Wind Energy Condor Action Team (WECAT)

Condor Conservation Plan

Draft

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DRAFT

WIND ENERGY CONDOR ACTION TEAM (WECAT) – CONDOR CONSERVATION PLAN

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Contents

Tables

Figures

On or Follows Page

Chapter 1
Introduction

1.1 Overview and Background

Wind energy production in the Tehachapi Wind Resource Area in southeastern Kern County, California, has been occurring for more than 35 years. Currently, there are approximately 50 operating projects in this wind resource area with approximately 3,465 turbines with 3.3 gigawatts (GW) of generating capacity (Hoen et al. 2022). The wind resource area is the largest wind energy production area in California, producing more than 50% of the state's wind energy in 2020; as such, it is an important contributor to the goals of the state's renewable portfolio standard program and assists the state in achieving the goal of 100% renewable energy by 2045 (California Energy Commission 2020). The wind resource area is located at the edge of the current range of the California condor (*Gymnogyps californianus*), which has been slowly expanding in recent years as the population has increased. California condors have become well established in the Tehachapi mountain range southwest of the Tehachapi Wind Resource Area and they fly over portions of it. To date, there have been no reported instances of California condors being injured or killed by operating wind turbines in the Tehachapi Wind Resource Area. However, as the California condor population continues to grow and their current range expands, the potential for a California condor to be injured or killed from a collision with a wind turbine or other wind project-related facility becomes greater.

1.2 WECAT Representation

To address the potential for conflicts between wind turbine operations and California condors, a group of project owners and operators within the Tehachapi Wind Resource Area have formed the Wind Energy Condor Action Team (WECAT). WECAT wind project owners and operators, will hereafter be referred to as *WECAT members* or *covered operators*. For purposes of this Condor Conservation Plan (CCP), each of the covered operators' specific wind energy project facilities are *covered projects*. WECAT members currently operate approximately 1,282 turbines across approximately 200 square miles with 2.3 GW of generating capacity, which represents approximately 72% of the current wind energy generating capacity within the Tehachapi Wind Resource Area (Figure 1-1). WECAT members are seeking to proactively address the risk of injuring or killing a California condor by preparing this CCP to meet the incidental take permit (ITP) issuance criteria under Section 10(a)(1)(B) of the federal Endangered Species Act (ESA). The WECAT members intend to apply to the U.S. Fish and Wildlife Service (USFWS) for an ITP for the activities covered by this CCP. If USFWS determines that the permit issuance criteria have been satisfied and issues the permit, then the covered operators will become co-permittees for the permit. WECAT will be reconstituted as a formal legal entity for the purposes of implementation to coordinate information among co-permittees and assist with the CCP implementation in accordance with agreements to be entered into between WECAT and the co-permittees.

1.3 Purpose

WECAT members are applying to USFWS for a permit for incidental "take" of the federally endangered California condor under Section 10(a)(1)(B) of the federal ESA. This CCP was developed in close coordination with USFWS and is intended to create a regional framework to support ITP issuance by creating a coordinated and consistent conservation program across the WECAT members to address increasing risk of injury or mortality of the species, and to provide mitigation that will fully offset these impacts and ultimately benefit the California condor.

1.4 Scope of Condor Conservation Plan

This section provides an overview of the scope of the CCP including permittees, permit duration, plan area, permit area, covered activities, and covered species.

1.4.1 Permittees

WECAT members are legal entities that own and operate wind energy facilities and will be co-permittees under the ITP issued by USFWS. Each co-permittee will be responsible for operating their wind energy facility consistent with the terms of this CCP and the ITP. The proposed ITP co-permittees are shown in Table 1-1. The parent companies of the proposed co-permittees, who are not WECAT members, are shown below for organizational and illustrative purposes only. The parent companies will not be co-permittees.

Table 1-1. WECAT Condor Conservation Plan Proposed Co-Permittees

Parent Company	Proposed Co-Permittees
Berkshire Hathaway Energy Renewables (BHER)	Pinyon Pines I LLC
	Pinyon Pines II LLC
CalWind Resources, Inc.	CalWind Resources, Inc. – Wind Resource 1
	CalWind Resources, Inc. – Wind Resource 2 – Pajuela Peak
Clearway Energy Group	Alta Wind I, LLC
	Alta Wind II, LLC
	Alta Wind III, LLC
	Alta Wind IV, LLC
	Alta Wind V, LLC
	Alta Wind XI, LLC
EDF Renewables (EDFR)	Pacific Wind Lessee, LLC
	Keyhole Wind, LLC [a]
EDP Renewables (EDPR)	Rising Tree Wind Farm LLC
	Rising Tree Wind Farm II LLC
	Rising Tree Wind Farm III LLC
EverPower Wind Holdings, Inc.	Mustang Hills, LLC

Parent Company	Proposed Co-Permittees
NextEra Energy Resources	Alta Wind VIII, LLC Coram California Development LP Coram Energy, LLC Coram Tehachapi, LLC North Sky River, LLC Sky River, LLC Windstar Energy, LLC
Wind Wall Development LLC	Wind Wall 2 LLC
8 parent companies	24 proposed co-permittees

[a] The Keyhole Wind project is not currently constructed. The project is currently being reviewed by Kern County and Keyhole Wind, LLC is seeking take coverage for California condor during operation under this CCP in the event that the County approves the project.

1.4.2 Permit Duration

WECAT is requesting a 30-year permit duration. This term was selected because wind power generation in the region will continue into the foreseeable future and because it provides covered operators long-term operational certainty while also minimizing the risk to California condors and ensuring that impacts are fully mitigated. This permit duration is sufficient to ensure the successful implementation of the conservation program and will be supported by annual reporting to the USFWS.

1.4.3 Geographic Coverage

1.4.3.1 Plan Area

The Tehachapi Wind Resource Area represents an area of wind power production in southeastern Kern County, California. For the purposes of this CCP, WECAT used the boundaries of the Tehachapi Wind Resource Area, as identified by the California Energy Commission (CEC) to define the plan area. WECAT modified these boundaries on the west to exclude the areas with highest California condor use and, in the south, to include covered projects. The plan area boundaries define the area in which all covered projects are located, as well as projects being operated by non-WECAT members and operators who have their own CCPs (Figure 1-2). The plan area is 341,916 acres. The plan area does not include all areas associated with the mitigation program activities (i.e., captive breeding facilities) because those activities are covered under a separate Section 10 permit.

1.4.3.2 Permit Area

The permit area is the area within the plan area where USFWS would permit incidental take for the covered activities. This area consists of the lands under direct control of covered operators within the plan area, including the locations of project-related operational facilities. The permit area is approximately 55,477 acres.

1.4.4 Covered Activities

The primary covered activity addressed by the CCP is the operation of wind turbines, including all elements of the turbine (e.g., rotating and nonrotating turbine blades and turbine towers). Operations of other facility infrastructure, as well as repowered equipment, are also proposed for coverage. In total, the covered activities include: operation by covered operators of wind turbines, including both existing and repowered equipment; operation of aboveground collection, gen-tie and transmission lines and poles; operation of meteorological towers, including tower guy wires; and operation of substations and switchyards. Covered activities include operations within the permit area that are typically associated with avian mortality or injury. Covered operators' facilities are described in detail in Chapter 2, *Covered Activities*.

1.4.5 Covered Species

The CCP covers one species, the federally endangered California condor. The California condor is the only species proposed for coverage because it is the only federally listed species that is reasonably certain to occur throughout the plan area that would be at risk of take by the covered activities. Should an individual project need take authorization for other listed species, that project can apply for such authorization independently of this CCP.

1.5 Regulatory Framework

The following regulatory framework provides an overview of important federal laws related to development and implementation of the CCP.

1.5.1 Endangered Species Act

The federal ESA is intended to protect endangered and threatened species and their habitats, conserve ecosystems, and to help restore and recover listed species. USFWS administers the ESA for terrestrial and freshwater species.

Section 9 of the ESA prohibits the take of any fish or wildlife species listed under the ESA as endangered and most species listed as threatened. *Take*, as defined in Section 3 of the ESA, means "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." *Harass* is defined as the intentional or negligent actions that create the likelihood of injury to a listed species by annoying it to such an extent as to significantly disrupt normal behavioral patterns, which include breeding, feeding, and sheltering. *Harm* is defined by regulation as any act that kills or injures the species, including significant habitat modification.

Section 10 of the ESA includes provisions to authorize take of endangered and threatened species. Section 10(a)(1)(B) provides a mechanism for private landowners, corporations, state agencies, local agencies, and other nonfederal entities to obtain an incidental take permit for take of federally listed fish and wildlife species that is "incidental to, and not the purpose of, the carrying out of an otherwise lawful activity." This is achieved by applying for an incidental take permit and submission of a conservation plan. Prior to issuing an ITP, USFWS must also comply with Section 7 of the ESA, which requires that they evaluate their own federal action to confirm that issuance of the permit is not likely to jeopardize the continued existence of the species addressed in the conservation plan or

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Figure 1-1
Regional Map
WECAT Condor Conservation Plan

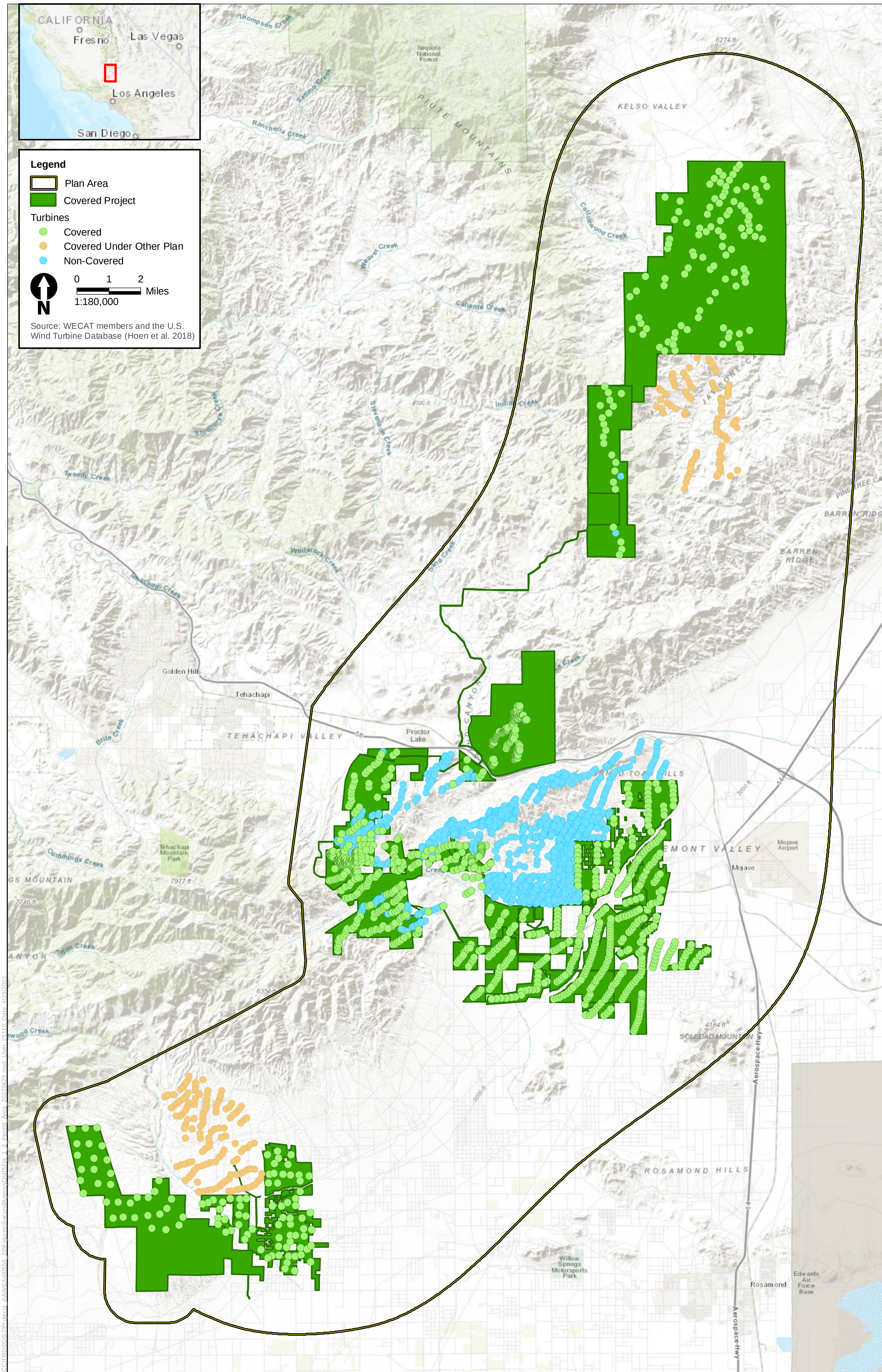

Figure 1-2
Permit Area Map
WECAT Condor Conservation Plan

adversely modify designated critical habitat. To issue an incidental take permit, USFWS must make the following findings:

- The taking will be incidental to an otherwise lawful activity.
- The applicant will, to the maximum extent practicable, minimize and mitigate the impacts of such taking.
- The applicant will ensure that adequate funding for the conservation plan will be provided.
- The taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild.
- Other measures that USFWS requires as necessary or appropriate for purposes of the conservation plan will be met.

1.5.2 National Environmental Policy Act

Issuance of an incidental take permit by USFWS under ESA Section 10 constitutes a federal action that requires compliance with the National Environmental Policy Act (NEPA). NEPA requires federal agencies to include in their decision-making process appropriate and careful consideration of environmental impacts of a proposed action and of possible alternatives. USFWS will be the NEPA lead agency for consideration of this CCP and will evaluate the potential environmental impacts of incidental take permit issuance and CCP implementation.

1.5.3 National Historic Preservation Act

USFWS is also required to comply with Section 106 of the National Historic Preservation Act (NHPA) before issuing an incidental take permit. Section 106 requires federal agencies to take into account the effects of their actions on historic properties listed or eligible for listing in the National Register of Historic Places. Historic properties include prehistoric and historic sites, buildings, structures, districts, and objects included in or eligible for inclusion on the National Register of Historic Places, as well as artifacts, records, and remains related to such properties. Historic properties may include places of traditional religious and cultural importance to Indian tribes.

1.6 Document Contents

The CCP is organized to include the following chapters.

- *Executive Summary* – Provides a summary of all components of the CCP.
- Chapter 1, *Introduction* –Provides information on the background, WECAT representation, purpose, scope (permittees, duration, geographic coverage, covered activities, covered species), and regulatory framework.
- Chapter 2, *Covered Activities* – Provides program description including facility and operational overview and covered activity description.
- Chapter 3, *Environmental Setting and Condor Habitat Use* – Provides an environmental setting, including detailed information on California condor use of the plan area.

- Chapter 4, *Biological Effects and Take Assessment* – Provides an effects analysis of the covered activities, requested take authorization, and anticipated impact of the take on the population.
- Chapter 5, *Conservation Program* – Provides detailed information on the conservation program including biological goals and objectives, measures to minimize take, measures to mitigate impacts of take, monitoring, and the adaptive management program.
- Chapter 6, *Implementation and Funding* – Describes plan implementation, changed and unforeseen circumstances, minor modifications and amendments, and implementation costs and funding.
- Chapter 7, *Alternatives* – Provides alternatives to the CCP.
- Chapter 8, *References*
- *Chapter 9, List of Preparers*
- Appendix A, *Covered Operator Maps*
- Appendix B, *Tagging Threshold Analysis*
- Appendix C, *Population Viability Analysis*

Chapter 2
Covered Activities

The chapter describes the activities covered by this CCP. WECAT members developed this CCP based on a common need to provide long-term operational assurances to the covered operators. CCP covered activities are selected based on their assessed risk of take of a California condor. Activities associated with projects that have little or no potential for take of a California condor are not covered by the CCP; see Section 2.4, *Activities Not Covered*, for details.

2.1 Overview of Covered Activities

2.1.1 Operation of Projects

The primary covered activity addressed by the CCP is the operation of wind turbines, including the tower, nacelle, and rotating and nonrotating turbine blades. The covered operators' wind projects are shown in Figure 2-1 and turbines include those listed in Table 2-1. The operation of other facility infrastructure is also proposed for coverage by this CCP.

- Operation of aboveground collection, electrical generation intertie (gen-tie), and transmission lines and poles.
- Operation of meteorological (met) towers, including met tower guy wires.
- Operation of substations and switchyards controlled by any of the covered operators.

Each of these specific wind energy projects is referred to in this CCP as a *covered project*. When describing equipment at a covered project, the CCP uses the term *covered facilities* (e.g., covered turbines, aboveground electrical equipment, met towers, and substations and switchyards).The term *covered operations* refers to the operation of all covered projects and all covered facilities.

2.1.2 Operation of Repowered Equipment

Over the course of the permit, covered projects may elect to repower with more modernized equipment. Repowering is the process of replacing older equipment and technology with new equipment and current technology. The operation of repowered wind turbines is a covered activity under this CCP. The construction associated with repowering is not a covered activity, as described in Section 2.4, *Activities Not Covered*.

Repowered projects may include updated turbine components (e.g., gearboxes, turbine nacelle assemblies, towers, turbine blades, etc.) as well as projects with updated turbine models. Projects with updated turbine components are likely to retain the same number of turbines but gain efficiency in power production and turbine control. Projects with updated turbine models are likely to have fewer, larger turbines on taller towers after repowering, and gain efficiency in power production and turbine control systems. For example, many of the repowering actions conducted 10 years ago were able to remove several hundred small turbines each and replace them with one-third as many large turbines. Repowered wind projects will include Programmable Logic Controller (PLC), a computing system used to control electromechanical processes, and Supervisory Control and Data

Acquisition (SCADA). PLC and SCADA systems monitor variables such as wind speed and direction, air and machine temperatures, electrical voltages, currents, vibrations, blade pitch and yaw angles, etc. The control system is always running and ensures that the machines are operating efficiently and safely. If power to the control system is lost, the turbines shut down in fail-safe mode. These upgrades will increase the covered operators' collective capacity to implement aspects of the CCP as outlined in Chapter 5, *Conservation Program*. The operation of the repowered facility infrastructure is also covered by this CCP:

- Operation of aboveground collection, gen-tie, and transmission lines and poles.
- Operation of meteorological (met) towers, including met tower guy wires.
- Operation of substations and switchyards.

2.2 Covered Projects

Twenty-three of the covered projects were constructed between 1985 and 2015. One covered project, Keyhole, is currently in process of obtaining construction permits from Kern County. When Keyhole becomes operational, it will be covered under the permit. Covered project information is summarized in Table 2-1 and project locations are depicted in Figure 1-2. Figures for each covered operators' covered project, organized by parent company, are included in Appendix A, *Covered Operator Maps*. Features common to all or most covered projects are described below.

2.2.1 Turbines

Wind turbine models have changed over the past two decades as the technology has improved. Eighteen covered projects are representative of modern turbines consisting of a monopole tower, a nacelle, and three blades attached to a hub. Modern turbine models in use include those manufactured by Vestas, Senvion, Gamesa, and General Electric and range in size from 1.5 megawatt (MW) to 3 MW, with hub heights ranging from approximately 150 feet to 330 feet and rotor diameters ranging from approximately 265 to 370 feet. Five covered projects have turbines smaller than 1 MW in size that may have monopole or lattice tower structures. These facilities have hub heights ranging from 65 to 165 feet and rotor diameters ranging from 25 to 78 feet.

Turbine technology continues to advance and turbines are generally becoming more efficient. As covered projects repower, turbine sizes could range in size from 2 to over 5 MW. These covered projects would have hub heights greater than 420 feet and rotor diameters of greater than 560 feet but will be dictated by Kern County code. The current number of covered turbines is approximately 1,282, though the number may change over time as projects are repowered or new or existing projects join WECAT (Table 2-1).

2.2.2 Collector, Gen-Tie, and Transmission Lines

The electrical infrastructure of covered projects varies. Generally, electricity from each turbine is conveyed via underground or overhead electric collector lines to a project substation. Although most covered operators' collector lines are buried, some projects require above ground collector lines or riser/dip poles due to rocky substrates or other existing infrastructure. Energy is then conveyed from the project substation to the interconnect substation (or grid) via a power line, which is often referred to as the project's gen-tie line. Aboveground collector lines typically consist

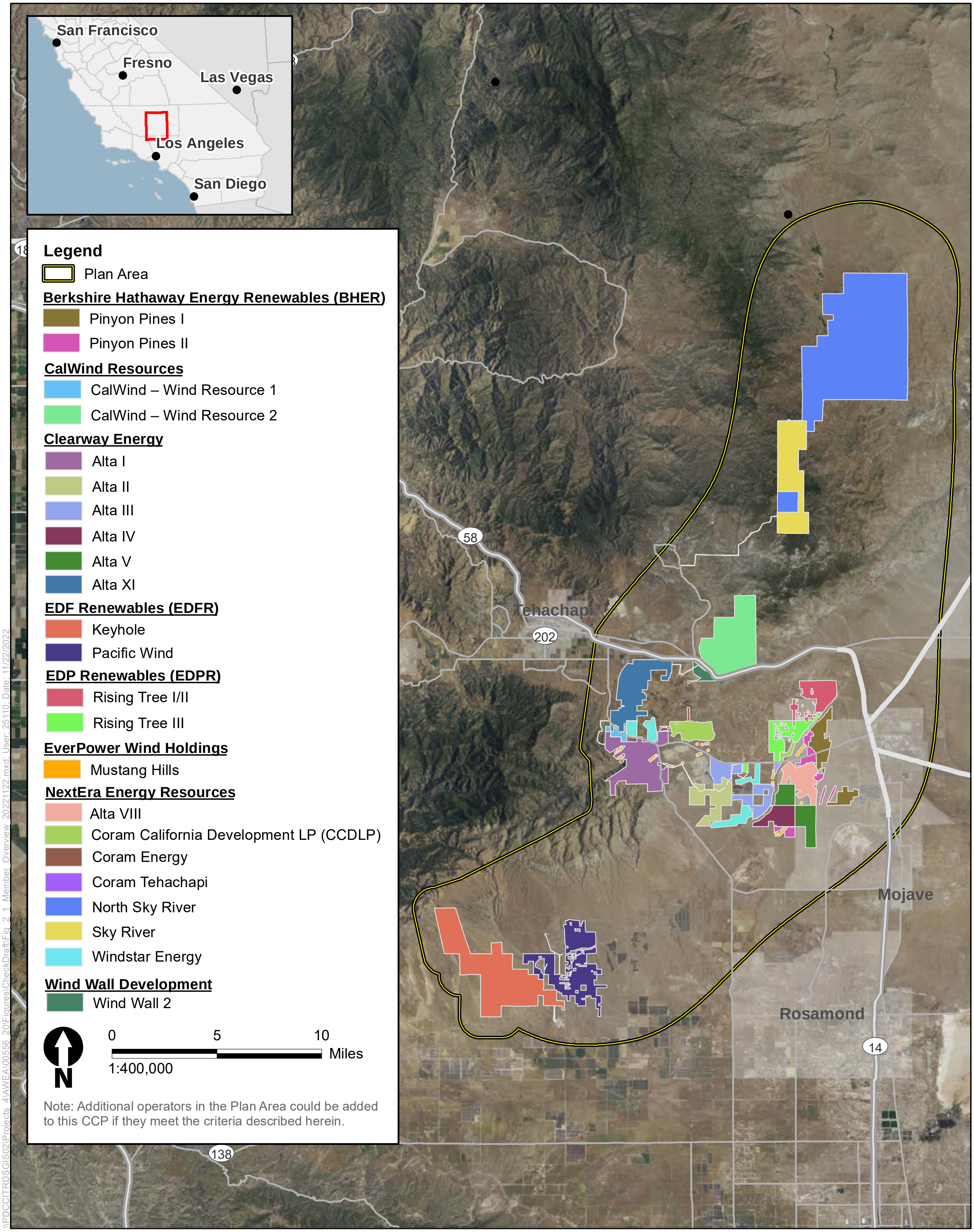

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Figure 2-1
Covered Project Overview Map
WECAT Condor Conservation Plan

of 32.8- to 45-foot-tall wood power poles that convey voltages under 69 kilovolts (kV). Gen-tie lines and transmission lines are run on wood or steel poles with heights that vary from 32.8 to 131.2 feet and typically convey electricity from 115 to 345 kV depending on the project size and MW generated, though may convey electricity at any voltage. WECAT may refer to collector, gen-tie-, and transmission lines collectively as power lines.

The number of aboveground miles of power lines varies by covered operator. Covered projects have approximately 96 miles of aboveground power lines including 1 mile of collector line, 21 miles of gen-tie lines, and 74 miles of transmission lines (Table 2-1). Underground electric infrastructure and underground gen-ties are not covered by the CCP because there is no potential for take of California condor resulting from their operation.

2.2.3 Meteorological Towers

Most of the covered projects maintain meteorological towers (met towers) to collect baseline weather, wind speed, and wind direction information and some projects have several. These covered facilities are typically 50 to 230 feet tall; some are free-standing and others are supported by guy wires. There are approximately 31 met towers covered by the CCP (Table 2-1).

2.2.4 Substations and Switchyards

Substations serve to step up lower voltage electricity to higher voltage electricity to interconnect wind projects to the electric grid. Switchyards provide a method to isolate a section of line with transmission voltage during grid operation and maintenance. Covered substations range in size from 0.25 acre to 3 acres and are fenced to prevent human entry without authorization. Substation equipment varies but typically includes transformers, circuit breakers, switches, surge arresters, buswork, capacitor banks and other equipment depending on the substation. Switchyard equipment typically includes large breakers, insulators, isolators, and buswork. Substation and switchyard substrate is typically graveled and maintained to be clear of vegetation. There are approximately 5 substations and switchyards covered by the CCP (Table 2-1).

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Table 2-1. Covered Project and Covered Facility Information[a]

Parent Company	Covered Operator/Covered Project	Initial Operation Date	Capacity (MW)	Number of Turbines	Make and Model of Turbines	Rotor Diameter (feet)	Aboveground Transmission Lines (miles)	Aboveground Collector Lines (miles)	Aboveground Gen-Tie Lines (miles)	Number of Met Towers	Guy Wired Towers	Number of Substations/ Switchyards
Berkshire Hathaway Energy Renewables (BHER)	Pinyon Pines I LLC	2012	168	56	Vestas V-90-3.0	295.3	8.73	0	0	1	No	0
	Pinyon Pines II LLC	2012	132	44	Vestas V-90-3.0	295.3	8.2	0	0	2	No	1
CalWind Resources, Inc.	CalWind Resources, Inc. – Wind Resource 1	1984	9	134	Nordtank 65/13kW	53.4	0.6	0	0	2	1	0
	CalWind Resources, Inc. – Wind Resource 2 – Pajuela Peak	1997	20	188	175 - Bonus 65/13kW 13 - Vestas V47-660	50.9 and 154.2	5.0	0	0	14	0	1
Clearway Energy Group	Alta Wind I, LLC	2010	150	100	GE-1.5-77	252.6	0	0	0	1	No	1
	Alta Wind II, LLC	2010	150	50	Vestas V-90-3.0	295.3	0	0	1.6	1	No	2
	Alta Wind III, LLC	2011	150	50	Vestas V-90-3.0	295.3	0	0	1.6	1	No	0
	Alta Wind IV, LLC	2011	102	34	Vestas V-90-3.0	295.3	0	0	5.7	1	No	1
	Alta Wind V, LLC	2011	168	56	Vestas V-90-3.0	295.3	0	0	0	1	No	0
	Alta Wind XI, LLC	2013	92	48	GE-1.7-100/2.85-103	328.1 and 337.9	0	0	4.1	1	No	1
EDF Renewables (EDFR)	Pacific Wind Lessee, LLC	2012	140	70	Senvion MM92	303	0	0	5.4	1	Yes	1 (shared)
	Keyhole Wind, LLC	Pending	100	34	SGRE 5.0-132	459.3	TBD	TBD	TBD	2	No	1
EDP Renewables (EDPR)	Rising Tree Wind Farm LLC	2015	80	24	Vestas V-112-3.3	367.5	4	0	0	2	No	0
	Rising Tree Wind Farm II LLC	2015	20	6	Vestas V-112-3.3	367.5	4	0	0	0	No	0
	Rising Tree Wind Farm III LLC	2015	100	30	Vestas V-112-3.3	367.5	4	0	0	2	No	1
EverPower Wind Holdings, Inc.	Mustang Hills, LLC	2011	150	50	Vestas V-90-3.0	295.3	1.5	0	0.25	2	Yes	1
NextEra Energy Resources	Alta Wind VIII, LLC	2012	150	50	Vestas V-90-3.0	295.3	5.6	0	0	0	No	1
	Coram California Development, LP	2012	102	34	Vestas V90-3.0	295.3	2.15	0	0	1	No	2
	Coram Energy, LLC	2005	15	10	GE 1.5 CW	231.3 and 252.6	0	0	1.8	0	Yes	0
	Coram Tehachapi, LLC	1992	6.98	31	Vestas V-27	88.6	0	0	0.4	1	No	1
	North Sky River, LLC	2012	162	100	GE 1.6 ESS	328.1	12	0	0	2	No	1
	Sky River, LLC	2020	60	21	Siemens 2.9 and GE 2.3	88.6	17.8	0	0	1	No	1
	Windstar Energy, LLC	2012	120	60	Gamesa 80-2.0/Gamesa 87-2.0	80 and 87	0	0	0	0	No	2
Wind Wall Development LLC	Wind Wall 2 LLC	1985	3.2	36	Vestas V-17	55.8	0	0.8	0	1	Yes	1
	Wind Wall 2 LLC	Repower	25	7	Vestas V-126-3.6	413.4	0	0.27	0	0	Yes	1
Total Existing			**2,245**	**1,282**			73.6	1.1	20.9	40		21
Total Pending			**125**	**41**								
Total Existing and Pending			**2,370**	**1,323**								

[a] Covered project and facility information may be corrected, modified, or changed over the permit term.
GE = General Electric; met tower = meteorological tower; MW = megawatts; TBD = to be determined.

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2.3 Covered Operations

2.3.1 Turbines

Turbines begin rotating based on several factors including wind speed and the covered operator's control system. In general, turbine blades rotate slowly (e.g., 1 to 2 rotations per minute) until the wind speed reaches the manufacturer's rated cut-in speed, at which point turbine blades begin to rotate more quickly and generate electricity. If the wind speed exceeds the turbine's cut-out speed, the turbine shuts down to prevent generator overspeed. Turbines do not rotate when they are braked for maintenance or other planned or unplanned outages. Turbine operation is controlled and monitored remotely by a SCADA system, if present. Repairs of the turbines or SCADA systems are not included as a covered activity, as described in Section 2.4, *Activities Not Covered*

All turbines will be operated under a California condor risk reduction program described in detail in Chapter 5, *Conservation Program*.

2.3.2 Collection, Gen-Tie, and Transmission Lines

Operation of aboveground collection, gen-tie, and transmission lines is included because of the electrocution and collision risk presented by their presence in the landscape. Repairs of these facilities are not included as a covered activity, as described in Section 2.4, *Activities Not Covered.*

2.3.3 Meteorological Towers

Operation of met towers is included in covered operations because of the collision risk presented by their presence in the landscape. Repairs of these facilities are not included as a covered activity, as described in Section 2.4, *Activities Not Covered.*

2.3.4 Substations and Switchyards

Operation of aboveground substations and switchyards is included in covered operations because of the electrocution and collision risk presented by their presence in the landscape Repairs of these facilities are not included as a covered activity, as described in Section 2.4, *Activities Not Covered.*

2.4 Addition of Covered Projects

This CCP has been structured so that, if an operator of an existing project or a new project that has yet to be constructed desires to seek incidental take coverage for California condors within the plan area, such coverage could be provided by this CCP under the circumstances described below. If a project does not satisfy the criteria set forth below, it may apply for its own incidental take permit from USFWS.

Additional projects within the plan area may be enrolled in the CCP with USFWS approval. Projects must meet the following conditions to be added during plan implementation.

