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28 March 2023

RE: Draft SEIR for the City of Mill Valley's 2023-2031 Housing Element Update

Dear Mr. Soluri,

I write regarding the Draft SEIR prepared for the City of Mill Valley's 2023-2031 Housing Element Update, which can and should be revised to fully analyze potential impacts to biological resources of the proposed 1 Hamilton Drive Affordable Housing Development. I understand from its Notice of Preparation that the 1 Hamilton project would add 50 residential units totaling 66,000 square feet of floor space and another 65 parking spaces to what is currently 1.9 acres of open space adjacent to two City parks and marsh to the west. The site includes 66 trees, a number of shrubs, two seasonal wetlands and numerous species of wildlife that I observed there, and that my desktop review suggests potentially occur there. The Draft SEIR for the City of Mill Valley's 2023-2031 Housing Element Update can and should inform the public and decision-makers of 1 Hamilton's existing environmental setting and of its potential impacts, including the impacts of habitat loss and interference with wildlife movement, and wildlife mortality caused by bird-window collisions, project-generated traffic, and free-ranging house cats.

My qualifications for preparing expert comments are the following. I hold a Ph.D. degree in Ecology from University of California at Davis, where I also worked as a post-graduate researcher in the Department of Agronomy and Range Sciences. My research has been on animal density and distribution, habitat selection, wildlife interactions with the anthrosphere, and conservation of rare and endangered species. I authored many papers on these and other topics. I served as Chair of the Conservation Affairs Committee for The Wildlife Society – Western Section. I am a member of The Wildlife Society and Raptor Research Foundation, and I've lectured part-time at California State University, Sacramento. I was Associate Editor of wildlife biology's premier scientific journal, The Journal of Wildlife Management, as well as of Biological Conservation, and I was on the Editorial Board of Environmental Management. I have performed wildlife surveys in California for thirty-seven years. My CV is attached.

## SITE VISIT

I visited the site of the proposed 1 Hamilton project for nearly 3 hours from 07:00 to 09:55 hours on 2 February 2023. I walked the site's perimeter, stopping to scan for wildlife with use of binoculars. I recorded all species of vertebrate wildlife I detected, including those whose members flew over the site or were seen nearby, off the site.

Animals of uncertain species identity were either omitted or, if possible, recorded to the Genus or higher taxonomic level.

Conditions were partly cloudy with no wind to slight breeze and 41–49° F. The site was covered by non-native grassland, trees and shrubs, and some of the soil base appeared to be serpentine (Photo 1). On it were California slender salamanders and coyote (Photos 1 and 2), black phoebe and Say's phoebe (Photos 2 and 3), and American robin and hermit thrush (Photos 4 and 5). I also saw and photographed great blue heron and California scrub-jays (Photos 8 and 9), Anna's hummingbirds in courtship and territorial defense (Photos 10 and 11), white-crowned sparrows (Photos 12 and 13), sign of California voles and easter gray squirrels (Photos 14 and 15). I detected 39 species of vertebrate wildlife, including 4 with special status (Table 1). In my experience, this is many species for a cursory reconnaissance-level survey. The site is inherently rich in wildlife species.


**Photo 1.** Project site view to the south, *2 February 2023*.


***Photos 2 and 3.*** California slender salamander (L) and coyote (R) on the project site, *2 February 2023*.


***Photos 4 and 5.*** *Black phoebe (L) and Say's phoebe (R) on the project site, 2 February 2023.*

***Photos 6 and 7.*** *American robin (L) and hermit thrush (R) on the project site, 2 February 2023.*

***Photos 8 and 9.*** *Great blue heron (L) and California scrub-jay (R) on the project site, 2 February 2023.*

***Photos 10 and 11.*** *Anna's hummingbirds displaying their gorgets on the project site, 2 February 2023.*

***Photos 12 and 13.*** *Male and female white-crowned sparrows, 2 February 2023.*

***Photos 14 and 15.*** *California vole burrow entrance (L) and an eastern gray squirrel (R), 2 February 2023.*

Reconnaissance-level surveys, such as the one I completed at the project site, cannot support species' absence determinations, but they can be useful for confirming presence of species. Such surveys can also be useful for estimating the number of species that were not detected, thereby revealing the degree to which the local wildlife community was sampled. One way to do this is to model the pattern in species detections during a survey. The cumulative number of species' detections increases with increasing survey time, but eventually with diminishing returns (Figure 1). In the case of my survey at the project site, the pattern in the data predicts that had I spent more time on site, or had I help from additional biologists, I would have detected many species of vertebrate wildlife. This modeling approach usually informs of the number of species I eventually would have detected, but in this case the model did not converge on a reasonable asymptote. After two hours of survey, I experienced a surge in new species detections that countered the usual rate of diminishing returns from my extended survey effort. In hindsight, I should have continued my survey.

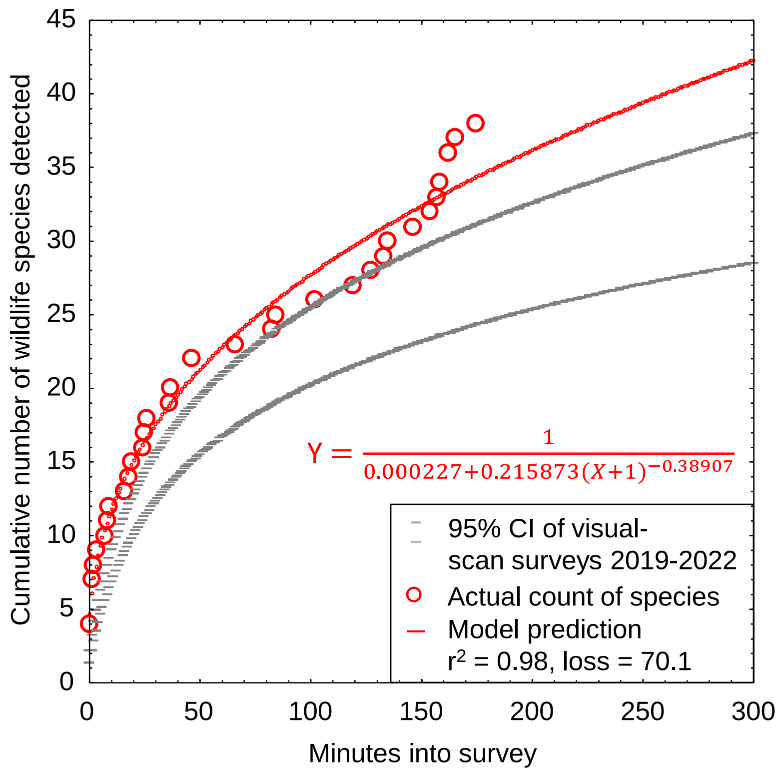
The pattern in the data also indicates that my rate of species' detections at the 1 Hamilton project site consistently exceeded the upper bound of the 95% confidence interval estimated from 43 surveys at other project sites I have surveyed in the Bay Area since 2019 (Figure 1). In other words, wildlife species richness at the 1 Hamilton project site is greater than most other sites I have visited in the Bay Area where projects have been proposed. More surveys are needed to more completely sample the wildlife species inventory of the site, but my survey provides a sound basis for estimating the number of vertebrate wildlife species that likely occur at the site.

