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TECHNICAL MEMORANDUM

DATE: February 12, 2020

TO: John Kuba, ConnectGen Operating LLC

FROM: Andrea Chatfield and Kori Hutchison, WEST, Inc.

RE: California Condor Risk Assessment for the Proposed Fountain Wind Project, Shasta County, California

INTRODUCTION

Fountain Wind LLC (Fountain Wind) contracted Western EcoSystems Technology, Inc. (WEST) to provide biological study support for Shasta County in its review of the proposed Fountain Wind Project (Project) in Shasta County, California under the California Environmental Quality Act (CEQA). While the California condor (*Gymnogyps californianus*) does not currently occur in northern California, a proposal to reintroduce the species to the north coast of California is currently underway. The following memorandum provides an assessment of the potential risk to California condors posed by development and operation of the Project should the proposed condor reintroduction program be successfully implemented in northern California. This assessment includes a brief overview of the proposed reintroduction program, background on the condor recovery efforts in Southern California, an overview of condor natural history, and an assessment of potential future risk to condors posed by the Project.

Proposed California Reintroduction in Northern California

In early 2016 the USFWS initiated a formal agreement with the Yurok Tribe of Northern California, the National Park Service's (NPS's) Redwood National Park, California State Parks, and the Ventana Wildlife Society to assess the feasibility of releasing California condors in coastal northern California and southern Oregon with the idea that more widely dispersed populations will enhance recovery efforts. According to the Yurok Tribe's Condor Program website, "returning the California condor to the Pacific Northwest is part of the Yurok Tribe's obligation to heal the world." The Yurok people consider the condor to be critical for a flourishing ecosystem by removing large decaying carcasses from the ecosystem in the absence of large mammalian carnivores. They also consider the condor a sacred animal. It is spiritually tied to Yurok ceremonies and its feathers

are used, and its songs are sung in the Yurok's World Renewal ceremony. In addition to the Yurok, other tribes may consider the condor to be sacred.

In April 2019, an Environmental Assessment (EA; US Department of the Interior [USDI] and Yurok Tribe 2019) was prepared describing the proposed program for reintroducing California condors into Redwood National Park as a first step to condors reinhabiting the Pacific Northwest. The EA was undertaken as a joint effort between the NPS, the US Fish and Wildlife Service (USFWS), and the Yurok Tribe. The reintroduction proposal is still under review and has not yet been approved by any of the participating entities.

While the proposed reintroduction site, the Bald Hills of Redwood National Park, is located approximately 110 miles (mi; 177 kilometers [m]) west-northwest of the Project (Figure 1), the California condor is a wide-ranging species known to cover up to 140 mi (225 km) in a day, particularly outside of nesting season. During breeding season, reproductive pairs typically fly less than 44 mi (71 km) from the nest site (Snyder and Snyder 2002). If reintroduction efforts are approved and eventually successful, the presence of condors in more inland portions of the state, including the Project Site, is a possibility; however, the likelihood of occurrence within the Project Site is not currently known. If the reintroduction plan is approved, reintroduced condors would be considered an experimental population, defined as members of a listed species that are geographically separate from other populations of the same species. While the California condor is currently listed as endangered under the federal Endangered Species Act (ESA; 1973) and state CESA (1984), respectively, it is unknown what designation this experimental condor population would have (i.e., essential or non-essential) and, therefore, what level of protection the population may be provided under the ESA and CESA. An experimental population that is deemed non-essential is subject to different requirements compared to other populations of the same species. The USFWS has proposed to designate the reintroduced birds in northern California as a non-essential experimental population under section 10(j) of the ESA, allowing the USFWS to tailor ESA protections for the population, rather than assigning the birds protection under ESA as an endangered species. Currently, the reintroduced condor population occurring in Arizona, Nevada, and Utah is designated as a non-essential experimental population (USFWS 2017). Regardless of their designation under the ESA or CESA, collisions between wind turbines and condors could potentially be considered a significant biological or cultural impact under CEQA.