- Enrolled projects must be located within the CCP plan area (Figure 1-1).

- The take limit established by the CCP (see Chapter 4, *Biological Effects and Take Assessment*) must not change.
- A new enrolled project must adhere to the requirements of this CCP, as determined by WECAT and USFWS (see Chapter 5, *Conservation Program)*.
- A new enrolled project must not be in an area that poses substantially higher risk of taking California condors (see Chapter 6, *Implementation and Funding*).
- Enrollment in the CCP would require the operator to join WECAT and be added to the ITP as a co-permittee.
- The proposed co-permittee must meet any organizational requirements or criteria of WECAT as may be established in its operating agreement.
- WECAT must confirm with USFWS that the co-permitee is appropriate to add to the permit.

Details of the addition of new operators are described in Chapter 6, *Plan Implementation,* Section 6.1.3, *Addition of Existing or New Operators*.

2.5 Activities Not Covered

The following activities are not covered by this CCP. A brief description of each activity and the reasons the activity is not proposed for coverage are provided below.

- **Facility maintenance.** WECAT members have different inspection, maintenance, repair, and replacement intervals for their facilities. Each project is unique with respect to its needs. These inspection, maintenance, repair, and replacement activities are not covered activities because take of California condor is not expected to occur from any of these maintenance or repair activities. Each WECAT member is responsible for its own environmental compliance for this work when needed.
- **Vehicle use.** The use of vehicles by operations and maintenance personnel is not a covered activity because take of California condor is not expected to occur from these activities given speed limits and employee education that makes vehicle collision risk extremely low.
- **Construction of new and repower projects.** Construction associated with the development of new wind projects or the action of replacing existing projects with repowered projects is not a covered activity because construction activities are not expected to result in take of California condors. The plan area of this CCP consists of private land located in unincorporated Kern County. Accordingly, the siting and development of new projects within the plan area would be subject to the exclusive jurisdiction of Kern County. WECAT members would seek local land use approvals from Kern County and will abide by regulatory and permitting requirements for construction activities.
- **Operation of underground electric facilities.** Most WECAT members own and operate electric collector lines underground, especially between turbines and nearby pad-mounted transformers. Electric facilities that are underground are not covered by this CCP because their operation has no potential for take of California condor.
- **Projects operated by non-permittee**. All of the covered projects connect to the regional electric grid operated by Southern California Edison. Electrical system facilities owned and

operated by Southern California Edison are not covered by this CCP. Additionally, although WECAT members account for a large percentage of the wind energy generation capacity in the Tehachapi Wind Resource Area, operation of wind projects within the plan area by non-permittees is not covered by this CCP.

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Chapter 3
Environmental Setting and Condor Habitat Use

This chapter provides an overview of the environmental setting and California condor use in the plan area that is relevant to this CCP. Section 3.1, *Environmental Setting*, describes the setting in terms of climate, topography, hydrology, land use, and vegetation. Section 3.2, *California Condor*, describes the California condor baseline biology and ecology, conservation management, and occurrence data and habitat within the plan area. Information in this chapter is used to support the effects analysis (Chapter 4, *Biological Effects and Take Assessment*) and the conservation strategy (Chapter 5, *Conservation Program*).

3.1 Environmental Setting

The plan area comprises a portion of the Tehachapi Mountains, southern region of the Sierra Nevada, the Tehachapi Valley and the Antelope Valley in southeastern Kern County, California (Figure 1-2).

3.1.1 Climate

The climate in the plan area is typical of the Mojave Desert, characterized by extreme temperatures and little precipitation. In the Antelope Valley, temperatures range between a mean maximum of 97 degrees Fahrenheit (°F) in July and mean minimum of 32°F in December. Precipitation mostly occurs in the winter months. Annual average precipitation is approximately 6 inches (WRCC 2016). In the Tehachapi Valley, in the western portion of the plan area, the mean maximum temperature is 87°F in July and the mean minimum temperature is 29°F in December. Precipitation falls mostly in the winter months as rain or snow, and averages approximately 11 inches per year (WRCC 1997).

3.1.2 Topography

The Tehachapi Mountain Range borders the western portion of the plan area. The Tehachapi Mountains are part of the Transverse Ranges of California and form the boundary between the San Joaquin Valley to the west and the Mojave Desert to the east. Foothills of the Tehachapi Mountains comprise the western portion of the plan area. Topography in this portion is generally rolling with an overall southeastern aspect. The southern reaches of the Sierra Nevada make up the northern portion of the plan area and contain similar topography. The Tehachapi Valley and State Route (SR) 58 separate the two mountain ranges.

Antelope Valley is approximately one-third of the plan area, in the southeastern portion. The Antelope Valley is a broad, ancient alluvial fan gradually sloping to the southeast. Slopes in this portion of the plan area are generally flat.

Elevations within the plan area range between 2,500 feet in Antelope Valley and 6,677 feet in the Tehachapi Mountains (Figure 3-1).

3.1.3 Hydrology

Most of the plan area is in the Antelope-Fremont Valleys watershed. Small portions of the western part of the plan area, including western flanks of the Tehachapi Mountains, are located in the Middle Kern-Upper Tehachapi-Grapevine watershed. In general, surface hydrology in the Antelope Valley portion of the plan area consists of shallow, ephemeral drainages that flow southeast. In the plan area's mountainous portions, surface water flows in intermittent drainages in canyons.

The National Hydrography Dataset (NHD) shows 88 waterbodies within the plan area (USGS 2014). Twenty-one of these waterbodies are considered perennial lakes/ponds and 47 are intermittent. Proctor Lake, in Tehachapi Valley along SR 58 is a playa; it does not contain water year-round, but may be inundated following extreme precipitation events. Other waterbodies within the plan area include 19 reservoirs, the majority of which are reservoirs for water storage, reservoirs that resulted from excavation of construction material, or sewage treatment ponds.

There are 11 named waterways in the plan area, totaling 152 miles. The Los Angeles Aqueduct and Second Los Angeles Aqueduct make up 69 miles of the waterways within the plan area, most of which are conveyed in underground pipelines. There is one drainage in the plan area with a section of perennial stream—Cottonwood Creek, which is in the northern portion. Six of the 24 miles of Cottonwood Creek in the northern portion of plan area is considered perennial. The remaining eight named waterways are intermittent.

3.1.4 Existing Land Use

Wind energy generation is the primary developed land use in this portion of Kern County. In 2016, generation capacity in the plan area was 3.3 gigawatts (GW) from approximately 48 wind energy facilities, of which 24 are currently covered projects under this CCP. Lands leased by the covered projects occupy approximately 55,477 acres of the plan area, or 16.2% of the plan area. Approximately 272 miles of power lines are within the plan area, 38% (104 miles) of which are proposed for coverage under the CCP. According to the Farmland Mapping and Monitoring Program of the California Department of Conservation, most of the plan area (54.7%) is grazing land. Nonagricultural and natural lands are approximately 39.5% of the plan area. Farmland and agricultural areas, urban/developed areas, and vacant/disturbed areas make up 0.8%, 1.8%, and 3.1% of the plan area, respectively (FMMP 2018).

Approximately 21% of the plan area is publicly managed lands and the remaining 79% of the plan area is privately owned. Livestock grazing (including sheep and cattle), occurs within the plan area on private lands and on public lands managed by the Bureau of Land Management (BLM). Livestock activity is relevant to the CCP as dead livestock are a source of carrion and can attract California condors. Livestock grazing occurs on many covered operators' leased lands. There are four BLM livestock allotments within the plan area for cattle and sheep. Animal Unit Months (AUM) on these BLM allotments range between 55 AUMs to 354 AUMs (Figure 3-2; BLM 2016). BLM sheep allotments are small and scattered in the southern portion of the plan area. Cattle grazing allotments are extensive in the northern portion, north of SR 58. Most of the grazing pastures in Rudnick Common have been relinquished and permitted grazing no longer occurs there (Figure 3-2).

Recreational hunting occurs within the plan area in designated state hunting zones. Project lease agreements do not allow for hunting, though hunters do trespass on the covered projects. Animals shot by hunters and not recovered and the gut piles of field-dressed animals are a source of carrion

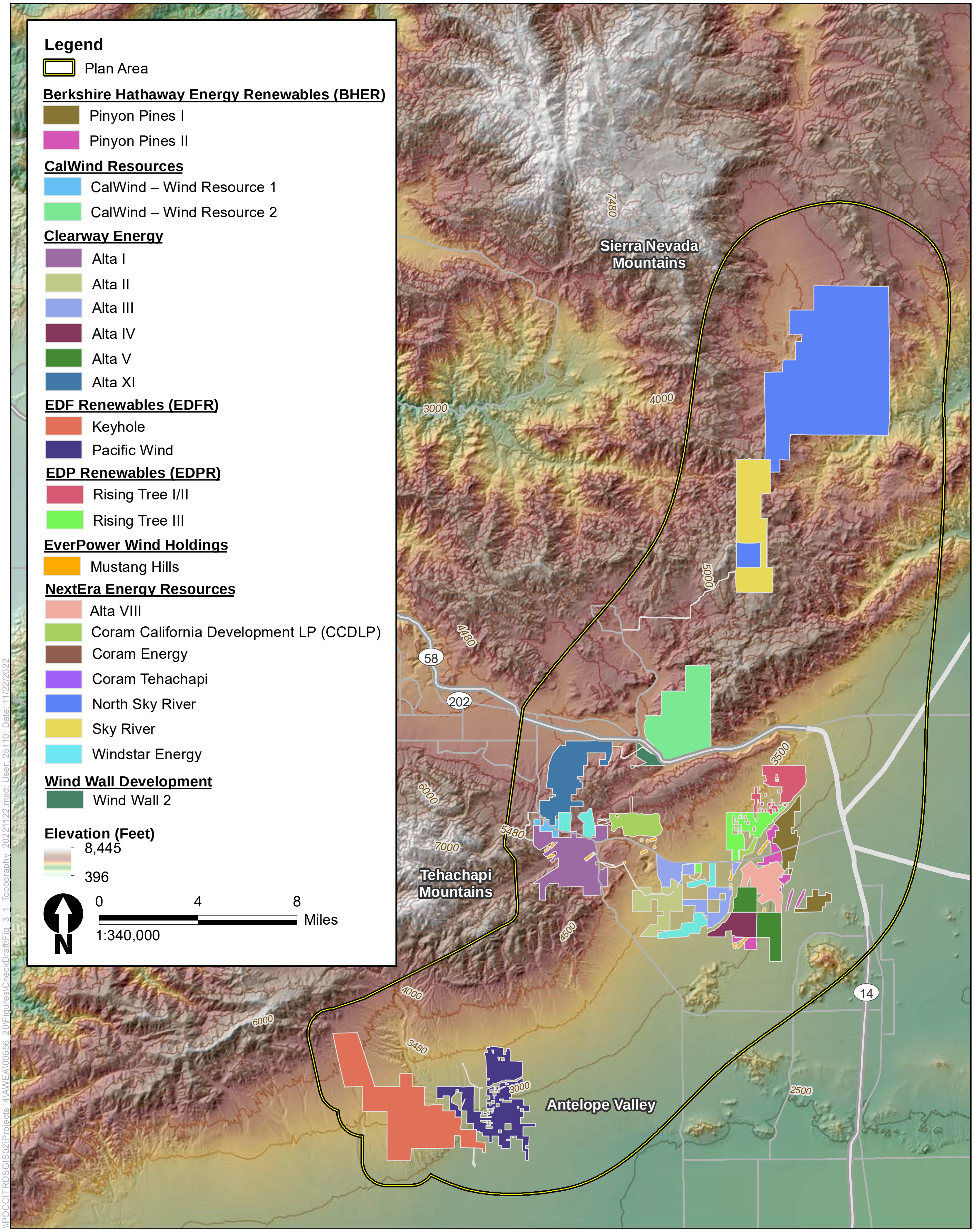

Figure 3-1
Topography
WECAT Condor Conservation Plan

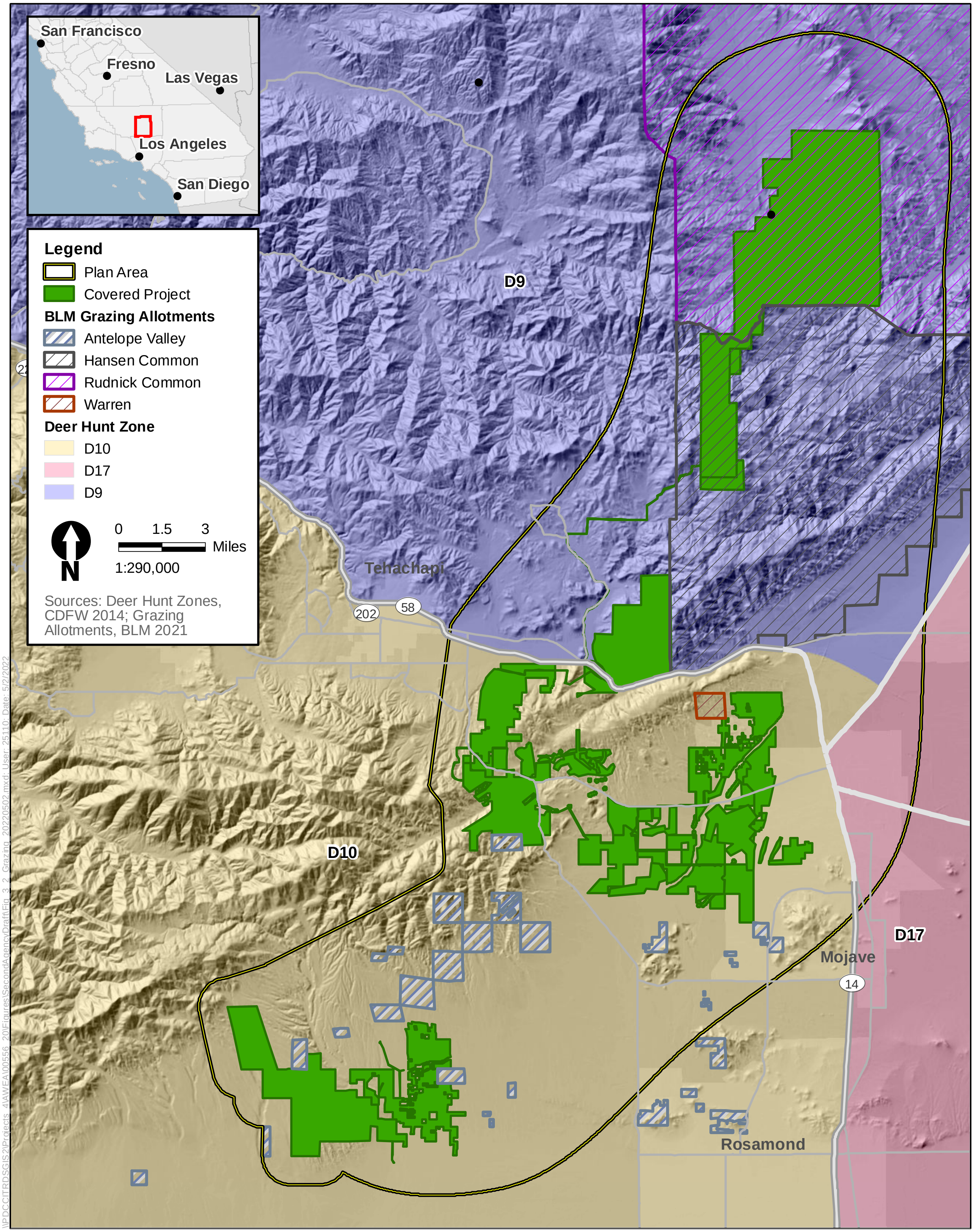

Figure 3-2
Grazing Allotments and Hunting Zones in the Plan Area
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that can attract California condors. California Department of Fish and Wildlife deer hunting zones D9, D10, and D17 are within the plan area (Figure 3-2; CDFW 2021).

3.1.5 Vegetation

Approximately 73% of the plan area is comprised of desert scrub/shrubland habitats. Grasslands and other herbaceous land cover types comprise approximately 17% of the plan area. Evergreen forest comprise approximately 6% of the plan area. Agriculture and developed areas comprise approximately 4% of the plan area. Open water and wetland/riparian habitats comprise less than 0.1% of the plan area (Table 3-1, Figure 3-3).

In the Antelope Valley, land cover types are primarily shrub/scrub and grassland/herbaceous interspersed with development and agricultural areas (pasture/hay and crops). Developed areas within this portion of the plan area are associated with wind energy development and associated infrastructure, solar energy development, the town of Mojave, and highways and roads.

At the higher elevations in the Tehachapi Mountains and Sierra Nevada foothills, land cover is primarily shrub/scrub and grassland/herbaceous cover types interspersed with evergreen and deciduous forests. Developed areas in the mountainous parts of the plan area are associated with highways and roads, the towns of Monolith and Tehachapi, and wind energy development and associated infrastructure. In the farthest northern portion of the plan area, there are several emergent wetland complexes in the Kelso Valley.

Table 3-1. Land Cover Types in the Plan Area

Land Cover Type	Amount (acres)	Percentage
Agriculture		
Pasture/Hay	43	0.01%
Cultivated Crops	424	0.12%
Aquatic		
Emergent Herbaceous Wetlands	252	0.07%
Open Water	31	0.01%
Woody Wetlands	39	0.01%
Barren Land (Rock/Sandy/Clay)	1,260	0.37%
Grassland/Herbaceous	57,232	16.74%
Developed		
Open Space	10,632	3.11%
Low Intensity	1,803	0.53%
Medium Intensity	974	0.28%
High Intensity	579	0.17%
Forest		
Deciduous Forest	68	0.02%
Evergreen Forest	19,999	5.85%
Mixed Forest	157	0.05%
Shrub/Desert Scrub	248,422	72.66%
Total	**341,915**	**100.00%**

Source: Multi-Resolution Land Characteristics Consortium 2019.

3.2 California Condor

The only species proposed for coverage under this CCP is the California condor. This section provides an overview of biology and ecology of the California condor relevant to this CCP. This section includes a species overview; a summary of the species' distribution, population decline, and recovery; a description of California condor foraging behavior and habitat use; a summary of management considerations and activities; and information on the distribution of the species within the permit area.

3.2.1 Species Overview

The California condor is a New World vulture, belonging to the family Cathartidae. This species is the largest flying bird in North America, with a wingspan of up to 9.5 feet and weighing between 17 and 24 pounds (USFWS 2013a). Males and females are similar in appearance. Adult condors are almost entirely black with prominent white underwings visible during flight. The heads and necks of adult birds are mostly bare and red or orange in color. Juvenile condors have mostly black, bare heads and mottled underwings. Adult plumage and coloration are attained at approximately 5 to 6 years of age (USFWS 2013a). Pair formation, courtship, and nest-site selection generally occur during the winter, and a single egg is produced between January and early April. Both male and female parents contribute to brood rearing. Young condors fledge from the nest between 5 and 7 months old, but often are not fully independent until after a year (USFWS 2013a).

California condors are gregarious birds, and may roost, feed, forage, or bathe in groups. Large concentrations of condors are generally uncommon but condors may congregate for short periods near waterbodies or at carcasses (Finkelstein et. al. 2020). California condors are obligate scavengers, depending primarily on large mammalian carcasses (Finkelstein et al 2020).

California condors' current occupied range in the United States includes portions of southern and central California, northwest California, northern Arizona, and southern Utah (Finkelstein et al 2020, Yurok Tribe 2022, Los Angeles Times 2022). The species experienced severe population declines in the 1950s and 1960s (USFWS 2013a). California condors were listed as endangered under the ESA in 1967. Critical habitat was designated for the species in 1977. Certain populations have been designated as nonessential, experimental populations in northern Arizona and southern Utah (1996), and in northern California and Oregon (2019; USFWS 2021a). USFWS first published a recovery plan for the species in 1975. The most recent revision of the recovery plan was published in 1996.

Current threats to the survival of California condors in the wild include lead poisoning, predation, and collision with anthropogenic structures (USFWS 1996). Due to its small population size, slow reproduction, and ongoing threats, this species is intensively managed by USFWS. Management of the southern California population involves captive breeding, releases, proffered feeding, and rigorous management and health monitoring of free-flying condors (USFWS 2020).

3.2.2 Distribution, Population Decline, and Recovery

Fossil records indicate that the California condor ranged over most of the North American continent during the late Pleistocene era (approximately 50,000–100,000 years before present). By the 1800s, the range of the California condor included most of western North America from British Columbia, Canada, to Baja California, Mexico (USFWS 2013a). By the 1950s, their range was confined to

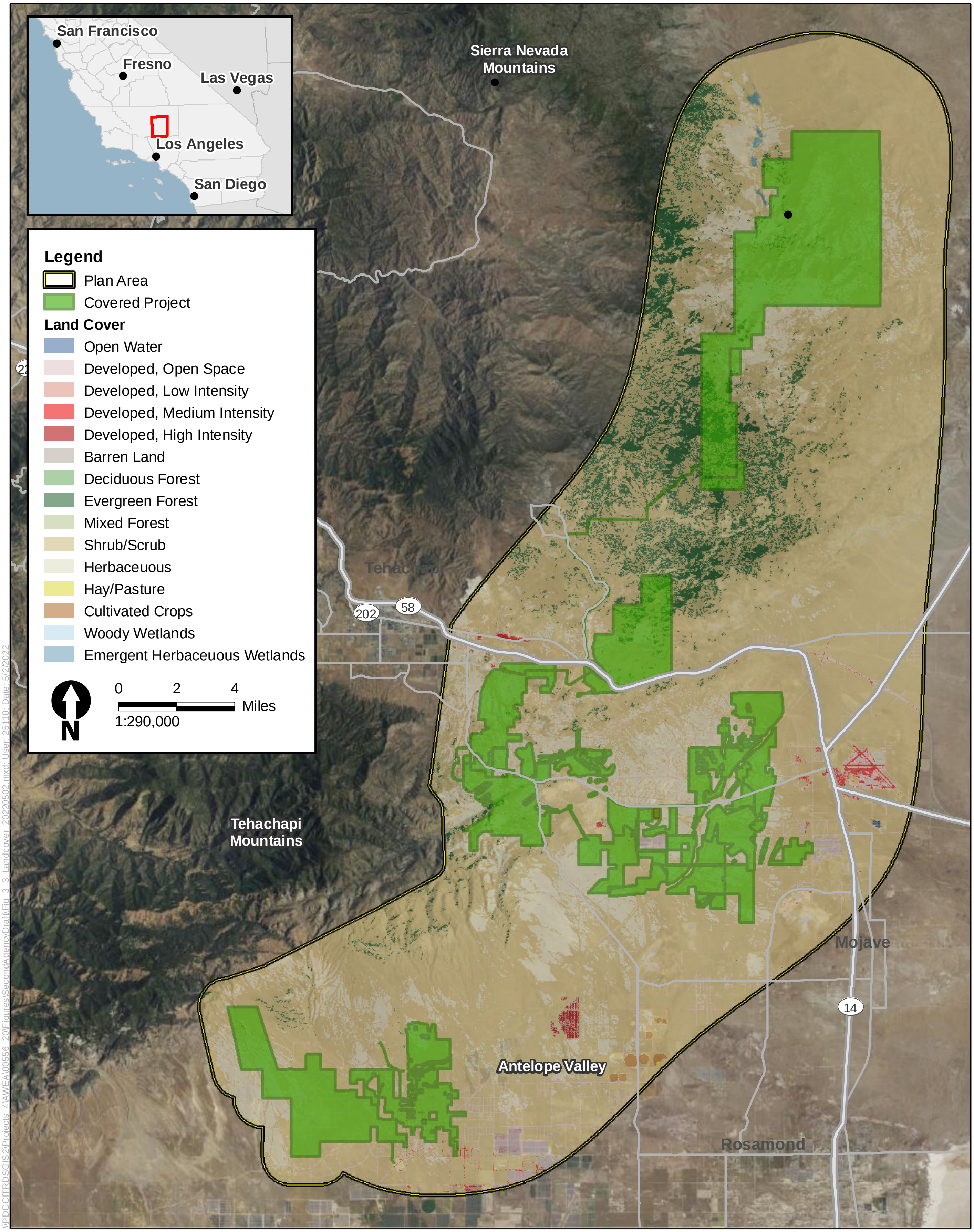

Figure 3-3
Land Cover Types in the Plan Area
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southern and central California in the mountains and foothills of Monterey, San Benito, San Luis Obispo, Santa Barbara, Ventura, Los Angeles, Kern, and Tulare Counties (USFWS 2013a). The population declined from approximately 150 individuals in 1950 to 25 individuals in 1978 (USFWS 1996).

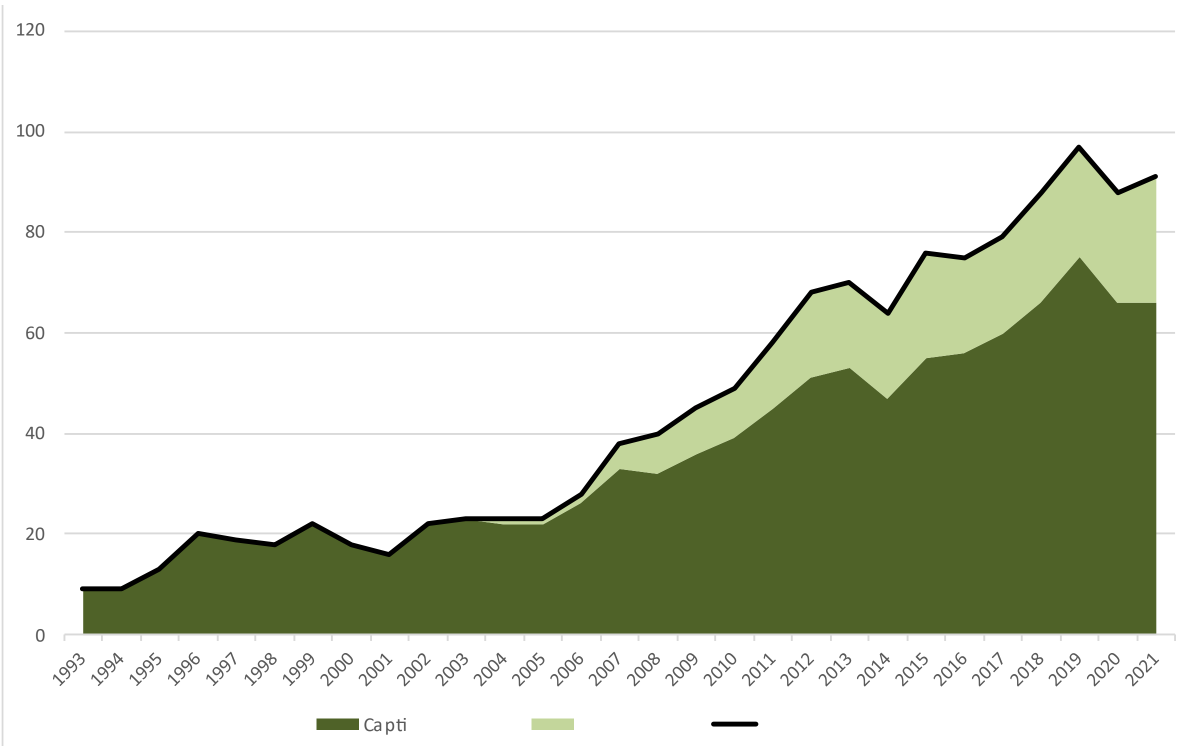
California condors are long-lived birds that reach sexual maturity at 6 years of age, and typically produce only a single egg each year, making this species dependent on high survival rates to sustain population numbers (Finkelstein et al. 2020). Declines in California condor populations have been attributed to human-caused mortality, including poisoning from lead ammunition fragments in scavenged carcasses, illegal shooting, poisoning from the use of rodenticides, power line collision and electrocution, wildfires, specimen collecting, and egg collecting (Finkelstein et al 2020). Initial conservation efforts starting in the 1930s were focused on habitat conservation; however, populations continued to decline sharply (USFWS 2013a). In 1982, a captive breeding program was established using eggs and chicks removed from the wild and a single adult California condor. Following a population crash in which 40% of the wild California condor population died, the remaining wild condors were captured in 1986 and 1987 to ensure their safety and preserve genetic diversity of the species (USFWS 2013a).

In 1992, eight captive-reared birds were released in southern California. Following this, California condors were reintroduced to Arizona in 1996, central California in 1997, northern Baja California, Mexico, in 2002, and in Pinnacles National Monument (now Pinnacles National Park) in California in 2003. Condors reintroduced into Arizona and Utah beginning in 1996 are part of a nonessential experimental population under Section 10(j) of the ESA. In 2021, USFWS issued a final rule to establish a second nonessential experimental population of California condors in the Pacific Northwest (USFWS 2021a), and in May 2022 two condors were released from Yurok tribal lands.

The California Condor Recovery Program is an international multi-entity effort, led by the USFWS, to recover the endangered California condor. Partners in condor recovery include the Peregrine Fund, Ventana Wildlife Society, National Park Service, San Diego Zoo, Los Angeles Zoo, Oregon Zoo, Santa Barbara Zoo, Chapultepec Zoo, Arizona Game and Fish Department, California Department of Fish and Wildlife, Utah Division of Wildlife Resources, Bureau of Land Management, U.S. Forest Service, the federal government of Mexico, the Yurok Tribe, and other governmental and non-governmental organizations. . The goal of the Recovery Program is to establish two geographically distinct, self-sustaining populations of California condors in the wild, with a third population retained in captivity (USFWS 1996). The Recovery Plan does not specify the locations of wild populations under the recovery criteria. Population targets for the recovery program are 150 individuals and 10–15 breeding pairs for each geographically distinct population (USFWS 1996). The Recovery Program is currently focused on creation of these self-sustaining populations through continued reintroduction of California condors and management of free-flying populations. The primary management and recovery actions of the Recovery Program are monitoring resource use, lead monitoring and mitigation in individual birds, mortality detection, nest management, captive releases and transfers, behavioral modification, and public outreach and education (USFWS 2017). An extensive tagging and tracking program has also been developed to monitor released California condors. This program includes tagging all released condors with alpha numeric tags and very high frequency (VHF) transmitters or patagial-mounted Global Positioning System (GPS) transmitters, allowing the distribution of the population to be monitored. Condors are recaptured annually, to the extent possible, for health assessments and to maintain the viability of the transmitters.

In 2020, the population of California condors was reported to be 504 individuals, 329 of which are free-flying individuals (USFWS 2020). Historically, the population has increased over time (Figure 3-4), although numbers decreased between 2019 and 2020 in both the wild population, loss of 8 condors, and total population, loss of 14 condors. Deaths in 2020 were attributable to lead poisoning (12), wildfire (9), power line collisions or electrocution (2), and unknown/pending necropsy (29). In 2020, 10 wild chicks fledged, and 29 captive California condors were released into the wild (USFWS 2020).

Figure 3-4. California Condor Southern California Population Size from 1992–2021



California condors in the wild are generally described by four geographic populations: Southern California, Central California, Arizona/Utah, and Baja California, Mexico. In 2021, USFWS reported the number of free-flying wild condors in each geographic location as:

- Southern California population: 92 individuals
- Central California population: 91 individuals
- Arizona/Utah population: 111 individuals
- Baja California, Mexico, population: 40 individuals.