***Table 1.*** *Species of wildlife I observed during 2.92 hours of survey on 2 February 2023.*

| **Common name** | ***Species name*** | **Status[1]** | **Notes** |
|---|---|---|---|
| California slender salamander | *Batrachoseps attenuatus* | | Under wood debris |
| Canada goose | *Branta canadensis* | | Off site |
| Mallard | *Anas platyrhynchos* | | Off site |
| Band-tailed pigeon | *Patagioenas fasciata* | | Flyover |
| Eurasian collared-dove | *Streptopelia decaocto* | Non-native | |
| Mourning dove | *Zenaida macroura* | | Pair |
| Anna's hummingbird | *Calypte anna* | | Territory defense |
| Greater yellowlegs | *Tringa melanoleuca* | | Off site |
| Ring-billed gull | *Larus delawarensis* | | Off site |
| Western gull | *Larus occidentalis* | BCC | Off site |
| California gull | *Larus californicus* | BCC, TWL | Flyover |
| Great blue heron | *Ardea herodias* | | Flyover |
| Turkey vulture | *Cathartes aura* | BOP | Flyover |
| Red-tailed hawk | *Buteo jamaicensis* | BOP | Pair just off site |
| Belted kingfisher | *Ceryle alcyon* | | Off site |
| Northern flicker | *Colaptes auratus* | | |
| Black phoebe | *Sayornis nigricans* | | Foraged |
| Say's phoebe | *Sayornis saya* | | Foraged |
| California scrub-jay | *Aphelocoma californica* | | Pair courtship |
| American crow | *Corvus brachyrhynchos* | | Flock foraging on site |
| Common raven | *Corvus corax* | | Pair courting on site |
| Bushtit | *Psaltriparus minimus* | | Flock |
| Ruby-crowned kinglet | *Regulus calendula* | | |
| Cedar waxwing | *Bombycilla cedrorum* | | Flock flew over |
| Northern mockingbird | *Mimus polyglottos* | | Guarding likely nest site |
| European starling | *Sturnus vulgaris* | Non-native | Flock off site |
| Hermit thrush | *Catharus guttatus* | | Foraged |
| American robin | *Turdus migratorius* | | Many; social drama |
| Dark-eyed junco | *Junco hyemalis* | | Pair |
| White-crowned sparrow | *Zonotrichia leucophrys* | | Foraged |
| California towhee | *Melozone crissalis* | | |
| Spotted towhee | *Pipilo maculatus* | | |
| Orange-crowned warbler | *Oreothlypis celata* | | |
| Yellow-rumped warbler | *Setophaga coronata* | | Offsite |
| Eastern gray squirrel | *Sciurus carolinensis* | Non-native | |
| Coyote | *Canis latrans* | | |
| Black-tailed deer | *Odocoileus h. hemionus* | | Trail across site |
| California vole | *Microtus californicus* | | Burrow systems |
| Broad-footed mole | *Scapanus latimanus* | | Burrow systems |

[1] Listed as BCC = U.S. Fish and Wildlife Service Bird of Conservation Concern, TWL = Taxa to Watch List (Shuford and Gardali 2008), BOP = Birds of Prey (California Fish and Game Code 3503.5).

***Figure 1.** Actual (red circles) and predicted (red line) relationships between the number of vertebrate wildlife species detected and the elapsed survey time based on my visual-scan survey on 2 February 2023, and compared to the mean and 95% CI of surveys at 43 sites I completed at proposed project sites in the Bay Area. Note that the relationship would differ if the survey was based on another method or during another season.*



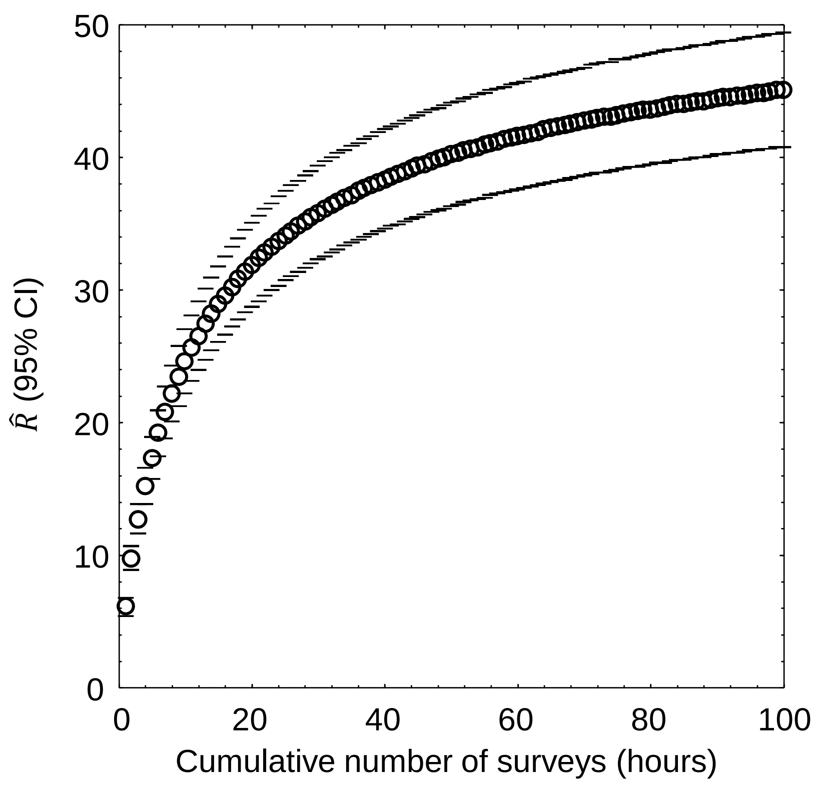

The 1 Hamilton site supports many species of wildlife, including many more than I could detect during a brief reconnaissance-level survey. However, although this modeling approach is useful for more realistically representing the species richness of the site at the time of a survey, it cannot represent the species richness throughout the year or across multiple years because many species are seasonal or even multi-annual in their movement patterns and in their occupancy of habitat. I surveyed only in winter, and therefore was unlikely to see some of the species that would use the site in spring, summer or fall.

By use of an analytical bridge, I can apply a model developed from a much larger, more robust data set at a research site to predict the number of wildlife species that would make use of the project site over the longer term. As part of my research, I completed a much larger survey effort across 167 $km^2$ of annual grasslands of the Altamont Pass Wind Resource Area, Alameda County, where from 2015 through 2019 I performed 721 1-hour visual-scan surveys, or 721 hours of surveys, at 46 stations. I used binoculars and otherwise the methods were the same as the methods I used at the project site. At each of the 46 survey stations at my research site, I tallied new species detected with each sequential survey at that station, and then related the cumulative species detected to the hours (number of surveys, as each survey lasted 1 hour) used to accumulate my counts of species detected. I used combined quadratic and simplex methods of estimation in Statistica to estimate least-squares, best-fit nonlinear models of the number of cumulative species detected regressed on hours of survey (number of surveys) at the station: $\hat{R} = \frac{1}{1/a + b \times (Hours)^c}$, where $\hat{R}$ represented cumulative species richness detected.

