Therefore, without implementation of noise reduction techniques, this BESS may result in impaired hearing for surrounding wildlife.

2.2.3 Behavioral Impacts of Noise

The presence of noise can have an impact on an animal's typical behaviors such as foraging, vigilance, vocalizations, anti-predatory reactions, movement patterns, and food storage (Arcangeli et al. 2023; Petric and Kalcounis-Rueppell 2023). High noise levels may mask the ability of animals to hear important cues in their environment, such as obscuring the sound of arthropods from foraging bats, leading to changes in foraging behavior and use of habitat (Schaub et al. 2008). Furthermore, while amphibians and reptiles may have a more limited range of hearing than mammals, many species are very sensitive to vibrations (Bowles 1995). Noise at lower frequencies then has an increased risk of having a negative impact on those species sensitive to vibrations in the environment, such as amphibians and reptiles.

Smith et al. (2017) study within Santa Cruz, Santa Clara, and San Mateo counties found that mountain lions reacted in a significantly stronger way when experimentally exposed to recordings of human noise compared to recordings of Pacific tree frog while feeding on a carcass. Mountain lions fled the kill site 10 out of 12 times when first exposed to human noise, compared to only one out of 12 times when first exposed to tree frog noise. They returned to the kill site less often when exposed to human noise, and if they did return, took much longer to do so (human noise median = 20 min; frog noise median = 2 min). Even once they returned, they were more vigilant overall, spending less than half as much time feeding after hearing human noise compared to frog noise. In another experiment in the Santa Cruz Mountains employing playback of human and frog sounds, Suraci et al. (2019) found that mountain lions avoided entering the 1 km^2 study site when human voices were broadcast from a grid of speakers at 80 dB at 1m.

A study of deer mice and woodland jumping mice (*Napaeozapus insignis*) in North Carolina found that these small rodents will take more time to begin foraging in a new area with anthropogenic noise versus natural noise and will also spend less time foraging in such areas (Petric and Kalcounis-Rueppell 2023). Though the number of seeds consumed in areas with anthropogenic noise was overall similar to areas with natural noises, the mice left fewer husks in the feeding areas with anthropogenic noise, indicating they were less likely to linger in these areas to eat and preferred to take their food elsewhere. In the same study, researchers also found that broadcasted noise (i.e., played from a speaker), whether it was anthropogenic or natural sounds, caused the mice to produce fewer ultrasonic (frequency >20,000 Hz) vocalizations. The response to anthropogenic noise was not identical between species, either, as jumping mice were more likely than deer mice to initiate foraging in a new area with anthropogenic noise. Wistar rats in a laboratory setting showed a significant decrease in exploration of their environment when exposed to noise as a result of increased anxiety (Akefe et al. 2020).

In the Altamont Pass area of California, California ground squirrels showed higher levels of vigilance, or alertness, at turbine sites than control sites without turbine noise (Rabin et al. 2006). The ambient decibel level and frequency of noise was higher at turbine sites; however, the lower-frequency squirrel anti-predator vocalizations overlapped with the turbine spectral band between 100 Hz and 6 Hz, resulting in a loss of hearing efficacy near turbines. This resulted in increased time spent near burrows and posting due to perceived greater predation risk at turbine sites. The squirrels appeared to be unable to hear approaching mammals as well and became more visually vigilant to compensate.

Road noise and traffic volume can have a major impact on species richness and use of WCS, as indicated by a Shilling et al. (2018) study of camera trap and sound data at 20 WCS located on I-5, I-80, I-280, I-680, and SR-65. The data showed that species sensitive to disturbance, including mountain lion, bobcat, coyote, grey fox, and several others, were less abundant at underpasses with higher maximum noise levels and traffic volume. Traffic noise also had an impact on species diversity, which was found to be lower at the openings of crossing structures than in adjacent habitats. A slight negative correlation was observed between the maximum noise level and species richness, indicating that the most sensitive species may avoid high noise areas. Noise from roads can also impact wildlife in adjacent habitats. For example, the federally endangered Mt. Graham red squirrel (*Tamiasciurus hudsonicus grahamensis*), a small tree squirrel, is more likely to occupy middens (i.e., stores of food in pine trees) farther from roads due to the decrease in traffic noise (Chen & Koprowski 2015). Generally, there is a lower diversity of birds, reptiles, and amphibians near roads due to avoidance behavior (Blickley and Patricelli 2010). Large ungulates such as elk (*Cervus canadensis*) will venture closer to roads during times of less disturbance such as on weekends, when busy logging roads are less used (Edge and Marcum 1985).

2.3 Temporal Differences In Species Response to Noise, Light, and Development

The impact of ALAN, noise, and development may vary depending upon the level of exposure over time. Acute but temporary exposure may result in strong momentary responses, whereas consistent exposure may cause more permanent changes in behavior, including temporal shifts in when wildlife use habitat, habituation, increased alertness, or avoidance.

Consistent ALAN exposure can cause niche shifts that alter temporal overlap between species, leading to reduction and homogenization of temporal niches (Sanders et al. 2023). When this occurs, a small number of synanthropic species with 24-hour vision may take advantage of the expanded opportunities, outcompeting more specialized species and resulting in the loss of biodiversity. Wildlife may respond differently to noise depending upon whether it is a sudden loud noise or chronic exposure to loud noise, as Collins et al. (2022) found during a camera trap study of mule deer and coyote (*Canis latrans*) behavior at 10 crossing structures in California. Both species shared the same rate of entering the crossing structure (82%) and were more prone to a flight response when exposed to acute loud noises. However, with chronic noise exposure deer reduced anti-predator behavior and were attracted to forage more in the area of the structure, whereas chronic exposure caused coyotes to alter their behavior from alertness to running through the structure.

Human presence in developed areas and near wildlands may result in temporal niche shifts for some species, while other species may be unable to alter their behavior significantly. Lovell et al. (2022) found that although both European badger (*Meles meles*) and red fox (*Vulpes vulpes*) were able to exploit resources in urban edges and adjacent wildlands, European badger activity was significantly negatively affected by human presence, resulting in a 22% reduction in activity per one human at cameras sites per day. Conversely, red fox were more active earlier in the evening and later in the morning, indicating that they were better able to adjust their behavior to avoid humans. Similarly, Beasley et al. (2023) found that European hedgehogs (*Erinaceaus europeaus*) shifted their foraging behavior to avoid humans in developed areas.