The plan area is located near the Southern California population of California condors. The condor release site at Bitter Creek National Wildlife Refuge is approximately 45 miles west of the plan area (Figure 3-5). The Southern California population has increased steadily over time, primarily driven by captive releases. In 1992, there were six condors in the Southern California wild population, which has grown to 92 individuals in 2021. California condors in the Southern California population have successfully reproduced in the wild since 2004; however, annual mortalities exceed the number of wild fledged individuals in most years. Thus, releases of captive-raised California condors

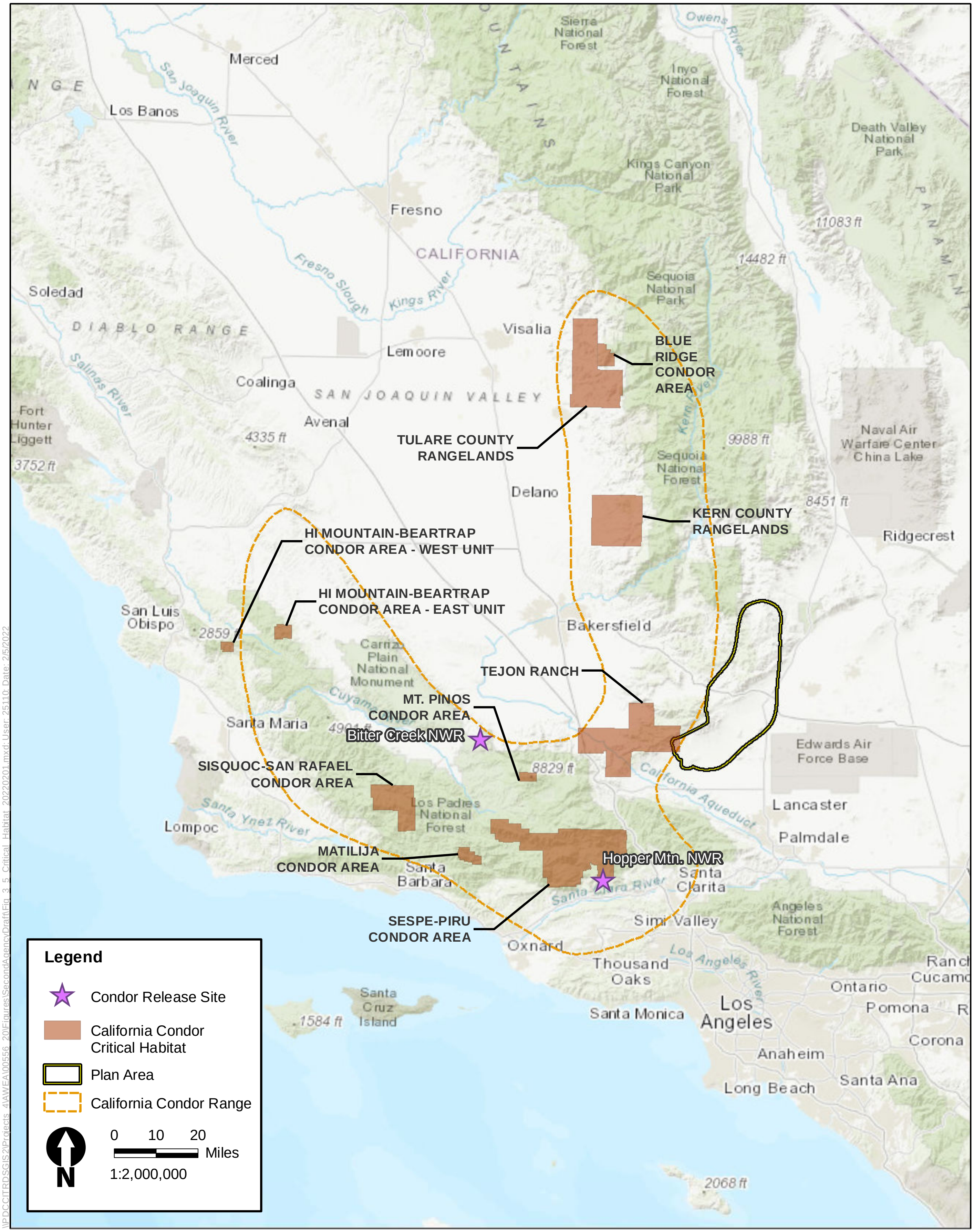


Figure 3-5
Release Sites and Critical Habitat
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will continue to be an important part of the species' recovery for the range wide population and the Southern California population.

The geographic range of the Southern California population of California condors has expanded with growing population numbers. GPS telemetry and VHF data indicate that the area of condor activity generally increased between 2012 and 2017 (from 10,500 square miles to 17,558 square miles); however, the activity area shrank in 2018 to 9,536 square miles. The Tehachapi Mountain Range is the area of the highest concentration of condor activity in recent years. Since 2017, USFWS has observed an increasing concentration of condors in the foothills of the Sierra Nevada north of Glenville, California (USFWS 2012, 2019, 2021).

3.2.3 Behavior and Habitat Use

3.2.3.1 Foraging

California condors are obligate scavengers and often travel long distances in search of carrion. This species primarily feeds on mammalian remains, including domestic livestock (e.g., cattle, domestic sheep, and horses), mule deer (*Odocoileus hemionus*), or other medium or small mammals if available (Finkelstein et. al. 2020). Condors may also feed on gut piles left by hunters (USFWS 2013a). To locate carcasses, California condors range widely, making long-distance reconnaissance flights in areas where carcasses are likely to be found (USFWS 1996). California condor flight involves soaring rather than flapping to cover long distances, using orographic uplifts and thermals along topographic features or circle-soaring to stay aloft (Finkelstein et al 2020). As such, condor movements are highly dependent on topography and prevailing wind patterns (USFWS 1996). The species may fly over a variety of habitats in search of foraging opportunities. Most records of feeding on carrion are from open habitats such as grasslands and open oak savannas where carcasses may be most abundant and visible and where condors may take off and land easily (Finkelstein et al 2020; USFWS 1996). California condors are also dependent on water sources such as ponds or reservoirs for drinking and bathing.

California condors are not typically the first scavenger species to find carcasses, and often rely on visual cues from other scavengers such as turkey vultures (*Cathartes aura*), common ravens (*Corvus corax*), or golden eagles (*Aquila chrysaetsos*) that already are feeding at a carcass (Finkelstein et al 2020). California condors rely on keen eyesight to locate food items and other scavengers, rather than relying on olfactory senses as do turkey vultures. Once a carcass is located, condors may circle above, or roost or perch nearby for a time before descending to feed (USFWS 1996). California condors are social scavengers and often feed together; therefore, multiple condors may be present at a carcass.

Individual home ranges for California condors are large and may overlap. Home range size for this species may also change throughout the year, depending on the availability and location of food and seasonal timing (e.g., during active nesting, the species may not range as widely as other times of the year). Typically, home ranges are larger in the late summer and early fall than during other times of the year, which may be related to seasonal changes in weather patterns and thermal development that facilitates long-range movement (Rivers et al. 2014). High-resolution telemetry data indicate that average monthly home ranges for California condors in southern California are approximately 217 square miles for adult condors and 160 square miles for juveniles. Wild-fledged juvenile California condors may not range as widely given that they stay closer to natal territories for the first 2 years following fledging (Rivers et al. 2014). Most juvenile condors in the Southern California population are captive-bred birds that have been released. Captive-bred juveniles are also likely to remain near release sites and proffered feeding locations for several months following their release.

Currently, three primary concentration areas are used by condors in the Southern California population. Bitter Creek National Wildlife Refuge, approximately 45 miles west of the plan area, is the California condor release site and where individuals are captured to monitor health. The Tehachapi Mountains, portions of which overlap the plan area. And the Hopper Mountain National Wildlife Refuge and adjacent private lands and portions of the Los Padres National Forest, located approximately 35 miles southwest of the plan area (Figure 3-5).

Proffered feeding opportunities are provided for California condors at trapping and release sites in the southern California population and this practice has been considered an integral part of the condor release program (USFWS 1996, 2013a). However, as the wild population grows and their range expands, condors are increasingly becoming less reliant on supplemental food sources. Between 2008 and 2018, USFWS has recorded 184 instances of non-proffered feeding events, the majority of which were cow, pig, or deer carcasses (USFWS 2021b). California condors foraging along the coast in central California have also been known to forage on the carcasses of marine mammals, fish, and marine birds.

3.2.3.2 Nesting

California condors nest in crevices, ledges, or potholes in a variety of rock formations, or in cavities in giant sequoia trees (*Sequoiadendron giganteum*) or redwood trees (*Sequoia sempervirens*). Nesting sites must have enough space for adult birds to move around the nest area during incubation/brooding, and a suitable area for take-offs and landing (USFWS 1996). Nest sites in southern California may be historic sites used by condors, perhaps for centuries (USFWS 1996). California condor pairs may use alternate nest sites in an area that may be a mile or more in diameter and spread across several canyon systems (Finkelstein et al. 2020). Nests sites typically also have roosting habitat in their vicinity.

California condors now successfully breed in all wild populations. The first nesting attempt in the reintroduced Southern California population occurred in 2001 in the Los Padres National Forest. In 2018, 12 nests were confirmed in the population, 5 of which were in the Los Padres National Forest. Four of these were in the Sespe Condor Sanctuary and Wilderness in Ventura County and one was in the San Rafael Wilderness in Santa Barbara County. Four nests were located within or immediately southwest of Hopper National Wildlife Refuge in Ventura County. Three nests were in Kern County: one on the Wind Wolves Preserve east of Bitter Creek National Wildlife Refuge, one on private land in the Tehachapi Mountains, and one in the Kern River Canyon in Sequoia National Forest (USFWS 2021b). Only one other nesting attempt has been documented in the Tehachapi Mountains, this attempt was by the same pair in 2017 (USFWS 2019). Neither nesting attempt in the Tehachapi Mountains was successful in fledging young (USFWS 2019, 2021b), and in 2018 the male condor from the pair was recovered dead. In 2021, as USFWS was tagging condors, they discovered one additional young in the population that was not previously accounted for, indicating that not all wild nest locations are known (USFWS 2021c).

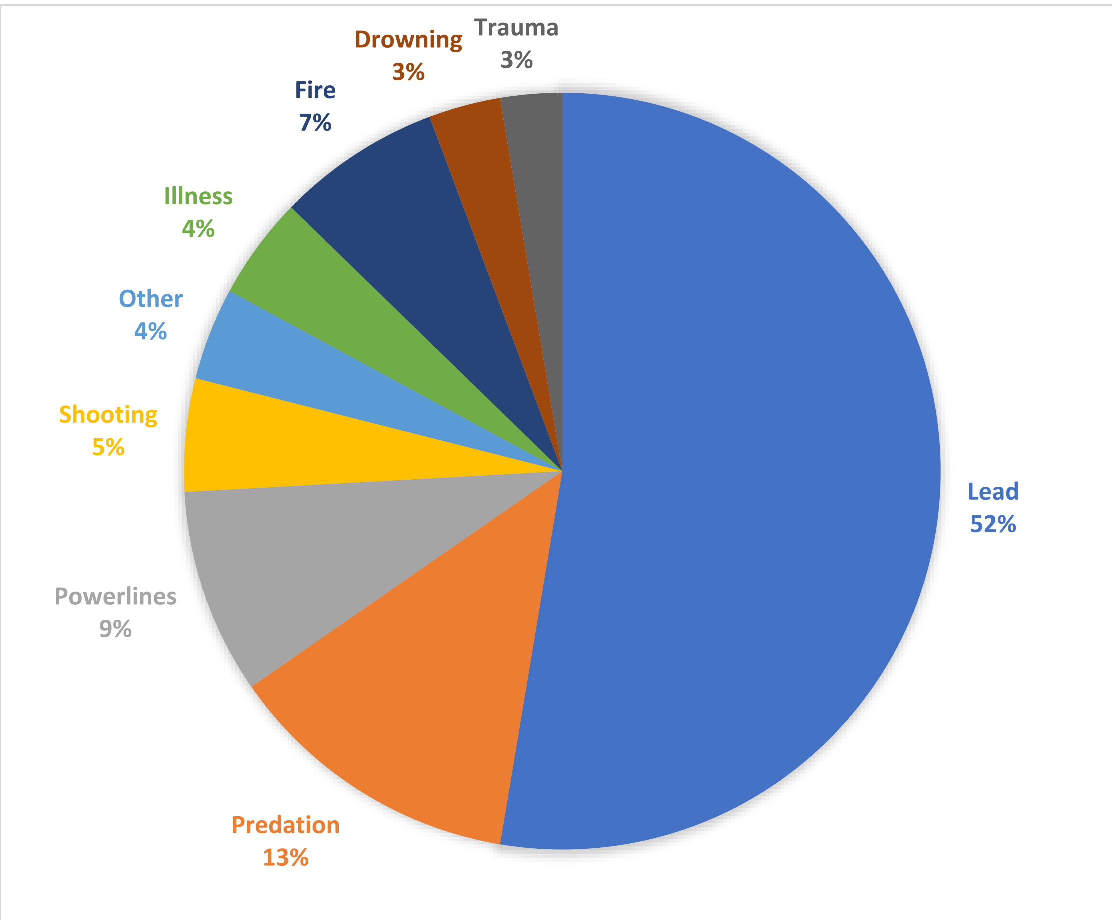
3.2.3.3 Roosting

California condors spend a considerable amount of time roosting, most often at traditional roosting sites near important foraging areas and areas where topography and prevailing winds are conducive to sustained flights. (USFWS 1996). Roost sites are typically on ridgelines, rocky outcrops, steep canyons, or tall trees or snags (USFWS 2013a). Condors in the Southern California population are known to use traditional roost sites within the Bitter Creek National Wildlife Refuge, Hopper Mountain National Wildlife Refuge, Tehachapi Mountains, and Los Padres National Forest. California condors may also roost temporarily near carcasses until the carrion is consumed (USFWS 2013a).

California condors generally remain at roosts until mid-morning and return in late afternoon, but may roost throughout the day, especially if an individual has fed recently. Condors also often roost communally (USFWS 1996). While roosting, condors often preen or sun themselves. In a study of the Southern California population roosting behavior, California condors generally roosted between 6 p.m. and 9 a.m., but roosting times varied throughout the year, with longer roost times recorded in the fall and winter, when meteorological conditions may not be favorable for long-distance foraging flights (Cogan et al. 2012).

3.2.4 Threats and Stressors

Threats and stressors to California condors include lead poisoning, predation, collision with or electrocution by power lines, ingestion of microtrash, West Nile virus, shooting, eggshell thinning, habituation, and wildfires (USFWS 2013a; USFWS 2020).



Source: USFWS 2021c

Figure 3-6. Causes of Mortality in Free-Flying California Condor Population, 1992–2021.

Since 1992, lead poisoning has been the cause of approximately 50% of wild California condor deaths for which a cause can be determined (USFWS 2020). Lead poisoning occurs when condors ingest lead fragments or contaminated flesh of animal carcasses killed by lead ammunition. Due to the large impact of lead poisoning on the population, this threat is seen as the most serious challenge to the species' recovery (USFWS 2020, 2013a; Finkelstein et al. 2012; Meretzky et al. 2000). As such, USFWS intensively monitors and manages the wild population of California condors for lead exposure. In California and Arizona, legislative and voluntary actions have limited the use of lead ammunition in hunting. More details about these actions are included in the next section, *Current Management and Recovery Actions*.

Predation is the second-leading cause of mortality in the wild population of California condors. Mortality data collected by USFWS suggest that adult condors have been killed by golden eagles, coyotes (*Canis latrans*), and black bears (*Ursus americanus*). Newly released condors may be most vulnerable to predators (USFWS 2013a). Eggs have also been preyed upon by ravens (USFWS 2013a).

Mortality of condors at power lines or poles can result from electrocution at power poles or from mid-span collisions and trauma from collisions with power line components. Collision with power lines was a leading cause of known mortality in the early years of the captive release program. USFWS also began a program of power pole aversion training for captive condors, which conditions birds to avoid perching on poles (USFWS 2013a). Since power pole aversion training began in 1995, electrocution incidences at power poles have been rare. Modifications to power poles (e.g., plastic covers over energized parts and electric line spacing) can minimize the potential for electrocution for large birds including California condors (APLIC 2006 and 2012). The application of Avian Power Line Interaction Committee (APLIC) guidance currently varies across projects and is influenced by facility age, siting, equipment, and operator practices. Collision with overhead power lines and electrocution is the third-leading cause of mortality in California condors in the wild since their reintroduction; however, since 2007, there have been no deaths associated with collision or electrocution and power lines in the Tehachapi Pass Wind Resource Area (USFWS 2013a, 2020).

Illegal shooting of California condors continues to be a threat to the wild population. Eleven shooting deaths have been documented in the California condor population since 1992 (USFWS 2021c). Shooting deaths were likely a key factor in the decline of the species prior to the species' listing under the ESA and CESA (Finkelstein et al. 2020).

Ingestion of microtrash (human-made fragments of plastic or metal) by chicks has also been a considerable cause of mortality (USFWS 2013a). Starting in 2007, USFWS has implemented a nest management program to enter active nests to monitor chick health and condition and to remove microtrash from the nest and immediate vicinity.

In addition to the predominant causes of mortality, condors are exposed to a variety of other threats and stressors. California condors are susceptible to West Nile virus, which has caused deaths in the wild and captive populations of the species (Rideout et al. 2012), though all condors in the southern California population are vaccinated against the disease and receive boosters (USFWS 2013a).

Eggshell thinning in the wild California condor population has resulted in recent nest failures, particularly in the Central California population (USFWS 2013a). Historically, the effects of the pesticide DDT is thought to have contributed significantly to this species' decline in the 1950s and

1960s, before it was banned in 1972. California condor eggshells collected in the 1960s exhibited severe thinning and structural abnormalities consistent with the effects of DDT (USFWS 2013a). Condors that feed on marine mammal carcasses in central California are still susceptible to this phenomenon. Although DDT has been banned in the United States, marine mammals off the coast of California are still exposed to the chemical as a result of illegal dumping in the ocean off southern California (USFWS 2013a). USFWS has identified DDT exposure as a significant threat to the California condors that forage on marine mammals (USFWS 2013a).

Habituation to humans and human-made structures poses a threat to the species because individuals may become dependent on humans, disrupting natural behavior patterns and reducing their ability to survive independently in the wild. USFWS power pole aversion training of captive condors has been successful to some extent in reducing habituation to humans and preventing perching on power poles (USFWS 2013a). California condors, particularly young condors, are inquisitive and social animals that are known to explore their environment to search for food and to key in on behaviors of other condors to find food (USFWS 2013a). USFWS uses hazing techniques to prevent habituation; however, in some cases, individual condors need to be trapped and removed from the wild population because of repeated instances of habituation to human behavior (USFWS 2013a).

Wildfires are an emerging threat to California condors. In 2020, nine free-flying wild condors and two chicks in nests died in the Dolan Wildfire in Big Sur (USFWS 2020). Overall, wildfire has resulted in 16 mortalities in the wild population since 1992 (USFWS 2020). Increasing frequency of wildfires as a result of climate change has the potential to destroy roosts and directly harm individual birds (USFWS 2013a).

The loss or modification of foraging, roosting, and nesting habitat has historically been recognized as a threat to the species. Currently, there is sufficient California condor habitat remaining within the species' range to support populations; maintaining this habitat is identified by USFWS as an important recovery action (USFWS 1996). Future loss or modification of foraging habitat or changes to livestock grazing management may affect this species in the future.

3.2.5 Management Considerations and Activities

3.2.5.1 Current Management and Recovery Actions USFWS and Recovery Partners Actions

USFWS and partners implement management and recovery actions for the California condor as part of the comprehensive Recovery Program (USFWS 1996). These actions include monitoring resource use by tracking condor movements, lead monitoring and mitigation, detecting mortalities, nest management, captive releases and transfers, behavioral modification, and public outreach (USFWS 2021b).

Telemetry data from wild California condors are used by USFWS to monitor nesting, roosting, and foraging habitat use throughout southern California (USFWS 2021b). These data provide insight to the spatial range of the species, how it changes by year, condor movements in relation to weather conditions, and locations of nests and roosts (USFWS 2021b). Additionally, telemetry data provide information on activities near potential threats to the species, including detections near wind turbines (USFWS 2021b).

Intensive nest management was instituted in 2007. Prior to the initiation of the program, nesting success in the wild population of California condors was 6%. Since 2007, nesting success has increased; in 2018, 6 of 12 nests (50%) successfully fledged chicks (USFWS 2021b). Nests are monitored by biologists or through remote cameras. USFWS also monitors the condition of chicks by means of nest entries (i.e., human visits) to monitor chick health, clean microtrash from the nest site, vaccinate for West Nile virus, and attach identifying patagial tag and VHF transmitters (USFWS 2021b). If problems arise during nesting, the field team may also intervene to support chick survival.

Lead monitoring and management is a significant part of the Recovery Program. USFWS attempts to capture each wild California condor every year to monitor blood levels and treat condors for lead exposure if necessary. Each condor is given a physical exam to identify the potential lead poisoning and is treated, if necessary. Treatment involves identification of symptoms, diagnostic blood tests, x-rays to detect metal objects, and chelation to remove lead from the bloodstream (USFWS 2021b).

In 2007, the Ridley-Tree Condor Preservation Act was passed; the act required the use of non-lead ammunition for hunting wildlife within the California condor's range in California. In 2013, Assembly Bill 711 was signed, which further extended the requirement for the use of non-lead ammunition for wildlife hunting to the entire state. The California Fish and Game Commission phased implementation of the statute, resulting in the full implementation of the law by July 1, 2019.

The USFWS began a captive breeding program in 1983. Releases of captive-bred California condors continue annually to augment the population in the wild (USFWS 2021b). Currently the program includes the Los Angeles Zoo, the San Diego Wild Animal Park, The Peregrine Fund's World Center for Birds of Prey in Boise, Idaho and the Oregon Zoo in Portland, Oregon. The breeding program is carefully managed by a gene book to ensure the breeding program maintains a healthy genetic mix across the populations. In southern California, 12 captive-bred condors were released into the wild at Bitter Creek or Hopper Mountain National Wildlife Refuge in 2018; however, the number varies annually, with 4 captive-bred birds released in 2021 (USFWS pers. comm.). Releases occur during the fall when weather conditions are conducive to keeping California condors close to the release site, where supplemental food is provided and the birds can be observed (USFWS 2021b).

The outreach component of the Recovery Program is carried out by USFWS and several partners. The Institute of Wildlife Studies conducts outreach programs every year to educate hunters and ranchers about the benefits of using non-lead ammunition and California condor conservation. In past years, multiple outreach events were held to raise awareness of new state laws and promote the use of non-lead ammunition, reaching thousands of people in southern California (USFWS 2021b). Additional outreach strategies continue to involve educating communities near California condor populations about the dangers to condors of habituation to humans (USFWS 2021b).

3.2.5.2 Other Regional Conservation Plans

The Tehachapi Uplands Multiple Species Habitat Conservation Plan (TUMSHCP) is a regional conservation plan for 25 species, including the California condor in southwest Kern County. The TUMSCHP covers 141,886 acres of the 270,365-acre Tejon Ranch. The TUMSHCP was prepared to provide ITP coverage for development, but it will also serve to preclude development and protect open space for covered species. The TUMSHCP is outside the plan area.

3.2.6 Covered Operator Actions

This section provides an overview of management actions and activities currently being implemented on a voluntary basis by many of the covered operators within the plan area. The Condor Risk Minimization Program of this CCP (Chapter 5, *Conservation Program*) builds upon and confirms the operators' commitments to many of these actions.

3.2.6.1 Condor Detection and Curtailment

Collision with wind turbines has been identified as a potential threat to California condors (USFWS 2020, 2013a); however, as of 2022, no condor collision with wind turbines has been documented (Sanzenbacher, personal communication). In the plan area, some wind facility operators currently make voluntary use of multiple California condor monitoring and notification systems to detect California condors approaching wind facilities and make curtailment decisions. Curtailment is the intentional slowing of wind turbine rotors below three revolution per minute. These curtailment decisions are informed by a variety of systems that include field biologists with binoculars, use of VHF condor transmitters and radio receivers to detect condor presence, and/or monitoring GPS/Global System for Mobile Communication (GSM) condor tags to detect condor presence in a specific area. The USFWS has confirmed that these systems are effective at reducing condor risk (USFWS 2017). Experienced wildlife biologists use VHF signals or GPS/GSM signals from tagged California condors to identify approaching condors, evaluate their flight trajectory, and notify operator control centers that they should curtail a string of turbines or the entire facility. When the biologist has determined the condor has departed or is no longer at risk, the biologist contacts the control center to end the curtailment and allow the project to resume operation.

The primary GPS/GSM detection and curtailment system in the plan area is operated by Alta Environmental Services (AES). AES developed a detection and curtailment approach that is based on VHF and GPS/GSM-transmitter-tagged California condors. The GPS/GSM transmitters provide near real-time location of condors throughout the plan area. The monitoring system has evolved over time, initially supporting one project and now supporting most of the covered operators' projects, in addition to non-covered projects in the plan area. AES tracks California condor movement remotely by monitoring GPS/GSM transmitter locations and movements, VHF directions and signal strength, and by visually observing condors with a full-time biomonitor in a centralized control tower during daylight hours. A field team of biologists deploy in the plan area to directly observe and verify condor activity and supplement the VHF and GPS/GSM tracking.

AES utilizes a VHF alert system, two GPS/GSM "geofences" (i.e., virtual geographic boundaries consisting of an outer fence and an inner fence), and project-specific curtailment zones. The VHF alert system includes two receivers that cover the entire plan area; the VHF receivers cover an area that is 33 miles wide (from east to west) and 41 miles long (from north to south). The VHF receivers complete cyclical scans of all VHF frequencies of tagged condors every 2 minutes during daylight hours. If a condor is detected, the receivers transmit a notification to AES via text message. The VHF units do not identify specific locations or exact distances but provide AES staff an early warning system for field staff to locate the condor. Meanwhile, the outer geofence is approximately 2 miles from the outermost boundary of covered turbines. When a GPS/GSM-tagged condor is outside the outer fence, location data are collected every 10-15 minutes and transmitted to the monitor every 24 hours. If a GPS/GSM-tagged condor crosses or is detected within the outer fence, a text notification is sent to the monitor to be aware of its presence in the area and the transmitter cycle shifts to collecting and reporting locations of the condor more frequently. The notification includes the following information: time, condor tag number, transmitter number, and coordinates. The monitor tracks the California condor's location, flight direction and movement patterns, and proximity to wind turbines. Within the outer fence, location data are collected electronically every 60 seconds and transmitted every 10 minutes until the condor crosses the outer fence to depart from the area. The inner fence is between 0.5 and 1 mile from the outermost boundary of turbines. If a GPS/GSM-tagged California condor crosses or is detected within the inner fence, a text notification is sent to the monitor with the details about that condor and the condor's location is collected every 10 seconds and transmitted at 5-minute intervals until the condor leaves the inner fence. The curtailment zone around each covered operator's project varies around the outermost project turbines and is also based on the proximity to landscape features and previous information related to condor behavior in the vicinity. If a California condor crosses into the curtailment zone, the monitor contacts designated personnel from the affected wind facility to implement a curtailment of a subset (i.e., zone) of turbines or all turbines, if needed. When a curtailment is implemented, blade speed immediately begins to decrease down to three rotations or less per minute. At three rotations per minute, the blade tip speed of covered turbines ranges from approximately 5 miles per hour (mph) to 39 mph, making the blades more visible to condors and easier to avoid. The tip speed varies across operators depending on rotor diameter, the age of the turbine, and braking equipment in the nacelle. Braking times typically range from 30 seconds to 3 minutes (with an average of 90 seconds). When the monitor has determined that the risk has abated, generally when the condor has crossed outside of the curtailment zone, a second call is placed to designated personnel to release the curtailment.

Several operators use a simplified version of this system that is based on a biologist's use of Yagi-Uda antenna, a directional antenna used to detect VHF signals from California condors and issue curtailment commands. During California condor use periods in the late summer and fall, operators mobilize biologists with hand-held Yagi-Uda antenna to detect condors in the vicinity of the project. The antenna can detect condors over long distances with signals becoming stronger the closer a condor comes. The biologist uses the device to detect California condor use in the area, visually identify when condors are approaching, and call the control center to issue a curtailment command. Multiple antennae are needed to pinpoint the location of the condor. When the biologist has determined the condor has departed or is no longer at risk, the biologist contacts the control center to release the curtailment signal and allow the project to resume operation.

All covered operators but one are able to apply curtailment. The one operator unable to apply curtailment cannot do so because of the turbines' older operating system and other technological issues; however, this operator is expected to repower in the next 2 years. Additional California condor detection and curtailment systems that utilize GPS/GSM notifications and VHF signals may be developed by other firms and may be used by operators in the future.

Some operators are exploring the use of automated high-resolution video-based detection, alert, and curtailment systems to support detection and curtailment actions. One system that has been shown to substantially reduce impacts on golden eagles is IdentiFlight (McClure et al. 2021). IdentiFlight blends artificial intelligence with high-precision optical technology to detect birds and curtail turbines, and this system can be trained to detect California condors.

3.2.6.2 Carcass Detection and Removal

Current, voluntary carcass detection and removal procedures vary by covered operator, but generally follow the following steps.

1. **Monitoring for scavenging activity**. Covered operator staff are trained to recognize and investigate any activity presented by scavenging species (i.e., turkey vulture, corvid, or coyote feeding patterns) that would suggest a carcass in the permit area and to remove the carcass before it potentially becomes a feeding opportunity for condors. If kettles of vultures and ravens (i.e., circling birds) are seen, or groups of scavengers are seen feeding on the ground, the site is investigated for a potential carcass.
2. **Detection of carcasses**. Carcasses are detected in two ways: covered operator field staff discover incidental occurrences of carcasses or other local landowners report carcasses. Based on the detection of carcasses, field staff may be mobilized to travel to the carcass, evaluate its size, and determine if California condors are feeding on the carcass. If condors are present, staff let the condors continue to feed on the carcass. If no condors are present, field staff continue with the removal and disposal process. If a carcass is on a public highway where it is unsafe to stop, field staff contact the Mojave area California Highway Patrol to request that it be removed.
3. **Removal of carcasses**. Carcasses of small and medium mammals (e.g., those that weigh approximately less than 150 pounds) are placed in a truck bed and removed, or covered from view until disposal can be accomplished. Carcasses of large mammals (e.g., those that weigh more than 150 pounds, such as cows) are covered with a tarp until the carcass can be removed or disposed of appropriately.
4. **Disposal of carcasses**. Field staff dispose of small and medium carcasses at the local landfill or bury them on-site where found, at a designated location, or as otherwise agreed to with the landowner. Field staff may use a backhoe to bury large carcasses.

Most covered operators have established agreements with landowners that facilitate access, removal, and disposal of carrion.

3.2.7 Distribution in the Plan Area

This section provides an overview of California condor observations within the plan area and a description of habitat suitability for the species within the plan area. The Tehachapi Mountains are considered an important activity center for California condors. As the species' population has increased and its range has expanded in recent years, activity within the footprint of wind energy facilities in the plan area has also increased (USFWS 2021b).

3.2.7.1 California Condor Locality Data Relative to the Plan Area

California condor location data in the plan area comes from telemetry data recorded by VHF/GPS/GSM transmitters. Condor activity records in the plan area have been increasing in recent years. Approximately two-thirds of the southern California population have made flights within the plan area based on WECAT review of GPS/GSM transmitter data through 2019. In 2019, 59 individual condors, were located at least once within 1 mile of wind covered projects in the plan area. California condors were detected within 1 mile of wind projects for 510 combined hours in 2019. Ground speed records for birds within 1 mile of turbines show that in some instances, condors are stationary, indicating the potential for temporary roosting or feeding within 1 mile of covered project boundaries. The number and frequency of flights within the plan area varies by location, season, and time of day.

California condor locality information was generalized by WECAT using USGS and USFWS GPS/GSM transmitter data across the plan area and a surrounding 5-mile buffer to visualize condor distribution and concentration within the plan area in 2020 (Figure 3-7). The resulting figure exhibits the relative occurrence of California condors within 0.25-mile grid cells based on GPS/GSM transmitter locations, color-coded from light yellow (few occurrences) to blue (many occurrences). A similar analysis was conducted with 2021 condor data, though in this analysis the color-coded grid cells were based on flight height information showing flight concentrations based on flight heights between 82 feet and 500 feet (i.e., turbine blade heights) (Figure 3-8).