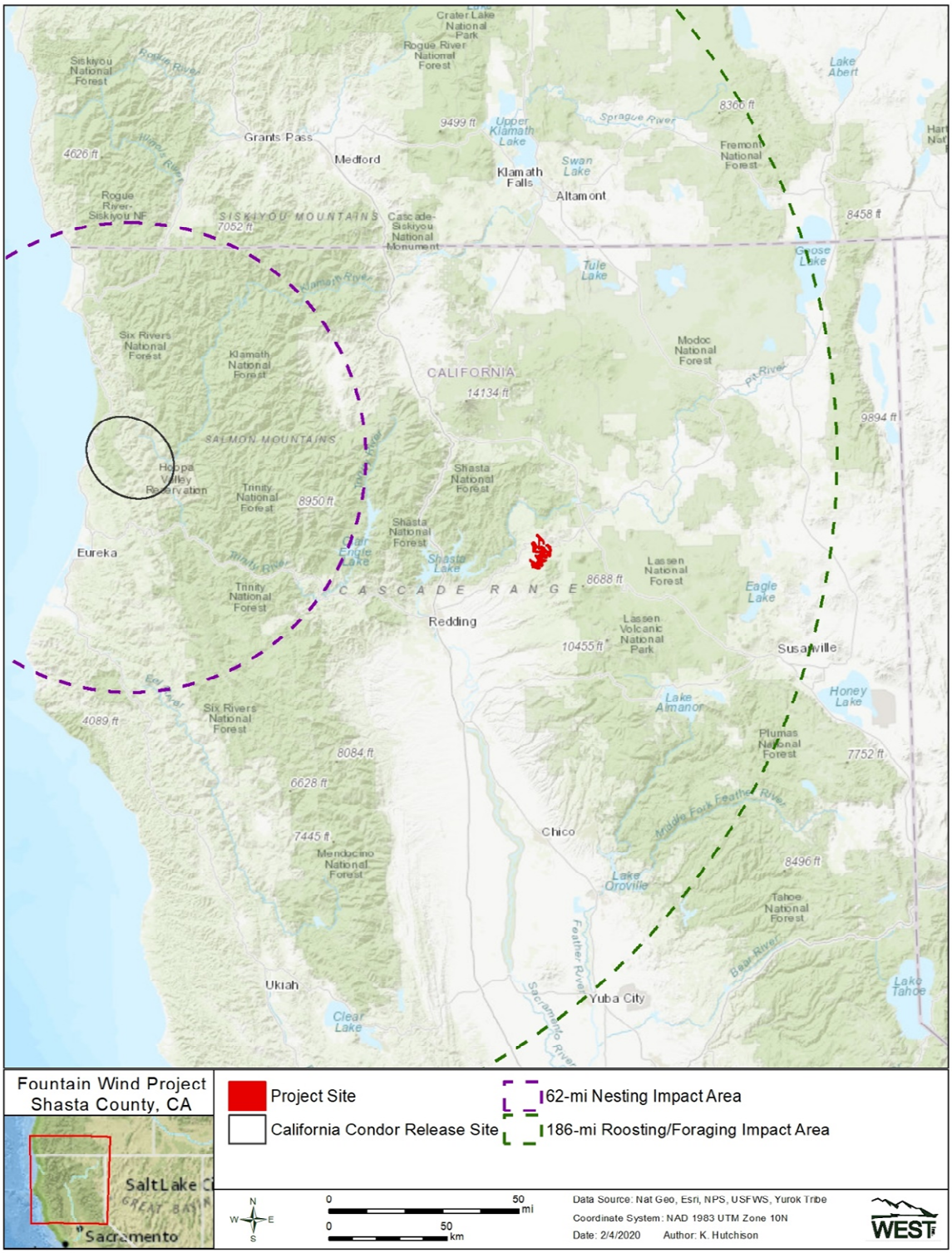

Figure 1. Location of the proposed California condor reintroduction site in the Bald Hills area of northwestern California in relation to the Fountain Wind Project in Shasta County, California. Also shown are the 186-mile and 62-mile impact analysis areas used in the Northern California Condor Restoration Program Environmental Assessment (US Department of the Interior and Yurok Tribe 2019).

BACKGROUND ON CALIFORNIA CONDORS

Recovery Program

California condors have a wingspan of up to 9.5 ft (2.9 m) and can weigh up to 22 pounds, making them one of the world's largest birds. They are also considered one of the world's rarest birds. California condors, which historically ranged throughout the western US, steadily declined throughout the 20th century and were close to extinction by the 1980's. The last known occurrence of a condor in northern California was in the early 20th century. In 1987, the last of the free-flying condors were taken into captivity (Kiff et al.1996). The captive population grew from 27 birds in 1987 to 86 by 1994. In the late 1980s and early 1990s, Andean condors (*Vultur gryphus*) were released in the wild in California to identify environmental hazards associated with releasing condors and to develop and implement measures to eliminate those hazards prior to releasing California condors. The first California condors were released in 1992. After several birds released collided with power lines, aversion training was implemented to teach California condors to avoid power lines. As part of the release program, California condors are also provided food in the form of stillborn dairy calves (Kiff et al. 1996).

As a result of reintroduction efforts that began in southern California in 1992, the current range of the California condor includes California's southern coastal ranges from Big Sur to Ventura County, east through the Transverse Range and the southern Sierra Nevada, with other populations now occurring in northern Baja California and in the Grand Canyon ecoregion in Arizona. The total wild populations in these areas now numbers more than 290 birds (USFWS 2017).

Life History

Nesting and Roosting

Paired California condors typically lay one egg between late January and early April (Kiff et al. 1996). The incubation period lasts about 56 days. The adults share incubation duties and both parents continue to feed the nestling until it reaches about three months of age, when it leaves the nest. Once out of the nest, the chick remains in the vicinity of the nest where it is still fed by its parents. Chicks begin to fly at six to seven months of age, but do not become fully independent from the parents until the following year. Although most California condors nest only once every two years, some pairs will nest annually. California condors typically do not nest until they are at least six years old, but their life span is long, reaching up to 60 years. California condors are typically a cavity-nesting species, selecting nest sites associated with steep rock formations or the burned out hollows of old growth conifers (Koford 1953, Snyder et al. 1986, Burnett et al. 2013). Nesting condors are easily disturbed by human activities and typically nest in remote areas with little disturbance (Kiff et al. 1996). For roosting, condors repeatedly use sites on ridgelines, rocky outcrops, steep canyons, and in tall trees or snags near nest sites or foraging grounds (Kiff et al. 1996).

Foraging

California condors feed only on the carcasses of dead animals and forage over large areas, an adaptation for reliance on an unpredictable food source (Meretsky and Snyder 1992). The condor ranges over a variety of habitats and is not considered a habitat specialist; however, the species needs relatively open areas to find food, including open grasslands and oak savannah foothills (Snyder and Snyder 2005). Records of condors feeding in forested environments are nearly absent, likely because of their inability to maneuver through trees and branches (Snyder and Snyder 2005).

California condors feed socially and typically circle the carcass high in the air before landing to feed, which may serve as a way to signal other condors of an available food source (Koford 1953). Prior to arrival of Europeans, the principal condor food items were likely big game species, such as elk (*Cervus elaphus*), mule deer (*Odocoileus hemionus*), and pronghorn (*Antilocapra americana*) in the interior, and carcasses of sea mammals, such as whales and sea lions, along the Pacific Coast (Kiff et al. 1996). Smaller animals also comprise a portion of their diet. Since human settlement, condors forage primarily on domestic livestock, with cattle comprising about half of their diet. Other species consumed include sheep and horses, as well as native species such as deer and ground squirrels; some evidence indicates California condors prefer deer over cattle (Kiff et al. 1996). In one study of carcass remains at nest sites, it was determined that cattle composed 41% of individual food items, while various ground squirrels were second in importance, composing 16% of individual food items (Snyder and Schmitt 2002). Condors do not use their sense of smell to locate food, but instead rely on sight and the presence of other scavengers, such as eagles and ravens (Kiff et al. 1996).