The models' coefficients of determination, $r^2$, ranged 0.88 to 1.00, with a mean of 0.97 (95% CI: 0.96, 0.98); or in other words, the models were excellent fits to the data.

I projected the predictions of each model to thousands of hours to find predicted asymptotes of wildlife species richness. The mean model-predicted asymptote of species richness was 57 after 11,857 hours of visual-scan surveys among the 46 stations. I also averaged model predictions of species richness at each incremental increase of number of surveys, i.e., number of hours (Figure 2). On average I detected 12.5 species over the first 2.92 hours of surveys in the Altamont Pass (2.92 hours to match the number of hours I surveyed at the project site), which composed 21.9% of the total predicted species I would detect with a much larger survey effort. Given the example illustrated in Figure 2, the 39 species I detected after my 2.92 hours of survey at the project site likely represented 21.9% of the species to be detected after many more visual-scan surveys over another year or longer. With many more repeat surveys through the year, I would likely detect $^{39}/_{0.219}$ = 178 species of vertebrate wildlife at the site. Assuming my ratio of special-status to non-special-status species was to hold through the detections of all 178 predicted species, then continued surveys would eventually detect 18 special-status species of vertebrate wildlife.

***Figure 2.*** *Mean (95% CI) predicted wildlife species richness, $\hat{R}$, as a nonlinear function of hour-long survey increments across 46 visual-scan survey stations across the Altamont Pass Wind Resource Area, Alameda and Contra Costa Counties, 2015–2019.*




Again, however, my prediction of 178 species of vertebrate wildlife, including 18 special-status species, is derived from a visual-scan survey during the daytime, and would not detect nocturnal birds and mammals. The true number of species composing the wildlife community of the site must be larger. A single reconnaissance-level survey should serve only as a starting point toward characterization of a site's wildlife community, but it certainly cannot alone inform of the inventory of species that use the site.

Considering the number of wildlife species known and predicted to occur at the site of the proposed project, and considering the number of special-status species known and predicted to occur at the site, an alternative project site warrants consideration. An alternative site should be analyzed in the Draft SEIR for the City of Mill Valley's 2023-2031 Housing Element Update.

## EXISTING ENVIRONMENTAL SETTING

The first step in analysis of potential project impacts to biological resources is to accurately characterize the existing environmental setting, including the biological species that use the site, their relative abundances, how they use the site, key ecological relationships, and known and ongoing threats to those species with special status. A reasonably accurate characterization of the environmental setting can provide the basis for determining whether the site holds habitat value to wildlife, as well as a baseline against which to analyze potential project impacts. For these reasons, characterization of the environmental setting, including the project's site's regional setting, is one of CEQA's essential analytical steps (§15125). Methods to achieve this first step typically include (1) surveys of the site for biological resources, and (2) reviews of literature, databases and local experts for documented occurrences of special-status species. In the case of this project, I initiated the first step with a cursory reconnaissance-level survey, though more surveys are needed. In the following I initiate the second step, though it, too, should serve only as a starting point for a more thorough desktop review.

### *Environmental Setting informed by Desktop Review*

The purpose of literature and database review, and of consulting with local experts, is to inform the reconnaissance-level survey, to augment it, and to help determine which protocol-level detection surveys should be implemented. Analysts need this information to identify which species are known to have occurred at or near the project site, and to identify which other special-status species could conceivably occur at the site due to geographic range overlap and site conditions. This step is important because the reconnaissance-level survey is not going to detect all of the species of wildlife that make use of the site. This step can identity those species yet to be detected at the site but which have been documented to occur nearby or whose available habitat associations are consistent with site conditions. Some special-status species can be ruled out of further analysis, but only if compelling evidence is available in support of such determinations (see below).

In my assessment based on database review and a visit to the 1 Hamilton site, 126 special-status species of wildlife are known to occur near enough to the site to be analyzed for occurrence potential at one time or another (Table 2). Of these, 4 were confirmed on the site by my survey visit, and 58 (46%) have been documented in databases within 1.5 miles of the site ('Very close'), 34 (27%) within 1.5 and 4 miles ('Nearby'), and another 27 (21%) within 4 to 30 miles ('In region'). Three-fourths (96) of the species in Table 2 have been reportedly seen within 4 miles of the project site. The site therefore likely supports many special-status species of wildlife. On any given day, one or more yet-to-be documented special-status species likely make use of the project site, but being there to document that use probably requires multiple surveys (see Figures 1 and 2). Reconnaissance-level surveys are not designed to support absence determinations of any of these species. Therefore, sufficient survey effort should be directed to the site to either confirm that the species in Table 2 use the site, or to support absence determinations.

## POTENTIAL BIOLOGICAL IMPACTS

An impacts analysis should consider whether and how the proposed project would affect members of a species, larger demographic units of the species, the whole of a species, and ecological communities. In the following I introduce several types of impacts likely to result from the 1 Hamilton project, and which need to be analyzed in an EIR. The same analysis needs to be directed toward other current or foreseeable projects addressed in the Draft SEIR for the City of Mill Valley's 2023-2031 Housing Element Update.

## HABITAT LOSS

The 1 Hamilton project would contribute further to habitat fragmentation, which poses serious problems to wildlife in the region. Habitat fragmentation and habitat loss have been recognized as the most likely leading causes of a documented 29% decline in overall bird abundance across North America over the last 48 years (Rosenberg et al. 2019). Habitat loss not only results in the immediate numerical decline of wildlife, but it also results in permanent loss of productive capacity. But habitat fragmentation is an impact multiplier by disproportionately reducing numerical and productive capacities of wildlife relative to the loss of combined habitat area. This is because individual habitat fragments are often too small or too isolated to continue supporting certain species (Smallwood 2015).

In the case of birds, two methods exist for estimating the loss of productive capacity that would be caused by the project. One method would involve surveys to count the number of bird nests and chicks produced. The alternative method is to infer productive capacity from estimates of total nest density elsewhere. Two study sites in grassland-wetland-woodland complexes had total bird nesting densities of 32.8 and 35.8 nests per acre (Young 1948, Yahner 1982) for an average 34.3 nests per acre. Assuming the 1.9-acre 1 Hamilton project site supports about the same total nesting density of the above-referenced study sites, one can predict a loss of 65 bird nests. This estimate is likely conservative considering that the project site has 66 trees on it.