2.4 Appropriate Buffer Distances Between ALAN and Noise Impacts and Wildlife Habitat Areas

The distance at which wildlife are impacted by ALAN may differ by species and guild, and thus these differences must be taken into account when determining appropriate buffers to reduce impacts. Small mammal species may require relatively small buffers (15-25 m) from detectable ALAN to allow them to utilize habitat for foraging, whereas larger mammal species, especially carnivores such as mountain lions, may require much larger buffers (500 m) with limited amounts of ALAN. The buffer needed to reduce the impacts of sound on wildlife habitat areas is more consistent among both small and large terrestrial mammals, with appropriate buffers in the range of 140-145 m from trails and roadways.

In a study of Santa Rosa beach mice (*Peromyscus polionotus leucocephalus*) in Florida, Bird et al. (2004) found that beach mouse foraging behavior was impacted within 10 meters (m) of low-intensity light. The researchers noted that the study area had a higher amount of vegetative cover than is typically found in Santa Rosa beach mouse habitat and acknowledged that the increased presence of cover may have reduced their perceived predation risk and response to ALAN. Shier et al. (2020), in an experimental study of Stephen's kangaroos rat foraging near ALAN, found that their foraging behavior was impacted 40 m from low-intensity light and 50-m from high intensity light, whereas each light source only emitted measureable irradiance up to 25 m. Therefore, depending upon the intensity of light, buffer distances to reduce impacts of ALAN on small mammals may need to be at least 15-25 m beyond the edge of measurable light.

For larger mammals, particularly carnivores that rely upon concealment to kill prey, much larger buffers may be required. Through analysis of several different data sets of radio-collared mountain lions in Southern California, it was found that mountain lions selected for areas with a lower amount of ALAN within 500 m compared to random areas within their territory (Barrientos et al. 2023). Although implementing a buffer distance this large may be difficult to achieve in many areas, understanding that ALAN may impact mountain lion behavior at such large distances allows for informed decisions on how to conserve habitat quality at the landscape level.

Suraci et al. (2019) found that when mountain lions were exposed to human voices broadcast at approximately 80 db at 1 m, they displayed avoidance behavior on average at approximately 145 m from the nearest speaker and reduced their movement speed by 34%. Although in some cases mountain lions also displayed avoidance behavior of frog noise, it was at a lesser distance of approximately 112 m. Mountain lions also entered the experimental site where speakers were located 30% less frequently when exposed to human noise compared to frog noise, indicating that fear of humans prompted a much stronger response. As such, a buffer greater than 145 m between areas of human noise and mountain lion habitat may be appropriate to avoid altered behavior.

Chen and Koprowski (2015) found that traffic noise did not dissipate (i.e., return to baseline levels) until at least 165 m from the road, and as a result, middens of Mount Graham squirrel (*Tamiasciurus hudsonicus grahamensis*) were found on average 140 m from roads. Furthermore, midden occupancy decreased to <50% when traffic noise was continuously over 43 dB in an area. In a study of prairie dogs (*Cynomys ludovicianus*) in Colorado, Shannon et al. (2016) found that the animals showed a greater response to disturbance when pre-recorded sound from a highway was played. As a result, prairie dogs became alert and initiated flight 4-5 m earlier compared to during control trials. Foraging bats avoided areas as close as 10-15 m to traffic noise, and were likely to avoid areas as far as 50 m away from traffic sources (Schaub 2008). In examining the response of various wildlife to noise, it is apparent that the buffer required to minimize noise impacts on wildlife areas must be tailored by project based on the species that may be affected and the intensity of noise.

Although regulations on noise levels typically pertain only to impacts to human receptors (and mostly in residential areas), they can provide a starting framework for creating appropriate wildlife noise avoidance buffers (Teff-Seker et al. 2022). The sound level at 50 ft from a typical highway with cars and trucks traveling at 55 mph is approximately 90 dBA (Bentrup 2008). For comparison, 55-60 dBA is acceptable for daytime residential areas, 60-65 dBA for outdoor conversation (Bentrup 2008), and 85 dBA for over 8 hours can cause permanent hearing loss in humans (NIDCD 2024). It is worth noting that this measurement, dBA, is different from dB, in that it is weighted for frequencies detectable by human ears. Despite these measurements being weighted for human hearing, these thresholds are often derived from experiments with laboratory animals such as rats, mice, and cats, and therefore can still be relevant to terrestrial wildlife (Bowles 1995). Without use of a constructed berm or dense vegetation to reduce noise, it would take a buffer of 450 ft for noise level to decrease from 90 dBA to 65 dBA (Bentrup 2008).

2.5 Best Management Practices to Reduce Impacts of ALAN and Noise on Wildlife

There are a number of best management practices that can reduce, though not eliminate, the impacts of ALAN. One of the most effective ways to minimize ALAN impacts is to focus development where infrastructure is already present so that impacts are concentrated in highly developed areas rather than spread across the landscape (North Carolina Resources Commission 2016). Classifying areas into environmental lighting zones in a range from natural darkness to urban city center brightness may help to guide development in such a way that ALAN is concentrated in dense urban areas and minimized in rural, exurban, and suburban areas (Jägerband and Bouroussis 2021). When development occurs in areas with little to no previous development, minimizing the footprint will help to reduce the overall impacts of ALAN. In addition, refraining from lighting roads and interchanges will eliminate a constant source of ALAN. As large of a buffer as possible between development and wildlands should be retained, and dense native vegetation should be installed within parking lots to block headlights from projecting directly into wildlands (North Carolina Resources Commission 2016).