Habitat Use and Movement

According to Snyder and Schmitt (2002), the most important habitat requirements for California condors are adequate food supplies, sufficient open habitat so that food can be readily found (i.e., seen) and accessed, and reliable air movements allowing extended soaring flight. California condors typically forage over open areas of foothill grassland and oak savannah habitats. While California condors are non-migratory, studies in the 1980's of the last California condors remaining in the wild showed that they were capable of covering large areas during daily movements, with core foraging areas averaging about 640,000 acres (ac; 263,045 hectares [ha]; Snyder and Snyder 2005). Immature and unpaired condors were especially mobile, with one daily flight of 141 mi (227 km) recorded. Paired birds tended to forage closer to their nests, with most flights typically less than 44 mi from the nest site. Outside the nesting season paired birds expand their foraging range (Kiff et al. 1996). Because open grasslands necessary for foraging are not typically associated with nesting areas, which are primarily wooded areas, substantial commutes are often required between primary nesting and foraging areas (Snyder and Schmitt 2002).

PROJECT SITE AND SURROUNDING LANDSCAPE

The Project Site currently encompasses approximately 4,463 ac (1,806 ha) of privately-owned commercial timberlands within Shasta County in northern California. The Project is located west

of the community of Burney and northeast of the larger community of Redding (Figure 1). The east-west running California State Route 299 bisects the northern portion of the Project Site, and the Hatchet Ridge Wind Farm (Hatchet Ridge), in operation since 2010, is located immediately to the northeast. The Lassen National Forest is located to the southeast of the Project and the Shasta-Trinity National Forest is located to the north and east. The majority of the remaining land surrounding the Project are privately-owned lands managed for timber harvest.

Timber management and harvest operations are currently being conducted primarily within the southeastern third of the site. In late August, 1992, the Fountain Fire burned approximately 64,000 ac (25,900 ha) in and around the Project Site, including an area encompassing the northern two-thirds of the Project Site. Post-fire management included salvage logging, site preparation, and planting in the year following the fire. The dominant vegetation type in and around the Project Site is mixed coniferous forest (both post-fire and unburned), with smaller amounts of mixed montane chaparral and mixed montane riparian forest/scrub. The primary land use in this area is commercial timber production, which has resulted in a highly fragmented landscape across much of the area. Dominant overstory species include a combination of white fir (*Abies concolor*), Douglas fir (*Pseudotsuga menziesii*), incense cedar (*Calocedrus decurrens*), ponderosa pine (*Pinus ponderosa*), sugar pine (*P. lambertiana*), and California black oak (*Quercus kelloggii*). Topography within the Project Site is characterized by gently rolling hills that transition to relatively steep, low mountains, with elevations ranging from approximately 3,700 feet (ft; 1,128 meters [m]) on the western extent of the Project Site to 5,400 ft (1,646 m) near Snow Mountain in the southeast (Figure 2).

RISK ASSESSSMENT

The Project lies approximately 110 mi from the proposed California condor reintroduction site in Redwood National Park. As such the Project falls within the 186-mi radius impact area used for the purpose of analyzing potential impacts in the EA (USDI and Yurok Tribe 2019). This impact area was based on condor flight movement data collected from other condor release sites in California, including Global Positioning System (GPS) location data from the southern and central California flocks. Of the millions of occurrence points collected over multiple years, only one condor flew outside the 186-mi distance, and this flight occurred over one day (USDI and Yurok Tribe 2019). More than 98% of all occurrence points were within 124 mi (200 km) of their release site (USDI and Yurok Tribe 2019). Similarly, based on condor nest location information from other condor release sites, the area of impact related to monitoring condor nests was limited to 62 mi (100 km) from the proposed Bald Hills reintroduction site (USDI and Yurok Tribe 2019). The location of the Project in relation to the 62-mi and 186-mi areas of potential impact identified in the EA are shown in Figure 1.

Potential for Turbine Collisions

To date, no California condor collision fatalities have been documented at any wind energy facility in North America. However, according to Thorngate (2007), California condors have many features that may put them at risk for turbine collisions, including: (1) high wing loading; (2) social foraging; (3) curiosity for novel objects; and (4) foraging preference for sloped grassland sites.

Because condors have very high wing loading, and their flapping flight is clumsy, they are less maneuverable around objects. Condors routinely forage and roost in social groups, so the presence of one condor near wind turbines increases the risk of mortality not only for that individual, but for other individuals that may follow it. Because they are scavengers, condors also exhibit pronounced curiosity for novel objects in their environment, and therefore the presence of new wind turbines might increase condor activity at a site (Thorngate 2007). As an example of social foraging behavior of California condors, within a few days of providing fresh carcasses at a new feeding station in the Wind Wolves preserve, a flock of approximately 20 birds, or more than half of the current Southern California population at the time, was observed foraging at the site (Dudek 2009). Based on flight height data collected by Sorenson et al. (2009) in Monterey County, California, their flight heights would also make them susceptible to turbine collisions, as approximately 66% of condor locations were of birds perched or flying <200 m above ground. However, to our knowledge, no data currently exist that show new wind projects near condor use areas (such as in the Tehachapi Wind Resource Area) have been a source of attraction for condors.

Project-Specific Risk Assessment

Because condors are heavy birds with long, bulky wings, they have difficulty getting airborne from flat ground (Snyder and Schmidt 2002). For this reason, condors generally require a more complex topography where elevated slopes, rock outcrops, cliffs, and large snags provide launching points, and deflected winds and thermals provide updrafts to facilitate lift. Such features are available within the Project Site. Based on the habitat model developed by D'Elia et al. (2015), the Project Site does provide some areas of suitable condor foraging and roosting habitat, primarily in the central portion of the Project Site (Figures 2 and 3). The areas of most suitable modeled foraging and roosting habitat, largely coincide with the boundary of the 1992 Fountain Fire (Figures 2 and 3), suggesting the 2015 model was based on post-fire vegetation characteristics of the region. The fire, and subsequent salvage logging, resulted in the removal of large areas of densely forested habitat which the 2015 habitat model may have categorized as more suitable for condor foraging/roosting than the unburned forested areas in the surrounding landscape. In the 27 years since the fire, the previously burned areas within the Project Site are now predominantly covered by dense stands of regenerating mixed-conifer forest, which would no longer be considered as moderate to high suitability for condor foraging or roosting.