***Table 2.*** *Occurrence likelihoods of special-status bird species at or near the proposed project site, according to eBird/iNaturalist records (https://eBird.org, https://www.inaturalist.org) and on-site survey findings, where 'Very close' indicates within 1.5 miles of the site, "nearby" indicates within 1.5 and 4 miles, and "in region" indicates within 4 and 30 miles, and 'in range' means the species' geographic range overlaps the site.*

| **Common name** | ***Species name*** | **Status[1]** | **Database records, Site visit** |
|---|---|---|---|
| San Bruno elfin butterfly | *Callophrys mossii bayensis* | FE | In region |
| Monarch | *Danaus plexippus* | FC | Very close |
| Bay checkerspot butterfly | *Euphydryas editha bayensis* | FT | In region |
| Mission blue butterfly | *Icaricia icarioides missionensis* | FE | Very close |
| Callippe silverspot butterfly | *Speyeria callippe callippe* | FE | In region |
| Myrtle's silverspot butterfly | *Speyeria zerene myrtleae* | FE | In region |
| California tiger salamander | *Ambystoma californiense* | FT, CT, WL | In region |
| California giant salamander | *Dicamptodon ensatus* | SSC | Very close |
| Red-bellied newt | *Taricha rivularis* | SSC | In region |
| Foothill yellow-legged frog | *Rana boylii* | CT, SSC | Nearby |
| California red-legged frog | *Rana draytonii* | FT, SSC | Nearby |
| Western pond turtle | *Emys marmorata* | SSC | Nearby |
| Alameda whipsnake | *Masticophis lateralis euryxanthus* | FT, CT | In region |
| San Francisco garter snake | *Thamnophis sirtalis tetrataenia* | FE, CE, CFP | In region |
| Brant | *Branta bernicla* | SSC2 | Very close |
| Cackling goose (Aleutian) | *Branta hutchinsii leucopareia* | WL | Very close |
| Redhead | *Aythya americana* | SSC2 | Very close |
| Harlequin duck | *Histrionicus histrionicus* | SSC2 | Nearby |
| Barrow's goldeneye | *Bucephala islandica* | SSC | Very close |
| Fork-tailed storm petrel | | SSC | Nearby |
| Ashy storm-petrel | | SSC | In region |
| Western grebe | *Aechmophorus occidentalis* | BCC | Very close |
| Clark's grebe | *Aechmophorus clarkii* | BCC | Very close |
| Western yellow-billed cuckoo | *Coccyzus americanus occidentalis* | FT, CE, BCC | In region |
| Black swift | *Cypseloides niger* | SSC3, BCC | Very close |
| Vaux's swift | *Chaetura vauxi* | SSC2, BCC | Very close |
| Costa's hummingbird | *Calypte costae* | BCC | Nearby |
| Rufous hummingbird | *Selasphorus rufus* | BCC | Very close |
| Allen's hummingbird | *Selasphorus sasin* | BCC | Very close |
| Snowy plover | *Charadrius nivosus* | BCC | Very close |
| Western snowy plover | *Charadrius nivosus nivosus* | FT, SSC, BCC | Very close |
| Whimbrel | *Numenius phaeopus* | BCC | Very close |
| Long-billed curlew | *Numenius americanus* | BCC, WL | Very close |
| Marbled godwit | *Limosa fedoa* | BCC | Very close |
| Red knot (Pacific) | *Calidris canutus* | BCC | Very close |

| **Common name** | ***Species name*** | **Status**[1] | **Database records, Site visit** |
|---|---|---|---|
| Short-billed dowitcher | *Limnodromus griseus* | BCC | Very close |
| Willet | *Tringa semipalmata* | BCC | Very close |
| Marbled murrelet | *Brachyramphus marmoratus* | FT, CE | Nearby |
| Rhinoceros auklet | *Cerorhinca monocerata* | WL | Nearby |
| Tufted puffin, | *Fratercula cirrhata* | SSC, BCC | Nearby |
| Cassin's auklet | *Ptychoramphus aleuticus* | SSC, BCC | Nearby |
| Laughing gull | *Leucophaeus atricilla* | WL | Nearby |
| Heermann's gull | *Larus heermanni* | BCC | Very close |
| Western gull | *Larus occidentalis* | BCC | On site |
| California gull | *Larus californicus* | BCC, WL | On site |
| California least tern | *Sternula antillarum browni* | FE, CE, FP | In region |
| Caspian tern | *Hydroprogne caspia* | BCC | Very close |
| Black tern | *Chlidonias niger* | SSC2, BCC | In region |
| Elegant tern | *Thalasseus elegans* | BCC, WL | Very close |
| Black skimmer | *Rynchops niger* | BCC, SSC3 | Very close |
| Common loon | *Gavia immer* | SSC | Very close |
| Brandt's cormorant | *Urile penicillatus* | BCC | Very close |
| Double-crested cormorant | *Phalacrocorax auritus* | WL | Very close |
| American white pelican | *Pelacanus erythrorhynchos* | SSC1, BCC | Very close |
| California brown pelican | *Pelecanus occidentalis californicus* | FP | Very close |
| Least bittern | *Ixobrychus exilis* | SSC2 | In region |
| White-faced ibis | *Plegadis chihi* | WL | Nearby |
| Turkey vulture | *Cathartes aura* | BOP | On site |
| Osprey | *Pandion haliaetus* | WL, BOP | Very close |
| White-tailed kite | *Elanus luecurus* | CFP, WL, BOP | Very close |
| Golden eagle | *Aquila chrysaetos* | BGEPA, CFP, BOP | Very close |
| Northern harrier | *Circus cyaneus* | BCC, SSC3, BOP | Very close |
| Sharp-shinned hawk | *Accipiter striatus* | WL, BOP | Very close |
| Cooper's hawk | *Accipiter cooperii* | WL, BOP | Very close |
| Northern goshawk | *Accipiter gentilis* | SSC2 | Nearby |
| Bald eagle | *Haliaeetus leucocephalus* | BGEPA, BCC, CFP | Very close |
| Red-shouldered hawk | *Buteo lineatus* | BOP | Very close |
| Swainson's hawk | *Buteo swainsoni* | CT, BOP | Nearby |
| Red-tailed hawk | *Buteo jamaicensis* | BOP | On site |
| Ferruginous hawk | *Buteo regalis* | WL, BOP | Very close |
| Rough-legged hawk | *Buteo lagopus* | BOP | Very close |
| Barn owl | *Tyto alba* | BOP | Very close |
| Northern spotted owl | *Strix occidentalis caurina* | FT, CT | In range |
| Western screech-owl | *Megascops kennicotti* | BCC, BOP | Very close |
| Great horned owl | *Bubo virginianus* | BOP | Very close |
| Burrowing owl | *Athene cunicularia* | BCC, SSC2, BOP | Nearby |
| Long-eared owl | *Asio Otis* | BCC, SSC3 | Nearby |