When determining the amount of light that is needed for a development, working backwards from complete darkness and only adding in lights for specific purposes is advised (Australian Government Department of Environment and Energy 2020). The lowest possible intensity of light necessary for the task should be selected. Warm-appearing bulbs, including low-pressure sodium (LPS), high-pressure sodium (HPS), and amber light-emitting diode (LED) with correlated color temperature (CCT) ≤3,000 k should be prioritized (DarkSky 2023; Jägerbrand and Bouroussis 2021; North Carolina Wildlife Resources Commission 2016). CCT within this range avoids blue, a critical step to reduce ALAN impacts since blue light has the greatest potential to reset circadian rhythm and alter movement behavior (DarkSky 2023). Where outdoor lights have been installed, they should be as low to the ground as feasible for the purpose, pointed down, and have full cutoff baffles or shields installed (DarkSky 2023, North Carolina Wildlife Resources Commission 2006, Australian Government Department of Environment and Energy 2020). Doing so will minimize the dispersal of light into adjacent wildlands. Lastly, adaptive light controls and sensors should be used to manage light timing and intensity both inside and outside of buildings.

There are some simple measures that can help to reduce noise impacts on wildlife. Limiting the amount of noise projected into wildland-urban interfaces and wildlands from concerts, sports games, and other outdoor events may help to reduce the impact of noise on sensitive species at night. Approaches to WCS's may be made darker and quieter through a combination of excavation to lower the approach in relation to the roadway and installation of berms and concrete walls (Shilling et al. 2022). The combination of these measures that is most effective will depend upon the topography of the approach, but together, these measures can create relatively dark paths with noise levels less than 65 dBA.

Installing various types of landforms may also reduce noise to wildlife from stationary sources. A BESS project in Morro Bay is planning to install berms that are 10-12 ft above grade of the project site to provide an acoustic shield from high noise emission (City of Morro Bay 2024). Although the amount of noise reduction may vary with each project, they estimated that the berms would reduce noise by approximately 8-9 dBA. Planting dense vegetation along roads in a 100-foot buffer can also reduce noise from cars and trucks traveling at 55mph to 50-55 dBA at 450 ft from the roadway (Bentrup 2008). Without a buffer, the noise at 450 ft would be at 65 dBA. The installation of a landform (such as a cement wall or berm) measuring at least 12-foot high can increase the efficacy of this sound buffer, reducing truck noise to 60 dBA at 150 ft and 55 dBA at 450 ft. When noise is emitted from a point source, such as a BESS, an acoustic enclosure could be installed to greatly reduce the level of sound emitted. Using thick acoustic metamaterials designed to attenuate low frequency noise may also be effective (Yao et al. 2014).

Section 3. Impacts of Development, Infrastructure, Recreation, and Human Presence on Wildlife

3.1 Response to Development

With increasing development in wildland-urban interfaces and exurban areas, wildlife have been forced to adapt to the presence of human structures, infrastructures, and presence on the landscape. Some species may avoid areas of higher residential development and human presence, while other species that are better adapted to urban areas may seek these areas out. The complex landscape may pose barriers to wildlife movement, foraging, and breeding, resulting in reduced breeding success and density. Within species, different sexes may respond differently, such as in mountain lions where females may be less averse to hunting in high density residential areas as they focus on feeding young, while males may avoid these areas as they are more focused on defending territories and finding mates.

3.1.1 Variability among Species

The extent of development within wildland-urban interfaces and exurban areas in the Santa Cruz Mountains, where nearly three million people live in the counties of Santa Clara, Santa Cruz, and San Mateo, has made navigating the landscape especially complicated for wildlife (U.S. Department of Commerce 2020). Extensive research has been conducted in the Santa Cruz Mountains on how mammals navigate this complex landscape. Wang et al. (2015) conducted a camera trap study near roads and trails in these three counties, finding that mammal use of these areas varied by species. The top model from the data showed that mountain lions avoided areas of higher residential development, especially where human activity was highest, but made some use of these areas when they bordered open space. The probability of occupancy for raccoon and striped skunk, two species that are well adapted to urban areas, was positively influenced by development in the model, whereas the opposite was true of coyote and bobcat (*Lynx rufus*). Serieys et al. (2021) found that bobcat occurrence was positively associated with a low building density (≤1 house/hectare) in Coyote Valley, above which they were decreasingly likely to use the area. Nickel et al. (2020) also found that responses to development and human presence in the Santa Cruz Mountains differed between medium and large mammals. The top model developed from their camera trap study, conducted within a 1400 km^2 grid, found that coyote, striped skunk, and opossum probability of presence was strongly positively associated with increasing building presence. Mountain lions, bobcats, and gray foxes avoided areas of high human use (i.e., recreational trails) during peak activity, but were otherwise positively associated with these areas, indicating that they were able to adjust their behavior to avoid humans in areas that otherwise provided good quality habitat. Conversely, these species intensity of use was negatively associated with increasing building presence, indicating that buildings represent a permanent impact to habitat use for these species. Wilmers et al. (2013) also found that mountain lions showed a negative response to increasing housing density, as well as identified their likelihood of various behaviors within high-density residential areas. The most likely behavior by mountain lions in high-density residential areas was to feed, followed closely by movement. They were much less likely to communicate in these areas, and very unlikely to den in higher-density residential areas. The likelihood of movement in higher-density residential areas was mediated if on a slope, perhaps indicating that slopes reduced mountain lions' perceived risk of encountering humans. In addition, mountain lions showed a slight avoidance of dense housing near water, possibly due to increased human presence in these areas. Although Nickel et al. (2020) found that gray fox likelihood of occurrence was negatively associated with building presence, Harrison (1997) found that gray foxes in New Mexico avoided use of residential developed areas that exceeded 125 houses/km^2 but appeared to benefit from lower housing densities due to a concentration of prey resources such as small rodents and birds that were attracted to development.

The impacts of development, infrastructure, and human disturbance may create barriers to effective foraging and reduce the availability and viability of breeding sites. Collectively, these impacts can result in reduced reproductive success (Skinner et al. 1991) and lower breeding density (Schley et al. 2004), as has been observed in the European badger. Human disturbance, especially when combined with the presence of dogs, may result in wildlife adjusting the times that they forage to avoid contact, as Beasley et al. (2023) found with European hedgehog.