Portions of the Project Site not burned in the Fountain Fire, primarily along the southeastern edge of the Project, are generally modeled as low suitability for condor foraging and roosting (Figures 2 and 3). This area, as well as adjacent lands to the south and east, are located in a relatively densely forested landscape, used primarily for timber harvest and recreational purposes. Such densely forested areas are generally not considered good foraging habitat for condors, as condors would likely have difficulty maneuvering among the trees, and because food sources are more difficult to detect visually while soaring above a forested landscape. For this reason, it is unknown how California condors would use the forested environments of the Pacific Northwest (USDI and Yurok Tribe 2019). Food resources, typically consisting of medium- to large-sized mammal carcasses, are also relatively scarce within the Project and surrounding area due to the absence of domestic livestock within the Project Site and surrounding public and private forest lands.

Within the larger 186-mi impact area evaluated in the EA, suitable condor foraging and roosting habitat is relatively scarce in the region surrounding the Project Site, compared to more extensive areas of suitable habitat primarily located to the west and north of the Project Site (Figures 4 and 5).

Based on the D'Elia et al. (2015) habitat model, nesting and habitat is much more limited in the Project vicinity and generally absent from the Project Site (Figure 6). Areas of modeled suitable nesting habitat closest to the Project Site appear to be associated with cliffs along the Pitt River (Figure 6). Within the larger impact analysis area, suitable condor nesting habitat is relatively scarce across the landscape; however, more concentrated areas of nesting habitat are located approximately 20 mi to the west and 40 mi to the south of the Project Site (Figure 7).

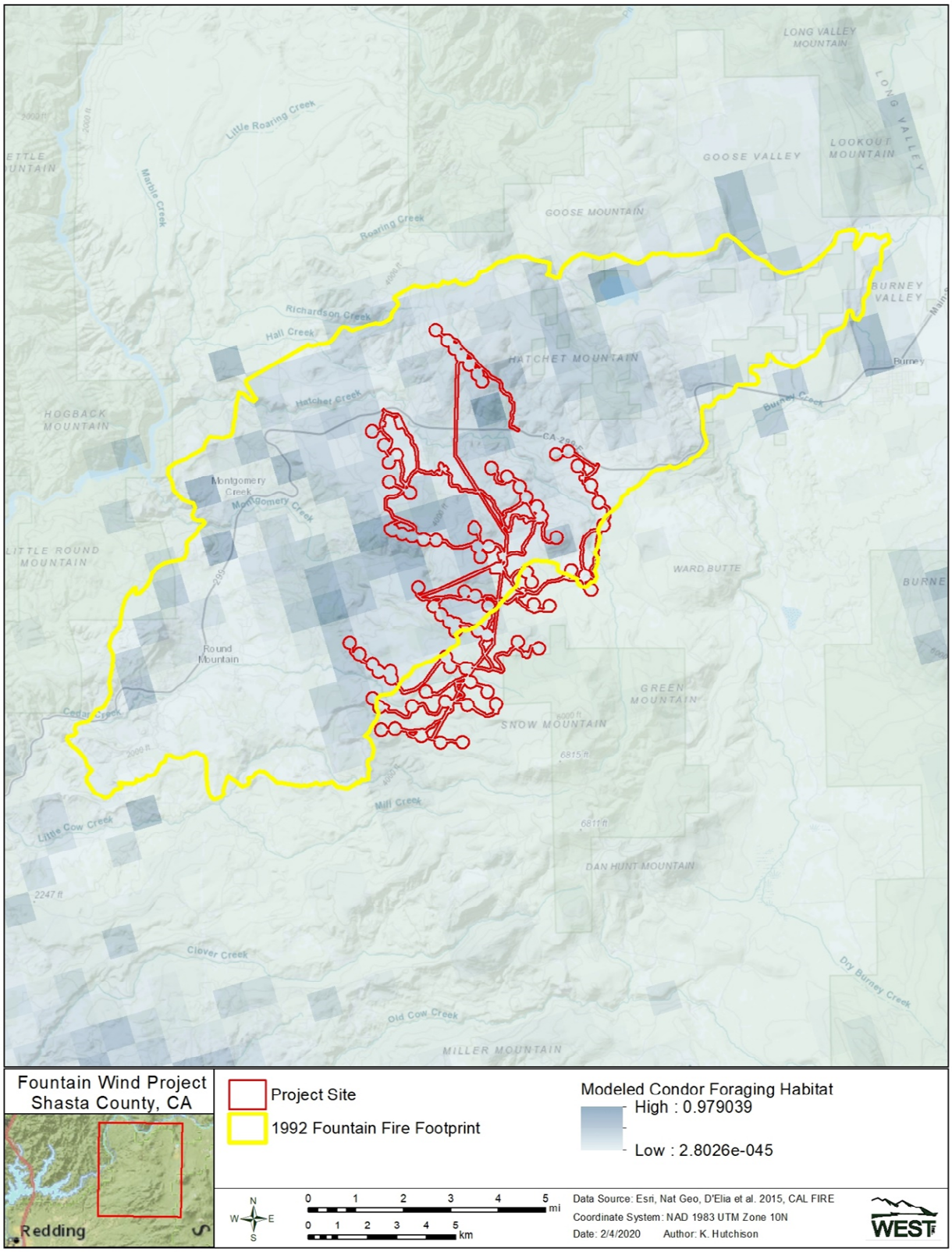

Figure 2. Modeled California condor foraging habitat in the vicinity of the Fountain Wind Project, Shasta County, California. Modeled habitat from D'Elia et al. (2015).