Seasonally, California condor activity in the plan area is greatest in the summer (June 1–August 31) and fall (September 1–November 30), with very limited use in the winter (December 1–February 28) and spring (March 1–May 31). During the summer of 2021, GPS/GSM-tagged condors spent approximately 7% of daylight hours in the plan area; of this, 2% of the time condors were perched or flying below 82 feet, 2% of the time they were flying between 82 and 500 feet, and 3% of the time they were flying above 500 feet (Figure 3-9). In the fall of 2021, GPS/GSM-tagged condors spent approximately 27% of daylight hours in the plan area; of this, 9% of the time condors were perched or flying below 82 feet, 9% of the time they were flying between 82 and 500 feet, and 9% of the time they were flying above 500 feet (Figure 3-9). There are similar but slightly lower trends for condor use within 1 mile of covered projects with 5% use in the summer and less than 20% use in the fall (Figure 3-9).

Regionally, California condor activity in the plan area is greatest in the Tehachapi Mountains, with very limited—near zero—use in the Antelope Valley and Southern Sierra Nevada, though there are periodic flyovers of these areas. California condor regional use of the Tehachapi Mountains within the plan area is approximately 6% in the summer and 27% in the fall, with less than 1% of the Antelope Valley or Sierra Foothills receiving condor use during any season (Figure 3-10). California condor use within 1-mile of covered projects is less than 5% in the spring and less than 20% in the fall in the Tehachapi Mountains and near zero in the Antelope Valley and Sierra Foothills (Figure 3-11).

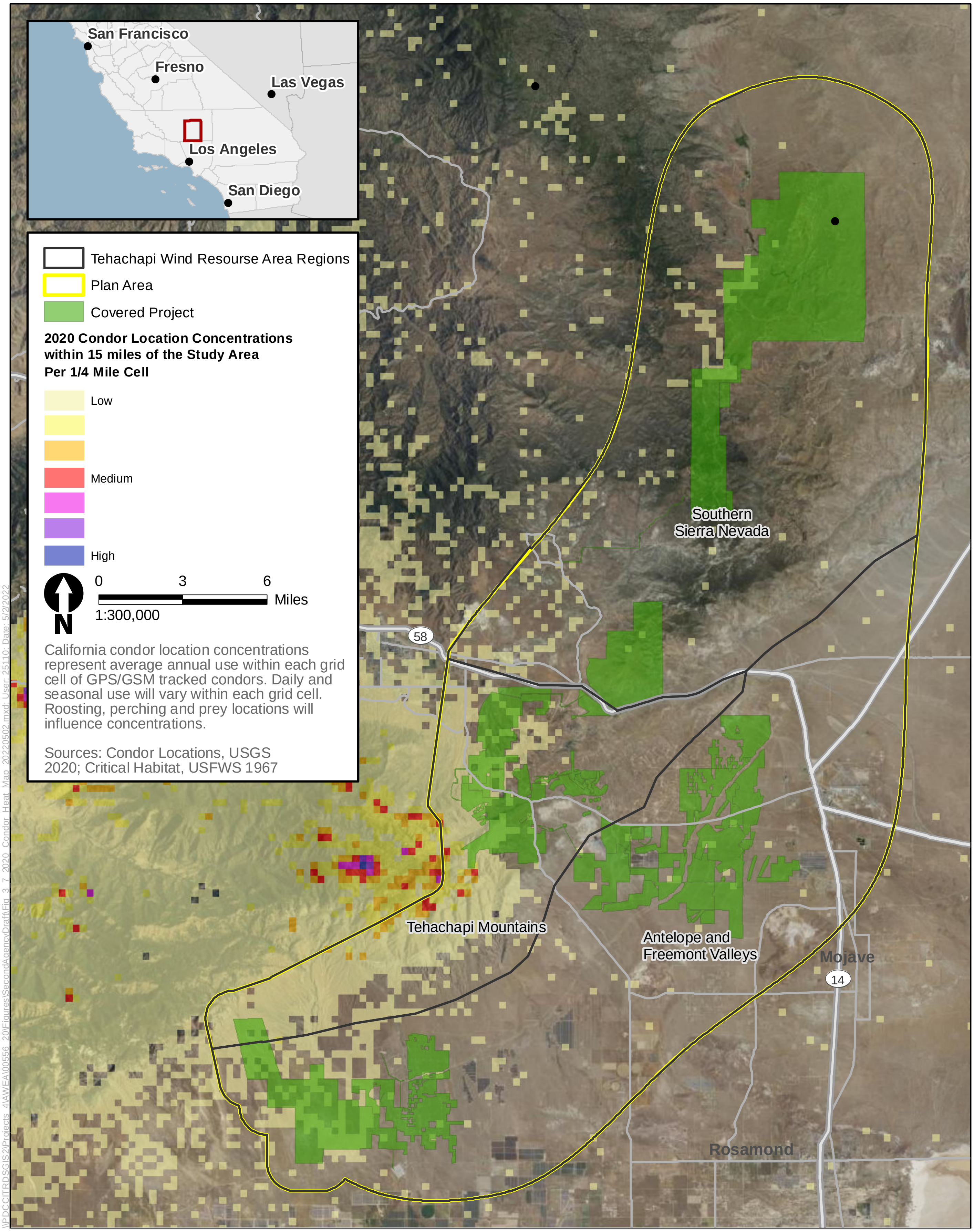


Figure 3-7
2020 Condor Use in the Plan Area
WECAT Condor Conservation Plan

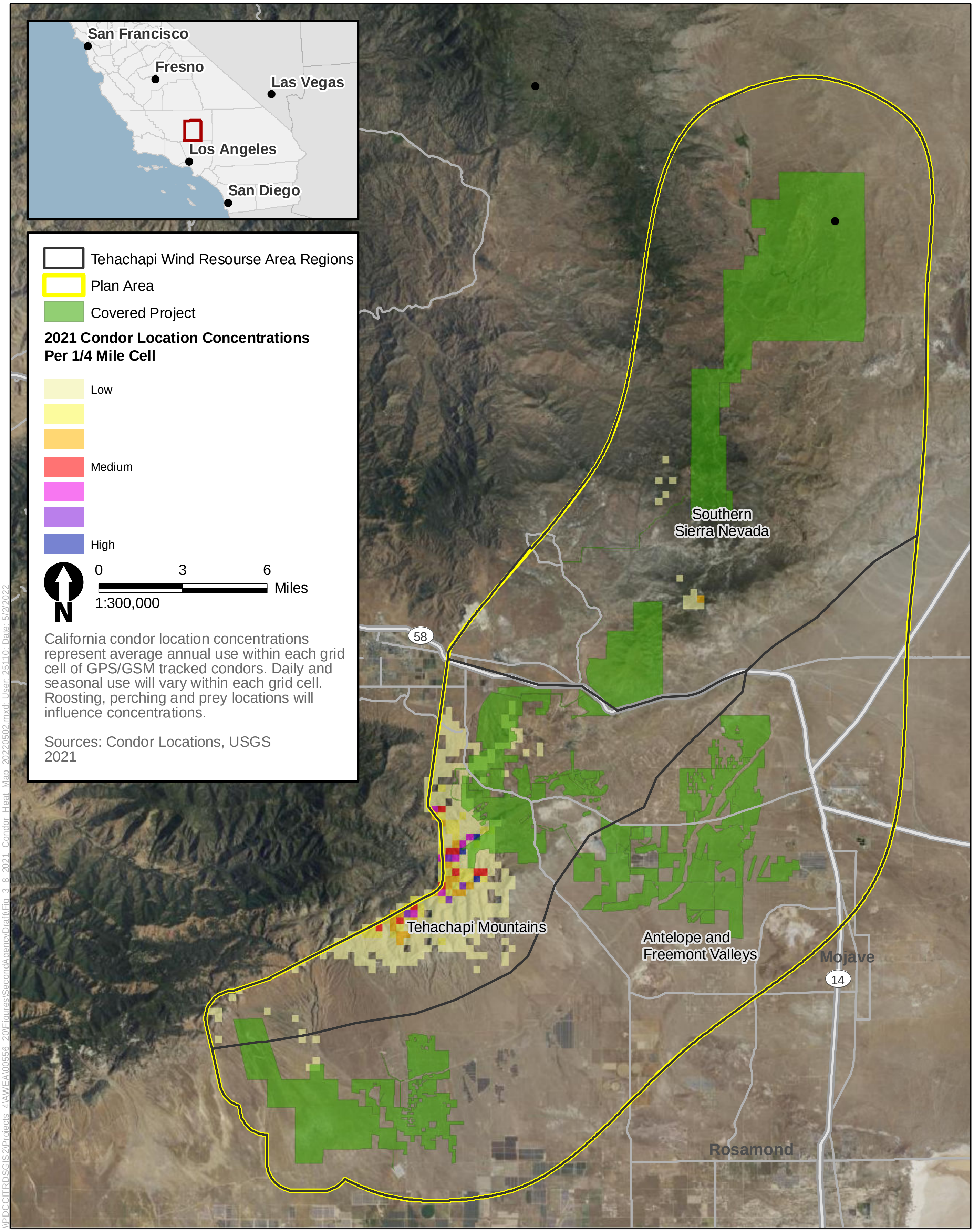
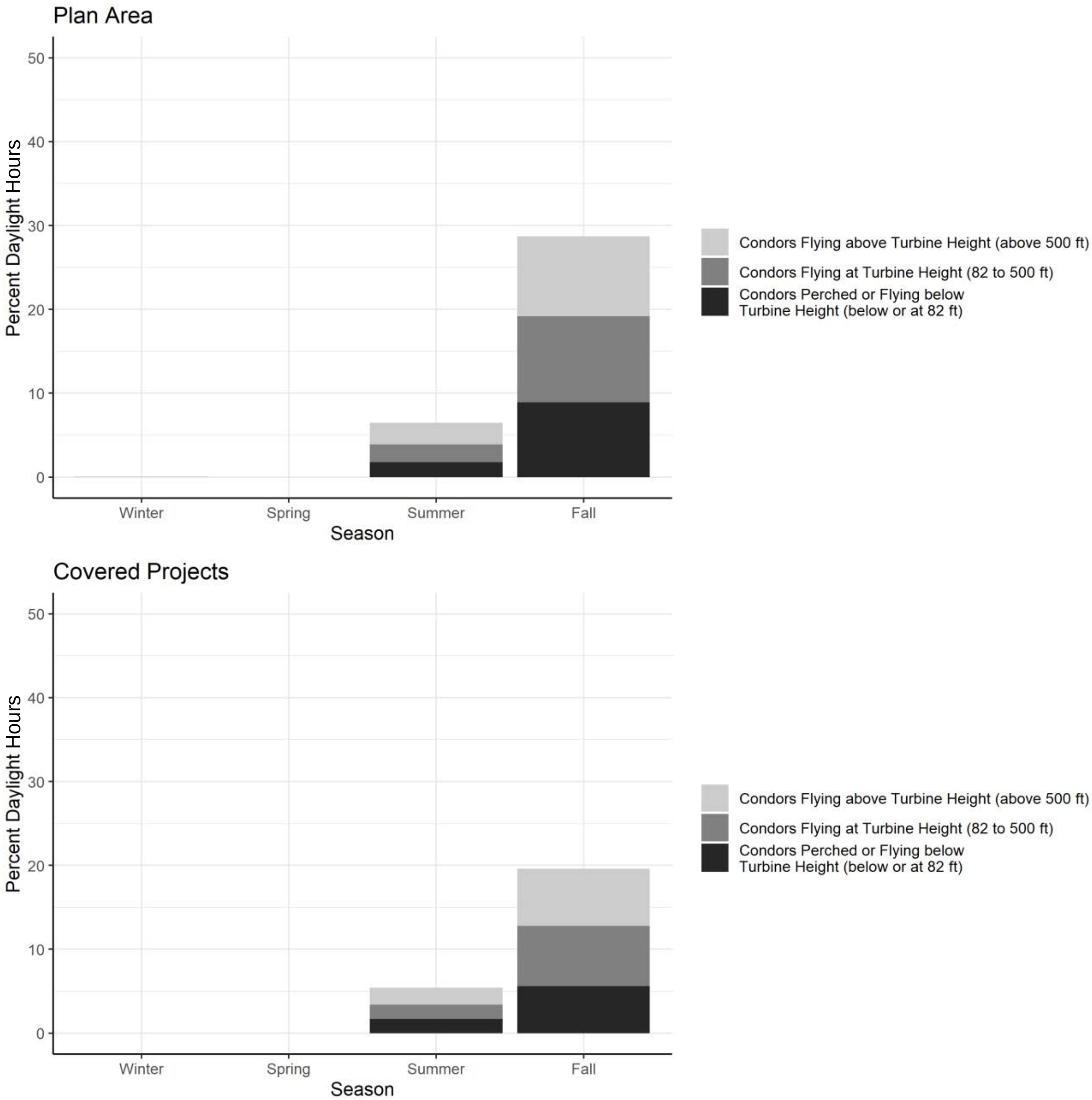


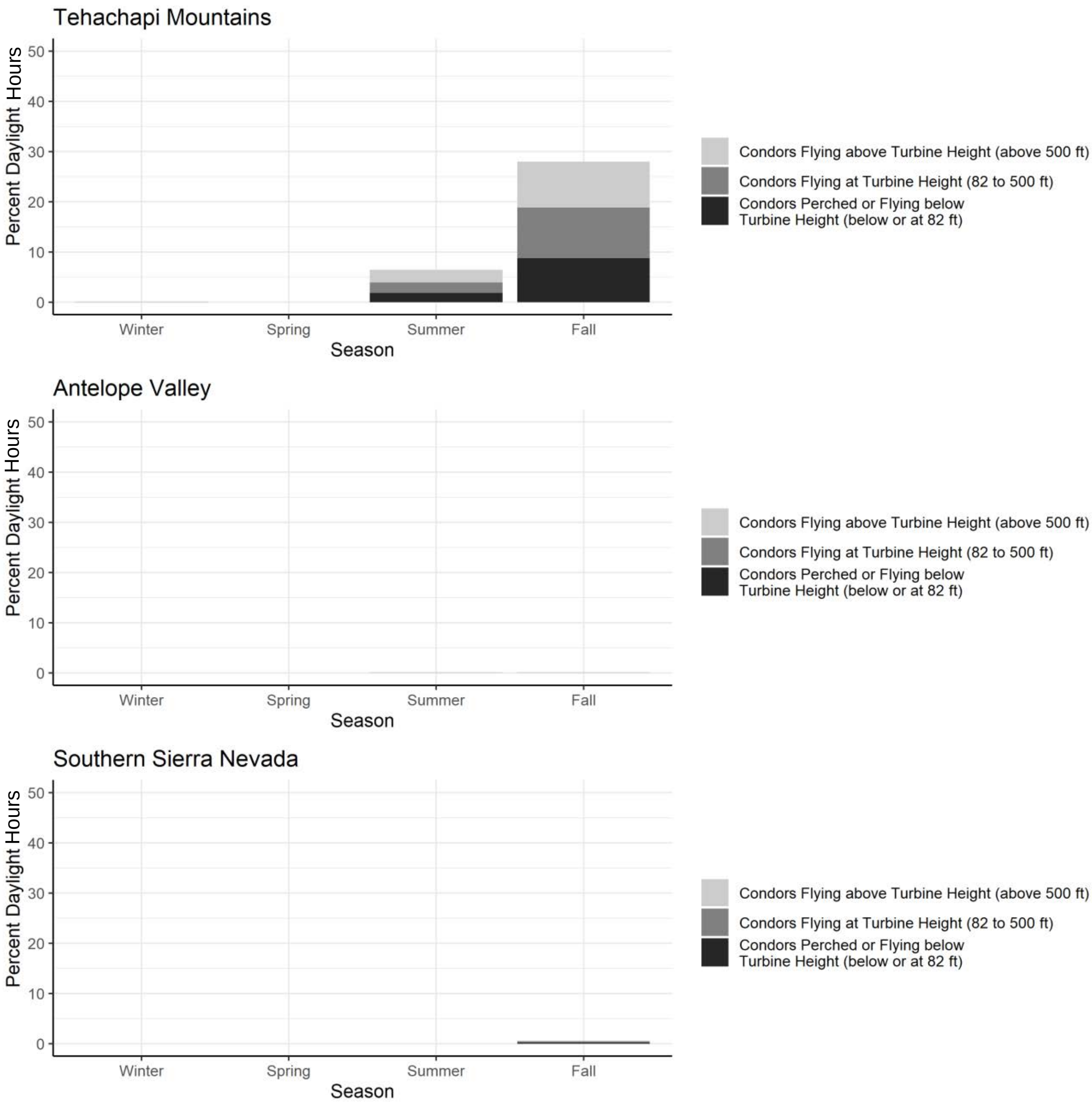
Figure 3-8
2021 Condor Use in the Plan Area by Flight Height within the Turbine Zone
WECAT Condor Conservation Plan

Figure 3-9. 2021 California Condor Use in the Plan Area and within 1-mile of Covered Projects



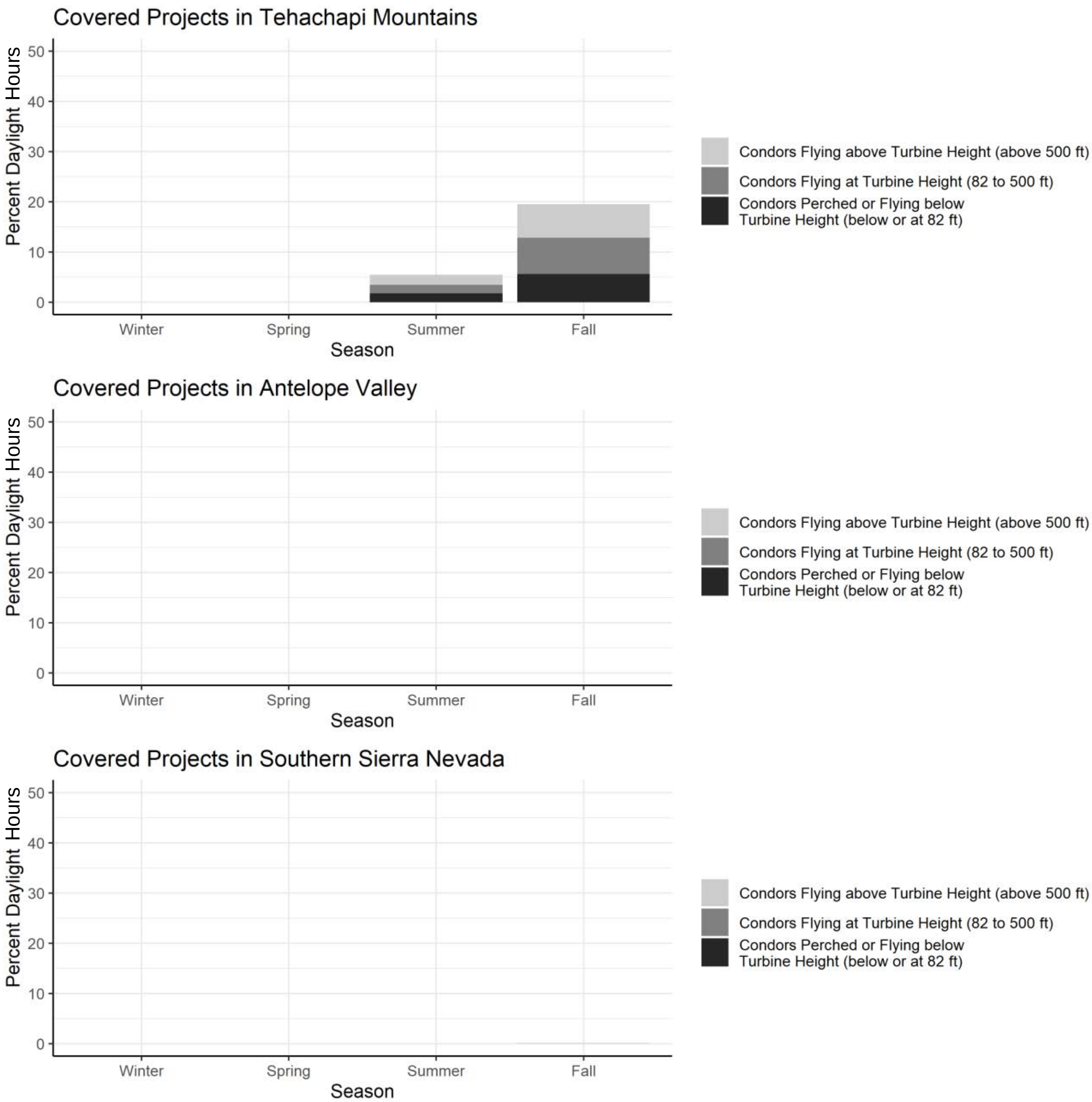
Note: Annual use of the region by California condors will vary from year to year.

Figure 3-10. 2021 California Condor Use in the Plan Area by Region and Season



Note: Annual use of the region by California condors will vary from year to year.

Figure 3-11. 2021 Condor Use within 1-mile of Covered Projects by Region



Note: Annual use of the region by California condors will vary from year to year.

California condor flights also varied by time of day based on season and location. In the Tehachapi Mountains and Sierra Nevada, the earliest condors were detected within 1 mile of turbines was at 5:34 a.m., recorded in the fall season, and 5:44 a.m., recorded in the summer season. California condors were detected flying as late as 8:08 p.m. in the summer and 7:17 p.m. in the fall. Flight times during early parts of the day and later into the evening are likely due to the presence of thermal updrafts early in the day in the summer and fall, when air and ground temperatures are high enough in the plan area to support their development. In spring and winter, condors were detected in the early to late afternoon within 1 mile of projects in the Tehachapi Mountains and Sierra Nevada, generally between noon and 4 p.m., with the exception of an early morning detection at 7:33 a.m.

In the Antelope and Fremont Valleys, the earliest condors were detected within 1 mile of covered projects was 8:25 a.m., occurring in the fall season. Typically, California condors in the valley were detected within 1 mile of several covered projects in the early to late afternoon in fall and summer, generally between noon and 4 p.m. California condors were detected only once during the summer in the southern Sierra Nevada portion of the plan area; this detection occurred in the late afternoon (6 p.m.).

3.2.7.2 California Condor Habitat in the Plan Area

This section briefly describes potential foraging, nesting, and roosting habitat for the California condor within the plan area. The southwest portion of the plan area includes USFWS-designated critical habitat for the California condor including a portion of the Tejon Ranch Unit (Figure 3-5 and Figure 3-6). Keyhole is the one covered project located within designated critical habitat.

Nesting

Two California condor nests have been identified in the Tehachapi Mountains in the plan area on Tejon Ranch, (USFWS 2019, 2021b). The nearest known successful nest was in the Los Padres National Forest, approximately 25 miles southwest of the plan area. Portions of the plan area in the Sierra Nevada foothills may contain suitable nesting substrate for this species, such as cliffs or trees; however, recent telemetry data indicate that the current distribution of condors does not occur here regularly. Nesting locations may expand into other areas with cliffs or big trees as this population increases.

Roosting

Portions of the plan area in the Tehachapi Mountains and the southern Sierra Nevada contain large trees or rock outcrops that are suitable for roost sites. Telemetry data indicate that California condors are typically flying when they occur within the plan area; however, concentrations of condor detections occurring within the Tehachapi Mountains indicate the presence of roosts (Figure 3-6).

Foraging

Most of the plan area is scrub/shrub and grassland/herbaceous land cover types, which contain the suitable open foraging habitat structure for California condors. The Tehachapi Mountains and Southern Sierra Nevada provide topography that allows for orographic lift and winds for long-range foraging flights for this species. Mule deer, coyote, ground squirrels, feral horses, and black-tailed jackrabbits (*Lepus californicus*) occur in the plan area, and livestock are grazed in the vicinity, which provide potential food resources for California condors.

Telemetry detections of California condors within the plan area indicate that condors occurring in the plan area are flying through and are likely foraging. There is no readily available estimate of carcass occurrences in the plan area; however, because of BLM's established grazing units, feral horses in the region, and other wildlife occurring in the plan area, carcasses can be expected to occur.

Other Habitat Resources in the Plan Area

Water resources in the plan area (e.g., ponds or reservoirs, described in Section 3.1.3) may provide opportunities for California condors to bathe and drink.

Chapter 4
Biological Effects and Take Assessment

This chapter evaluates the effects of the covered activities, including the incidental take of California condors and the anticipated impact of the taking on the southern California population.

4.1 Effects of the Covered Activities

Potential take associated with covered activities includes injury or death from collision with or electrocution by covered facilities. Table 4-1 summarizes the threats to California condors that may occur as a result of the covered activities. Each of these threats from the covered activities is described more fully below.

Table 4-1. Threats to California Condor Associated with Covered Activities

Covered Activity	Threat to Condors
Operation of wind turbines, including tower, nacelle, and rotating and nonrotating turbine blades	Collisions resulting in injury or death
Operation of meteorological towers, including tower guy wires	Collisions resulting in injury or death
Operation of aboveground electric collector lines, gen-tie lines, transmission lines, and poles/structures	Electrocution or collisions resulting in injury or death
Operation of substations and switchyards controlled by any of the covered operators	Electrocution resulting in injury or death

Wind Turbines: California condors could be injured or killed from collision with operating wind turbines. Though there have been no documented instances of condor death or injury at any wind facility, condor use in the Tehachapi Wind Resource Area has increased over the past 10 to 15 years as the condor population has increased (USFWS 2020a). The lack of fatalities is likely in part due to existing operators' detection and curtailment actions to minimize risk to California condors. However, the population is expected to continue to increase over the permit term as additional captive-bred individuals are released and free-flying condor pairs rear chicks in the wild. USFWS anticipates an increasing number of condors could be exposed to potential collisions with turbines as the population grows and free-flying condors expand their current range (USFWS 2013b). California condors have been documented flying over and near areas with operating turbines (USFWS 2013b), including documented condor movements within the permit area and near wind turbines (USGS 2020: Figure 3-7, Figure 3-9, Table 3-2). Increasing condor exposure to the covered wind turbines may result in injury or death from collision with operating turbines during the permit term.

Meteorological Towers: California condors could be injured or killed from collision with guyed meteorological towers (met towers). Met tower facilities with guy wires could pose a collision risk for condors because the guy wires are less visible to condors than the tower structures (USFWS 2013a). This collision risk may result in condor injury or death at guyed met towers during the permit term. Condors are known to routinely perch on a variety of towers and other large structures, but are expected to avoid collision with large stationary structures, such as met towers, while in flight (USFWS 2013a). Known causes of condor mortality from 1992 through 2020 did not include any instances of condor collisions with large stationary objects (USFWS 2020); however, one condor mortality resulted from entanglement in loose strapping on a radio communication tower (USFWS 2013a). Entanglement is generally a rare event for condors.

Electric Collector Lines, Gen-Tie Lines, and Transmission Lines: California condors could be injured or killed from collision or electrocution associated with aboveground electric lines. Electric power infrastructure assessed for potential risk to condors includes aboveground collector lines (typically 34.5 kilovolt [kV]), gen-tie lines (typically 115 kV to 345 kV) that connect the wind energy facilities to an interconnection substation, and transmission lines (typically 115 kV to 345 kV). California condor mortality has been documented from collisions and electrocutions at overhead power lines (USFWS 2020b). Of the known causes of death for free-flying condors throughout their range between 1992 and 2020, 19 deaths (9.4%) were attributed to power line collisions or electrocutions (USFWS 2020b: Figure 3-6).

Electrocution can occur when an individual is able to simultaneously touch two energized points (i.e., phase-to-phase) or energized and grounded points (i.e., phase-to-ground) (Avian Power Line Interaction Committee [APLIC] 2006a). To reduce the risk of electrocution, most captive breeding facilities provide power pole aversion training to their condors before release. This training involves mock power poles installed in holding pens that deliver a mild shock to any condors that land on the poles. Additionally, mock power poles are installed outside of holding pens at release sites to provide training to wild-fledged and free-flying birds visiting the holding pen sites. The purpose of the training is to deter condors from approaching and perching on power poles to reduce the likelihood of power line-related electrocutions (USFWS 2013a). Thus far, the training appears to be successful in reducing the tendency of condors to use power poles for perching sites (USFWS 2013b). However, perching on poles still occurs and may increase as the wild population increases, and thus, condor injury or death may result from electrocution at aboveground electric lines during the permit term.

Collision occurs when a California condor flies into and collides with a power line span between structures. Some collisions also can result in bird electrocutions, if the bird's mass and strike momentum push the condor into the two energized conductors (i.e., phase-to-phase contact). Lines near condor nests or on slopes or ridgelines used by condors for orographic lift present a greater risk of collision because of more frequent condor exposure to the lines (Bransfield 2021). Thinner, less visible lines (e.g., transmission shield wires, distribution overhead neutral wires) may also present a greater risk because they are less visible than larger wires (i.e., energized conductors; Faanes 1987; Sporer et al. 2013; APLIC 2012). Although some of the covered aboveground lines are along slopes or ridgelines, none are near known nests and none have been documented to injure or kill a condor to date. However, increasing condor habitat use in the Tehachapi Wind Resource Area (USFWS 2020a) and the corresponding increase in condor exposure to the covered facilities may result in injury or death from collision with aboveground lines during the permit term.

Substations and Switchyards: California condors could be injured or killed from electrocution at a substation or switchyard. Condor electrocution at substations or lower voltage switchyards has not been documented (USFWS 2020b) but APLIC recognizes that these facilities pose a potential electrocution risk to birds. Birds commonly at risk in substations include owls, corvids (i.e., ravens, crows, magpies), and songbirds. Vulture, hawk, and eagle mortality is not often documented. Generally, large equipment clearances within switchyards prevent phase-to-phase or phase-to-ground contact and therefore these facilities do not present an electrocution risk to birds; however, lower voltage switchyards (e.g., 115 kV, 138 kV) have reduced phase-to-phase and phase-to-ground clearances and may present a risk similar to substations. California condors may be attracted to a substation or switchyard facility if carrion (e.g., bird, mammal, reptile) or other attractants are inside the fenced area. This attraction risk may result in condor injury or death from electrocution at switchyards or substations during the permit term.

4.2 Requested Take Authorization

Given that there have been no known injuries or mortalities of California condor due to conflicts with wind projects, it is infeasible to reliably predict the amount of take that will occur incidental to covered activities during the permit term. Nonetheless, given that take is reasonably certain to occur over the permit term due to an increasing use of the area by California condor, some methodology was required to determine the level of take authorization requested under this CCP.

To identify the level of requested take authorization, a qualitative assessment of the conditions that may influence the risk of California condor take from the covered activities was conducted based on a variety of factors. The conditions assessed include:

- The area evaluated for the CCP's proposed coverage;
- The frequency and severity of potential condor interactions with wind project facilities; and
- The expected effectiveness of implementation of the CCP's minimization strategy.

The specific factors that were used to assess each of these conditions are described below.

The CCP is intended to address covered projects, but also be flexible enough to address non-covered projects anywhere within the plan area to allow for potential future inclusion of additional covered projects, provided they adhere to the Condor Risk Minimization Program. These measures are discussed in Chapter 5, *Conservation Program*, Section 5.2, *Measures to Avoid and Minimize Take*. Therefore, the magnitude of the proposed coverage is broad and intended to cover existing facilities, new facilities, repowered facilities, and operators who may join the CCP during the permit term. It is expected that one covered project will repower in the next two years, that one covered project will be built in the next 5 years, multiple covered projects will repower after 15 years, and additional non-covered projects will be added. Many non-covered operators already have turbines and above-ground facilities that are interspersed with covered operators. Overall, these changes are not expected to change the risk to California condor for the incidental take permit because of the irregular nature of condor use in the area and implementation of the Condor Risk Minimization Program. In most instances, repowering will result in fewer, larger turbines within the plan area with more space between turbines and greater rotor swept area for individual turbines; the net change in rotor swept area may increase or decrease depending on the number of turbines being replaced. However, irrespective of this repowering would improve the capacity to curtail turbines thus increasing the effectiveness of the Condor Risk Minimization Program. The coverage of additional facilities within the plan area is also not expected to change the overall risk of take as the level of risk and corresponding take authorization request was assessed for the entire plan area and will be minimized by covered operators implementing the Condor Risk Minimization Program across the entire plan area. The Condor Risk Minimization Program will operate despite changes in turbine technology, number of turbines, rotor swept area, number of covered projects, and number of condors present. Additionally, coverage of repowered or additional projects would not change the ability of the covered operators to manage the CCP through monitoring and adaptive management to remain within the take authorization limit.