3.1.2 Variability within Species

Species may also respond differently to development depending upon sex. Wilmers et al. (2013) found that female mountain lions were less averse to movement near higher-density residential areas, most likely due to their need to care for cubs. Conversely, males showed greater aversion to development, possibly due to their routine of altering between searching for mates and communicating, two behaviors that would both attract more human attention. Smith et al. (2015) found that female mountain lions significantly increased the amount of time spent hunting in response to increasing housing density. Due to disturbance, females ate less of each kill and spent more time hunting for the next kill in areas of higher housing density. Because males have larger home ranges and can more easily avoid development, their kill rate remained constant across the wildlands, rural, exurban, and suburban areas.

3.2 Impacts of Roads

Although roads may not pose a significant threat to wildlife in rural areas, in urban and suburban areas they exert a strong influence on the way wildlife move through the landscape and establish a home range. Species such as mountain lions may seek out higher quality habitats that are sparse in the landscape, resulting in higher rates of road crossing and associated mortality. Other species such as American badger (*Taxidea taxus*) may avoid crossing roads, resulting in heavily restricted burrow locations and home ranges.

Roads combine the impacts of the built environment (ALAN, noise, and human disturbance) in a concentrated area, forming sharp boundaries between habitats and altering wildlife movement and foraging behavior. Kautz et al. (2021) found that large carnivores responded to the presence of roads in different ways. In a study of GPS collared animals in the western upper peninsula of Michigan, they found that black bears (*Ursus americanus*) avoided roads, bobcats and coyotes were neutral to the presence of paved 1-lane and 2-lane roads, and gray wolves (*Canis lupus*) selected for roads. All of these species selected roads for travelling at night, but they reduced use of roads during day to avoid human contact. Wolves and black bears altered their behavior to be 1.3 times more nocturnal when their home ranges included a high density of roads, indicating that they sought to reduce human interactions.

Roads and development can determine the size and shape of home ranges, and in doing so may heavily impact the fitness and survival of wildlife. In a study of GPS collared mountain lions in Southern California, Burdett et al. (2010) found that they used oak woodlands, riparian areas, higher elevations, steep and rugged terrain, and public protected lands more than expected based upon availability, while grasslands, scrublands, exurban development, and urban/suburban development areas were used less than expected based upon availability. Some of these areas were selected because they supported ample vegetation and hosted higher concentrations of mule deer, while selection against exurban development was an important factor that lowered the risk of mortality compared to those that selected for or showed a neutral response to it. Among the 16 mountain lions that selected for or showed a neutral response to exurban development, 11 died during the study: three were taken by depredation permits related to human-mountain lion conflict, two were struck by vehicles, one died due to intraspecific aggression, one died during a capture attempt, and the cause of mortality for four individuals was unknown.

Roads were also shown to heavily impact the movement of radio collared American badgers in Ontario, Canada. Sunga et al. (2017) found that badgers avoided crossing roads significantly more than expected within their home range, particularly busy highways. Because of the avoidance of busy highways, home ranges and burrow locations were somewhat restricted. Avoidance was warranted, as three of the nine radio collared badger were killed by vehicle strikes during the study. Interestingly, another study of American badger in British Columbia found that they were positively associated with highways, roads, and power lines and negatively associated with heavily vegetated areas (Apps et al. 2002). American badgers preferred habitat includes open canopy, which highways and roads provide in a landscape where it is limited. Due to forest fire suppression, open canopy has become increasingly unavailable as forest in-growth eliminated open areas (Newhouse and Kinley 2000).

3.3 Impacts of Recreation

Recreation may further restrict wildlife use of habitat, as depending upon species, wildlife may avoid recreational trails at distances ranging from 100-400 m for birds and 40-1,000 m for mammals. There is some evidence that wildlife respond to varying degrees depending upon the type of recreation activity, but additional research is needed to determine if these varying responses are significant. Large mammals elicit strong responses to motorized recreation, with the strength of the response determined by the size of the herd and the herd's distance from the trail or road.

Wildlife have been shown to avoid areas where human recreation occurs, including mountain lions in the Santa Cruz Mountains (Suraci et al. 2019). The impact of trails themselves, which result in habitat modification and fragmentation, may lead mountain lions to develop a negative association with trails (Baker and Leberg 2018).

Trails that allow dogs may also cause additional avoidance of recreation areas, as Reilly et al (2016) found in both mountain lions and opossums. Recreation can result in a range of responses by wildlife depending upon the species. Through a meta-analysis of wildlife threshold to response distances, Dertien et al. (2021) found that body mass and bird group play an important role in determining the distance at which birds respond to recreational disturbance. Wading and passerine birds showed the lowest sensitivity to disturbance, with a mean threshold of < 100 m until a response was elicited, whereas raptors elicited a response at a mean threshold of > 400 m. Among both groups, increasing body mass resulted in an increasing threshold response distance, likely due to the longer time needed for heavier and larger birds to take flight. The study also found a wide disparity in response among two mammal groups, with rodents threshold to response ranging from 50-100 m while ungulates response ranged from 40-1,000 m. Designing trail systems to have gaps of at least 250 m between trails systems and preventing social trails will provide undisturbed areas for many of these species (Dertien et al. 2021).

Although hiking appeared to be the recreation activity with the lowest threshold to response distance and motorized recreation the highest, there was no statistically significant difference between activities (Dertien et al. 2021). Similarly, significant differences in the response of mule deer to mountain biking and hiking have been observed in some studies (Naidoo and Burton 2020) and not observed in others (Taylor and Knight 2003), highlighting the need for additional studies evaluating wildlife response to recreation.

Motorized recreational activities have been shown to exhibit strong responses in large mammals. Borkowski et al. (2006) study of American bison (*Bison bison*) and elk (*Cervus elaphus*) response to over snow vehicles found that both increasing herd size and distance of the closest animal to the road resulted in an increased threshold to response distance. In addition, direct human approaches made bison and elk 15 and 7 times more likely to elicit a response. Wildlife may become more sensitive to recreation and elicit a response from farther away when it is a frequent disturbance, as Preisler et al. 2005 found with elk in the Rocky Mountains. Elk were 7-13 times more likely to elicit a response when within 20 m of a route regularly used by ATVs compared to within 500 m of an ATV route.