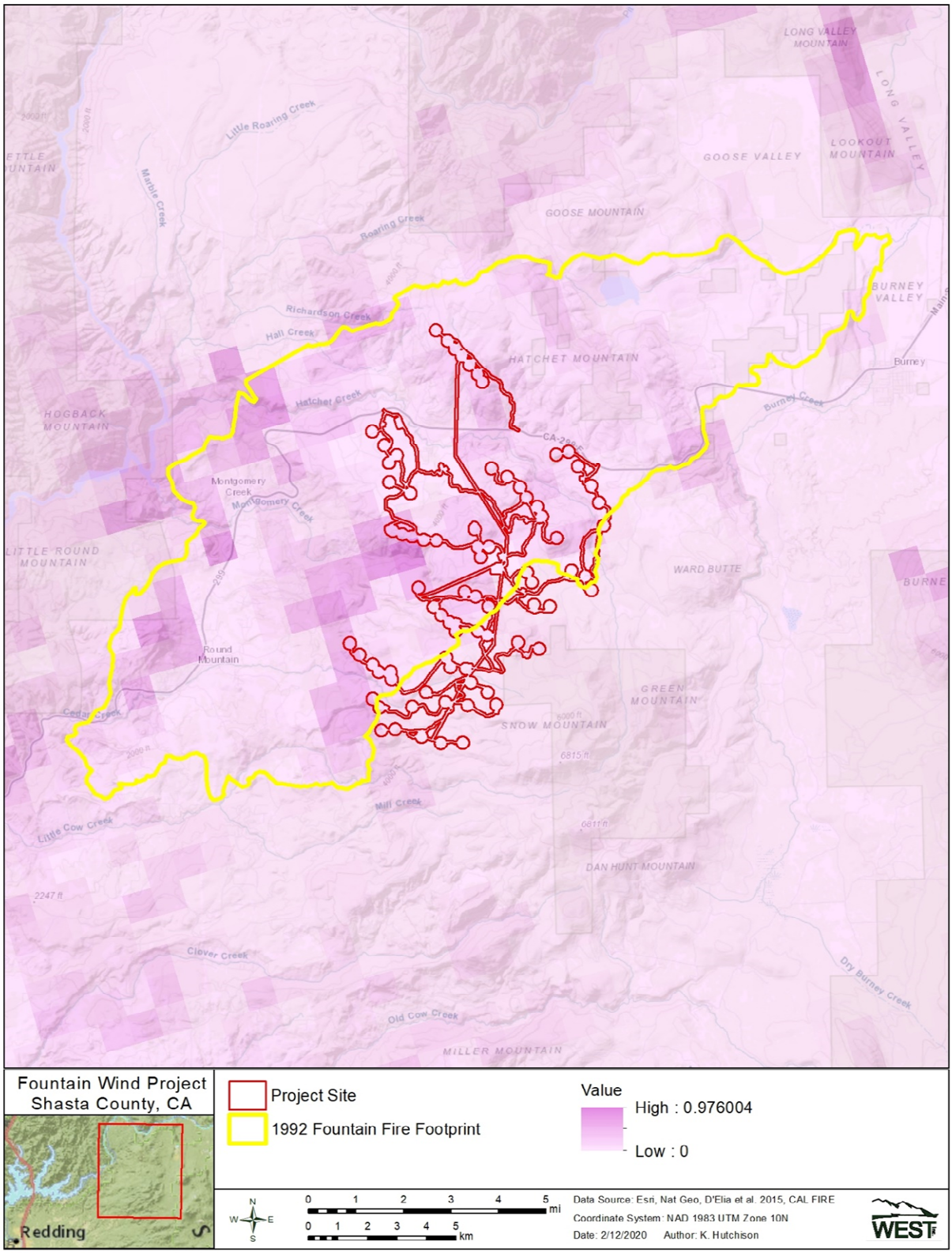

Figure 3. Modeled California condor roosting habitat in the vicinity of the Fountain Wind Project, Shasta County, California. Modeled habitat from D'Elia et al. (2015).