Factors related to the frequency and severity of California condor interactions with the covered facilities include patterns of condor mortality, condor activity within the permit area, condor population trends, condor behavior, and location-specific characteristics of the permit area that may affect the level of condor interactions. Although no known injuries or deaths of condors have occurred at wind energy facilities, the permit area is 35 miles from the Hopper Mountain National Wildlife Refuge and 48 miles from the Bitter Creek National Wildlife Refuge where condors are fed, tagged, and released. These are distances routinely traveled by condors in 1 day of foraging, introducing the potential for condors to be exposed to the operating turbines and other covered facilities. Land use within and near the permit area includes activities that can attract condors (e.g., hunting, wildlife, grazing, water resources), and the number of free-flying condors in Southern California is expected to increase over time because of the continued release of captive-bred individuals and the increase in the number of breeding condors in the wild. Thus, condor activity within the permit area is expected to increase with population increases and range expansions, exposing more condors to the covered activities.

Factors related to the expected effectiveness of the CCP's minimization strategy include the components of the Condor Risk Minimization Program. This CCP establishes a firm commitment to condor risk minimization measures that are currently implemented on a voluntary basis by most of the covered operators, as well as adding implementation of condor risk minimization measures at covered projects that are not currently implementing measures voluntarily. These measures are discussed in Chapter 5, *Conservation Program*, Section 5.2, *Measures to Avoid and Minimize Take* and include general operational measures, carrion management, condor detection, and turbine curtailment.

The factors above informed the level of perceived risk of California condor take under this CCP. Take is not expected to occur every year or at every project; however, given the large number of operators, frequency and proximity of condor use, scale of the covered facilities and permit area, increase in California condor population and expanding California condor range, and 30-year permit term, authorization for take of multiple California condors is needed.

Specifically, given the level of perceived risk of California condor take under this CCP, there are at least two plausible scenarios to support a need for authorization of take of multiple condors. First, incidental take of individual condors may occur on an occasional basis (e.g., one take every two to three years) during the permit term, given the size of the plan area. Covered operators will be implementing many measures to minimize the risk of take, including carcass removal programs and curtailment as soon as condors are detected nearby (see Chapter 5, *Conservation Program*, for details). Despite these measures, some risk of take remains, especially in areas of higher condor activity in the western part of the permit area (see Figure 3-6) and later in the permit term as the California condor population expands in number and range. Additionally, incidental take of multiple California condors in one event could occur. Despite the CCP's minimization measures, such an event is still possible because of condors' social and communal feeding behaviors and the fact that not all condors in the wild population are tagged. If condors detect carrion within the permit area before it is noticed and removed (or covered/buried) by the operators, multiple condors could gather at the carcass, creating the risk that multiple condors could be injured or killed in one event as they fly toward a carcass or disperse from it. This CCP's adaptive management threshold for detecting condor use is designed so that the occurrence of multiple untagged condors within the permit area is unlikely (see Appendix B, *Tagging Threshold Analyses*), but it is possible that two or three untagged condors could gather at a carcass before the presence of a tagged bird alerts the operators to the condor presence. As the California condor population increases over time, the percentage of the population that is tagged may decrease, and their range expands, take of multiple condors in one event may become more likely, especially toward the latter part of the permit term.

Given this need for take authorization of multiple California condors, WECAT considered three possible requested take authorization levels: 6, 11, and 15 condors. WECAT evaluated the take authorization request levels to ensure that the selected level would provide adequate take coverage for the regional need while meeting USFWS requirements for permit issuance. This included balancing the perceived level of risk against the confidence in condor rearing success.

Because the take authorization will be shared among WECAT, the lower potential level of 6 California condors was determined to provide inadequate take authorization. This take amount would only provide for occasional take of an individual condor during the 30-year permit term and may not allow for potential increases in take later in the permit term. In addition, this level of take authorization would not allow for an event where multiple condors were injured or killed (especially later in the permit term) in addition to the infrequent take of individual condors. Considering the anticipated take level of two condors per operator in the CCPs prepared for the Manzana Wind Power Project and Pine Tree Wind Farm (Avangrid Renewables LLC et al. 2020; Los Angeles Department of Water and Power et al. 2021), with 30 year permit terms, sharing take authorization of 6 condors across WECAT was perceived by the operators to be insufficiently low coverage for this CCP. Taking the same approach as these CCPs, 24 covered operators would result in a minimum take request of 48 condors over a 30-year permit term. This number seemed excessively large given the lack of California condor fatalities to date, the effectiveness of detection and curtailment efforts to date, and the mitigation obligation that would be required.

Because of the extent of the shared coverage under this CCP, increasing California condor population, and the expanding range of the California condor, the take authorization request level of 11 California condors was determined to provide the necessary continuity in CCP implementation and regulatory assurances to WECAT. These regulatory assurances may also help incentivize participation by additional operators in the Tehachapi Wind Resource Area.

Based on the perceived level of risk under the CCP and the fact that take authorization of 11 condors would provide for the increase in occasional take later in the permit term or multiple-condor take scenarios considered possible under this CCP, it was considered unlikely that the operators would require take coverage for 15 condors. Although the higher potential take authorization level of 15 California condors would provide even more coverage for the operators, the impact of the taking on the California condor population of this level of take authorization is increased and would require more mitigation to fully offset the impact.

In summary, the covered operators are requesting authorization for take of up to 11 free-flying California condors resulting from covered activities in the permit area over a 30-year permit term inclusive of the potential to cover repowered projects and add other operators within the plan area. Take of any adult California condor with an active nest could also result in the death of the dependent egg or chick. Thus, the requested take authorization of up to 11 free-flying condors may result in the take of up to 11 dependent young condors. This is addressed in the impact of take assessment (Section 4.3., *Anticipated Impact of the Taking on the Population*) and in the mitigation ratio (Section 5.3.3, *Mitigation to Offset the Impact of Authorized Take*).

4.3 Anticipated Impact of the Taking on the Population

The proposed impact of the taking of 11 free-flying California condors will be fully offset through the mitigation described in Section 5.3, *Measures to Mitigate Unavoidable Impacts of Take*. For the purposes of evaluating population-level effects, however, this CCP considers the impacts that could theoretically occur, in the absence of mitigation, should the covered activities result in the incidental take of all 11 California condors for which take authorization is requested.

To evaluate the population-level impacts of the taking for California condors *in the absence of mitigation*, this CCP used a Population Viability Analysis (PVA) originally developed by independent academics and researchers for the CCPs prepared for the Manzana Wind Power Project and Pine Tree Wind Farm (Avangrid Renewables LLC et al. 2020; Los Angeles Department of Water and Power et al. 2021). A PVA is a population demographic model that can assess the likelihood that a population will persist or become extinct within a certain timeframe. PVAs are commonly used in conservation planning as a tool to understand and forecast future scenarios of population growth and decline.

The PVA used for this analysis (Bakker and Finkelstein 2022) models the impact of the take on the Southern California population of condors using the best available scientific data, having incorporated additional, updated survivorship data (through 2018) that was not evaluated in prior versions of the PVA (Bakker and Finkelstein 2020). To model the impact of potential take from wind energy facilities, the PVA assumes every California condor injured or killed would be a breeding age adult, the breeding class of the individuals will be in proportion to the prevalence of the breeding class in the population, and that indirect mortality of one egg or chick will also result for each of the successful breeders taken. This is conservative because juveniles comprise a large proportion of the Southern California population (USFWS 2021) so take could also involve juvenile birds and not necessarily only adult birds.

The PVA used demographic rates (i.e., reproductive rates and survival rates for different life stages and age classes of birds) to model the predicted changes in future population growth rates and population size of California condors in 40 years (in the absence of mitigation) under several scenarios. Collectively, these model scenarios provide a realistic range of impacts on the California condor population in the absence of mitigation that could occur under the CCP. The model incorporated four variables to capture the range of potential outcomes:

- Wind mortality level scenarios: 4 adult condors; 15 adult condors; 25 adult condors.
- Timing of mortality scenarios: occurs in the first 10 years of the scenario (early); occurs evenly over the 30-year scenario (even); occurs in the last 10 years of the scenario (late).
- Lead and other anthropogenic-related mortality rate scenarios: current mortality rate; rate of the observed lower 25% (reduced mortality rate); rate of the observed higher 75% (increased mortality rate).

- Captive release rate scenarios: current release of 12 individuals per year; current release until discontinued after 15 years; no releases.

This CCP focuses on the model results from scenarios with a wind mortality rate of 15 California condors, because that scenario best represents the requested take of 11 condors in this CCP, plus the cumulative impact of the 4 free-flying condors proposed for take authorization by the CCPs prepared for the Manzana Wind Power Project and Pine Tree Wind Farm (Avangrid Renewables LLC et al. 2020, Los Angeles Department of Water and Power et al. 2021). Similarly, this CCP focuses on the model results from the scenarios with the early mortality timing, in which take primarily occurred in the first 10 years, because that scenario represents the most conservative scenario for the requested permit term of 30 years. This scenario is conservative in that it assumes take is concentrated during the first 10 years of the CCP's proposed permit term of 30 years when the impact of take on the population is highest (because in that period the population is the lowest, before it grows over time), but it is more reasonable to expect that take will actually be less likely to occur in the beginning of the ITP term when there are fewer birds in the population.

This CCP also focuses on the current or reduced lead mortality scenarios and the current or discontinued rate of California condor releases as these scenarios were considered to be realistic and relevant to this CCP. Although it is possible that lead mortality rates will persist at the current levels over the permit term, given the laws requiring the use of non-lead ammunition for hunting in California (Section 3.2.4, *Management Considerations and Activities*), it is unlikely that the lead mortality rates will increase beyond the current levels and this scenario was considered not relevant to this CCP. Similarly, although it is possible that the California condor breeding program will be discontinued in the future and condor releases into the population will cease, given the current population levels and the continued reliance of the population on the California condor breeding program for stability, it is unlikely that discontinuation of the condor breeding program is imminent and that condor releases into the population will cease prior to implementation of this CCP. Furthermore, in this unlikely event, the California condor population would be expected to decrease, nullifying many factors of the perceived level of risk under this CCP and making the take of 11 condors unlikely. Thus, the no-release scenario was considered not relevant to this CCP.

For the early mortality timing scenarios, in the absence of mitigation the removal of 15 adult California condors would reduce the population growth rate by 0.11% to 0.14% over 40 years compared to a no-take scenario, assuming the ongoing and current release rate of 12 captive-bred condors per year into the Southern California population and depending on the lead mortality rate (Table 4-2). If the California condor release program were to continue for the next 15 years and then cease, the removal of 15 adult condors would reduce the population growth rate by 0.21% to 0.27% over 40 years compared to a no-take scenario, depending on the lead mortality rate. These modeled scenarios and predicted reductions in the population growth rate would result in the total California condor population size being between 5.1% and 9.1% lower after 40 years than it would be in the absence of the simulated take from wind energy facilities.

Table 4-2. California Condor Population Viability Analysis Results over 40 Years with the Removal of 15 Condors under the Early Mortality Timing Scenario (within 10 Years) in the Absence of Mitigation

Condor Release Rate Scenario [a]	Lead Mortality Rate Scenario	Percent Change in the Population Growth Rate over 40 years (compared to population growth rate in the absence of take)
Current (12 condors annually)	Reduced	-0.14
	Current	-0.11
Current then Discontinued (12 condors annually then stopping after 15 years)	Reduced	-0.21
	Current	-0.27

[a] The modeled condor release rate scenarios do not include the proposed mitigation for this CCP.

The full results of the PVA used for this CCP are provided in Bakker and Finkelstein (2022). In summary, unmitigated take of 15 condors in the next 10 years (from this CCP, as well as the CCPs prepared for the Manzana Wind Power Project and Pine Tree Wind Farm) could cause the total population size to be between 5% and 9% lower over the next 40 years than it would be in the absence of take. However, the covered operators will implement measures to minimize the potential for take and will also mitigate to fully offset the impacts of the taking by implementing the measures described in Chapter 5, *Conservation Program*.

Chapter 5
Conservation Program

This chapter describes the conservation program for this CCP, which has been developed in accordance with ESA Sections 10(a)(2)(A) and 10(a)(2)(B), the ESA implementing regulations (50 Code of Federal Regulations [CFR], Sections 17.22, 222.307), and the *Habitat Conservation Planning and Incidental Take Permitting Handbook* (HCP Handbook) (USFWS and NMFS 2016). The conservation program includes biological goals and objectives, measures to minimize and mitigate the impacts of the potential take of California condors in the permit area resulting from covered activities, and a monitoring and adaptive management program.

5.1 Biological Goals and Objectives

Biological goals and objectives define the expected outcome of the conservation program (HCP Handbook [USFWS and NMFS 2016]). The *goals* represent the guiding principles for operation of the conservation program described in the CCP and form the basis for the minimization and mitigation strategies employed. The biological *objectives* represent the measurable targets through which the biological goals will be achieved and provide a basis for evaluating progress toward achieving the goals. The biological objectives establish the basis for the specific actions to achieve those goals, which are set forth below as conservation measures.

The biological goals, objectives, and conservation measures of this CCP are consistent with the conservation and recovery goals for the species (USFWS 1996). The USFWS California Condor Recovery Program currently considers the release of captive-reared birds into the wild (this CCP's proposed mitigation plan) as a priority and focus of recovery efforts because it is currently the most effective method of increasing population size as quickly as possible. Other interventions, such as nest management and habitat conservation, were considered for mitigation but rejected because at present they do not demonstrate the same ability to support a population increase as has been achieved by captive breeding.

The biological goals and objectives of this CCP are as follows:

Biological Goal 1: Minimize the likelihood of California condor mortality caused by covered activities in the permit area.

Objective 1a: Implement a condor risk minimization program that reduces condor attractants within the permit area (e.g., carcass removal).

Objective 1b: Implement a system to detect condors approaching turbines and curtail turbines with the capacity to curtail when condors are nearby.

Objective 1c: Implement condor take response actions to evaluate each take and determine if there are facility, system, or process improvements that should be made to reduce future risk.

Biological Goal 2: Enhance the conservation and recovery of California condors by expanding the capacity of an existing captive breeding program to rear and release condors into the wild population.

Objective 2a: Provide funding to The Peregrine Fund (TPF) to construct two additional condor breeding chambers at the World Center for Birds of Prey.

Objective 2b: Provide operations and maintenance funding to TPF for the ongoing annual costs of captive breeding and release of 35 condors using the two additional breeding chambers as well as existing facilities.

The covered operators and WECAT will use adaptive management throughout CCP implementation to ensure that the conservation program is effective in meeting these biological goals and objectives and that the take of condors at covered projects does not exceed the permitted level of take (see Section 5.5, *Adaptive Management Program*). USFWS will be notified of all adaptive management actions and will be involved in decisions regarding the addition of new components to the conservation program (see Section 6.5, *Role of USFWS in Decisions Regarding CCP Implementation*).

5.2 Measures to Avoid and Minimize Take

The covered operators will minimize take of California condors through operational measures implemented at covered projects. These measures include both (1) general operational measures that will reduce impacts on condors and (2) a targeted Condor Risk Minimization Program that includes carrion management, condor detection and turbine curtailment components. These efforts are described in the following sections.

5.2.1 General Operational Measures

The general operational measures described in this section will avoid or minimize risk to California condors presented by background conditions within the permit area (see Chapter 3, *Environmental Setting and Condor Habitat Use,* Section 3.2.4, *Management Considerations and Activities*, for a description of the threats and stressors experienced by condors). The covered operators will commit to implementing these measures for the duration of the ITP. These measures include the following:

1. **Include the commitments of this CCP in annual operator staff training programs.** Covered operators will educate all on-site staff on the components of this CCP and the requirements for staff in implementing plan components, including the condor incident reporting system (Section 5.4.1 *Condor Take Detection Methods*).
2. **Minimize the occurrence of microtrash at covered projects.** Covered operators will implement a trash management system at their covered projects, including the use of closed trash containers and operator staff training on the importance of proper trash disposal.
3. **Minimize potential for avian electrocution and collision risks on overhead power lines.** Covered operators will apply the APLIC (2006, 2012) guidance and the forthcoming 2022

suggested practices update, as practical and appropriate for given equipment and risk levels,[1] to reduce the risk of California condor electrocution and collision risks at the covered electric facilities. These measures may include approaches to minimize bird contacts on poles and along line segments, using the best practices for condor protection. APLIC-guided practices may be implemented or adjusted as projects are modernized during repowering or through adaptive management (Section 5.5, *Adaptive Management Program*).

4. **Minimize potential for vehicular collisions with wildlife**. Speed limits on non-public roads within the boundaries of covered projects will be set to ≤25 miles per hour (mph).

5.2.2 Condor Risk Minimization Program

In addition to the general operational measures described above, the covered operators will implement a Condor Risk Minimization Program designed specifically to minimize risk of California condor take from the covered activities for the duration of ITP term. The program builds upon and establishes as a binding commitment measures that a majority of the operators have already been voluntarily implementing, in one form or another, to minimize risk to condors from the covered activities (Section 3.2.4, *Management Considerations and Activities*). The program uses a three-prong approach to reduce the risk of California condor injury or death:

1. Reduce carrion in the permit area, particularly near turbines, to reduce potential attraction of condors to the permit area.
2. Detect condors that may enter the permit area.
3. Reduce potential collision risk through targeted turbine curtailment based on detection.

Over the ITP term, operators may choose to modify their facilities or operations to improve capabilities to implement various aspects of the Condor Risk Minimization Program. This may occur either during planned repowering or within the framework of the adaptive management strategy (Section 5.5, *Adaptive Management Program*).

5.2.2.1 Carrion Management Plan

To reduce California condor attractants in the permit area, particularly near turbines, each operator will be responsible for implementing a carrion management plan which meets the following minimum standards for detection and removal of carrion. Each operator will inform the landowners within their covered project(s) of the carrion management plan and request their cooperation in minimizing the condor scavenging opportunities and in communicating to grazing lessees the importance of minimizing condor scavenging opportunities.

Operators will train staff and subcontractors to recognize and investigate any activity presented by scavenging species and to report the presence of any carcasses observed on the site or along project access roads during the course of their day-to-day duties. Upon detection of any large mammal carcass (i.e., approximately the size of a coyote or larger) on the covered project sites or along a project access road, operators or their contractors, or livestock owner, will remove, bury, or cover the carcass as soon as possible, but at least within 24 hours, or as achievable given any logistic or

[1] Substations and switchyards have limited opportunities for minimization, but also present a lower risk to California condors than other electric facilities such as power poles and power line spans (Section 4.1, *Effects of the Covered Activities*).

legal constraints. Logistic constraints may include equipment, terrain, or other safety considerations; legal constraints may include land access authority or animal ownership considerations. If California condors are already present at the carcass, the operator will let the condors continue to feed on the carcass and monitor condor activity in the area. If a carcass is on a state highway where it is unsafe to stop, the operator will contact the California Highway Patrol to request it be removed.

If the operator is logistically or legally unable to remove, bury, or cover a carcass, the operator will notify the landowner or grazing leaseholder of the carcass and request that the carcass be removed, buried, or covered. Operator staff will offer the landowner or lessee assistance with this process.. If existing wind or grazing leases present constraints to carcass removal by an operator, the operator will work to develop agreements regarding carrion management with landowners and the holders of any grazing leases within the Project boundary.

Several operators already have voluntary carrion management plans in place or are participating in a third-party program that includes carcass monitoring and removal services (Section 3.2.5, *Management Considerations and Activities*). The commitments under this CCP's carrion management plan must be met or exceeded by existing carrion management plans or participation in third-party programs. If existing plans do not satisfy the minimum standards established by this CCP, they will be modified so that all operators will meet the minimum standards at covered projects during implementation of this CCP.

5.2.2.2 Condor Detection System

To reduce the risk of California condor collisions with turbines, each covered project[2] will implement a condor detection system that meets the following minimum standards for detection and notification of condors approaching turbines. The purpose of the condor detection systems is to detect approaching condors and send an alert with enough time to curtail specific turbines posing a collision risk.

Each operator will determine, based on their unique circumstances and based upon the minimum standards outlined below, the type of detection technique that will be implemented at their project (e.g., GPS/GSM tracking, VHF tracking, high-resolution video-based detection, biomonitoring, and/or another type of technique).

Regardless of the detection technique, operators must independently or in cooperation with other operators achieve the following detection system coverage of covered projects:

1. At least 50% detection probability of condors within a 1-kilometer buffer of the outermost covered project turbines at 10 meters above ground level. For GPS/GSM tracking or VHF tracking, this detection probability is expected to be achieved with a minimum 95% spatial coverage of the 1-kilometer buffer and a tagging percentage at or above the adaptive management threshold (Section 5.5.2, *Approach to Detecting Condor Use*). For high-resolution video-based detection, biomonitoring, or another visual-detection technique, this detection probability is expected to be achieved with a 50% viewshed coverage of the 1-kilometer buffer.

[2] One exception is that Coram Tehachapi, LP, which consists of 31 small turbines (Table 2-1) does not have the technical capacity to curtail but is located in an area of low recorded California condor activity. When this covered project repowers, anticipated within the next two years, the new facilities will be required to meet the prescribed standards herein described.

This will provide flexibility for the placement of monitoring locations focused on the areas with the highest documented condor activity.

2. Temporal coverage of 30 minutes before sunrise to 30 minutes after sunset:
   a. year-round by technology-based techniques (e.g., GPS/GSM tracking, VHF tracking, high-resolution video-based detection, or another type of technique) or
   b. from September 1 to November 30 or during other peak use months as agreed to with USFWS based on condor use and activity for biomonitoring.
3. Real-time tracking of condor movement including the condor's location, flight direction and patterns, and proximity to wind turbines.

Upon detection of a condor within 1 kilometer that is moving toward covered project turbines, an alert will immediately be sent to have those turbines curtailed at the covered project(s) (see Section 5.2.2.3, *Turbine Curtailment System*, below). The condor detection system will track the condor until it flies beyond 1 kilometer from the covered project and is no longer at risk of collision with the project's turbines.

Currently, most covered operators voluntarily subscribe to a third-party California condor risk reduction program (Section 3.2.4, *Management Considerations and Activities*). This "geofence" program consists of GPS/GSM-based detection utilizing two virtual fences (an outer fence and inner fence), VHF detection towers, human monitors to track condor movements and send alerts to the project if condors within the inner fence are approaching turbines, and project-specific curtailment zones. The commitments under this CCP's condor detection system must be met or exceeded by existing or future detection systems or participation in third-party programs, such that this CCP's condor detection system establishes the minimum standards all covered operators will follow at covered projects.

Detection methods may be altered over the term of the CCP in response to adaptive management (Section 5.5.1, *Adaptive Management Approach to the Take of Condors* and Section 5.5.2, *Adaptive Management Approach to Detecting Condor Risk*) or at the discretion of the operator, but changes to a covered project's detection monitoring methods must be capable of performance equal to or greater than the methods being replaced and the change must be reviewed by WECAT and USFWS.

5.2.2.3 Turbine Curtailment System

To reduce the risk of collision to condors approaching covered turbines, operators will be responsible for implementing a turbine curtailment system that meets the following minimum standards for slowing blade rotations. Every covered project[3] will be required to implement a turbine curtailment system.

As described above, the turbine curtailment system will be immediately triggered upon notification of an approaching condor within 1 kilometer of covered project turbines (see Section 5.2.2.2, *Condor Detection System*, above). In response to this notification, the operator will curtail those turbines in the flight path of the approaching condor. When a curtailment event is triggered, blade speed will

[3] One exception is that Coram Tehachapi, LP, which consists of 31 small turbines (Table 2-1) does not have the technical capacity to curtail but is located in an area of low recorded California condor activity. When this covered project repowers, anticipated within the next two years, the new facilities will be required to meet the prescribed standards herein described

immediately begin decreasing down to a speed of zero to three rotations per minute[4] depending on the wind turbine type and the wind speed at the time of curtailment. When the operator is notified that the risk has abated, generally when the condor has moved away from and beyond 1 kilometer of project turbines, the operator may release the curtailment.

Most operators currently and voluntarily implement turbine curtailment in response to notifications by a third-party condor detection system (Section 3.2.4, *Management Considerations and Activities*). The commitments under this CCP's turbine curtailment system must be met or exceeded by existing or future curtailment systems. If existing systems do not satisfy the minimum standards established by this CCP, they will be modified so that all operators will meet the minimum standards at covered projects during implementation of this CCP.

5.3 Measures to Mitigate Unavoidable Impacts of Take

The covered operators have developed a mitigation strategy to increase the number of captive-reared condors produced at and released from an established breeding facility with a history of success with California condors. As described below, the strategy is based upon a quantitative and measurable approach to mitigating the impact of taking up to 11 condors as a result of covered activities. Specifically, WECAT as an entity facilitating the CCP, will enter into an agreement with TPF to provide funding to enhance TPF's condor breeding program at the World Center for Birds of Prey in Boise, Idaho. The following sections describe the current TPF condor breeding program and WECAT's proposal to increase capacity of the facility and provide funding to rear and release 35 California condors to fully offset the impact of the taking of up to 11 California condors.

5.3.1 Current Status of the Breeding Program

TPF's World Center for Birds of Prey has raised California condors since 1993 and is the largest of four facilities that breed condors for release at sites in California, Arizona, and northern Mexico. TPF has 20 breeding chambers that are currently occupied by 18 breeding pairs, as well as one large socialization pen for first-year condors. TPF's two newest breeding chambers are currently unused because of insufficient funding to establish and care for breeding pairs in those chambers. From the 18 breeding pairs, TPF averages production of 15 young annually for release, a success rate of approximately 81% for each breeding attempt. On average, TPF produces 40% of all California condors raised in captivity each year among all partners. With funding from WECAT, TPF will expand its current breeding program by filling the two currently unoccupied breeding chambers with breeding pairs and constructing and filling two additional breeding chambers.

5.3.2 Description of the Breeding Program

TPF works closely with USFWS and other members of the Condor Recovery Program to coordinate breeding activities to support recovery efforts. TPF pairs condors for breeding as directed by USFWS. California condor pairing is carefully managed by USFWS to maximize production while

[4] At a maximum of three rotations per minute, the blade tip speed of covered turbines ranges from approximately 5 mph to 39 mph, depending on rotor diameter, making the blades more visible to California condors and easier to avoid.

optimizing genetic diversity, minimizing genetic loss, and maintaining genetic balance in the captive and wild populations. Pairing strategies are based on genetic information, behavioral data, logistical considerations, and other information (USFWS 1996).

Once California condor breeding pairs are established, TPF must maximize the safety and success of each egg laid to achieve high levels of breeding success. To do so, TPF collects all laid eggs and incubates them artificially for most of the incubation period. This allows TPF to make sure the embryo is developing as expected and there are no complications with the incubation process. When the eggs are close to hatching, they are returned to the nest to be raised by adult condors.

Young California condors spend an average of 16 months at the World Center for Birds of Prey, with time spent in the breeding chamber with their parents and in the socialization pen where they interact with and learn from an adult mentor, as well as other young condors. While in the socialization pen, young condors learn social feeding skills using calf carcasses provided by TPF. They also receive power pole aversion training in the socialization pen. Each California condor requires regular feedings, routine vaccinations, and other husbandry tasks, all accomplished through limited human interaction with condors and without acclimating the condors to human presence.

A critical component of the captive condor operation is daily monitoring and observation. The California condors are closely watched from the time they first hatch until they are transported to the field for release. This monitoring is critical in identifying if the condors are exhibiting behaviors well-suited for the wild. Positive behaviors can range from appropriate social interactions to the development of strong flight muscles through regular flight. If undesirable behaviors are observed, such as spending too much time on the ground, TPF manages the flock accordingly and works to reduce the behavior's occurrence. These time-intensive practices reduce the occurrence of undesirable behaviors that could make young California condors vulnerable to predators, while minimizing human interaction.

5.3.3 Mitigation to Offset the Impact of Authorized Take

As described in Section 4.2, *Requested Take Authorization*, the covered operators request a take authorization of up to 11 California condors over the 30-year permit term. Although this level of take may not occur during the permit term due to the minimization measures described above, the mitigation program is designed to fully offset the impact of the taking of the authorized take limit regardless of whether the limit is reached. Based on the California condor population viability analysis (PVA), mitigation to fully offset the impact of the taking can be achieved by rearing and releasing two to three California condors for every condor taken (Bakker and Finkelstein 2022); therefore, WECAT conservatively proposes to work with TPF to rear and release 35 California condors over the permit term (i.e., a 3.2:1 ratio). Additional rationale supporting this analysis is provided below.

To evaluate the mitigation required to offset the impact of the taking of the authorized take limit, this CCP used the California condor PVA (Bakker and Finkelstein 2022) to determine how many captive-reared condors would need to be released into the wild to fully offset the taking of one adult condor, including its lost reproductive potential. This was calculated as the number of captive-reared condors released into the wild that would be required to maintain the same population size (as projected in 2050) as if no condors were removed.

The PVA incorporated two variables to capture a range of potential outcomes for the number of captive-reared California condors required to offset the take of one free-flying adult: population growth conditions and breeding class of the individual taken. For population growth conditions both the current growth scenario and a no growth scenario were considered (Table 5-1). The PVA also takes into account the post-release survival rates of released condors and thus does not assume that all released California condors are recruited into the wild breeding population.

Table 5-1. Population Growth Scenarios for Population Viability Analysis

Variable	Current Growth Scenario	No Growth Scenario
Lead mortality rate	Current lead mortality rate	Lead mortality rate doubles
Annual release rate	6 females	No releases
Ongoing management of nests	10 nests	No nests managed
Replacement of failed eggs in the wild	Up to 1 failed egg replaced	No replacement

Each of these growth scenarios was run with one of two assumptions for the breeding class of individual taken. In the first assumption, successful breeders were taken in proportion to their abundance in the current population. In the second assumption, only successful breeders were taken, regardless of their abundance or proportion in the population. For the model scenarios in which successful breeders were taken in proportion to their abundance in the current population, 2.4 to 2.6 captive-reared condors were required to offset the take of one free-flying adult. For the model scenarios in which only successful breeders were taken from the population, 2.8 to 3.2 captive-reared condors were required to offset the take of one free-flying adult. Using the most conservative assumptions of the PVA described above, the impact of removal of one adult condor from the free-flying population can be fully offset by the captive breeding and release of 3.2 condors. Taking this conservative approach, the requested take of up to 11 California condors requires 35 captive-raised condors to be released into the wild to offset the impacts of the taking.