| **Common name** | ***Species name*** | **Status**[1] | **Database records, Site visit** |
|---|---|---|---|
| Short-eared owl | *Asia flammeus* | BCC, SSC3, BOP | Nearby |
| Lewis's woodpecker | *Melanerpes lewis* | BCC | Nearby |
| Nuttall's woodpecker | *Picoides nuttallii* | BCC | Very close |
| American kestrel | *Falco sparverius* | BOP | Very close |
| Merlin | *Falco columbarius* | WL, BOP | Very close |
| Peregrine falcon | *Falco peregrinus* | CFP, BCC, BOP | Very close |
| Prairie falcon | *Falco mexicanus* | BCC, WL, BOP | Nearby |
| Olive-sided flycatcher | *Contopus cooperi* | BCC, SSC2 | Very close |
| Willow flycatcher | *Empidonax trailii* | CE, BCC | Very close |
| Vermilion flycatcher | *Pyrocephalus rubinus* | SSC2 | In region |
| Loggerhead shrike | *Lanius ludovicianus* | BCC, SSC2 | Very close |
| Oak titmouse | *Baeolophus inornatus* | BCC | Very close |
| California horned lark | *Eremophila alpestris actia* | WL | Very close |
| Bank swallow | *Riparia riparia* | CT | In region |
| Purple martin | *Progne subis* | SSC2 | Very close |
| Wrentit | *Chamaea fasciata* | BCC | Very close |
| California thrasher | *Toxostoma redivivum* | BCC | Nearby |
| Cassin's finch | *Haemorhous cassinii* | BCC | In region |
| Lawrence's goldfinch | *Spinus lawrencei* | BCC | Nearby |
| Grasshopper sparrow | *Ammodramus savannarum* | SSC2 | Nearby |
| Samuels song sparrow | *Melospiza melodia samueli* | BCC, SSC3 | Very close |
| Black-chinned sparrow | *Spizella atrogularis* | BCC | In region |
| Brewer's sparrow | *Spizella breweri* | BCC | Nearby |
| Yellow-breasted chat | *Icteria virens* | SSC3 | Very close |
| Yellow-headed blackbird | *Xanthocephalus xanthocephalus* | SSC3 | In region |
| Bullock's oriole | *Icterus bullockii* | BCC | Nearby |
| Tricolored blackbird | *Agelaius tricolor* | CT, BCC, SSC1 | Nearby |
| Lucy's warbler | *Leiothlypis luciae* | SSC3, BCC | In region |
| Virginia's warbler | *Leiothlypis virginiae* | WL, BCC | In region |
| San Francisco common yellowthroat | *Geothlypis trichas sinuosa* | SSC3, BCC | In range |
| Yellow warbler | *Dendroica petechia* | BCC, SSC2 | Very close |
| Summer tanager | *Piranga rubra* | SSC1 | In region |
| Pallid bat | *Antrozous pallidus* | SSC, WBWG:H | In region |
| Townsend's big-eared bat | *Corynorhinus townsendii* | SSC, WBWG:H | In region |
| Canyon bat | *Parastrellus hesperus* | WBWG:L | In region |
| Big brown bat | *Episticus fuscus* | WBWG:L | Nearby |
| Silver-haired bat | *Lasionycteris noctivagans* | WBWG:M | Neraby |
| Western red bat | *Lasiurus blossevillii* | SSC, WBWG:H | Nearby |
| Big brown bat | *Episticus fuscus* | WBWG:L | Very close |
| Hoary bat | *Lasiurus cinereus* | WBWG:M | Nearby |
| Miller's myotis | *Myotis evotis* | WBWG:M | In region |

| **Common name** | ***Species name*** | **Status**[1] | **Database records, Site visit** |
|---|---|---|---|
| Little brown myotis | *Myotis lucifugus* | WBWG:M | In region |
| Fringed myotis | *Myotis thysanodes* | WBWG:H | In range |
| Yuma myotis | *Myotis yumanensis* | WBWG:LM | Nearby |
| California myotis | *Myotis californicus* | WBWG:L | Nearby |
| Mexican free-tailed bat | *Tadarida brasiliensis* | WBWG:M | Nearby |
| San Francisco dusky-footed woodrat | *Neotoma fuscipes annectens* | SSC | Nearby |
| Salt-marsh harvest mouse | *Reithrodontomys raviventris* | FE, CE, FP | In region |
| American badger | *Taxidea taxus* | SSC | Nearby |

[1] Listed as FT or FE = federal threatened or endangered, FC = federal candidate for listing, BCC = U.S. Fish and Wildlife Service Bird of Conservation Concern, CT or CE = California threatened or endangered, CCT or CCE = Candidate California threatened or endangered, CFP = California Fully Protected (California Fish and Game Code 3511), SSC = California Species of Special Concern (not threatened with extinction, but rare, very restricted in range, declining throughout range, peripheral portion of species' range, associated with habitat that is declining in extent), SSC1, SSC2 and SSC3 = California Bird Species of Special Concern priorities 1, 2 and 3, respectively (Shuford and Gardali 2008), WL = Taxa to Watch List (Shuford and Gardali 2008), and BOP = Birds of Prey (CFG Code 3503.5), and WBWG = Western Bat Working Group with priority rankings, of low (L), moderate (M), and high (H).

The loss of 65 nest sites of birds would qualify as a potentially significant project impact, but the impact does not end with the immediate loss of nest sites as nest substrate is removed and foraging grounds graded in preparation for impervious surfaces. The reproductive capacity of the site would be lost. The average number of fledglings per nest in Young's (1948) study was 2.9. Assuming Young's (1948) study site typifies bird productivity, the project would prevent the production of 189 fledglings per year. Assuming an average bird generation time of 5 years, the lost capacity of both breeders and annual fledgling production can be estimated from an equation in Smallwood (2022): {(nests/year × chicks/nest × number of years) + (2 adults/nest × nests/year) × (number of years ÷ years/generation)} ÷ (number of years) = 215 birds per year denied to California. In the case of the 1 Hamilton project site, it would be prudent to explore alternative project sites with an aim toward minimizing the annual toll to California's birds.

## WILDLIFE MOVEMENT

One of CEQA's principal concerns regarding potential project impacts is whether a proposed project would interfere with wildlife movement in the region. Many of the wild animals I saw at the 1 Hamilton project site were moving across it. Terrestrial wildlife use a well-worn trail across the middle of the site. Tracks of black-tailed deer adorned the trail, and I watched as a coyote use it (Photo 3). Volant wildlife also moved across the site, many without ever touching the ground or a tree branch, but they nevertheless relied on the unimpeded atmospheric medium that is currently available on the project site. If a building is constructed on this site, then the project would interfere with wildlife movement in the region. The magnitude of this interference needs to be investigated through observational study, and it needs to be determined whether the impacts could be mitigated. Additionally, it would be prudent to study wildlife movement at alternative project sites to learn whether the impacts can be minimized by developing the project elsewhere.

## BIRD-WINDOW COLLISIONS

The 1 Hamilton project would add 50 residential units within a building 58 feet in height. The building would present glass windows to birds attempting to use an essential portion of their habitat – that portion of the gaseous atmosphere that is referred to as the aerosphere (Davy et al. 2017, Diehl et al. 2017). The aerosphere is where birds and bats and other volant animals with wings migrate, disperse, forage, perform courtship and where some of them mate. Birds are some of the many types of animals that evolved wings as a morphological adaptation to thrive by moving through the medium of the aerosphere. The aerosphere is habitat. Indeed, an entire discipline of ecology has emerged to study this essential aspect of habitat – the discipline of aeroecology (Kunz et al. 2008). Many special-status species of birds have been recorded at or near the aerosphere of the project site, and I saw many birds using the aerosphere while I surveyed the site. Bird-window collision mortality is a potentially significant impact that warrants analysis.