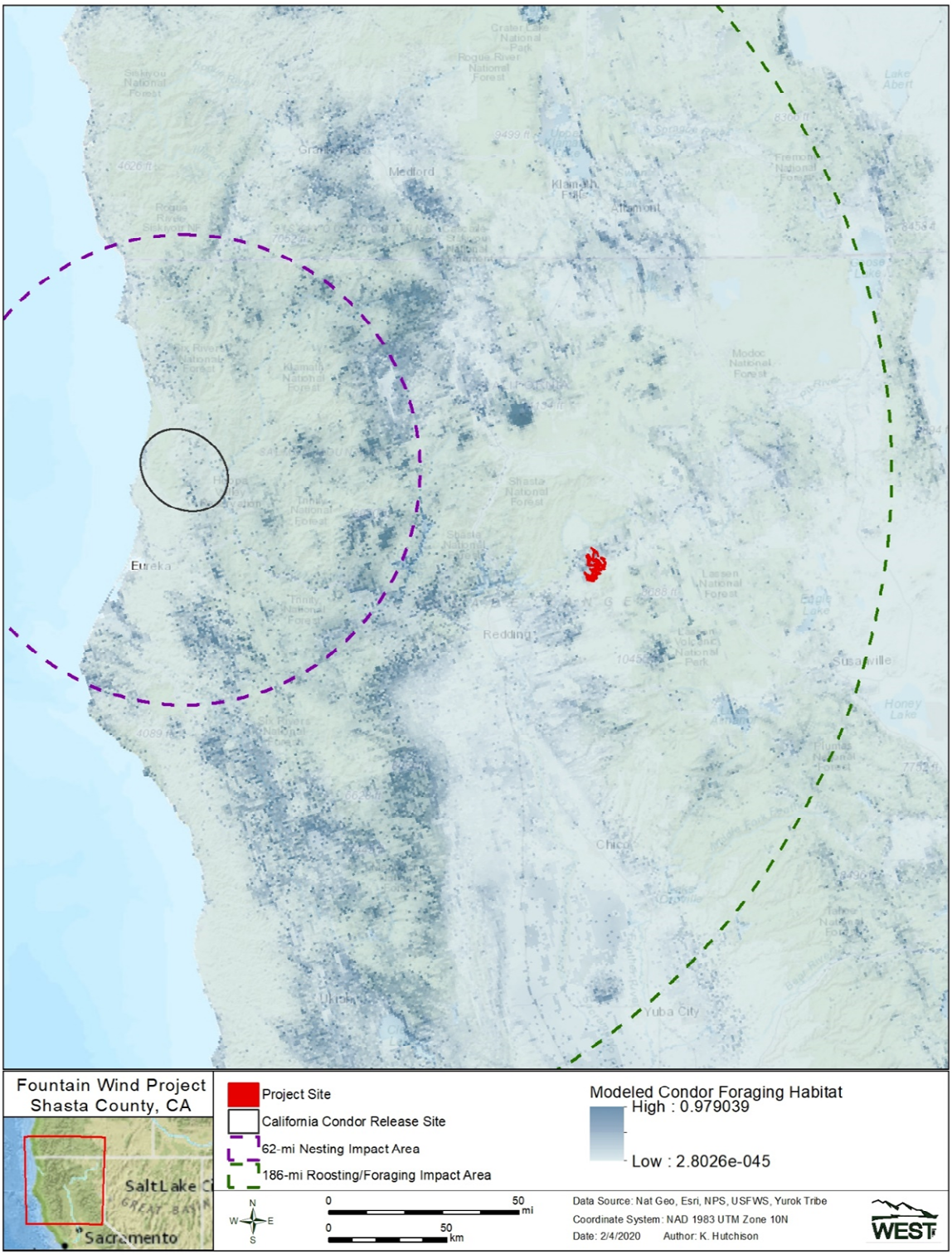

Figure 4. Modeled California condor foraging habitat within the 186-mile and 62-mile impact analysis areas evaluated in the Northern California Condor Restoration Program Environmental Assessment (US Department of the Interior and Yurok Tribe 2019). Modeled habitat from D'Elia et al. (2015).

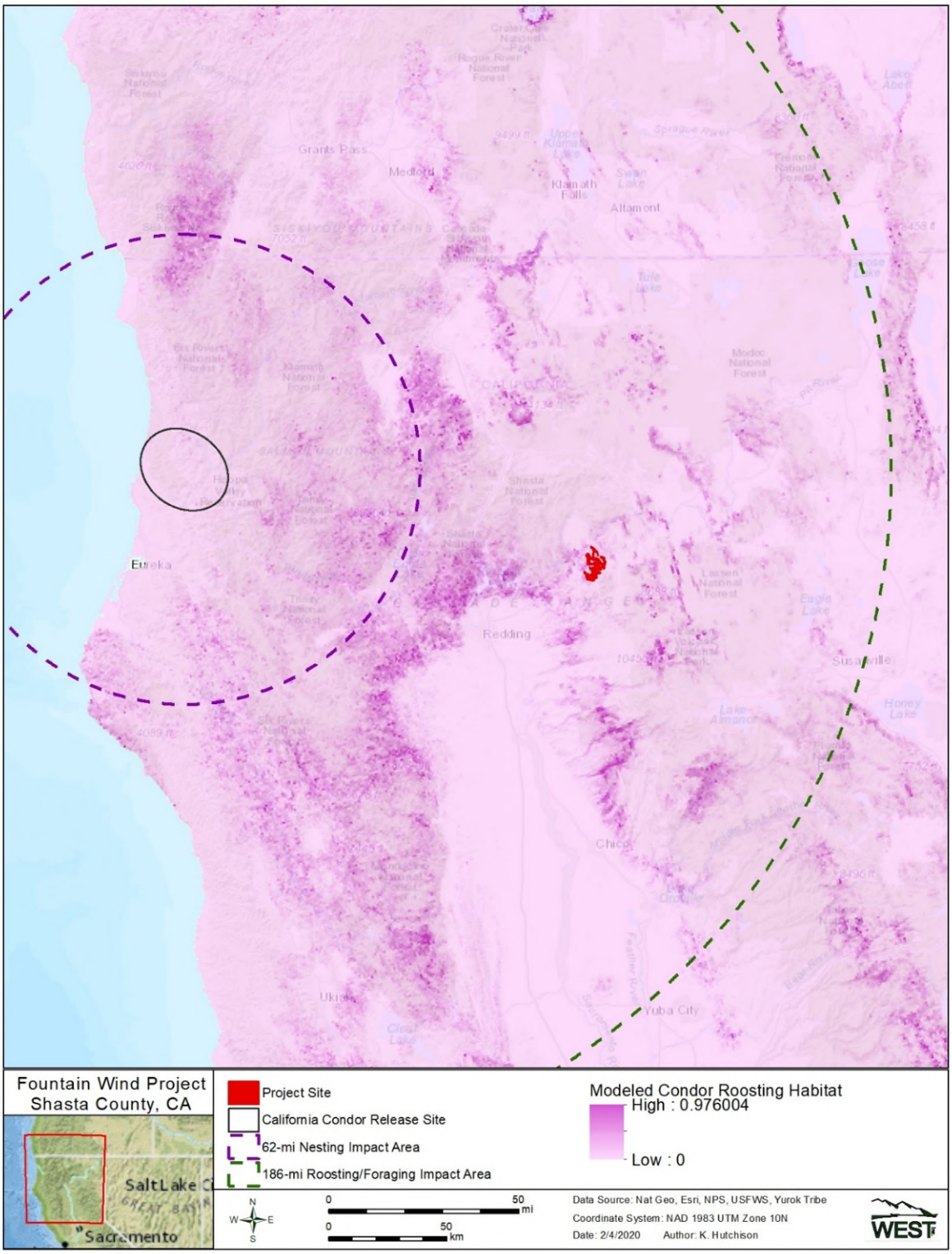

Figure 5. Modeled California condor roosting habitat within the 186-mile and 62-mile impact analysis areas evaluated in the Northern California Condor Restoration Program Environmental Assessment (US Department of the Interior and Yurok Tribe 2019). Modeled habitat from D'Elia et al. (2015).