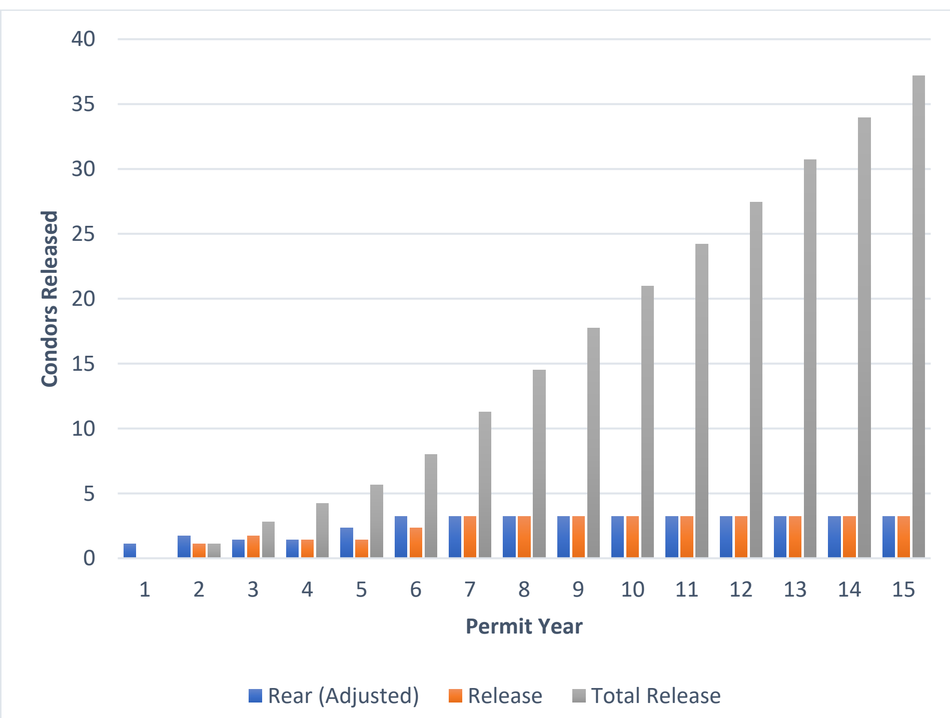
5.3.4 Increase California Condor Production

To achieve the rearing and release of 35 captive-reared California condors and fully offset the impact of take of 11 adult free-flying condors, WECAT will provide funding to increase California condor production at TPF's World Center for Birds of Prey. Specifically, WECAT will provide funding to TPF to construct two additional breeding chambers at the World Center for Birds of Prey. Combined with the two breeding chambers that are currently unoccupied, WECAT will contract with TPF to rear 35 California condors for release using these four breeding chambers.

WECAT's funding will be directly used by TPF to increase the number of California condors reared and released at the World Center for Birds of Prey by 35 condors over 15 years. According to TPF, the World Center for Birds of Prey currently averages the production of 15 condors annually for release. This program is funded by federal grants restricted to condor recovery, private sector grants restricted to condor recovery, and unrestricted gifts to TPF. WECAT's funding will go directly to the production of condors to meet this CCP's mitigation requirements and is in addition to the funding and operation of TPF's ongoing condor production. Specifically, TPF will use funding for California condor production in two breeding chambers that were constructed with another source of funding but have never been used because TPF has been unable to identify a secure funding source to cover the necessary expense of caring for four adults and two eggs, nestlings, and fledglings annually. TPF will further use funding to construct two additional breeding chambers and care for birds in these new chambers, for a total of construction of two chambers and condor production in four chambers, above and beyond TPF's ongoing California condor production program. Thus, the specific rearing and releasing of 35 condors to offset the covered operators' requested authorized take would not be possible and will not occur in the absence of covered operators' funding.

Upon receiving funding from WECAT, TPF will begin to implement mitigation by introducing condors into the currently empty chambers. It would also contract to begin constructing two additional chambers and selecting breeding condor pairs to occupy the chambers, introducing the birds and allowing them to acclimate, managing the first breeding attempts for successful egg hatching, and raising and socializing the hatched condors until they are deemed ready for release into the wild (typically at approximately 1.5 years old). Based on TPF's average success rate that a breeding chamber produces a California condor released into the wild population by 1.5 years of age (based on TPF's 81% success rate), and assuming the first WECAT-sponsored California condor releases could occur as soon as year 2 of the ITP, the four breeding chamber operations funded by WECAT (including construction of two additional chambers) are expected to result in a net increase in TPF's condor production of 35 condors by the end of the 30-year ITP term (i.e., 4 breeding chambers x 0.81 success rate x 11 years = 35 condors released). This production rate will ensure that WECAT will fully offset the impact of the authorized take by the end of the ITP term (Figure 5-1). If the take limit is not reached, or if TPF's success rate is higher than expected, WECAT will be able to fully offset the impact of the taking before the end of the ITP term. If the production rate is slower than anticipated, WECAT will implement adaptive management measures to address production issues.

Figure 5-1. Anticipated Condor Release Schedule



Totals are based on an estimated release schedule based on discussions with TPF.

WECAT-sponsored condors will be released by TPF as directed by USFWS, such that the mitigation will directly contribute to and support the ongoing condor recovery effort. All activities conducted by TPF to raise and release California condors using funding provided by WECAT would be covered by TPF's existing recovery permit (ESA Section 10(a)(1)(A) permit); therefore, no additional permitting would be required by the TPF.

5.4 Monitoring

Monitoring is a mandatory element of all HCPs (50 CFR Sections 17.22(b)(1)(iii)(B), 17.32(b)(1)(iii)(B), and 222.307). The HCP Handbook specifies that HCP monitoring programs must "provide the information necessary to assess compliance and project impacts, and verify progress toward the biological goals and objectives" and identifies two categories of monitoring under an HCP: compliance monitoring to evaluate compliance with the permit terms and conditions and effectiveness monitoring to support ongoing conservation decisions (USFWS and NMFS 2016). To meet these requirements, this CCP's monitoring program consists of compliance monitoring to detect take of the covered species at the project, and mitigation effectiveness monitoring to ensure that the mitigation is implemented and functioning as planned. The monitoring program will verify ITP compliance through detection of take of the covered species, provide progress reports on the fulfillment of mitigation requirements, and evaluate the effectiveness of the minimization and mitigation actions in meeting the biological goals and objectives (Section 5.1, *Biological Goals and Objectives*). Monitoring results will be reported to USFWS after each year of monitoring.

5.4.1 Condor Take Detection Methods

If a California condor take occurs during implementation of this CCP, it may be detected through USFWS's on-going monitoring of tagged (GPS/GSM or VHF) condors or as an incidental carcass discovery by covered operator personnel or subcontractors. When a transmitter signal indicates that a California condor tag has stopped moving for an extended period, USFWS attempts to locate and recover the dropped transmitter, or to locate and recover the condor for veterinary treatment in the case of injury or necropsy in the case of death. Upon notification by USFWS or a GPS/GSM- or VHF-based condor detection system of a tagged condor that has stopped moving at a location within the permit area, the covered operator(s) will assist USFWS with the location and recovery of the condor as necessary and permissible and begin implementation of response actions (see Section 5.4.2, *Condor Take Response Actions*).

In addition to notifications regarding tagged California condors from USFWS, under this CCP, all covered operators will be responsible for implementing a Condor Incident Reporting System (CIRS) that meets the following minimum standards to monitor and report injury or mortality of California condors, if any should occur, for the ITP term. The purpose of the CIRS is to standardize the actions taken by site personnel in response to California condor incidents encountered at the covered projects and to ensure the covered operators are documenting condor incidents. All of the covered turbines require routine maintenance and have operations and maintenance (O&M) staff present on a daily, weekly, or monthly basis, with older facilities requiring more frequent maintenance visits and new facilities and repowered facilities requiring avian fatality monitoring for a period of time as a condition of county permitting. As a result, O&M staff are present, driving the facility roads and inspecting the covered turbines and ancillary facilities year-round. Presence of staff provides added condor protection through observations while driving access roads and working in and around turbines. In addition, when curtailments occur, on-site personnel can provide extra visual support to contracted staff on the ground for verification of condor presence or absence.

The CIRS will be utilized by operator staff who encounter dead or injured condors incidentally while conducting any activities within the permit area such as general wind turbine or electrical equipment O&M activities. It is the responsibility of covered operator staff and subcontractors to report all condor incidents to their immediate supervisor. Operator staff will be specifically trained to monitor for dead or injured California condors during their work activities. The CIRS training will occur at least once per calendar year, or as-needed for new site personnel, to ensure all are aware of the potential for condors to occur at their site and the CIRS requirements and communication procedures. A data sheet that describes how personnel can recognize California condor will be permanently posted in the O&M facility. In addition, copies of the data sheet will be kept within all vehicles used by personnel, or electronically if digital devices are used, to conduct on-site activities. The data sheet will include instructions and the procedures that personnel shall take in the event an injured or dead condor is discovered on-site, including whom to notify and what actions to take. In addition, any California condor found injured will be reported immediately to the nearest appropriate wildlife rehabilitation facility. All incidents involving a condor will be reported to USFWS by the covered operator within 24 hours of detection. Upon discovery of take of a California condor, the covered operator will begin implementation of condor take response actions and reporting protocol (see Section 5.4.2, *Condor Take Response Actions*, and [*placeholder for section reference for reporting protocol*]). Long-term data collected as part of the CIRS will be maintained on-site by a designated personnel member (e.g., environmental manager or operations manager), or digitally, if a system is available to do so.

Several covered operators have ongoing implementation of voluntary wildlife incident reporting that includes California condor reporting. The commitments under this CIRS must be met or exceeded, such that this CIRS establishes the minimum standards all covered operators will follow at covered projects during implementation of this CCP.

Together with the high level of take detection coverage provided by the California condor tagging program, implementation of the CIRS provides a high likelihood of detecting take of condors because of the species' large body size, distinguishing characteristics, and the long carcass persistence times typical of large birds. However, condor take detection methods may be modified over the term of the CCP in response to adaptive management (Section 5.5.3, *Approach to Detecting Condor Take*).

5.4.2 Condor Take Response Actions

In response to discovery of a California condor take (i.e., injury or mortality) at a covered operator's covered facility, the covered operator will take the following actions:

1. Report the take to USFWS per the reporting protocol (see Section 6.1.4 *Reporting*).
2. Develop an incident report summarizing the likely cause(s) of the take (to the extent the cause can be identified).
3. Determine whether adaptive management is necessary, based on three main criteria:
    a. Whether the take resulted from a localized insufficiency of the Condor Risk Minimization Program.
    b. The likelihood of take reoccurrence, if determinable.

   c. The likelihood that take may exceed the authorized limit during the ITP term.

4. Coordinate with WECAT on proposed next steps based on the incident report and adaptive management determination. Next steps may include:
   a. Continue to implement CCP without any change in protocol.
   b. Implement adaptive management steps (see Section 5.5.1, *Approach to the Take of Condors*).
   c. Coordinate with USFWS to determine appropriate actions if incident report is inconclusive, concluded the take was not a result of a covered activity, or is inconsistent with USFWS's independent assessment.

If, based on the evaluation and coordination between covered operator, WECAT and USFWS, the condor injury or mortality is determined not to be attributable to the covered activities (e.g., lead poisoning or gunshot), the covered operators will continue to implement the CCP without any change in protocol. If the California condor take occurred as a result of a non-covered activity attributable to a covered operator, the covered operator will coordinate with WECAT and USFWS to determine the next steps for ESA compliance.

If take is attributable to a covered activity and, based on the evaluation described above, adaptive management is determined necessary by the covered operator and WECAT, the covered operator(s) will implement the adaptive management approach to take of California condors (see Section 5.5.1, *Approach to the Take of Condors*).

5.4.3 Condor Breeding, Rearing, and Release Monitoring

WECAT will require an annual update from TPF on the status of the breeding program and the status of the WECAT-sponsored activities, including the number of WECAT-sponsored birds hatched and released each year. Once birds are released into the wild, they will be monitored by USFWS or its recovery partners according to the agency's ongoing monitoring and management of the species.

5.5 Adaptive Management Program

Adaptive management is a method to address uncertainty in natural resources management. Broadly defined, it means examining strategies for meeting biological goals and objectives, and then, if necessary, adjusting future conservation management actions according to what is learned. Adaptive management will be utilized to ensure that the covered operators' conservation program is effective and that the take of condors at covered projects does not exceed the permitted level of take. Therefore, the adaptive management protocol is designed to respond to specific take occurrences and overall pace of take during the ITP term. In addition, adaptive management may respond to USFWS's management of the California condor population and the influence of the tagging program on the effectiveness of this CCP over the ITP term. USFWS will be notified of all adaptive management actions and involved in decisions regarding the addition of new components to the conservation program (see Section 6.5, *Role of USFWS in Decisions Regarding CCP Implementation*), such as new detection techniques or supplemental monitoring efforts.

5.5.1 Approach to the Take of Condors

If based on the evaluation of a California condor take (see Section 5.4.2, *Condor Take Response Actions*), adaptive management is determined necessary by the covered operator and WECAT, the covered operator will take the following actions:

1. Based on the incident report, determine the most efficient and practicable corrective action to reduce the likelihood of take reoccurrence. This could include items such as additional staff training, carrion management improvements, modifications to the detection system, communication protocol improvement, etc., or continued implementation of the CCP without modification if no changes are necessary.
2. Based on the number of condors taken to date under the permit and the numbers of condors taken in the current incident, determine the magnitude of the corrective action and schedule for implementation. These actions will be driven by the likelihood that take during the remainder of the permit term may exceed the authorized limit.
3. Based on the likelihood of take reoccurrence, determine the geographic scope and/or seasonal extent of the corrective action. These actions will be driven by the spatial scale and season(s) in which take is considered likely to reoccur.
4. Produce a corrective action plan for review and comment by WECAT. Corrective action plans are expected to focus on one or more of the following systems:
    a. Measures to minimize electrocution and collision risk at electric facilities.
    b. Carrion management plan.
    c. Condor detection system.
    d. Turbine curtailment system.
5. Notify USFWS and implement the corrective action plan.
6. Report on the implementation of the corrective action plan to WECAT annually, for inclusion in the annual report (Section 6.1.4, *Reporting*).

Adaptive management will be implemented at the project where take occurred, unless WECAT determines that the likelihood of take reoccurrence considered together with the amount of authorized take and time remaining on the permit indicates that adaptive management should be implemented by additional covered operators. In this situation, WECAT will coordinate the adaptive management across the covered operators. If WECAT, after coordination with USFWS, determines that the cause of the incidental take is likely to exceed 11 condors within the permit term, WECAT will work with the covered operators to apply to USFWS for an amendment to the CCP.

5.5.2 Approach to Detecting Condor Use

Over the 30-year ITP term, USFWS may reduce or discontinue the California condor tagging program, which would cause the percentage of tagged condors in the wild population to decline and reduce the effectiveness of this CCP's current approach to detecting condors in the permit area (Section 5.2.2, *Condor Risk Minimization Program*). If at some point during the ITP term, the tagging percentage becomes too low for GPS/GSM/VHF-based detection systems to be effective at detecting most California condors in the permit area (based on the trigger definition below), the covered operators will respond with adaptive management. First, covered operators and WECAT will coordinate with USFWS to determine whether actions are required to ensure the continuation of an effective minimization strategy. The first considerations would be whether it is appropriate and logistically feasible for WECAT to provide funding to increase tagging efforts by USFWS. If this option is not acceptable to USFWS but action is required, covered operators will independently or cooperatively work to supplement the condor detection system or to implement an alternative condor detection system that does not rely on GPS/GSM/VHF technology.

This adaptive management would be triggered based on evidence that take of an untagged California condor is likely to occur under the ITP term. Specifically, if the percentage of the wild Southern California condor population that is tagged with GPS/GSM/VHF transmitters is below 70%, as reported by WECAT (e.g., through annual reporting) or notified by USFWS, WECAT will check in with USFWS. During this check-in, WECAT and USFWS will discuss condor activity (e.g., number and location of detections in the Plan Area, condor behavior, status of the USFWS tagging program, etc.) and any actions USFWS may recommend to the covered operators on a voluntary basis. If the percentage of the wild Southern California condor population that is tagged with GPS/GSM/VHF transmitters decreases further and falls below 50% for a period of 1-year, as reported by WECAT (e.g., through annual reporting) or notified by USFWS, the covered operators will implement an alternative condor detection system subject to the conditions described above. This tagging percentage is designed to prevent the occurrence of groups of condors in the permit area without detection, as more fully described in Appendix A, *Covered Operator Maps*. This tagging percentage also maintains the effectiveness of the Condor Risk Minimization Program upon which this CCP and the take authorization request is based by ensuring that GPS/GSM/VHF-based detection systems implemented under the CCP will meet the minimum detection standards established in Section 5.2.2.2, *Condor Detection System*.

Alternative condor detection systems may entail any system that can be used in combination with or does not rely on GPS/GSM/VHF technology and that meets the minimum standards established in Section 5.2.2, *Condor Risk Minimization Program*. Alternative condor detection systems may be implemented solely or in addition to continuation of GPS/GSM/VHF-based detection systems (if preferred by the covered operator); however, alternative condor detection systems must independently meet or exceed the minimum standards established in Section 5.2.2, *Condor Risk Minimization Program*. An alternative condor detection system must be implemented within 1 year of the trigger occurring. WECAT will notify USFWS of the proposed adaptive management prior to implementation, and will document the implementation of the alternative condor detection system in the annual report.

5.5.3 Approach to Detecting Condor Take

Similar to the condor detection system, a reduction in the percentage of tagged California condors in the wild population may reduce the effectiveness of this CCP's approach to detecting condor take (Section 5.4.1, *Condor Take Detection Methods*). If at some point during the ITP term, the tagging percentage becomes too low for GPS/GSM/VHF-based monitoring to be effective at detecting most condor take (based on the trigger definition below), the covered operators will respond with adaptive management. First, covered operators and WECAT will coordinate with USFWS to determine whether actions are required to ensure the continuation of an effective monitoring plan. The first considerations would be whether it is appropriate and logistically feasible for WECAT to provide funding to increase tagging efforts by USFWS. If this option is not acceptable to USFWS but action is required, covered operators will independently or cooperatively work to implement supplemental condor take monitoring that does not rely on GPS/GSM/VHF technology.

This adaptive management would be triggered based on evidence that USFWS's monitoring of tagged (GPS/GSM or VHF) condors and the CIRS (e.g., during monthly or more frequent visits to turbines) have a decreasing ability to detect condor take during the ITP term. Specifically, if the percentage of the wild condor population that is tagged with GPS/GSM/VHF transmitters is below 70%, as reported by WECAT (e.g., through annual reporting) or notified by USFWS, WECAT will check in with USFWS. During this check-in, WECAT and USFWS will discuss condor activity (e.g., number and location of detections in the Plan Area, condor behavior, status of the USFWS tagging program, etc.) and any actions USFWS may recommend to the covered operators on a voluntary basis. If the percentage of the wild Southern California condor population that is tagged with GPS/GSM/VHF transmitters decreases further and falls below 50% for a period of 1 year or more, as reported by WECAT (e.g., through annual reporting) or notified by USFWS, the covered operators will implement supplemental condor take monitoring. Although take is not expected to occur in every year of the ITP term, this tagging threshold will be evaluated in every ITP year to ensure that if take occurs, there is a high probability of detecting the take. This tagging threshold is the level at which supplemental monitoring efforts may improve the confidence in condor take monitoring results, compared to monitoring of tagged condors alone, as more fully described in Appendix B, *Tagging Threshold Analysis*.

Supplemental condor take monitoring would entail road and pad searches at all covered turbines once per month during the fall (September 1–November 30) or as agreed to with USFWS based on condor use and activity when risk to condors is highest based on tagged condor occurrence in the permit area (Section 4.2, *Requested Take Authorization*). Searches may be conducted by covered operator staff and/or subcontractors and results of searches would be tracked following the CIRS (Section 5.4.1, *Condor Take Detection Methods*) and, if applicable, the condor take reporting protocol (Section 6.1.4.2, *Condor Take Incident Reporting*).

Supplemental condor take monitoring will be implemented in addition to continuation of GPS/GSM/VHF-based monitoring and the CIRS established in Section 5.4.1, *Condor Take Detection Methods*. Supplemental condor take monitoring must be implemented within 1 year of the trigger occurring. WECAT will notify USFWS of the proposed adaptive management prior to implementation and will document the implementation of supplemental condor take monitoring in the annual report.

5.5.4 Approach to Mitigation

If TPF is not able to perform the mitigation actions as expected, WECAT will work with TPF to reprioritize mitigation funding and direct funds to actions or improvements that will result in the production of more California condors consistent with the mitigation plan's objectives.

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Chapter 6
Implementation and Funding

This chapter describes implementation and funding for this CCP. It provides information on how the CCP will be implemented, including the roles of the CCP administrator (WECAT), covered operators, addition of new operators, and reporting requirements of the CCP. The chapter also describes changed and unforeseen circumstances, permit assurances, minor modifications and amendments, the role USFWS in decisions regarding CCP implementation, permit suspension or revocation, change of ownership, and permit renewal. Finally, this chapter also describes implementation costs and funding.

6.1 Plan Implementation

As described in Chapter 1, *Introduction*, Section 1.4.1, *Permittees*, this CCP will be a jointly held permit with all covered operators. The covered operators will be listed on the permit as co-permittees. WECAT will help administer the permit. WECAT and the covered operators' respective obligations are described in the following sections.

6.1.1 Plan Administrator

WECAT will assist with the administration and implementation of the CCP across all covered operators. WECAT will have the following responsibilities:

- Collect and compile information from covered operators and TPF relevant to annual reporting and CCP implementation.
- Prepare and submit annual reports to USFWS (see Section 6.1.4, *Reporting*).
- Serve as the initial point of contact for USFWS and covered operators regarding implementation issues.
- Review operators' changes to condor detection monitoring systems (see Section 5.2.2.2, *Condor Detection System*).
- Review incident reports from covered operators regarding take.
- Coordinate with operators on potential causes of take and appropriate responses to minimize risk of additional take.
- Assist with implementation of adaptive management responses in the event of USFWS reduction or discontinuation of the condor tagging program (see Section 5.5.2, *Approach to Detecting Condor Use,* and Section 5.5.3, *Approach to Detecting Condor Take*).
- Review adaptive management corrective action plans (see Section 5.4.2, *Condor Take Response Actions*, and Section 5.5.1, *Approach to Take of Condors*).
- Coordinate adaptive management responses across multiple operators as necessary (see Section 5.5.1, *Approach to Take of Condors*).

- Review operators' compliance with condor risk minimization program minimum standards (see Section 5.2.2, *Condor Risk Minimization Program*).
- Collect, consolidate, and administer funding, including any surety bonds or other security, for components of CCP implementation (see Section 6.9.2, *Implementation Funding*).
- Enter into an agreement with TPF to deliver funds (see Section 5.3, *Measures to Mitigate Unavoidable Impacts of Take,* and Section 6.9.2, *Implementation Funding*) and monitor progress on captive breeding mitigation (see Section, 5.4.3, *Condor Breeding, Rearing, and Release Monitoring*).
- Maintain records on CCP, permit, and implementation-related document modifications and amendments, including permit transfers.
- Administer contracts with covered operators to implement elements of the CCP, if necessary.
- Hire or contract staff to complete WECAT responsibilities as described herein.
- Respond to changed circumstances, or ensure participating operators respond appropriately to changed circumstances.

Upon permit issuance, WECAT will be reorganized into a Delaware limited liability company with the purpose of undertaking the responsibilities set forth above, with each of the permittees becoming a member of the company. In addition to acting in the administrative capacity described above, on behalf of the permittees WECAT will enter into a legal contract with the mitigation provider (i.e., The Peregrine Fund) by which WECAT will fund the breeding and release of condors as required by this CCP. To assure the performance of its obligations under the CCP, WECAT will also enter into a legal contract with the permittees by which (i) WECAT will become bound to carry out the roles and responsibilities identified for it under the CCP and (ii) each of the co-permittees will agree to comply with the terms of the HCP and the ITP with respect to its own projects. WECAT would include part-time staff including a president to oversee and manage WECAT, prepare annual reports, and supervise key issues that arise during implementation; support staff to prepare meeting materials, compile data for annual reports, draft annual reports, and assist covered operators with issues that may arise; legal support to help with landowner contracts and permit questions; and accountant support to assist with budget tracking and member contribution accounting.

6.1.2 Covered Operators

All covered operators will be members of WECAT. Covered operators are responsible for implementing the minimization, monitoring, and adaptive management measures, and funding mitigation in accordance with the biological goals and objectives outlined in Chapter 5, *Conservation Program*. Responsibilities of covered operators include the following:

- Providing necessary information to WECAT to comply with permit requirements.
- Providing mitigation funding to WECAT as specified in Section 6.9.2, I*mplementation Funding*.
- Implementing general operational measures (see Section 5.2.1, *General Operational Measures*):
- Implementing the condor risk minimization program (see Section 5.2.2, *Condor Risk Minimization Program*):

- Implementing a Condor Incident Reporting System (CIRS) to monitor and report injury or mortality of California condors at covered projects (see Section 5.4.2, *Condor Take Response Actions*).
- In the event of a California condor take, conduct condor take response actions outlined in Chapter 5 (see Section 5.4.2, *Condor Take Response Actions*), including: reporting take to USFWS, coordinating with USFWS to assist in the recovery of the injured or dead condor, completing an incident report, assessing whether adaptive management is necessary, and coordinating with WECAT on next steps based on findings.
- Implementing adaptive management, if necessary (see Section 5.5, *Adaptive Management Program*).

6.1.3 Addition of Existing or New Operators

If any project operator desires to join this CCP, they must send a request to USFWS to be included as a co-permittee and become a member of WECAT. The requirements for inclusion include:

- Enrolled projects must be located within the CCP plan area (Figure 1-1).
- The take limit established by the CCP (see Chapter 4, *Biological Effects and Take Assessment*) will not change.
- A new enrolled project must adhere to the requirements of this CCP, as determined by WECAT and USFWS (see Chapter 5, *Conservation Program)*.
- A new enrolled project must not be in an area that poses substantially higher risk of taking California condors based on the latest patterns of condor use and activity.
- The proposed co-permittee must meet any organizational requirements or criteria of WECAT as may be established in its operating agreement.

This CCP evaluates the potential for taking up to 11 condors over 30 years and concludes that the potential effect on the condor population throughout the plan area would be minimized and mitigated with implementation of the conservation strategy. The addition of existing or new covered operators (beyond the initial 24 covered operators generating 72% of the power in the plan area) could affect the localized risk to individual condors but is not expected to change the risk to the population throughout the plan area so long as the conservation strategy is implemented, and the take authorization will remain the same under the permit.

Prior to seeking concurrence from USFWS for inclusion, a proposed covered operator must first consult with WECAT to confirm that the foregoing criteria are satisfied. If WECAT determines that inclusions is appropriate, WECAT will notify USFWS of the new member to be added to the permit. WECAT will coordinate with USFWS to confirm adding a new co-permittee is acceptable; following discussions with USFWS the goal is to have confirmation within 30-60 days. Nothing in this CCP prevents a covered operator from applying to USFWS for incidental take authority independent of this CCP, but no such actions will change the take limits provided to the covered operators under the ITP.

In addition to complying with the CCP and becoming bound by any contractual arrangements involving WECAT, including its operating agreement, any new operator must cover all costs of seeking to be added to the permit and pay a proportionate share of all costs incurred to date by

WECAT, including condor risk evaluation, planning, permitting and mitigation costs. An administrative change to the permit would need to be consistent with Section 6.4, *Administrative Changes and Amendments*. If approved by USFWS, updated permits would be circulated to WECAT and all covered operators.

6.1.4 Reporting

This section describes annual reporting requirements and the California condor take reporting protocol.

6.1.4.1 Annual Reporting

An annual report will be submitted to USFWS by March 31 of each year that summarizes CCP implementation for the previous calendar year, as well as relevant information cumulatively since permit issuance. To ensure that WECAT can prepare the annual report on time, each covered operator will submit to WECAT the data and information to be included in the annual report that is relevant to their covered project(s) by January 31 of each year. The data will be submitted in a standardized format to ensure consistency in data reporting. WECAT will compile the data and information provided by all covered operators into one annual report to be submitted to USFWS. The annual reports will contain the following information related to achieving the CCP's biological goals and objectives:

- Executive summary of annual findings
- Confirmation that measures to minimize take were implemented, including any results of the implementation:
    - Staff training
    - General minimization measures
    - Condor risk minimization program
        - Carrion management plan (including number and type of carcasses removed, buried, or covered during the reporting year)
        - Condor detection system (including status of the detection system and any system interruptions)
        - Turbine curtailment (including number of curtailment events by month)
- Any covered operator-related California condor take during the reporting year. In the case of a mortality this would include the date, location, and condition of the carcass when detected, as well as timing of the carcass's collection.
- Cumulative count of covered operator-related California condor take since permit issuance.
- Summary of the status of breeding, rearing, and release of WECAT-sponsored condors by TPF in the reporting year and cumulatively since permit issuance.
- Documentation of any adaptive management triggered in the previous year and responses, if implemented or planned.
- Information on financial status of the CCP:

  - Confirmation that all operators' annual budgets include operational funds to implement conservation measures.
  - Confirmation that all operators have provided mitigation funding to WECAT.
- Documentation of any changed circumstance in the reporting year and responses, if implemented or planned.

6.1.4.2 Condor Take Incident Reporting

If an injured California condor is found within a covered project, the covered operator must immediately contact USFWS's California Condor Recovery Program staff at (805) 644-5185, the Palm Springs Fish and Wildlife Office (Palm Springs FWO) at (760) 322-2070, USFWS's Office of Law Enforcement at (916) 414-6660, and WECAT. The California Condor Recovery Program staff will respond, assess the injury, and determine the next course of action.

If a dead California condor is found within a covered project, the covered operator must contact USFWS's Office of Law Enforcement, Palm Springs FWO, and the California Condor Recovery Program within 24 hours in accordance with the contacts on the permit. If USFWS, a covered operator, or other entity responsible for monitoring condor health detects a telemetry signal from a tagged condor that indicates a mortality in a covered project, the parties will all coordinate to investigate the location of the mortality signal and if possible, to retrieve the carcass. The carcass must be left in place and secured (e.g., covered with a tarp and the tarp weighted with rocks), to the degree possible, to deter scavengers. USFWS will provide further direction at the time of or soon after notification.

The covered operators will confirm their organizations' appropriate contact information each year in the annual report and WECAT will confirm that the USFWS contact information is current.

6.2 Changed and Unforeseen Circumstances

Federal No Surprises Assurances (codified in 50 CFR 17.3, 17.22(b)(5), 17.32(b)(5); 50 CFR 222.307(g)) provide assurances to Section 10 permit holders that, as long as the permittee is properly implementing the conservation plan and the ITP, no additional commitment of land, water, or financial compensation will be required with respect to covered species, and no restrictions on the use of land, water, or other natural resources will be imposed beyond those specified in the conservation plan without the consent of the permittee. The No Surprises rule has two major components: changed circumstances and unforeseen circumstances.

6.2.1 Changed Circumstances

Changed circumstances are defined in 50 CFR 17.3 as changes in circumstances affecting a species or geographic area covered by a conservation plan that can reasonably be anticipated by a conservation plan's applicants and USFWS, and for which the applicants and USFWS can plan in advance. The No Surprises regulation requires that a permittee's response to changed circumstances through additional mitigation be limited to those measures that are defined in the conservation plan.

If a changed circumstance occurs during the permit term, it will be addressed through the implementation of remedial measures. *Remedial measures* are specific actions that will be taken in response to the changed circumstances and are designed to address any adverse impacts on California condors resulting from the changed circumstance. Remedial measures will generally not include actions beyond those expressly identified in this section, although they may include new actions agreed to by the covered operator(s), WECAT, and USFWS. Appropriate remedial measures must be taken in the event of a changed circumstance and are different from adaptive management. If a changed circumstance is detected, WECAT will notify USFWS within 30 days. WECAT will implement remedial measures as described in this section and report implementation to USFWS as part of the annual report.

WECAT and covered operators will help develop and implement remedial measures for the following changed circumstances: (1) temporary failure of detection system, (2) change in the ability of the mitigation provider to provide the needed mitigation, and (3) listing of a new species.

6.2.1.1 Temporary Failure of Detection System

If a covered operator's condor detection system is disrupted, this would result in the reduced ability to detect California condors flying near covered projects and impair the operator's ability to respond to condor presence by curtailing turbines in accordance with the condor risk minimization program. Because detection systems may vary from project to project, disruption of these systems may take several forms. Examples of disruptions include:

- Electrical outages in an area resulting in the shutdown of detection systems.
- Vandalism of installed detection systems.
- Weather events (e.g., excessive wind, lightning, rain, snow, solar flares) that may temporarily disable or reduce effectiveness of GPS/GSM technology.
- Weather events (e.g., smoke and fire, thunderstorms) that may temporarily cause on-site monitors to leave for safety reasons or affect detection due to reduced visibility.
- Weather events, fire, earthquake, or other short-term catastrophic events that destroy detection systems or require a safety stand-down of human-staffed detection systems.