3.4 Buffer Distances between Development and Wildlife Habitat Areas

Because species' responses to development can vary widely, and in fact some species may benefit from a certain level of development, there are a range of buffer distances that should be considered between development and wildlife habitat areas. Along riparian corridors, research in the Appalachian Mountains found that buffers of 330 ft, which included both the riparian area and adjacent upland areas, were large enough to allow for the persistence of North American river otter (*Lontra canadensis*) and provide a movement corridor for black bear, bobcat, red fox, and deer (The Nature Conservancy 2015). Buffers of approximately 300-540 ft for amphibians and reptiles may help to connect the various habitats that herpetofauna may need throughout their life history, including breeding ponds and overwintering upland habitat for amphibians and riparian foraging areas and upland nesting areas for reptiles (The Nature Conservancy 2015). In Southern California, Poessel et al. (2014)

found that GPS collared bobcats avoided both highways and high-capacity local roads when moving within their home range. Although there was some variation between the three study sites, the minimum distance that bobcats avoided highways was 395 m, while the minimum distance that they avoided high-capacity local roads was 1033 m. Forty percent of home ranges did not include either highways or high-capacity local roads, and 90% of tracked movement paths did not cross these highways or roads.

3.5 Best Management Practices to Reduce Impacts of Built Structures on Wildlife

Built structures and associated human disturbance have both direct impacts via loss of habitat and indirect impacts via fragmentation of remaining habitat into small, degraded, and disconnected parcels that provide low-quality habitat, restrict movement to and from other habitats, and provide sources for anthropogenic disturbance (Theobald et al. 1997). The installation of impermeable fencing within landscapes, which may restrict the movement of animals, reduce breeding success, and affect the survival of both individuals and populations as whole, should be avoided where feasible (Jakes et al. 2018), except where directional fencing is installed to reduce road mortality and direct animals to safe road crossings. Concentrating development within a small footprint also helps to minimize impacts. Furthermore, high-density development should be focused in locations where development has already resulted in avoidance by mountain lions and bobcats so that the habitat is not further fragmented, although mountain lion avoidance may be mediated somewhat if the development occurs on slopes (Wilmers et al. 2013). Although higher-density development will likely cause mountain lions, bobcats, and possibly coyotes to avoid these areas (Wang et al. 2015; Nickel et al. 2020; Serieys et al. 2021), concentrating development will help to ensure that there are larger, contiguous areas of habitat where development does not cause significant avoidance and behavioral changes for these species.

Another approach to reduce the impact of development is to alter where and when humans recreate to allow for greater movement of wildlife during key times. Avoiding nighttime recreation and human activities within wildland-urban interfaces and wildlands will allow species that avoid these areas during the day, when humans are present, to utilize them at night. Reducing human access to key sections of riparian corridors, which mountain lions in Southern California use preferentially (Burdett et al. 2010), may allow for mountain lions to more effectively navigate the landscape. Where there are built structures, providing a mosaic of native complex vegetation in adjacent areas may help species that rely upon cover for movement, such as bobcat and mountain lion, to find their way to higher quality habitat (Serieys et al. 2021). Complex vegetation in Coyote Valley and Aromas, even if sparse, was found to be more highly selected for by bobcats compared to dense orchards and other monocrops. Incorporating complex vegetation at the edges of developed areas where structures are present may thus aid in reducing impacts to bobcats and other medium-sized carnivores.

Section 4. Development and Land Use Planning

4.1.1 Best Management Practices for Development Near Important Wildlife Habitat and Movement Areas

The best way to prevent development-related impacts to important wildlife habitat and movement areas is to avoid development in these areas (Beier et al. 2008). However, recognizing that development can and will occur in these areas, guiding development and associated infrastructure in such a way that it allows wildlife to continue using movement corridors is critical. As discussed in Section 3.1.5 above, concentrating development into a small footprint, in areas that are already developed or subject to human disturbance, would reduce impacts of development on wildlife. Avoiding development near WCS, including siting ALAN sources more than 500 m and noise sources more than 145 m from WCS, may be most conducive to allowing mountain lions to use WCS. Where these distances cannot be achieved due to existing constraints, installing fencing to deter human use of the approaches to the WCS and the crossing itself, and managing vegetation in the area to allow mountain lions to see the crossing well, may promote use of the crossing by both mountain lions and their prey.

Where roads already exist or must be built, focused studies should identify wildlife species that may need to cross so that appropriate WCS types can be installed. There is extensive literature regarding determining appropriate WCS for various wildlife species; we did not attempt to synthesize wildlife crossing literature, but we do provide a few examples. In a literature review of various species' preferences with respect to WCS characteristics, Beier et al. (2008) found that ungulates prefer vegetated overpasses or open terrain below high underpasses that provided high visibility, carnivores such as mountain lion and black bear prefer concrete box culverts that provide a dark path, and rodents prefer pipes and small culverts (Beier et al. 2008). Because species have varying and sometimes conflicting preferences, providing larger structures that incorporate as many of these elements as possible may help facilitate a greater number of species using WCS. The number of crossing structures installed must consider the species in question home range size. Smaller animals (i.e., reptiles, amphibians, and small mammals) have smaller home ranges and thus require crossing structures at an interval of approximately 150-300m (Clevenger et al. 2001). Conversely, larger wildlife may require crossing structures at larger intervals (approximately 0.94 miles). Development should consider where crossing structures are located and minimize impacts to their efficacy by restricting human activity near structures, especially at night (Clevenger and Waltho 2005).

Newly built or improved roadways within or adjacent to important wildlife habitat and movement areas should be designed to minimize the ability of wildlife to access the road. Mountain lions (Burdett et al. 2010), American badgers (Newhouse and Kinley 2000), rodents (González-Gallina et al. 2013), amphibians (Fahrig et al. 1995), and many other species have been shown to have high levels of road mortality. Raising roads above the surrounding topography has been shown to greatly reduce road mortality for all vertebrate taxa (Clevenger et al. 2003, Dodd et al. 2004). In conjunction, installing tall barrier walls and/or fences with outriggers (extension on top at a right angle) facing away from the roadway along roadways among a network of appropriate placed crossing structures is a key component to direct wildlife to safe passage and away from new development.