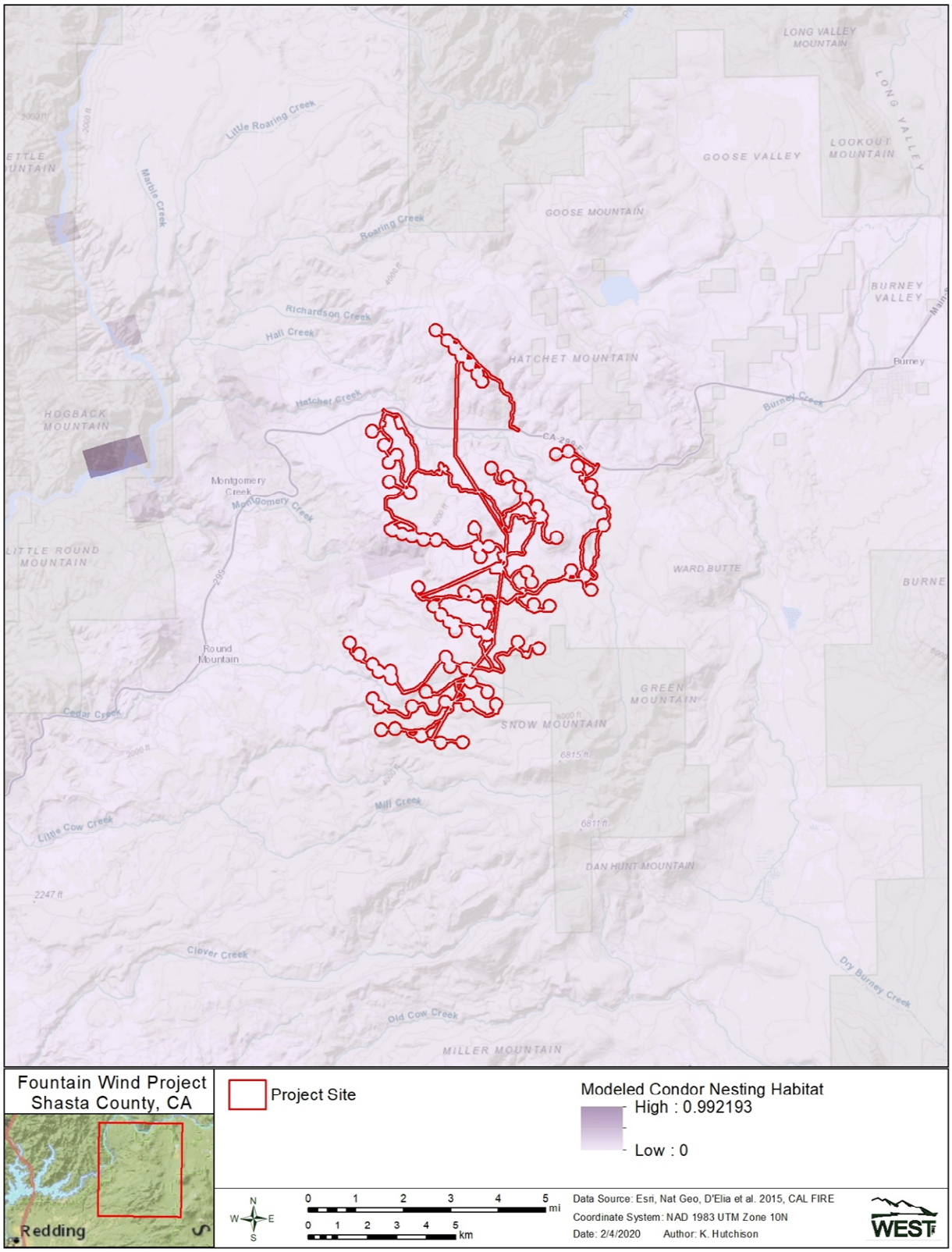

Figure 6. Modeled California condor nesting habitat in the vicinity of the Fountain Wind Project, Shasta County, California. Modeled habitat from D'Elia et al. (2015).