The disruption or outage of detection systems lasting up to 3 days during the minimum required seasonal coverage period (September 1 to November 30) would be considered a changed circumstance. Electrical repairs are typically made as soon as possible, and generally within 2 days. Electrical outages lasting longer than 3 days are extremely rare and therefore would be considered an unforeseen circumstance (see Section 6.2.2, *Unforeseen Circumstances*).

The covered operator will repair or replace any damage caused by vandalism, fire, earthquake, or weather event that impairs the detection system after the danger has passed; any such event is considered a changed circumstance. The destruction of detection systems resulting from vandalism events could take days or weeks to repair. Weather or fire events are likely to be short-term but their effects could take days to resolve. However, as the current condor detection system in the region has never been out of commission for more than several days since its operation began, these events are expected to be infrequent and resolved quickly.

Remedial Measures

The following remedial measures would apply if wind turbines are operating during the conditions identified above in Section 6.2.1.1, *Temporary Failure of Detection System*. For detection system outages related to loss of electrical power to the detection system, covered operators would use an alternative power system. Covered operators would use a backup electrical generation system (e.g., batteries or generator) until service can be restored. If generators are not available within 3 days, covered operators will temporarily use biological monitors during daylight hours if the outage occurs during the current period of greatest condor activity, between September 1 and November 30, or as agreed to with USFWS based on condor use and activity.

Vandalized or damaged detection systems would be repaired or replaced as soon as possible. If systems are unrepairable, the operator would determine the most effective and economic solution to replace the detection system, which may be different than the original system. If the detection system is down for more than 3 days between September 1 and November 30, the operator will employ a temporary detection system, such as biological monitors, until a permanent solution is in place.

If multiple GSM/VHF units fail or GSM/VHF detection issues arise, WECAT or the covered operator will discuss the reasons for the reduction in GSM technology effectiveness with USFWS and determine when USFWS will replace the affected unit(s). WECAT may provide supplemental funding to replace GSM units if USFWS and WECAT determine it is necessary and appropriate.

If weather events damage the detection systems, the covered operator will take action to restore operation of the monitoring equipment as soon as possible. If the detection system is down for more than 3 days between September 1 and November 30 or as agreed to with USFWS based on condor use and activity, the operator will employ a temporary detection system, such as biological monitors, until a permanent solution is in place.

6.2.1.2 Change in the Ability of the Mitigation Provider to Provide the Needed Mitigation

If TPF is unable to provide the needed mitigation, WECAT and the covered operators will work with USFWS to ensure the mitigation would still be provided by another entity and at the same level. While unlikely, factors that could influence the success of the breeding program are fire at the California condor breeding facility and diseases and parasites at the breeding facility. Each is described below.

A fire at the TPF breeding facility has the potential to result in the mortality of captive breeding birds or California condors scheduled for release to the wild and to destroy breeding chambers. Destruction of breeding chambers, holding facilities, and other infrastructure at TPF would result in delayed or cessation of breeding and rearing activities. While the threat of fire at TPF's breeding facility is low (i.e., there is defensible space and a fire plan) it is not impossible. However, TPF indicates there are measures in place to address this concern including the following.

- Multiple firebreaks surrounding the entire property and around buildings and bird enclosures.
- Defensible space around all condor breeding pens.
- All buildings have a fire sprinkler and alarm system that is well maintained and inspected by the fire alarm company annually.
- The fire sprinkler and alarm system includes 24/7 monitoring, in which the alarm company will make a phone call to condor staff and, if needed, the fire department if any of the buildings have a malfunction, water flow, or any other system or equipment concerns.

- There is 24/7 coverage of the facility by the condor staff so that fire emergencies can be responded to quickly;
- In addition to the professional fire sprinkler and alarm system, all falcon and condor buildings have manual sprinklers installed on the roof to use in emergencies.

TPF also maintains an insurance policy on its facilities to repair and replace facilities destroyed in the event of fire. With enough notice, TPF is prepared to respond to the threat of fires by securing the safety of individual condors and transporting eggs, chicks, and young off-site if necessary. A fire of any size, or intensity at the breeding facility that disrupts operations at the breeding facility is considered a changed circumstance that could necessitate remedial measures, as described below.

Diseases and/or parasite infestation could occur at the TPF breeding facility, which could result in the mortality of breeding condors or California condors scheduled for release to the wild. Additionally, diseases may reduce the fitness of breeding birds or delay or cancel the release of individual condors to the wild to prevent spread of disease to the free-flying populations. Currently, all adult California condors are inoculated annually against West Nile virus and chicks are vaccinated at 45 days, 75 days, and 6 months; however, there is the potential for emerging diseases or parasites that may impact the species at captive facilities. TPF regularly monitors for diseases and pathogens in their facilities. TPF indicates that all condors are dusted for feather lice anytime they are in-hand; when pre-release pens are empty TPF has exterminators spray it for parasites; and all condors are monitored for behavior and any bird that is acting ill is quarantined and seen by a vet. Sick birds are never sent to a release site. If a disease is detected in the captive population, TPF would follow their procedures for isolating and containing the disease at their facility. If the disease were to become a larger threat to the captive population, remedial measures will be implemented and are described below.

Remedial Measures

Remedial measures for fires would involve providing resources and support for securing the safety of individual California condors and transferring condors to safe facilities. Covered operator's contributions to TPF would include a reserve to be used by TPF to facilitate the transfer of condors from facilities during fire, maintenance of condors while damage is repaired, and funding for repair of breeding chambers and holding facilities. The majority of expenses are expected to be covered by TPF's insurance. WECAT would coordinate with TPF and USFWS to determine timelines and plans for temporary housing, facility repairs, and reconstruction.

If a new disease is detected or an existing disease begins to spread, TPF would contact USFWS to collaboratively determine the best method to monitor, treat, control, and eradicate the disease in the captive population, and to prevent spread to the wild population of California condors. TPF would also coordinate with WECAT regarding the outbreak and any planned responses. A part of covered operator's contributions to TPF would include a reserve to be used by TPF to respond to disease and parasite issues.

6.2.1.3 Listing of a New Species

During the permit term, it is possible that a species that is not covered by this CCP but that could be affected by covered activities will be listed under the ESA. If the co-permittees determine prohibited take of a newly listed species is reasonably certain to occur from the covered activities, WECAT or the affected co-permittees will coordinate with USFWS. Depending on the circumstances, the co-permittees will consider implementing measures that would avoid take of the species, amending the CCP to include the additional species, or pursuing independent project-specific ESA compliance approaches.

6.2.2 Unforeseen Circumstances

Unforeseen circumstances are defined in 50 CFR 17.3 as changes in circumstances affecting a species or geographic area covered by a conservation plan that could not reasonably have been anticipated by a conservation plan's developers and USFWS, and that result in substantial and adverse changes in the status of the covered species. Permittees are not required to respond to unforeseen circumstances, although they may voluntarily do so. In the event of unforeseen circumstances during the permit term, USFWS, WECAT, and the covered operator(s) would work together to identify opportunities to redirect existing resources to address unforeseen circumstances, as appropriate.

As described in the No Surprises Regulation, it is USFWS's responsibility to demonstrate the existence of unforeseen circumstances using the best scientific and commercial data available. The No Surprises Regulation does not limit USFWS or any federal, state, local, or tribal government agency or private entity from taking additional actions at its own expense to protect or conserve covered species. The No Surprises Regulation also does not prevent USFWS from asking WECAT or covered operators to voluntarily undertake additional measures or mitigation on behalf of the affected species. In the event of unforeseen circumstances during the permit term, USFWS and WECAT would work together to identify opportunities to redirect existing resources to address these unforeseen circumstances.

6.3 Permit Assurances

Covered operators requests regulatory assurances, consistent with the federal No Surprises Regulation, that USFWS will not: (1) require the commitment of additional compensation, land, or water by the covered operators, or (2) impose restrictions on covered operations beyond the terms of the CCP to minimize and mitigate the effects of the covered activities.

6.4 Administrative Changes and Amendments

During CCP implementation, there may be a need to modify or amend the CCP, permit, or implementing documents. WECAT or covered operators may initiate administrative changes or amendments as described in this section. All administrative changes and amendments requested by WECAT will be subject to USFWS review and approval consistent with the ESA and other statutory requirements, and any modifications or amendments requested by USFWS will be subject to agreement by WECAT and the covered operators.

6.4.1 Administrative Changes

WECAT and the covered operators may implement administrative changes that address small errors, omissions, or language that may be too general or too specific for implementation, provided such changes do not result in changes to take levels described in the CCP and permit and do not significantly alter covered activities or the conservation strategy. Where such clarifications of the CCP will affect future implementation, USFWS, WECAT, and the covered operators may memorialize interpretations in writing and retain them for the administrative record. Examples of administrative changes are:

- Correcting or updating covered operator project maps.
- Modifying avoidance or minimization measures (e.g., slight changes or modifications triggered by adaptive management or changed circumstances).
- Modifying annual reporting protocols or monitoring protocols.
- Changing the names or addresses of covered operator contacts.
- Increasing the size of turbines covered provided the covered operator is effectively implementing the condor risk minimization program and the effectiveness of the minimization program remains as or more effective.
- Adding new power lines or met towers within covered project boundaries provided the covered operator is effectively implementing the condor risk minimization program.
- Expanded footprint that is located within the plan area.
- Changes in parent company or ownership of a covered LLC.

Further, the addition of new covered operators or new covered projects will be addressed administratively if USFWS confirms the new covered operator will satisfy the requirements for inclusion described in Section 6.1.3, *Addition of Existing or New Operators.*

WECAT and the covered operators will notify USFWS of any administrative changes and request acknowledgment of receipt.

6.4.2 Amendments

Changes to the CCP, permit, or implementing documents that do not qualify as administrative changes will be processed as amendments in accordance with all applicable laws and regulations, including the ESA and NEPA. WECAT, covered operators, or USFWS may propose an amendment and will provide a statement of the reasons for and an analysis of the amendment's effects on the CCP, permit, or implementing documents.

Changes that would require an amendment to the CCP or permit include but are not limited to the following:

- Addition of new species to the CCP.
- Addition of new covered activities.
- Any change in the amount of authorized take of California condors.
- Significant changes in the conservation strategy.
- Significant changes to the funding structure that may affect the implementation of the CCP.

Within 45 days, USFWS will confirm receipt of the amendment request and will notify WECAT and the covered operators of how the amendment is to be processed. Depending on the scope and scale of the proposed amendment, additional analysis, NEPA compliance, and public notification and comment may be needed.

6.5 Role of USFWS in Decisions Regarding CCP Implementation

Successful implementation of the CCP relies on participation and feedback from USFWS. WECAT and covered operators will request and participate in meetings with USFWS, as needed, to ensure that the CCP is being implemented properly and consistent with its terms and conditions. Additionally, USFWS will be responsible for reviewing the annual report and will assist in other administrative changes to the CCP, as appropriate. USFWS will assist with decisions regarding CCP implementation as expeditiously as possible.

The Palm Springs FWO will be the primary USFWS office contact for CCP implementation.

If requested, USFWS California condor recovery staff will also provide information to support CCP implementation. Recovery staff will notify Palm Springs FWO and WECAT if a tagged California condor stops moving (i.e., the condor dies) and responding to injured condors at covered projects. If changed circumstances require remedial measure implementation, WECAT or covered operators would consult with Palm Springs FWO to determine the most effective strategy to address the changed circumstance.

6.6 Permit Suspension or Revocation

Because noncompliance by a covered operator may compromise the overall effectiveness of the CCP, WECAT will work with covered operators to resolve any compliance issues as quickly as possible. If a compliance issue identified by WECAT cannot be resolved expeditiously by WECAT and the identified covered operator continues to be in noncompliance with the requirements of the CCP or the ITP, WECAT will notify the covered operator and USFWS of such deficiencies and request that the covered operator resolve the compliance issue within 60 days or, if the deficiency is of such a nature that it cannot be cured within 60 days, that the cure be commenced within such period and diligently prosecuted to completion. Failure by a defaulting operator to cure an identified non-compliance issue will subject that operator to contractual remedies, including potential expulsion from WECAT.

In addition to the foregoing private remedies, USFWS may choose to suspend or revoke "all or part" of the permit authority (i.e., take coverage) of a covered operator in accordance with the laws and regulations in force at the time of such suspension or revocation. The regulations governing suspension and revocation are currently codified at 50 CFR 13.27 (suspension) and 50 CFR 13.28, 17.22(b)(8) and 17.32(b)(8) (revocation). Because the ITP is a jointly held permit, USFWS reserves the right to suspend the permit as a whole, but WECAT and the covered operators intend to work collaboratively and efficiently with each other and USFWS to ensure non-compliance issues are addressed quickly, and ensure the permit remains effective and in place for covered operators that are in compliance. This is supported by the current regulatory language of 50 CFR 13.27 limiting suspension to permittees who are not in compliance, and USFWS has indicated its willingness to focus any suspension on non-complying permittees, except where the identified non-compliance may ultimately justify revocation of the permit as a whole (e.g., due to the potential for jeopardy to California condor resulting from such non-compliance). USFWS has also indicated its willingness to refrain from initiating any suspension or revocation proceedings pending the outcome of WECAT's efforts, in cooperation with USFWS, to informally resolve any non-compliance issues.

6.7 Change of Ownership

If there is a transfer of ownership of a covered project during the permit term, the owner's take authorization under the ITP may be transferred to the new owner. To accomplish the transfer, the transferor and transferee shall jointly submit to USFWS the information required as specified in 50 CFR 13.25, including written documentation demonstrating that the proposed transferee (1) meets all of the requirements of USFWS regulations for holding a permit; (2) has provided adequate written assurances of sufficient funding and will implement the relevant terms and conditions of the permit; and (3) has been or will be admitted to WECAT upon the transfer of permit authority. A permit transfer shall not be required for changes in the control or ownership of a permittee, provided the permittee continues to own the project covered by the ITP.

6.8 Permit Renewal

The ITP may be renewed, without issuance of a new permit, provided that a renewal request is provided by WECAT, with the concurrence of those permittees requesting renewal, at least 30 days before expiration and that (1) the authorized take limit has not been reached and (2) the biological circumstances and other pertinent factors affecting California condor are not significantly different from those of the original CCP. USFWS will honor No Surprises assurances and will process the permit renewal request in accordance with 50 CFR Section 13.22. The request for renewal of the ITP shall include:

- A list of existing and proposed new covered operators.
- A reference to the original permit number.
- Certification that statements and information provided in the original CCP and permit application, together with approved amendments, are still true and correct, and a list of changes needed to clarify or revise the CCP.
- A description of take that has occurred under the existing permit.
- A statement that covered activities under the CCP will continue as identified.
- A description of the status of the mitigation provided.

If during the permit the covered operators take fewer than 11 condors but nonetheless have provided for the breeding, rearing and release of 35 condors, USFWS will take into consideration during any renewal request that the covered operators have provided mitigation at a ratio of 3.2:1 required by this CCP. That is, in evaluating the impacts of any taking associated with a renewed term, and considering all other relevant factors including temporal benefits to the species, USFWS may adjust the required mitigation to account for the benefits of higher levels of mitigation provided in advance and during the original permit term.

Consistent with 50 CFR Section 13.22, if a renewal request is filed at least 30 days prior to the permit's expiration, and the permittee meets the regulatory criteria, the permit shall remain valid while the renewal is being processed. Otherwise, the ITP shall expire in accordance with its stated term.

6.9 Implementation Costs and Funding

The following sections describe the estimated costs to implement this CCP and the commitments of covered operators to fully fund those costs.

6.9.1 Implementation Costs

Implementation costs are divided into three primary categories: administration, minimization, and mitigation. Administrative costs are those assumed by WECAT to oversee and report on implementation of the CCP. Minimization costs include covered operator's costs to implement measures to minimize take, monitor, and implement adaptive management. Mitigation costs include California condor breeding, rearing, and release. Mitigation costs also include remedial measures to support changed circumstances. All CCP costs are estimated in Tables 6-1, 6-2 and 6-3 in 2022 dollars.

6.9.1.1 Administration

Administrative costs will primarily be those incurred by WECAT in overseeing and reporting on implementation of the CCP. These costs will be paid by covered operators through their membership in WECAT. These costs include staff salaries to support the implementation items described in Section 6.1.1, *Plan Administrator*. Costs have been estimated for a senior manager, support staff, legal staff, biologist, and an accountant for labor and expenses (Table 6-1). Salaries and direct expenses are estimated to cost approximately $147,392 per year for staff time to implement the CCP. Additional start-up costs of $100,000 for training materials and program management are also included.

Table 6-1. Annual Plan Administration Costs

Administration	Hourly Rate	Average Hours per Year	Annual Cost
WECAT Staff			
Staff management (10% FTE)	$254.00	208	$52,832
Staff support (10% FTE)	$160.00	208	$33,280
Legal support (2% FTE)	$840.00	42	$35,280
Accountant support (5% FTE)	$250.00	104	$26,000
Subtotal			*$147,392*
WECAT Expenses	**Number**	**Cost per Unit**	**Annual Expense**
Travel (TPF 1/year + Mojave 2/year)	3	$1,050	$3,150
Miscellaneous Expenses	1	$1,575	$1,575
Subtotal			*$4,725*
Total			***$152,117***

FTE = Full-time Equivalent; TPF = The Peregrine Fund.

6.9.1.2 Minimization

Covered operators will implement the CCP as described in Chapter 5, *Conservation Program*, and Section 6.1.2, *Covered Operators*. Covered operators will implement minimization, monitoring, and adaptive management. Covered operators will implement general measures and staff training; implement a condor risk minimization program consisting of a carrion management plan, condor detection system, and turbine curtailment system; implement a CIRS program; and provide data annually to WECAT and coordinate with WECAT and USFWS, as necessary. If necessary, covered operators will also implement the condor take response protocol and adaptive management responses. Each operator's expenses will vary based on the size of the covered project, number of staff needed to implement the commitments in the CCP, number of carrion incidents, condor use in the vicinity of the covered project (which will determine the frequency of detections and curtailments), and number of California condor takes. Each operator will pay for these operational expenses with their operational budgets and shall annually certify that funds have been budgeted to meet the needs of the CCP.

6.9.1.3 Mitigation

WECAT worked closely with TPF to estimate costs associated with California condor breeding, rearing, and release. These costs are based on TPF's experience breeding and releasing California condors over the last 28 years. Total costs (without inflation) for TPF's expenses are $6.04 million over 15 years, including construction of two new pens, initial operating costs to support the care of adult birds in preparation of breeding, and efforts to support the rearing and release of 35 California condors using 4 pens (Table 6-2). Covered operators will contribute to the mitigation in three increments, providing a minimum of $2.01 million year 1, the same amount adjusted for inflation in year 6, and the same amount adjusted for inflation in year 11. California condor rearing and release costs using four pens is expected to cost $411,600 per year for 11 years.

Table 6-2. Cost Estimate to Rear and Release California Condors

Category	Cost per Unit	Number of Units	Total Cost
Breeding chamber construction (2 chambers)	$133.60	8,312 sf	$1,110,483
Supplemental chamber buildout	$70,000	1	$70,000
Operating costs to support care of adult birds in preparation of breeding	$82,320	4 years	$329,280
Condor rearing and release cost (using 4 pens)	$411,600	11 years	$4,527,600
Total			**$6,037,363**

Note: TPF calculated condor rearing and release costs by dividing the total annual program cost in 2021 by the average number of condors raised and released per year over the most recent 10 years. This number includes all operating costs such as personnel, condor food, veterinary costs, utilities, maintenance, information technology and other shared services, and an annual share of vehicle replacement cost to support condor release.

Further, to address potential mitigation for adaptive management and changed circumstances, covered operators will contribute to a remedial measure fund that will be managed by WECAT. This fund includes supplemental condor tagging support, detection system review and support, fire response and facility repair, and disease and parasite response (Table 6-3). Adaptive management and remedial measure costs are estimated at $721,875. If an individual covered operator determines that they need a new detection system, the operator would cover those expenses.

WECAT may work with TPF and seek to purchase supplemental insurance for TPF to address items like fire response and facility repair. These costs are not expected to be immediately needed, therefore, one-third of the budget for these items will be provided in year 1, year 6, and year 11. If WECAT needs to fund these items sooner, covered operators will supplement the remedial measure reserve to ensure there is sufficient funding to cover adaptive management and changed circumstances requirements.

Table 6-3. Adaptive Management and Changed Circumstance Funding

Remedial Measure Reserve	Total Cost
Supplemental tagging support	$105,000
Detection system remedial measures	$157,500
Fire response and facility repair	$262,500
Disease and parasite response	$131,250
Contingency (10%)	$65,625
Total	**$721,875**

6.9.2 Implementation Funding

Implementation funding will be provided by covered operators. Covered operators will provide funding to WECAT upon permit issuance in year 1, year 6, and year 11 for mitigation and as agreed to with WECAT for annual administrative expenses. WECAT will then carry out its obligations under the CCP, manage the funds across operators to pay TPF, manage a remedial measure reserve, and support CCP implementation. CCP administration and mitigation costs total $11.4 million (in 2022 dollars) (Table 6-4). WECAT will work with covered operators to ensure an equitable per covered project cost. Annual operator expenses for minimization will be provided from project's annual operating budgets. WECAT will adjust payments due from covered operators to account for inflation.

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Table 6-4. WECAT CCP Implementation Costs (2022 Dollars, No Inflation)

Cost Category Administration	Rate per hour	Average Hours per Year	Average Annual Expense	Year														
				1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
WECAT Expenses																		
Staff (see Table 6-1)																		
Staff management (10% FTE)	$254	208	$52,832	$52,832	$52,832	$52,832	$52,832	$52,832	$52,832	$52,832	$52,832	$52,832	$52,832	$52,832	$52,832	$52,832	$52,832	$52,832
Staff support (10% FTE)	$160	208	$33,280	$33,280	$33,280	$33,280	$33,280	$33,280	$33,280	$33,280	$33,280	$33,280	$33,280	$33,280	$33,280	$33,280	$33,280	$33,280
Legal support (2% FTE)	$840	42	$35,280	$35,280	$35,280	$35,280	$35,280	$35,280	$35,280	$35,280	$35,280	$35,280	$35,280	$35,280	$35,280	$35,280	$35,280	$35,280
Accountant support (5% FTE)	$250	104	$26,000	$26,000	$26,000	$26,000	$26,000	$26,000	$26,000	$26,000	$26,000	$26,000	$26,000	$26,000	$26,000	$26,000	$26,000	$26,000
Subtotal		*562*	*$147,392*	*$147,392*	*$147,392*	*$147,392*	*$147,392*	*$147,392*	*$147,392*	*$147,392*	*$147,392*	*$147,392*	*$147,392*	*$147,392*	*$147,392*	*$147,392*	*$147,392*	*$147,392*
Expenses	**Number**	**Cost/ unit**	**Annual Expense**															
Travel (TPF 1/year + Mojave 2/year)	3	$1,050	$3,150	$3,150	$3,150	$3,150	$3,150	$3,150	$3,150	$3,150	$3,150	$3,150	$3,150	$3,150	$3,150	$3,150	$3,150	$3,150
Training Materials	1	$35,000	NA	$35,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Startup Costs	1	$65,000	NA	$65,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Miscellaneous expenses	1	$1,575	$1,575	$1,575	$1,575	$1,575	$1,575	$1,575	$1,575	$1,575	$1,575	$1,575	$1,575	$1,575	$1,575	$1,575	$1,575	$1,575
Subtotal			*$4,725*	*$104,725*	*$4,725*	*$4,725*	*$4,725*	*$4,725*	*$4,725*	*$4,725*	*$4,725*	*$4,725*	*$4,725*	*$4,725*	*$4,725*	*$4,725*	*$4,725*	*$4,725*
Total			***$152,117***	*$252,117*	*$152,117*	*$152,117*	*$152,117*	*$152,117*	*$152,117*	*$152,117*	*$152,117*	*$152,117*	*$152,117*	*$152,117*	*$152,117*	*$152,117*	*$152,117*	*$152,117*
Minimization																		
Minimization costs to be covered by each operator				$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Subtotal				*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*
Mitigation																		
Condor Rearing Expenses (see Table 6-2)																		
Funding for The Peregrine Fund				$2,012,454	$0	$0	$0	$0	$2,012,454	$0	$0	$0	$0	$2,012,454	$0	$0	$0	$0
Subtotal				*$2,012,454*	*$0*	*$0*	*$0*	*$0*	*$2,012,454*	*$0*	*$0*	*$0*	*$0*	*$2,012,454*	*$0*	*$0*	*$0*	*$0*
Adaptive Management and Changed Circumstances Funding (see Table 6-3)																		
Detection system review and support	$105,000			$52,500	$0	$0	$0	$0	$52,500	$0	$0	$0	$0	$52,500	$0	$0	$0	$0
Supplemental tagging support	$157,500			$35,000	$0	$0	$0	$0	$35,000	$0	$0	$0	$0	$35,000	$0	$0	$0	$0
Fire response and facility repair	$262,500			$87,500	$0	$0	$0	$0	$87,500	$0	$0	$0	$0	$87,500	$0	$0	$0	$0
Disease and parasite response	$131,250			$43,750	$0	$0	$0	$0	$43,750	$0	$0	$0	$0	$43,750	$0	$0	$0	$0
Contingency (10%)	$65,625			$21,875	$0	$0	$0	$0	$21,875	$0	$0	$0	$0	$21,875	$0	$0	$0	$0
Subtotal	*$721,875*			*$240,625*	*$0*	*$0*	*$0*	*$0*	*$240,625*	*$0*	*$0*	*$0*	*$0*	*$240,625*	*$0*	*$0*	*$0*	*$0*
Total				***$2,253,079***	***$0***	***$0***	***$0***	***$0***	***$2,253,079***	***$0***	***$0***	***$0***	***$0***	***$2,253,079***	***$0***	***$0***	***$0***	***$0***
Grand Total				***$2,505,196***	***$152,117***	***$152,117***	***$152,117***	***$152,117***	***$2,405,196***	***$152,117***	***$152,117***	***$152,117***	***$152,117***	***$2,405,196***	***$152,117***	***$152,117***	***$152,117***	***$152,117***

FTE = Full-time Equivalent. TPF = The Peregrine Fund. NA = Not Applicable.

Table 6-4. Continued

Cost Category Administration	Rate per hour	Average Hours per Year	Average Annual Expense	Year 16	17	18	19	20	21	22	24	25	26	27	28	29	30	Total
WECAT Expenses																		
Staff (see Table 6-1)																		
Staff management (10% FTE)	$254	208	$52,832	$52,832	$52,832	$52,832	$52,832	$52,832	$52,832	$52,832	$52,832	$52,832	$52,832	$52,832	$52,832	$52,832	$52,832	$1,584,960
Staff support (10% FTE)	$160	208	$33,280	$33,280	$33,280	$33,280	$33,280	$33,280	$33,280	$33,280	$33,280	$33,280	$33,280	$33,280	$33,280	$33,280	$33,280	$998,400
Legal support (2% FTE)	$840	42	$35,280	$35,280	$35,280	$35,280	$35,280	$35,280	$35,280	$35,280	$35,280	$35,280	$35,280	$35,280	$35,280	$35,280	$35,280	$1,058,400
Accountant support (5% FTE)	$250	104	$26,000	$26,000	$26,000	$26,000	$26,000	$26,000	$26,000	$26,000	$26,000	$26,000	$26,000	$26,000	$26,000	$26,000	$26,000	$780,000
Subtotal		*562*	*$147,392*	*$147,392*	*$147,392*	*$147,392*	*$147,392*	*$147,392*	*$147,392*	*$147,392*	*$147,392*	*$147,392*	*$147,392*	*$147,392*	*$147,392*	*$147,392*	*$147,392*	*$4,421,760*
Expenses	**Number**	**Cost/ unit**	**Annual Expense**															
Travel (TPF 1/year + Mojave 2/year)	3	$1,050	$3,150	$3,150	$3,150	$3,150	$3,150	$3,150	$3,150	$3,150	$3,150	$3,150	$3,150	$3,150	$3,150	$3,150	$3,150	$94,500
Training Materials	1	$35,000	NA	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$35,000
Startup Costs	1	$65,000	NA	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$65,000
Miscellaneous expenses	1	$1,575	$1,575	$1,575	$1,575	$1,575	$1,575	$1,575	$1,575	$1,575	$1,575	$1,575	$1,575	$1,575	$1,575	$1,575	$1,575	$47,250
Subtotal			*$4,725*	*$104,725*	*$4,725*	*$4,725*	*$4,725*	*$4,725*	*$4,725*	*$4,725*	*$4,725*	*$4,725*	*$4,725*	*$4,725*	*$4,725*	*$4,725*	*$4,725*	*$241,750*
Total			***$152,117***	***$152,117***	***$152,117***	***$152,117***	***$152,117***	***$152,117***	***$152,117***	***$152,117***	***$152,117***	***$152,117***	***$152,117***	***$152,117***	***$152,117***	***$152,117***	***$152,117***	***$4,663,510***
Minimization																		
Minimization costs to be covered by each operator				$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Subtotal				*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*
Mitigation																		
Condor Rearing Expenses (see Table 6-2)																		
Funding for The Peregrine Fund				$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$6,037,363
Subtotal				***$0***	***$0***	***$0***	***$0***	***$0***	***$0***	***$0***	***$0***	***$0***	***$0***	***$0***	***$0***	***$0***	***$0***	***$6,037,363***
Adaptive Management and Changed Circumstances Funding (see Table 6-3)																		
Detection system review and support	$105,000		NA	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$105,000
Supplemental tagging support	$157,500		NA	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$157,000
Fire response and facility repair	$262,500		NA	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$262,500
Disease and parasite response	$131,250		NA	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$131,250
Contingency (10%)	$65,625		NA	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$65,625
Subtotal	*$721,875*			*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*721,875*
Total				***$0***	***$0***	***$0***	***$0***	***$0***	***$0***	***$0***	***$0***	***$0***	***$0***	***$0***	***$0***	***$0***	***$0***	***$6,759,238***
Grand Total				***$152,117***	***$152,117***	***$152,117***	***$152,117***	***$152,117***	***$152,117***	***$152,117***	***$152,117***	***$152,117***	***$152,117***	***$152,117***	***$152,117***	***$152,117***	***$152,117***	***$11,422,748***

FTE = Full-time Equivalent. TPF = The Peregrine Fund. NA = Not Applicable.

6.9.3 Funding Assurances

Funding for this CCP will be assured through initial deposits from covered operators to WECAT for implementation. This up-front funding will ensure that conservation actions with TPF proceed quickly, and in advance of take of California condors, to support condor breeding and rearing. Covered operators will make similar deposits in years 5 and 10 to meet the overall CCP mitigation obligation, and as agreed to with WECAT for annual administrative expenses. Covered operators will also provide an annual fee commitment as part of their annual reporting requirements; this commitment will indicate that the covered operator has operational funds sufficient to pay for covered project minimization expenses related to CCP implementation.

WECAT will pay TPF a minimum of $2,012,454 to implement the first 5 years of California condor conservation and will place $240,625 in funds for remedial measures in an endowment account to support future management actions. Two additional contributions of the same amount plus inflation will be made to TPF and the endowment account in years 5 and 10.

Collectively, these actions demonstrate that funding for this CCP is assured.

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Chapter 7
Alternatives

This chapter describes alternatives that WECAT considered to reduce the take of California condor and the reasons why these alternatives were not selected. The chapter includes a description of the No Action Alternative and four other alternatives considered.

7.1 Alternative 1: No Action Alternative

Under the No Action Alternative, WECAT would not apply for an ITP. Individual operators would continue to operate their project facilities as they have since the projects were commissioned. Thus, the no action alternative would not reduce the number of wind turbines in the project area. Each operator would determine if it will implement voluntary California condor protection measures that they deem appropriate. Under this alternative, WECAT members would not be obligated to implement the CCP including setting biological goals and objectives, implementing consistent general operational measures, implementing a condor risk minimization program, or providing mitigation as outlined in Chapter 5, *Conservation Program*.