Window collisions are often characterized as either the second or third largest source or human-caused bird mortality. The numbers behind these characterizations are often attributed to Klem's (1990) and Dunn's (1993) estimates of about 100 million to 1 billion bird fatalities in the USA, or more recently by Loss et al.'s (2014) estimate of 365-988 million bird fatalities in the USA or Calvert et al.'s (2013) and Machtans et al.'s (2013) estimates of 22.4 million and 25 million bird fatalities in Canada, respectively. The proposed project would impose windows in the airspace normally used by birds.

Glass-façades of buildings intercept and kill many birds, but these façades are differentially hazardous to birds based on spatial extent, contiguity, orientation, and other factors. At Washington State University, Johnson and Hudson (1976) found 266 bird fatalities of 41 species within 73 months of monitoring of a three-story glass walkway (no fatality adjustments attempted). Prior to marking the windows to warn birds of the collision hazard, the collision rate was 84.7 per year. At that rate, and not attempting to adjust the fatality estimate for the proportion of fatalities not found, 4,574 birds were likely killed over the 54 years since the start of their study, and that's at a relatively small building façade. Accounting for the proportion of fatalities not found, the number of birds killed by this walkway over the last 54 years would have been about 14,270. And this is just for one 3-story, glass-sided walkway between two college campus buildings.

Klem's (1990) estimate was based on speculation that 1 to 10 birds are killed per building per year, and this speculated range was extended to the number of buildings estimated by the US Census Bureau in 1986. Klem's speculation was supported by fatality monitoring at only two houses, one in Illinois and the other in New York. Also, the basis of his fatality rate extension has changed greatly since 1986. Whereas his estimate served the need to alert the public of the possible magnitude of the bird-window collision issue, it was highly uncertain at the time and undoubtedly outdated more than three decades hence. Indeed, by 2010 Klem (2010) characterized the upper end of his estimated range – 1 billion bird fatalities – as conservative. Furthermore, the estimate lumped species together as if all birds are the same and the loss of all birds to windows has the same level of impact.

By the time Loss et al. (2014) performed their effort to estimate annual USA bird-window fatalities, many more fatality monitoring studies had been reported or were underway. Loss et al. (2014) incorporated many more fatality rates based on scientific monitoring, and they were more careful about which fatality rates to include. However, they included estimates based on fatality monitoring by homeowners, which in one study were found to detect only 38% of the available window fatalities (Bracey et al. 2016). Loss et al. (2014) excluded all fatality records lacking a dead bird in hand, such as injured birds or feather or blood spots on windows. Loss et al.'s (2014) fatality metric was the number of fatalities per building (where in this context a building can include a house, low-rise, or high-rise structure), but they assumed that this metric was based on window collisions. Because most of the bird-window collision studies were limited to migration seasons, Loss et al. (2014) developed an admittedly assumption-laden correction factor for making annual estimates. Also, only 2 of the studies included adjustments for carcass persistence and searcher detection error, and it was unclear how and to what degree fatality rates were adjusted for these factors. Although Loss et al. (2014) attempted to account for some biases as well as for large sources of uncertainty mostly resulting from an opportunistic rather than systematic sampling data source, their estimated annual fatality rate across the USA was highly uncertain and vulnerable to multiple biases, most of which would have resulted in fatality estimates biased low.

In my review of bird-window collision monitoring, I found that the search radius around homes and buildings was very narrow, usually 2 meters. Based on my experience with bird collisions in other contexts, I would expect that a large portion of bird-window collision victims would end up farther than 2 m from the windows, especially when the windows are higher up on tall buildings. In my experience, searcher detection rates tend to be low for small birds deposited on ground with vegetation cover or woodchips or other types of organic matter. Also, vertebrate scavengers entrain on anthropogenic sources of mortality and quickly remove many of the carcasses, thereby preventing the fatality searcher from detecting these fatalities. Adjusting fatality rates for these factors – search radius bias, searcher detection error, and carcass persistence rates – would greatly increase nationwide estimates of bird-window collision fatalities.

Buildings can intercept many nocturnal migrants as well as birds flying in daylight. As mentioned above, Johnson and Hudson (1976) found 266 bird fatalities of 41 species within 73 months of monitoring of a four-story glass walkway at Washington State University (no adjustments attempted for undetected fatalities). Somerlot (2003) found 21 bird fatalities among 13 buildings on a university campus within only 61 days. Monitoring twice per week, Hager at al. (2008) found 215 bird fatalities of 48 species, or 55 birds/building/year, and at another site they found 142 bird fatalities of 37 species for 24 birds/building/year. Gelb and Delacretaz (2009) recorded 5,400 bird fatalities under buildings in New York City, based on a decade of monitoring only during migration periods, and some of the high-rises were associated with hundreds of fatalities each. Klem et al. (2009) monitored 73 building façades in New York City during 114 days of two migratory periods, tallying 549 collision victims, nearly 5 birds per day. Borden et al. (2010) surveyed a 1.8 km route 3 times per week during 12-month period and found 271 bird fatalities of 50 species. Parkins et al. (2015) found 35 bird fatalities of 16 species within only 45 days of monitoring under 4 building façades. From 24 days of survey over a 48-day span, Porter and Huang (2015) found 47 fatalities under 8 buildings on a university campus. Sabo et al. (2016) found 27 bird fatalities over 61 days of searches under 31 windows. In San Francisco, Kahle et al. (2016) found 355 collision victims within 1,762 days under a 5-story building. Ocampo-Peñuela et al. (2016) searched the perimeters of 6 buildings on a university campus, finding 86 fatalities after 63 days of surveys. One of these buildings produced 61 of the 86 fatalities, and another building with collision-deterrent glass caused only 2 of the fatalities, thereby indicating a wide range in impacts likely influenced by various factors. There is ample evidence available to support my prediction that the proposed project would result in many collision fatalities of birds.

Project Impact Prediction

I have reviewed and processed results of bird collision monitoring at 213 buildings and façades for which bird collisions per $m^2$ of glass per year could be calculated and averaged (Johnson and Hudson 1976, O'Connell 2001, Somerlot 2003, Hager et al. 2008, Borden et al. 2010, Hager et al. 2013, Porter and Huang 2015, Parkins et al. 2015, Kahle et al. 2016, Ocampo-Peñuela et al. 2016, Sabo et al. 2016, Barton et al. 2017, Gomez-Moreno et al. 2018, Schneider et al. 2018, Loss et al. 2019, Brown et al. 2020, City of Portland Bureau of Environmental Services and Portland Audubon 2020, Riding et al. 2020). These study results averaged 0.073 bird deaths per $m^2$ of glass per year (95% CI: 0.042-0.102). This average and its 95% confidence interval provide a robust basis for predicting fatality rates at a proposed new project.

The NOP prepared for 1 Hamilton does not disclose the extent of glass windows on the proposed new building. Until I see more details of the planned project, I can rely on another resource to predict impacts. I have maintained a database of the extent of glass windows relative to the extents of floor space among other projects for which I have prepared expert testimony. For 13 recently proposed California apartment projects, the ratio of $m^2$ of windows to $ft^2$ of floor space was 0.0129 (95% CI: 0.0071–0.0187), which applied to the floor space of the new proposed project would predict 851 $m^2$ (95% CI: 469–1,234 $m^2$). Applying the mean fatality rate (above) to my estimate of 851 $m^2$ of glass in the project, I predict annual bird deaths of 62 (95% CI: 37–87). I can update this prediction once I see more details about the project.