Section 5. Best Management Practices to Reduce the Impacts of ALAN, Noise, and Disturbance on Wildlife

Below is a list of key points that planners, land owners, and managers can use to create a landscape that accommodates sensible development while reducing the impacts of ALAN, noise, and disturbance on wildlife movement, use of habitat, and population health.

- Minimize or eliminate lighting along roads and interchanges
- Work backwards from complete darkness and add lights only for specific purposes
- Install lights as low to the ground as possible, pointed down, and with full cutoff baffles or shields installed
- Utilize motion sensors and timers to reduce the amount of time ALAN emitted
- Site high-density residential and recreational areas in urban and suburban areas, while limiting development at urban-wildland interfaces, wildlands, riparian areas, lakes, and ponds
- Site lighting to prevent ALAN from reaching ponds, lakes, and streams
- Use the lowest possible light intensity needed for the purpose
- Use LPS, HPS, or amber LED bulbs with CCT ≤3,000 k
- Excavate land, install berms or walls, and/or plant dense native vegetation to reduce ALAN and noise projection into wildlife habitat areas, including approaches to WCS
- Buffer distances of 15-25 m beyond the edge of measurable ALAN are optimal to reduce behavioral impacts to small mammals
- Buffer distances of up to 500 m with a low amount of ALAN are most conducive to supporting mountain lion movement through the landscape
- Buffer distances of 145-150 m from noise sources may reduce both physical and behavioral impacts to mammals
- Limit outdoor nighttime activities that introduce a large amount of ALAN and noise to important wildlife areas
- Design trails to have gaps of at least 250 m between them to provide undisturbed habitat for most species
- Limit use of motorized vehicles to specific areas to reduce systemic avoidance of areas by large mammals
- Avoid installing impermeable fences that limit wildlife movement within the middle of landscapes and habitat areas

- Install impermeable fences or walls along roadways fitted with outriggers to reduce wildlife access to roadways and to direct wildlife to WCS
- Install WCS that provide the appropriate features for target wildlife species; larger WCS may accommodate a greater diversity of species using the crossing
- Install WCS at the appropriate distance apart from each other by accounting for the home range of target species.

Section 6. References

Akefe, I.O., J. O. Ayo, and V. O. Sinkalu. 2020. Kaempferol and zinc gluconate mitigate neurobehavioral deficits and oxidative stress induced by noise exposure in Wistar rats. PLoS ONE 15(7): e0236251.

Apps, C. D., N. J. Newhouse, and T. A. Kinley. 2002. Habitat associations of American badgers in southeastern British Columbia. Canadian Journal of Zoology 80(7):1228–1239.

Arcangeli, G., L. G. Lulli, V. Traversini, S. De Sio, E. Cannizzaro, R. P.Galea, and N. Mucci. 2023. Neurobehavioral alterations from noise exposure in animals: a systematic review. International Journal of Environmental Research and Public Health 20(1):591.

Australian Government Department of Environment and Energy. 2020. National light pollution guidelines for wildlife including marine turtles, seabirds and migratory shorebirds. Annex to Resolution 13.5, Version 1.0. Department of the Environment and Energy, Commonwealth of Australia.

Baker, A. D. and P. L. Leberg. 2018. Impacts of human recreation on carnivores in protected areas. PLoS ONE 13(4):e0195436

Beasley, R., C. Carbone, A. Brooker, M. Rowcliffe, and J. Waage. 2023. Investigating the impacts of humans and dogs on the spatial and temporal activity of wildlife in urban woodlands. Urban Ecosystems 26:1843–1852.

Beier, P. 2006. Effects of artificial night lighting on terrestrial mammals. Pages 19–42 *in* Rich, C. and T. Longcore, editors. Ecological consequences of artificial night lighting. Island Press, Washington, D.C., USA.

Beier, P., D. Majka, S. Newell, E. Garding. 2008. Best management practices for wildlife corridors. Convention on Biological Diversity.

Bentrup, G. 2008. Conservation buffers: design guidelines for buffers, corridors, and greenways. Department of Agriculture, Forest Service, Southern Research Station, Ashville, North Carolina, USA.

Barrientos, R., W. Vickers, T. Longcore, E. S. Abelson, J. Dellinger, D. P. Waetjaen, G. Fandos, and F. M. Shilling. 2023. Nearby night lighting, rather than sky glow, is associated with habitat selection by a top predator in human-dominated landscapes. Philosophical Transactions of the Royal Society B. 378: 20220370

Bird, B. L., L. C. Branch, and D. L. Miller. 2004. Effects of Coastal Lighting on Foraging Behavior of Beach Mice. Conservation Biology 18(5):1435-1439

Blickley, J. L., and Patricelli, G. L. 2010. Impacts of anthropogenic noise on wildlife: research priorities for the development of standards and mitigation. Journal of International Wildlife Law & Policy 13(4):274–292.

Bliss-Ketchum, L. L., C. E. de Rivera, B. C. Turner, and D. M. Weisbaum. 2016. The effect of artificial light on wildlife use of a passage structure. Biological Conservation 199:25–28.

Borkowski, J. J., P. J. White, R. A. Garrott, T. Davis, A. R. Hardy, and D. J. Reinhart. 2006. Behavioral responses of bison and elk in Yellowstone to snowmobiles and snow coaches. Ecological Applications. 16(5):1911-1925.f

Bouskila, A. 1995. Interactions between predation risk and competition: a field study of kangaroo rats and snakes. Ecology 76(1):165.

Bowles, A. E. 1995. Responses of wildlife to noise. Pages 109–156 *in* R. L. Knight and K. J. Gutzwiller, editors. Wildlife and recreationists: coexistence through management and research. Island Press, Washington, DC, USA.

Buchanan, B. W. 2006. Observed and potential effects of artificial night lighting on anuran amphibians. Pages 192–220 *in* Rich, C. and T. Longcore, editors. Ecological consequences of artificial night lighting. Island Press, Washington, D.C., USA.

Burdett, C. L., K. R. Crooks, D. M. Theobald, K. R. Wilson, E. E. Boydston, L. M. Lyren, R. N. Fisher, T. W. Vickers, S. A. Morrison, and W. M. Boyce. 2010. Interfacing models of wildlife habitat and human development to predict the future distribution of puma habitat. Ecosphere 1(1):4. doi:10.1890/ES10-00005.1.