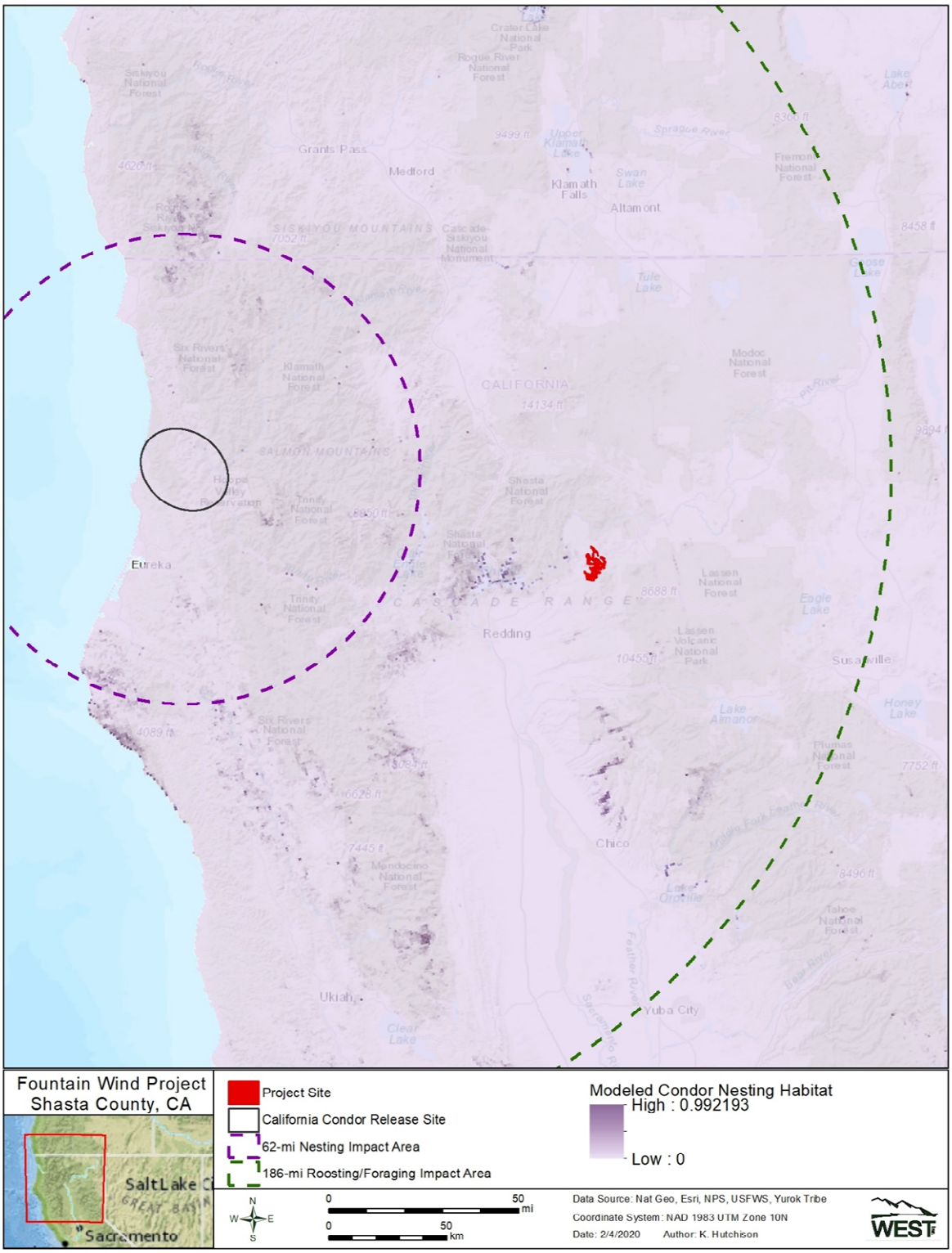

Figure 7. Modeled California condor nesting habitat within the 186-mile and 62-mile impact analysis areas evaluated in the Northern California Condor Restoration Program Environmental Assessment (US Department of the Interior and Yurok Tribe 2019). Modeled habitat from D'Elia et al. (2015).

Risk Minimization Measures

If the proposed reintroduction program is approved and successful, there is a low but not non-existent risk that a reintroduced condor could fly 110 mi from Redwood National Park and collide with a Project turbine. For purposes of CEQA, this presents a remote but not necessarily speculative risk of the Project resulting in impacts to condors. The proposed 10(j) designation of the reintroduced population as non-essential experimental, would likely remove specific prohibitions against incidental take from wind turbines and power lines. The non-essential population designation would also align with the 10(j) rule for condors in Arizona, Utah, and Nevada. If the reintroduction of condors in the Pacific Northwest is successful, it is likely that power companies in northern California will take similar measures to those implemented within the condor's range in Southern California, including the use of GPS technology to assess areas of existing threat to condors from power line and wind turbine interactions. Monitoring of released condors will be an essential component of the reintroduction program, with the majority of condors outfitted with GPS transmitters and VHF radio transmitters prior to release (USDI and Yurok Tribe 2019). Released condors would be remotely monitored daily via satellite or GPS transmitter data, providing information on condor movements and habitat use in northern California, including information on risk to condors posed by the Project.

Should the condor reintroduction be successful in the Pacific Northwest, and condors begin to use areas in the Project vicinity, several additional avoidance measures could be taken to minimize any risk at the Project. The overhead transmission lines associated with the Project should be reviewed to ensure they meet Avian Powerline Interaction Committee (APLIC; 2012) suggested practices, including marking to make them visible to birds. Additionally, because condors in the population may be outfitted with transmitters (unless the reintroduced population reaches a level where such intensive monitoring is no longer warranted), wind project operators may be able to track the birds near their facilities and curtail turbines when there is a risk of collision. High-resolution camera technology is also currently being used and refined to detect large birds, such as eagles, and temporarily shut down individual turbines or groups of turbines which are deemed to pose an immediate collision risk. Such technology could potentially be used for condors. Finally, a program to immediately remove carcasses of medium to large mammals found within or near the boundaries of the Project could help reduce attraction to the area by condors. Based on the current vegetation communities and land use across the Project Site and surrounding area, the Project Site is not likely to provide a concentrated or consistent source of carcasses for condors. Livestock are currently not present within the Project Site, and future use of the site for livestock production is not anticipated. If land use changes occur in the future, a coordinated carcass removal program could minimize potential risk to condors.

CONCLUSION

Currently, the proposed Project poses no risk to California condors. Should the proposed northern California reintroduction of condors be successfully implemented, and condors venture into more inland portions of northern California, there may be some risk of collision with Project turbines and transmission lines. However, given the distance of the Project from the proposed

reintroduction site (110 mi), the densely forested landscape within and surrounding the Project, and the general lack of a concentrated food source for condors within the Project and surrounding area, the potential for condors to regularly forage or roost within the Project Site is believed to be low. Based on the D'Elia et al. (2015) condor habitat suitability model, suitable nesting habitat is generally absent from the Project vicinity and roosting and foraging habitat is limited. Furthermore, areas predicted by the model as having greater suitability for condors, closely align with the boundary of the 1992 Fountain Fire and may no longer be considered suitable for condors given forest growth over the 27 years since the fire. While habitat suitability generally appears low within the Project Site, if condors do begin to use inland areas there is some potential for condors to occur in the Project vicinity while traveling between nesting/roosting and foraging areas, which could put them at risk of collision.

Despite condors occurring in relatively close proximity to wind energy facilities in southern California over the past 27 years since the southern California reintroduction, no known condor fatalities have been documented at any facility to date. Given the distance of the Project from the proposed reintroduction site, the general lack of nesting/roosting/foraging habitat within the Project Site, and the ability to closely monitor the released population, risk of the Project to the reintroduced condor population is considered low.

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