It would be prudent to explore alternative project sites that would pose less bird-window collision risk than the 1 Hamilton site poses. I saw many birds fly across the site within 58 feet of the ground – the height of the proposed building – including great blue heron, band-tailed pigeon, common raven, American crow, California gull, Anna's hummingbird, California scrub-jay, black phoebe and many others. Alternative sites should be compared for their relative collision risk by comparing rates of bird flights across those portions of the aerosphere that would correspond with building locations, and these rates should be measured in a program of visual-scan surveys at intervals spaced throughout a year.

## TRAFFIC IMPACTS TO WILDLIFE

A substantial impact to wildlife from the proposed 1 Hamilton project would be wildlife mortality and injuries caused by project-generated traffic. Project-generated traffic would endanger wildlife that must, for various reasons, cross roads used by the project's traffic (Photo 16), including along roads far from the project footprint. Vehicle collisions have accounted for the deaths of many thousands of amphibian, reptile, mammal, bird, and arthropod fauna, and the impacts have often been found to be significant at the population level (Forman et al. 2003). Across North America traffic impacts have taken devastating tolls on wildlife (Forman et al. 2003). In Canada, 3,562 birds were estimated killed per 100 km of road per year (Bishop and Brogan 2013), and the US estimate of avian mortality on roads is 2,200 to 8,405 deaths per 100 km per year, or 89 million to 340 million total per year (Loss et al. 2014). Local impacts can be more intense than nationally.


***Photo 16.*** *A coyote uses the crosswalk to cross Hamilton Drive and was fortunate that one driver showed the good grace to stop for it, 2 February 2023. Not all drivers stop, nor do all animals use the crosswalk. Too often, animals are injured or killed when they attempt to cross roads. Increased traffic volume increases collision risk to wildlife.*

The nearest study of traffic-caused wildlife mortality was performed along a 2.5-mile stretch of Vasco Road in Contra Costa County, California. Fatality searches in this study found 1,275 carcasses of 49 species of mammals, birds, amphibians and reptiles over 15 months of searches (Mendelsohn et al. 2009). This fatality number needs to be adjusted for the proportion of fatalities that were not found due to scavenger removal and searcher error. This adjustment is typically made by placing carcasses for searchers to find (or not find) during their routine periodic fatality searches. This step was not taken at Vasco Road (Mendelsohn et al. 2009), but it was taken as part of another study next to Vasco Road (Brown et al. 2016). Brown et al.'s (2016) adjustment factors for carcass persistence resembled those of Santos et al. (2011). Also applying searcher detection rates from Brown et al. (2016), the adjusted total number of fatalities was estimated at 12,187 animals killed by traffic on the road. This fatality number over 1.25 years and 2.5 miles of road translates to 3,900 wild animals per mile per year. In terms comparable to the national estimates, the estimates from the Mendelsohn et al. (2009) study would translate to 243,740 animals killed per 100 km of road per year, or 29 times that of Loss et al.'s (2014) upper bound estimate and 68 times the Canadian estimate. An analysis is needed of whether increased traffic generated by the project site would similarly result in local impacts to wildlife.

For wildlife vulnerable to front-end collisions and crushing under tires, road mortality can be predicted from the study of Mendelsohn et al. (2009) as a basis, although it would be helpful to have the availability of more studies like that of Mendelsohn et al. (2009) at additional locations. My analysis of the Mendelsohn et al. (2009) data resulted in an estimated 3,900 animals killed per mile along a county road in Contra Costa County. Two percent of the estimated number of fatalities were birds, and the balance was composed of 34% mammals (many mice and pocket mice, but also ground squirrels, desert cottontails, striped skunks, American badgers, raccoons, and others), 52.3% amphibians (large numbers of California tiger salamanders and California red-legged frogs, but also Sierran treefrogs, western toads, arboreal salamanders, slender salamanders and others), and 11.7% reptiles (many western fence lizards, but also skinks, alligator lizards, and snakes of various species). Vehicle miles traveled (VMT) is a metric that can be useful for predicting wildlife mortality because I was able to quantify miles traveled along the studied reach of Vasco Road during the time period of the Mendelsohn et al. (2009), hence enabling a rate of fatalities per VMT that can be projected to other sites, assuming similar collision fatality rates.

<u>Predicting project-generated traffic impacts to wildlife</u>

The NOP prepared for 1 Hamilton does not disclose a prediction of annual VMT, but this metric should be reported in the Draft SEIR for the City of Mill Valley's 2023-2031 Housing Element Update. Fortunately, in the meantime I have maintained a database of predicted annual VMT relative to the extents of floor space among other projects for which I have prepared expert testimony. For 5 recently proposed California residential projects (3 apartment projects), the ratio of annual VMT to ft$^2$ of floor space averaged 36.28. Applied to the 66,000 square feet of floor space in the proposed project, this ratio would predict 2,394,480 annual VMT. During the Mendelsohn et al. (2009) study, 19,500 cars traveled Vasco Road daily, so the vehicle miles that contributed to my estimate of non-volant fatalities was 19,500 cars and trucks × 2.5 miles × 365 days/year × 1.25 years = 22,242,187.5 vehicle miles per 12,187 wildlife fatalities, or 1,825 vehicle miles per fatality. This rate divided into my predicted annual VMT would predict 1,312 vertebrate wildlife fatalities per year. But perhaps fewer animals would be killed in the urbanized part of Mill Valley that surrounds the project site as compared to the study area of Mendelsohn et al. (2009), but even assuming the true fatality rate would be a third of the Mendelsohn et al. (2009) rate, the annual death toll to wildlife resulting from project-generated traffic would be 437, which would still be a significant, unmitigated impact of the 1 Hamilton project.

Based on my indicator-level analysis, the project-generated traffic would cause substantial, significant impacts to wildlife. It would be prudent to explore alternative project sites to minimize wildlife mortality caused by project-generated traffic. Such an exploration could be undertaken by comparing available data on wildlife road mortality in the region or by observational studies of wildlife crossings of roads at alternative project sites. I would suggest use of a thermal-imaging camera to observe nocturnal wildlife activity along reaches of roadway that border alternative project sites.

## HOUSE CATS

The NOP prepared for the 1 Hamilton project is silent on whether ownership of house cats would be allowed in the project. Considering national trends, it is safe to assume that house cats would be introduced to the project site by residents of the proposed residential units. This is significant because house cats serve as one of the largest sources of avian mortality in North America (Dauphiné and Cooper 2009, Blancher 2013, Loss et al. 2013, Loyd et al. 2017). Loss et al. (2013) estimated 139 million cats in the USA in 2013 (range 114 to 164 million), which killed an estimated 16.95 billion vertebrate wildlife annually (range 7.6 to 26.3 billion). In 2012 there were 0.44 house cats per human, and 122 vertebrate animals were killed per cat, free-ranging members of which killed disproportionately larger numbers of vertebrate wildlife. The NOP is also silent on the anticipated number of residents, but assuming 2.8 residents per unit (https://ipropertymanagement.com/), the proposed project would add 140 residents. The above rates of cat ownership applied to this number of new residents **would predict 62 new cats, which would kill 7,564 vertebrate wildlife per year**. Many of the wildlife fatalities caused by house cats would be in neighboring open spaces including any remaining grassland and the marshes to the west.