Chen, H. L. and J. L. Koprowski. 2015. Animal occurrence and space use change in the landscape of anthropogenic noise. Biological Conservation 192:315–322.

City of Morro Bay. 2024. Morro Bay Battery Energy Storage System Project Draft Environmental Impact Report.

Clevenger, A. P., B. Chruszcz, and K. E. Gunson. 2001. Highway mitigation fencing reduces wildlife-vehicle collisions. Wildlife Society Bulletin. 29(2):646-653

Clevenger, A. P,, B. Chruszcz, and K.E. Gunson. 2003. Spatial patterns and factors influencing small vertebrate fauna road-kill aggregations. Biological Conservation 109: 15–26.

Clevenger, A. P. and N. Waltho. 2005. Performance indices to identify attributes of highway crossing structures facilitating movement of large mammals. Biological Conservation 121:453–464.

DarkSky. 2023. Solutions to light pollution. <https://darksky.org/resources/what-is-light-pollution/light-pollution-solutions/>. Accessed 29 May 2024.

Dertien, J. S., C. L. Larson, and S. E. Reed. 2021. Recreation effects on wildlife: a review of potential quantitative thresholds. Nature Conservation. 44:51-68

Ditmer, M. A., D. C. Stoner, C. D. Francis, J. R. Barber, J. D. Forester, D. M. Choate, K. E. Ironside, K. M. Longshore, K. R. Hersey, R. T. Larsen, B. R. McMillan, D. D. Olson, A. M. Andreasen, J. P. Beckmann, P. B. Holton, T. A. Messmer and N. H. Carter. 2021. Artificial nightlight alters the predator–prey dynamics of an apex carnivore. Ecography 44:149–161.

Dodd Jr., C. K., W. J. Barichivich, and L. L. Smith. 2004. Effectiveness of a barrier wall and culverts in reducing wildlife mortality on a heavily traveled highway in Florida. Biological Conservation 118:619–631

Edge, W. D. and C. L. Marcum. 1985. Movements of elk in relation to logging disturbances. Journal of Wildlife Management Vol 49(4):926–930.

Fahrig, L., J. H. Pedlar, S. E. Pope, P. D. Taylor, and J. F. Wegner. 1995. Effect of road traffic on amphibian density. Biological Conservation 73(3):177–182.

González-Gallina, A., Benítez-Badillo, G., Rojas-Soto O. R., and M. G. Hidalgo-Mihart. 2013. The small, the forgotten and the dead: highway impact on vertebrates and its implications for mitigation strategies. Biodiversity Conservation 22:325-342

Harrison, R. L. 1997. A Comparison of gray fox ecology between residential and undeveloped rural landscapes. Journal of Wildlife Management 61(1):112–122.

Hazlerigg, D. G. and G. C. Wagner. 2006. Seasonal photoperiodism in vertebrates: from coincidence to amplitude. Trends in Endocrinology and Metabolism 17:83–91.

Jägerbrand, A. K. and C. A. Bouroussis. 2021. Ecological Impact of Artificial Light at Night: Effective Strategies and Measures to Deal with Protected Species and Habitats. Sustainability. 13:5991.

Jakes, A. F., P. F. Jones, L. C. Paige, R. G. Seidler, and M. P. Huijser. 2018. A fence runs through it: A call for greater attention to the influence of fences on wildlife and ecosystems. Biological Conservation 227:310-318.

Kautz, T. M., N. L. Fowler, T. R. Petroelje, D. E. Beyer JR., N. J. Svoboda, J. L. Belant. 2021. Large carnivore response to human road use suggests a landscape of coexistence. Global Ecology and Conservation 30. doi:0.1016/j.gecco.2021.e01772.

Kotler, B. P. 1984. Risk of Predation and the Structure of Desert Rodent Communities. Ecology. 65(3):689-701

Lovell, C., S. Li, J. Turner, and C. Carbone. 2022. The effect of habitat and human disturbance on the spatiotemporal activity of two urban carnivores: the results of an intensive camera trap study. Ecology and Evolution 12. doi:10.1002/ece3.8746.

Lythgoe, J. N. 1979. The ecology of vision. Oxford University Press, New York City, USA.

McKenna, M. F., G. Shannon, K Fristrup. 2016. Characterizing anthropogenic noise to improve understanding and management of impacts to wildlife. Endangered Species Research 31:279–291.

Naidoo, R. and A. C. Burton. 2020. Relative effects of recreational activities on a temperate terrestrial wildlife assemblage. Conservation Science and Practice 2, e271.

Taylor, A. R. and R. L. Knight. 2003. Wildlife responses to recreation and associated visitor perceptions. Ecological Applications 13:951-963.

The Nature Conservancy. 2015. Ecological Buffers. Pages 1–6 *in* Reducing Ecological impacts of shale development: recommended practices for the Appalachians. <https://www.nature.org/content/dam/tnc/nature/en/documents/PA_Shale_Development_Ecol Ecolog_Buffers.pdf>. Accessed 29 May 2024.

Newhouse, N. J. and T. A. Kinley. 2000. Ecology of American Badgers near their range limit in southeastern British Columbia. BC Hydro. Report prepared for Columbia Basin Fish & Wildlife Compensation Program.

Nickel, B. A., J. P. Suraci, M. L. Allen, and C. C. Wilmers. 2020. Human presence and human footprint have non-equivalent effects on wildlife spatiotemporal habitat use. Biological Conservation 241:108383.

[NIDCD] National Institute on Deafness and Other Communication Disorders. 2024. How is Sound Measured? U.S. Dept. of Health and Human Services, Bethesda, Maryland, USA. Accessed 30 May 2024. <https://www.noisyplanet.nidcd.nih.gov/have-you-heard/how-is-sound-measured>.

North Carolina Wildlife Resources Commission. 2016. Best management practices: minimize impacts of development on adjoining wildlife areas. Raleigh, USA.

Perlman, I. and R. A. Normann. 1998. Light adaptation and sensitivity controlling mechanisms in vertebrate photoreceptors. Progress in Retinal and Eye Research 17(4):523–63.