House cats also contribute to downstream loading of *Toxoplasma gondii*. According to a UC Davis wildlife health research program, "*Toxoplasma gondii is a parasite that can infect virtually all warm-blooded animals, but the only known definitive hosts are cats – domesticated and feral house cats included. Cats catch the parasite through hunting rodents and birds and they offload it into the environment through their feces… and …rain that falls on cement creates more runoff than rain that falls on natural earth, which contributes to increased runoff that can carry fecal pathogens to the sea*" (http://www.evotis.org/ toxoplasma-gondii- sea-otters/).

It would be prudent to consider constraints on house cat ownership such as requiring cats to remain indoors. Another option would be to explore alternative sites where free ranging cats would cause fewer wildlife fatalities due to lesser adjacency to open spaces.

## CUMULATIVE IMPACTS

Considering the rapid decline of birds that is underway, a cumulative impacts analysis is warranted. One or both of the two CEQA methodologies needs to be decided upon and implemented at each of alternative project sites to find which site minimizes cumulative impacts.

## MITIGATION MEASURES

**Protocol-level Detection Surveys in Support of Mitigation:** Detection surveys need to be completed for special-status species, nesting birds, and roosting bats to (1) support negative findings of species when appropriate, (2) inform preconstruction surveys to improve their efficacy, (3) estimate project impacts, and (4) inform compensatory mitigation and other forms of mitigation. Detection survey protocols and guidelines are available from resource agencies for multiple special-status species. Otherwise, professional standards can be learned from the scientific literature and species' experts.

**Pest Control:** The 1 Hamilton project should commit to minimal use of rodenticides and avicides. It should commit to no placement of poison bait stations outside the buildings.

**Guidelines on Building Design to Minimize Bird-Window Collisions: T**he 1 Hamilton project should at a minimum adhere to available Bird-Safe Guidelines, such as those prepared by American Bird Conservancy and New York and San Francisco. The American Bird Conservancy (ABC) produced an excellent set of guidelines recommending actions to: (1) Minimize use of glass; (2) Placing glass behind some type of screening (grilles, shutters, exterior shades); (3) Using glass with inherent properties to reduce collisions, such as patterns, window films, decals or tape; and (4) Turning off lights during migration seasons (Sheppard and Phillips 2015). The City of San Francisco (San Francisco Planning Department 2011) also has a set of building design guidelines, based on the excellent guidelines produced by the New York City Audubon Society (Orff et al. 2007). The ABC document and both the New York and San Francisco documents provide excellent alerting of potential bird-collision hazards as well as many visual examples. The San Francisco Planning Department's (2011) building design guidelines are more comprehensive than those of New York City, but they could have gone further. For example, the San Francisco guidelines probably should have also covered scientific monitoring of impacts as well as compensatory mitigation for impacts that could not be avoided, minimized or reduced.

New research results inform of the efficacy of marking windows. Whereas Klem (1990) found no deterrent effect from decals on windows, Johnson and Hudson (1976) reported a fatality reduction of about 69% after placing decals on windows. In an experiment of opportunity, Ocampo-Peñuela et al. (2016) found only 2 of 86 fatalities at one of 6 buildings – the only building with windows treated with a bird deterrent film. At the building with fritted glass, bird collisions were 82% lower than at other buildings with untreated windows. Kahle et al. (2016) added external window shades to some windowed façades to reduce fatalities 82% and 95%. Brown et al. (2020) reported an 84% lower collision probability among fritted glass windows and windows treated with ORNILUX R UV. City of Portland Bureau of Environmental Services and Portland Audubon (2020) reduced bird collision fatalities 94% by affixing marked Solyx window film to existing glass panels of Portland's Columbia Building. Many external and internal glass markers have been tested experimentally, some showing no effect and some showing strong deterrent effects (Klem 1989, 1990, 2009, 2011; Klem and Saenger 2013; Rössler et al. 2015).

Monitoring and the use of compensatory mitigation should be incorporated into any new building project because the measures recommended in the available guidelines remain of uncertain efficacy, and even if these measures are effective, they will not reduce collision fatalities to zero. The only way to assess mitigation efficacy and to quantify post-construction fatalities is to monitor the project for fatalities, including at residential dwelling units.

**Road Mortality:** Compensatory mitigation is needed for the increased wildlife mortality that would be caused by bird-window collisions and the project-generated road traffic in the region. I suggest that this mitigation can be directed toward funding research to identify fatality patterns and effective impact reduction measures such as reduced speed limits and wildlife under-crossings or overcrossings of particularly dangerous road segments. Compensatory mitigation can also be provided in the form of donations to wildlife rehabilitation facilities (see below).

**House Cats**

If the 1 Hamilton project is approved, homeowners should not be allowed to let their cats range free. A fund should be established for long-term management of house cats in the project. Management could include public education about the environmental effects of outdoor and free-ranging cats. It could also include a program to spade and neuter cats, especially free-ranging cats. It could also involve some removals of feral cats.

**Fund Wildlife Rehabilitation Facilities:** Compensatory mitigation ought also to include funding contributions to wildlife rehabilitation facilities to cover the costs of injured animals that will be delivered to these facilities for care. Many animals would likely be injured by collisions with windows and automobiles.

**Landscaping:** If the 1 Hamilton project is approved, California native plant landscaping (i.e. chaparral, grassland, and locally appropriate scrub plants) should be considered to be used in the landscaping, as opposed to landscaping with lawn and exotic shrubs. Native plants offer more structure, cover, food resources, and nesting substrate for wildlife than landscaping with lawn. Native plant landscaping has been shown to increase the abundance of arthropods which act as importance sources of food for wildlife and are crucial for pollination and plant reproduction (Narango et al. 2017, Adams et al. 2020, Smallwood and Wood 2022.). Further, many endangered and threated insects require native host plants for reproduction and migration (e.g., monarch butterfly). Around the world, landscaping with native plants over exotic plants increases the abundance and diversity of birds, and is particularly valuable to native birds (Lerman and Warren 2011, Burghardt et al. 2008, Berthon et al. 2021, Smallwood and Wood 2022). Landscaping with native plants is a way to maintain or to bring back some of the natural habitat and lessen the footprint of urbanization by acting as interconnected patches of habitat for wildlife (Goddard et al. 2009, Tallamy 2020).

Lastly, not only does native plant landscaping benefit wildlife, it requires less water and maintenance than traditional landscaping with lawn and hedges.

Thank you for your attention,

Shawn Smallwood, Ph.D.

**LITERATURE CITED**


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Photo 17. One of a pair of California scrub-jays foraging on the project site, 2 February 2023.