Perry, G. and R. N. Fisher. 2006. Night lights and reptiles: observed and potential effects. Pages 192–220 *in* Rich, C. and T. Longcore, editors. Ecological consequences of artificial night lighting. Island Press, Washington, D.C., USA.

Petric R., M. Kalcounis-Rueppell. 2023. Anthropogenic noise decreases activity and calling behavior in wild mice. PeerJ 11. doi.org/10.7717/peerj.15297.

Poessel, S. A., C. L. Burdett, E. E. Boydston, L. M. Lyren, R. S. Alonso, R. N. Fisher, K. R. Crooks. 2014. Roads influence movement and home ranges of a fragmentation-sensitive carnivore, the bobcat, in an urban landscape. Biological Conservation 180:224–232.

Preisler, H. K., A. A. Ager, and M. J. Wisdom. 2006. Statistical methods for analyzing responses of wildlife to human disturbance. Journal of Applied Ecology 43:164-172.

Rabin, L. A. R. G. Coss, D. H. Owings. 2006. The effects of wind turbines on antipredator behavior in California ground squirrels (*Spermophilus beecheyi*). Biological Conservation 131:410–420.

Reilly, M. L., M. W. Tobler, D. L. Sonderegger, and P. Beier. 2016. Spatial and temporal response of wildlife to recreational activities in the San Francisco Bay ecoregion Biological Conservation 207:117-126.

Robert, K. A., J. A. Lesku, J. Partecke and B. Chambers. 2015. Artificial light at night desynchronizes strictly seasonal reproduction in a wild mammal. Proceedings of the Royal Society B 282(1816) doi:0.1098/rspb.2015.1745.

Sanders D., M. R. Hirt, U. Brose, D. M. Evans, K. J. Gaston, B. Gauzens, and R. Remo. 2023 How artificial light at night may rewire ecological networks: concepts and models. Philosophical Transactions of the Royal Society B 78. doi:10.1098/rstb.2022.0368.

Schaub, A., J. Ostwald, and B. M. Siemers. 2008. Foraging bats avoid noise. Journal of Experimental Biology. 211(19):3174–3180.

Schley, L., M. Schaul, and T. J. Roper. 2004. Distribution and population density of badgers *Meles meles* in Luxembourg. Mammal Review 34(3):233–240.

Serieys, L. E. K., M. S. Rogan, S. S. Matsushima, C. C. Wilmers. 2021. Road-crossings, vegetative cover, land use and poisons interact to influence corridor effectiveness. Biological Conservation 253:108930. doi:10.1016/j.biocon.2020.108930.

Shannon, G., K. R. Crooks, G. Wittemyer, K. M. Fristrup, L. M. Angeloni. 2016. Road noise causes earlier predator detection and flight response in a free-ranging mammal. Behavioral Ecology. 27(5):1370–1375

Shier, D. M., A. K. Bird, and T. B. Wang. 2020. Effects of artificial light at night on the foraging behavior of an endangered nocturnal mammal. Environmental Pollution 263(A). doi:10.1016/j.envpol.2020.114566.

Shilling, F., A. Collins, A. Louderback-Valenzuela, P. Farman, M. Guarnieri, T. Longcore, B. Banet, and H. Knapp. 2018. Wildlife-Crossing Mitigation Effectiveness with Traffic Noise and Light. UC Davis Road Ecology Center Research Report from the National Center for Sustainable Transportation.

Shilling, F., D. Waetjen, T. Longcore, W. Vickers, S. McDowell, A. Oke, A. Bess, and C. Stevens. 2022. Improving Light and Soundscapes for Wildlife Use of Highway Crossing Structures. Institute of Transportation Studies, Davis. Technical Report.

Skinner, C., P. Skinner, and S. Harris. 1991. The past history and recent decline of badgers *Meles meles* in Essex: an analysis of some of the contributory factors. Mammal Review 21:67–80.

Smith, J. A., Y. Wang, and C. C. Wilmers. 2015. Top carnivores increase their kill rates on prey as a response to human-induced fear. Proceedings of the Royal Society B. doi:10.1098/rspb.2014.2711.

Smith, J. A., J. P. Suraci, M. Clinchy, A. Crawford, D. Roberts, L. Y. Zanette, C. C. Wilmers. 2017. Fear of the human 'super predator' reduces feeding time in large carnivores. Proceedings of the Royal Society B. 284: 20170433.

Sunga, J., J. Sayers, K. Cottenie, C. J. Kyle, and D. M. Ethier. 2017. The effects of roads on habitat selection and movement patterns of the American badger subspecies *Taxidea taxus jacksoni* in Ontario, Canada. Canadian Journal of Zoology 95(11):821–828.

Suraci, J. P., Clinchy, M., Zanette, L. Y. and Wilmers, C. C. 2019. Fear of humans as apex predators has landscape-scale impacts from mountain lions to mice. Ecology Letters, 22:1578-1586.

Teff-Seker, Y., O. Berger-Tal, Y. Lehnardt, and N. Teschner. 2022. Noise pollution from wind turbines and its effects on wildlife: A cross-national analysis of current policies and planning regulations. Renewable and Sustainable Energy Reviews 168:112801.

Tennessee Valley Authority. 2018. Vonore Battery Energy Storage System and Associated Substation – Monroe and Blount Counites, Tennessee: Final Environmental Assessment. Knoxville, USA.

Theobald, D. M., J. R. Miller, N. T. Hobbs. 1997. Estimating the cumulative effects of development on wildlife habitat. Landscape and Urban Planning 39:25–36.

Wang, Y., M. L. Allen, and C. C. Wilmers. 2015. Mesopredator spatial and temporal responses to large predators and human development in the Santa Cruz Mountains of California. Biological Conservation 190:23–33.

Wilmers, C. C., Y. Wang, B. Nickel, P. Houghtaling, Y. Shakeri. 2013. Scale dependent behavioral responses to human development by a large predator, the puma. PLoS ONE 8(4):e60590. doi:10.1371/journal.pone.0060590.

U.S. Department of Commerce. 2020. 2020 Decennial Census.

Yao, S., P. Li, X. Zhou, and G. Hu. 2014. Sound reduction by metamaterial based acoustic enclosure. AIP Advances 4(12), 124306