Individual operators may choose to seek their own take permit or chose to not obtain a permit and implement measures to avoid take. If a California condor is taken on a wind facility that does not have a take permit, the operator may be subject to USFWS law enforcement investigation for the taking. The Southern California condor population has been steadily increasing and expanding their range; as a result, the risk of take at covered operator facilities is expected to increase over the next 15 years. If a group of individual projects requested take, it could potentially result in a higher take request of USFWS than under the WECAT CCP. For example, if all covered operators prepared their own CCPs and each project requested take of one California condor, USFWS could receive requests for take of up to 24 condors or more over 30 years for the same activities covered by this CCP.

Under this alternative, operators would have discretion to 1) continue to implement measures they deem appropriate to reduce risk of take and not apply for a take permit, 2) continue to implement measures they deem appropriate to reduce the risk of take and apply for a take permit, or 3) determine such measures are not warranted. Each individual operator is expected to make their own decision based on their own perceived risk factors. Therefore, the No Action Alternative would result in inconsistent measures across operators. This approach would provide fewer assurances that California condor take would be avoided, minimized, and mitigated. The approach also does not create a regional framework for a coordinated and consistent California condor conservation program, an important goal of this CCP, and will not result in the breeding, rearing, and release of 35 California condors. For these reasons, this alternative was not considered further.

7.2 Alternative 2: Reduced Permit Term Alternative

Under the Reduced Permit Term Alternative, WECAT would request a shorter permit term of 10 years, instead of 30 years. WECAT would also request a lower take limit of 4 California condors (instead of 11). Operations of WECAT facilities would be covered under the ITP for a shorter duration. WECAT's conservation strategy outlined in Chapter 5, *Conservation Program,* would also be limited to the shorter duration. All other aspects of the conservation strategy would remain the same except that the number of new condors raised in captivity and released into the wild would be reduced to 13 (instead of 35).

Under this alternative, take authorized would be lower than under the proposed CCP. However, over the long term, take of condors may be the same as currently proposed in the CCP due to range expansion and potential expiration of additional avoidance and minimization measures in the CCP. WECAT members would be expected to renew the ITP after five years to obtain similar regulatory assurances that the proposed CCP permit term provides.

This alternative was eliminated from consideration because it is inefficient. It is inefficient to develop a program that only lasts 10 years when the operational life of projects is much longer. It is inefficient to develop and implement a mitigation program for a 10-year permit term when the breeding, rearing, and release of California condors take 4–5 years per individual. It is also inefficient for WECAT and the USFWS to renew or expand this program every five years. The Reduced Permit Term alternative was not considered further because it may not reduce take over the operational life of the WECAT facilities and it is inefficient to implement.

7.3 Alternative 3: Alternative Mitigation—Lead Abatement and Chelation

Under the Alternative Mitigation—Lead Abatement and Chelation Alternative, WECAT would implement an alternative mitigation strategy involving lead abatement and chelation. Lead poisoning is the leading cause in death of California condors, so addressing this threat could have a great benefit to the species. Under this alternative, WECAT would contribute funds to multiple sources (non-governmental education and conservation organizations, USFWS, or California Department of Fish and Wildlife) to support lead ammunition reduction education and outreach programs, lead-ban enforcement programs, and lead chelation programs. Instead of funding TPF to breed, rear and release condors, WECAT would develop a conservation strategy where mitigation funds are spent on reducing condor fatalities due to lead poisoning. This strategy would require WECAT to inventory existing funding sources for abatement programs and chelation programs and develop agreements with stakeholders to carryout enhanced efforts to reduce condor's lead exposure. Chelation can be an effective strategy, but California condors with lead poisoning may not recover even with chelation. Funding education and outreach programs to promote lead ammunition reduction and lead-ban enforcement may be effective in reducing risks of lead exposure to condors. However, this benefit is indirect and difficult to quantify to meet the necessary permit issuance criteria.

The Alternative Mitigation—Lead Abatement and Chelation Alternative was eliminated from further consideration because there are limited data to quantify the direct benefit to condors through funding outreach, education, and enforcement and it is therefore difficult to quantify the benefits of such actions to the California condor population and determine appropriate mitigation levels.

7.4 Alternative 4: Modified Condor Risk Minimization Program

Under a Modified Condor Risk Reduction Program Alternative, WECAT would develop a modified condor risk minimization program. The modified risk minimization program would still include a carrion management plan, condor detection system, and turbine curtailment system. The carrion management plan would be the same, but a new condor detection system would be developed that relies on biological monitors or an alternative technology to detect California condors (i.e., visual detection system). The curtailment system would rely on the biological monitor or technology sending curtailment messages to the operator to reduce risk to California condors.

This alternative was eliminated from consideration because it is not an efficient use of biological monitors given variation in seasonal condor use throughout the year, because biological monitors would need to be funded throughout the year, and passive detection systems are much more cost effective. While alternative technology is promising, its use as a stand-alone minimization approach is limited by the detection distances of the devices, possibly requiring many detection units, and has not been broadly tested in the wind resource area. Because of the uncertainty in the effectiveness of a new condor detection system, WECAT members would request the same take authorization under this alternative (take of up to 11 condors over 30 years). This alternative was eliminated because it would not reduce the extent of the taking, the effectiveness is currently unknown, and because components of this alternative are already included in WECAT's proposed adaptive management program.

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Chapter 8
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8.2 Personal Communications

8.2.1 Chapter 3

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Chapter 9
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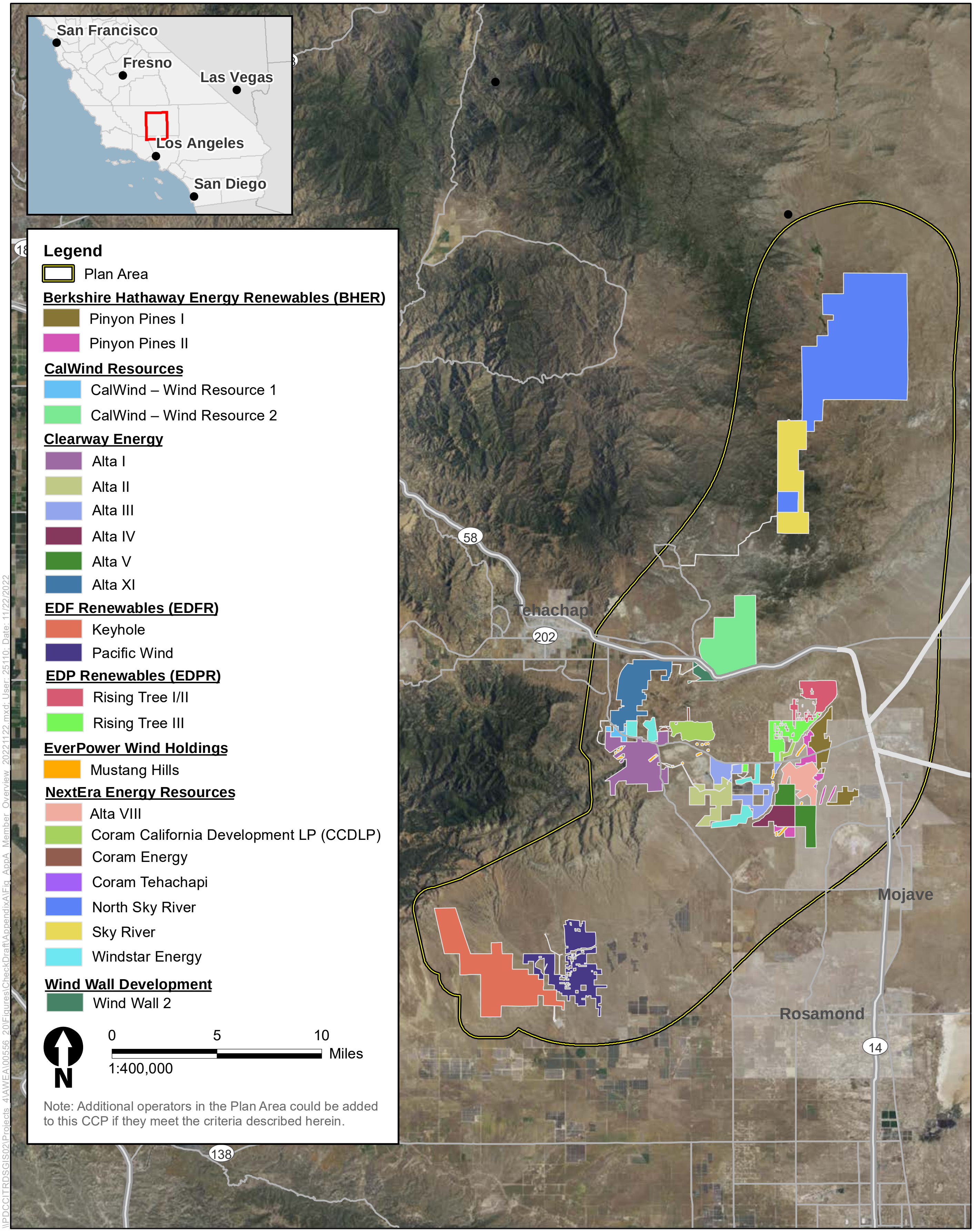
Ed Duggan

Appendix A

Covered Operator Maps



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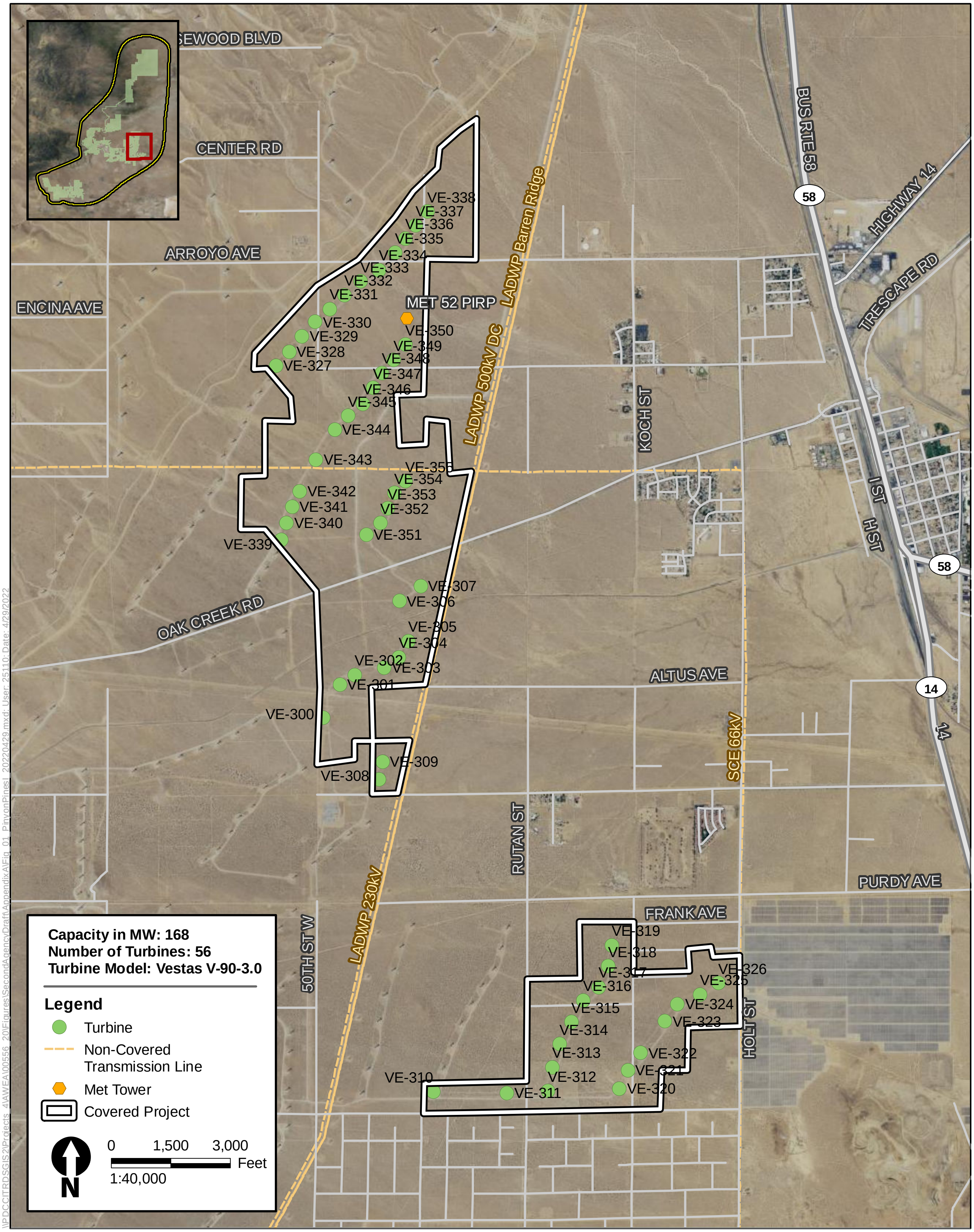
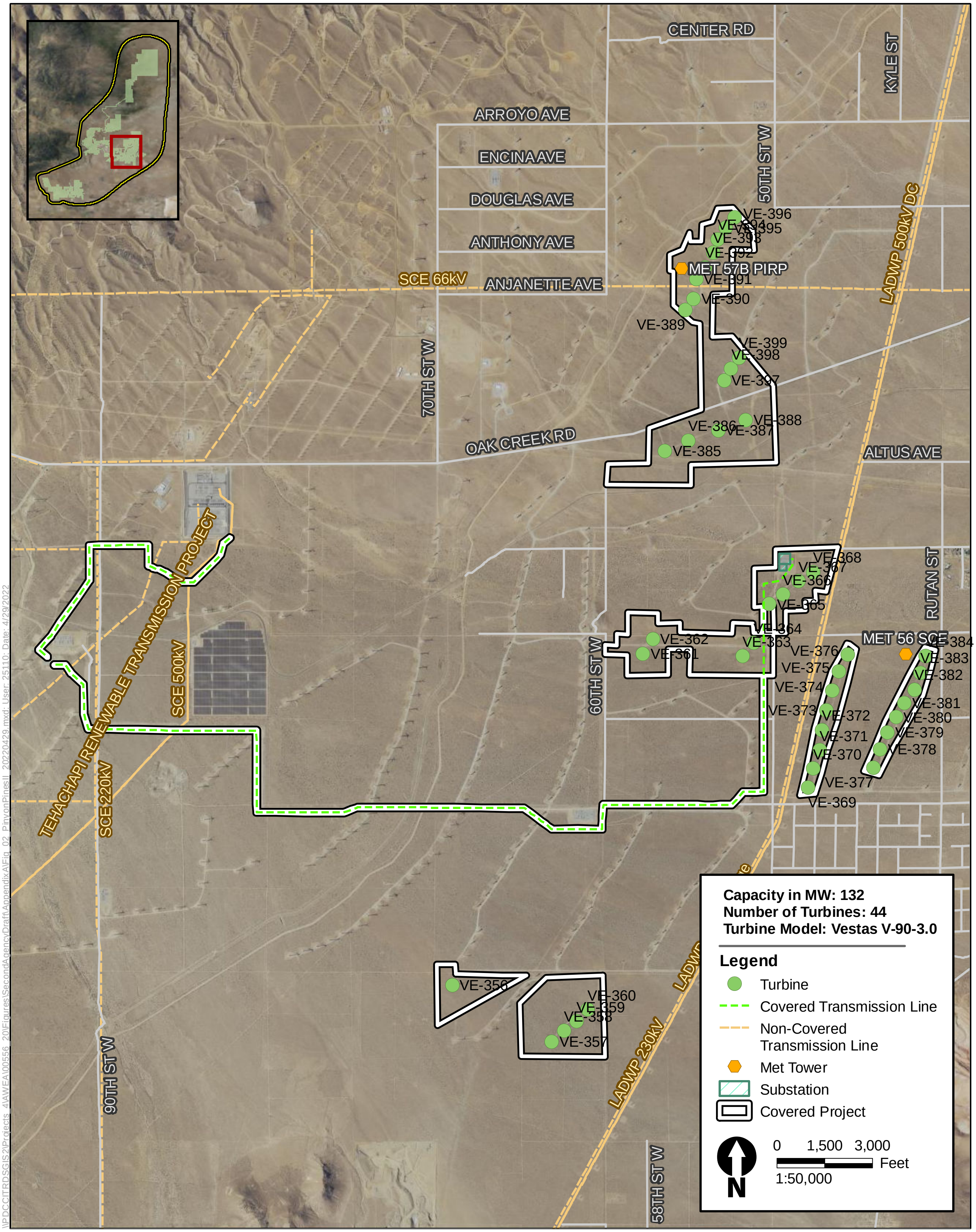
Covered Project Overview Map
Covered Projects are Organized Alphabetically by Parent Company
WECAT Condor Conservation Plan



Berkshire Hathaway Energy Renewables (BHER)
Pinyon Pines I Project
WECAT Condor Conservation Plan



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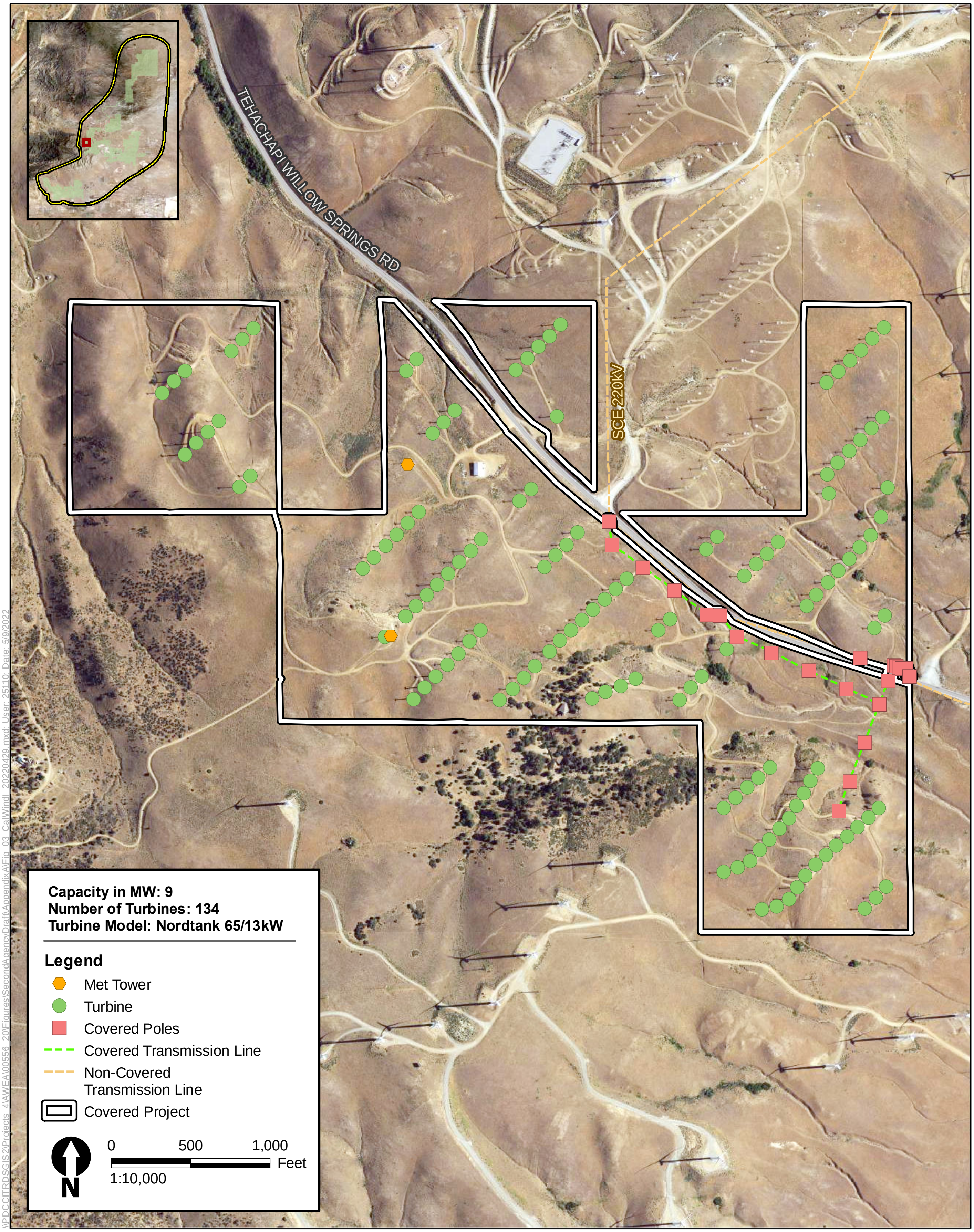
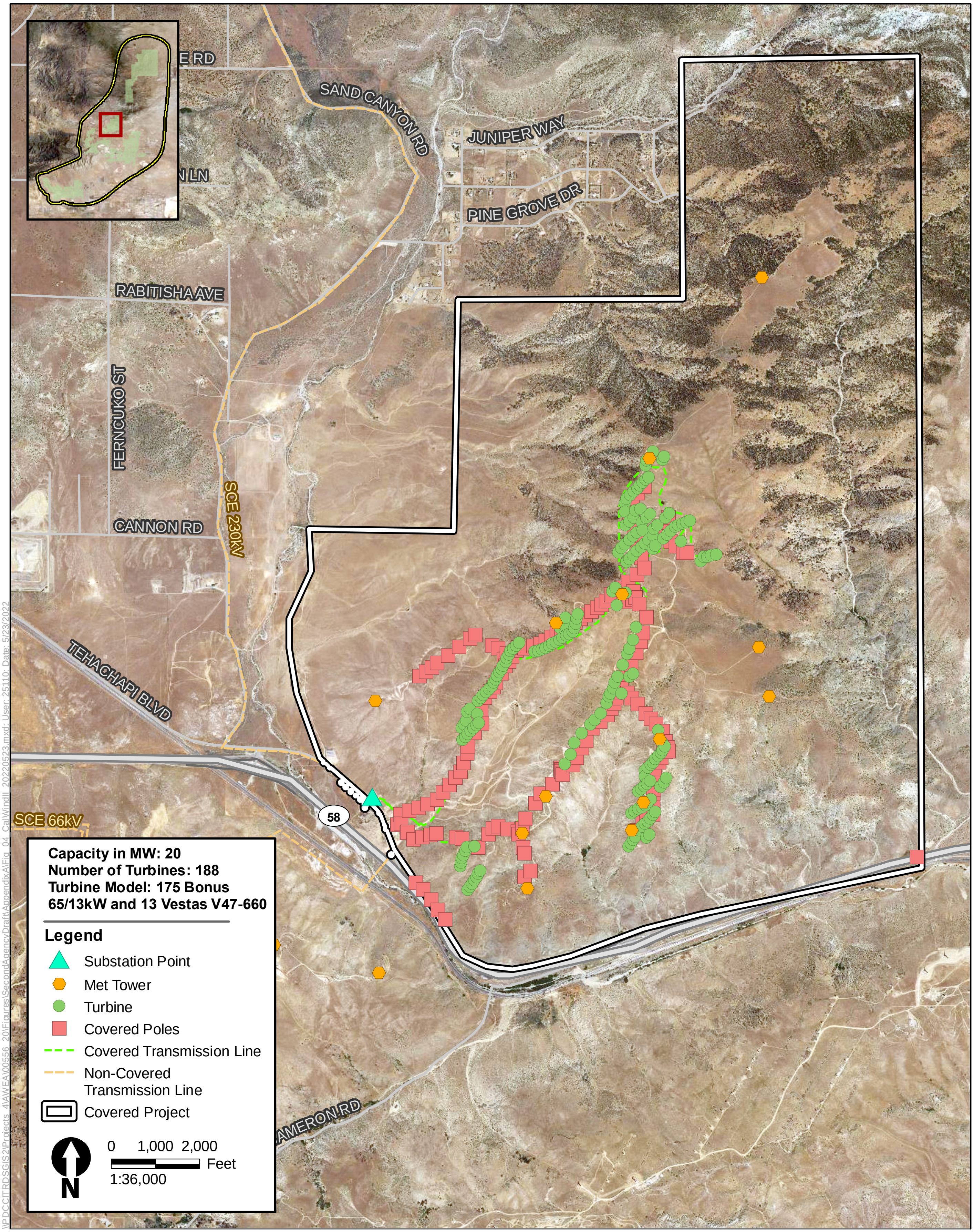
Berkshire Hathaway Energy Renewables (BHER)
Pinyon Pines II Project
WECAT Condor Conservation Plan



CalWind Resources
CalWind — Wind Resource 1
WECAT Condor Conservation Plan



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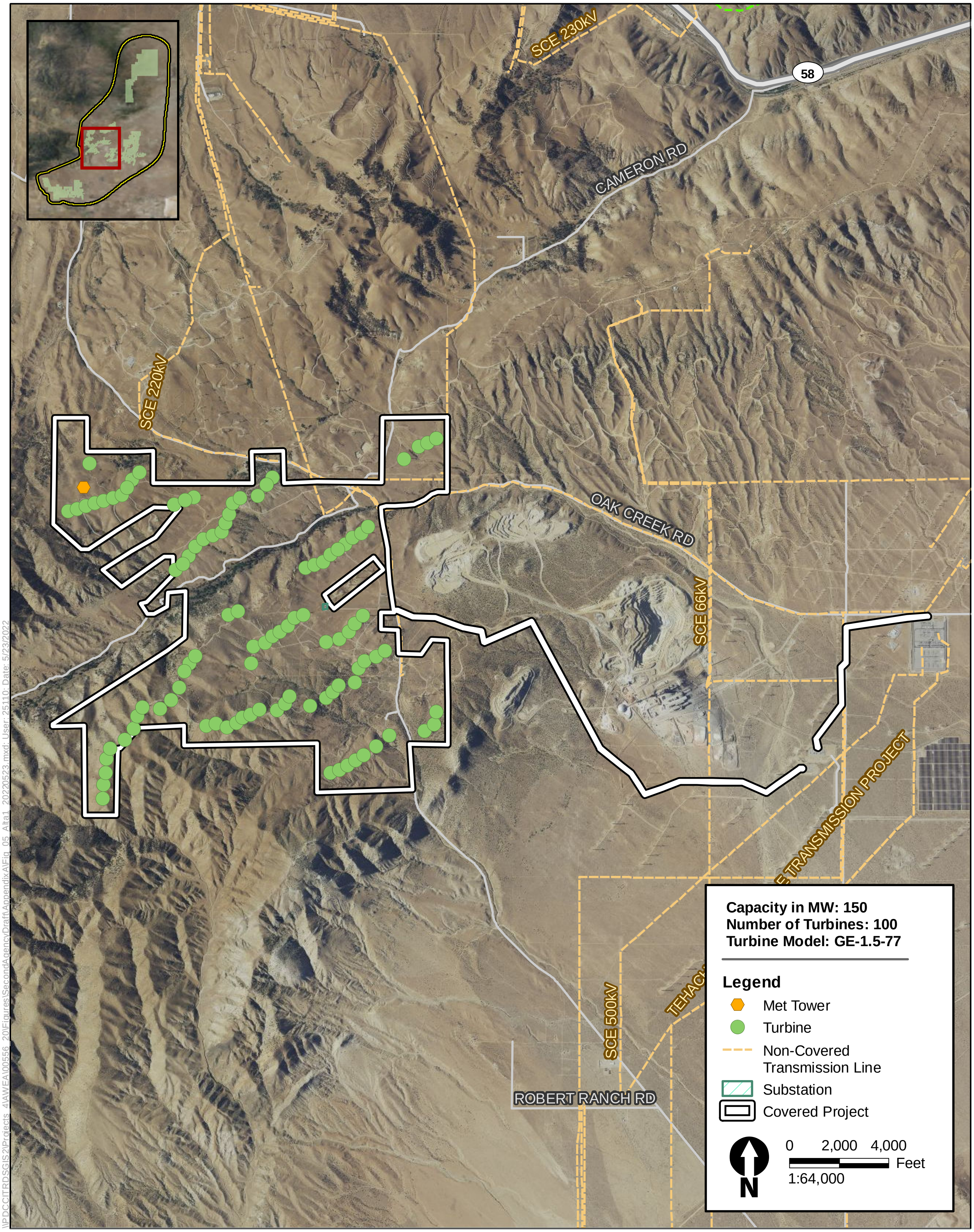
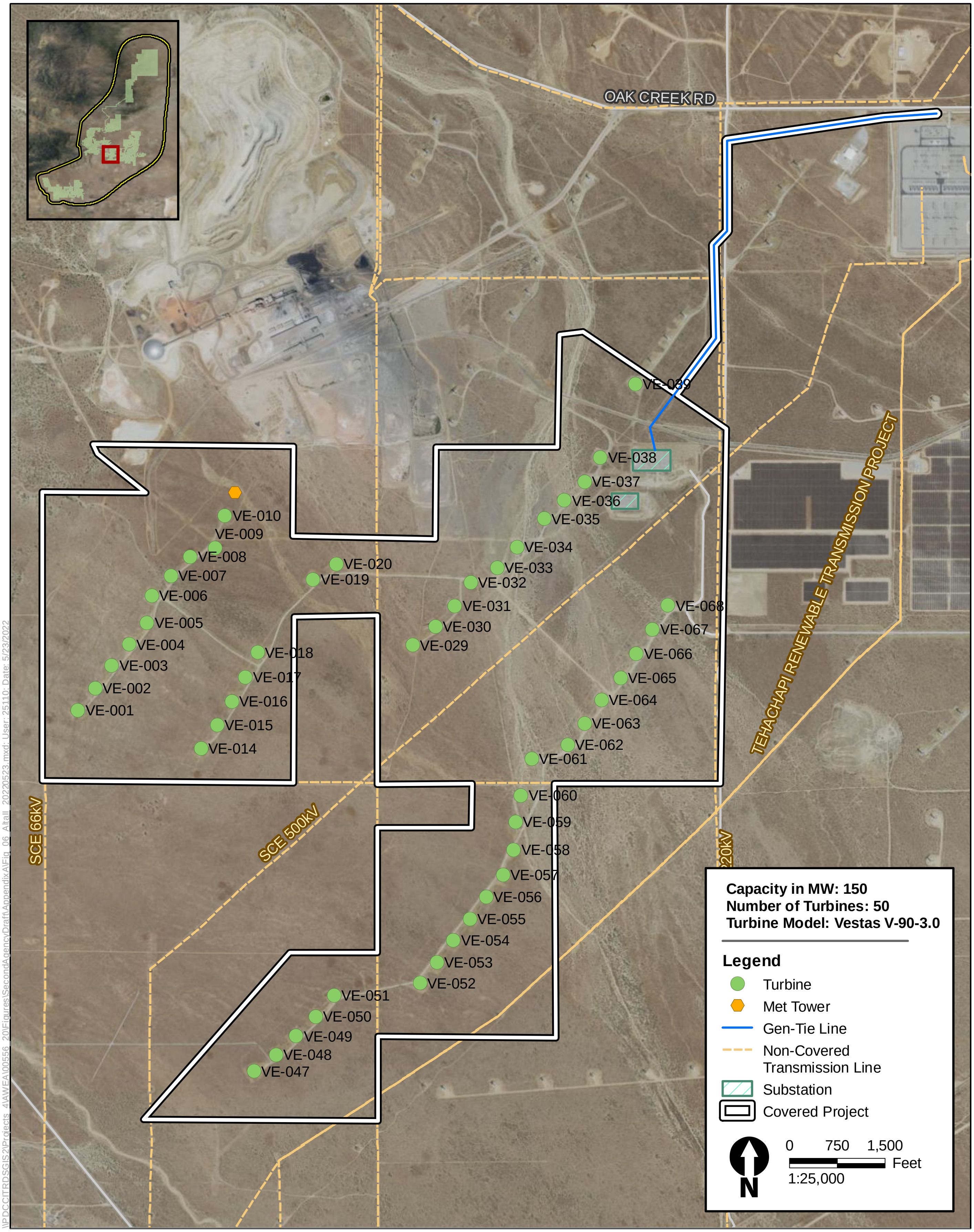


Clearway Energy
Alta I Project
WECAT Condor Conservation Plan



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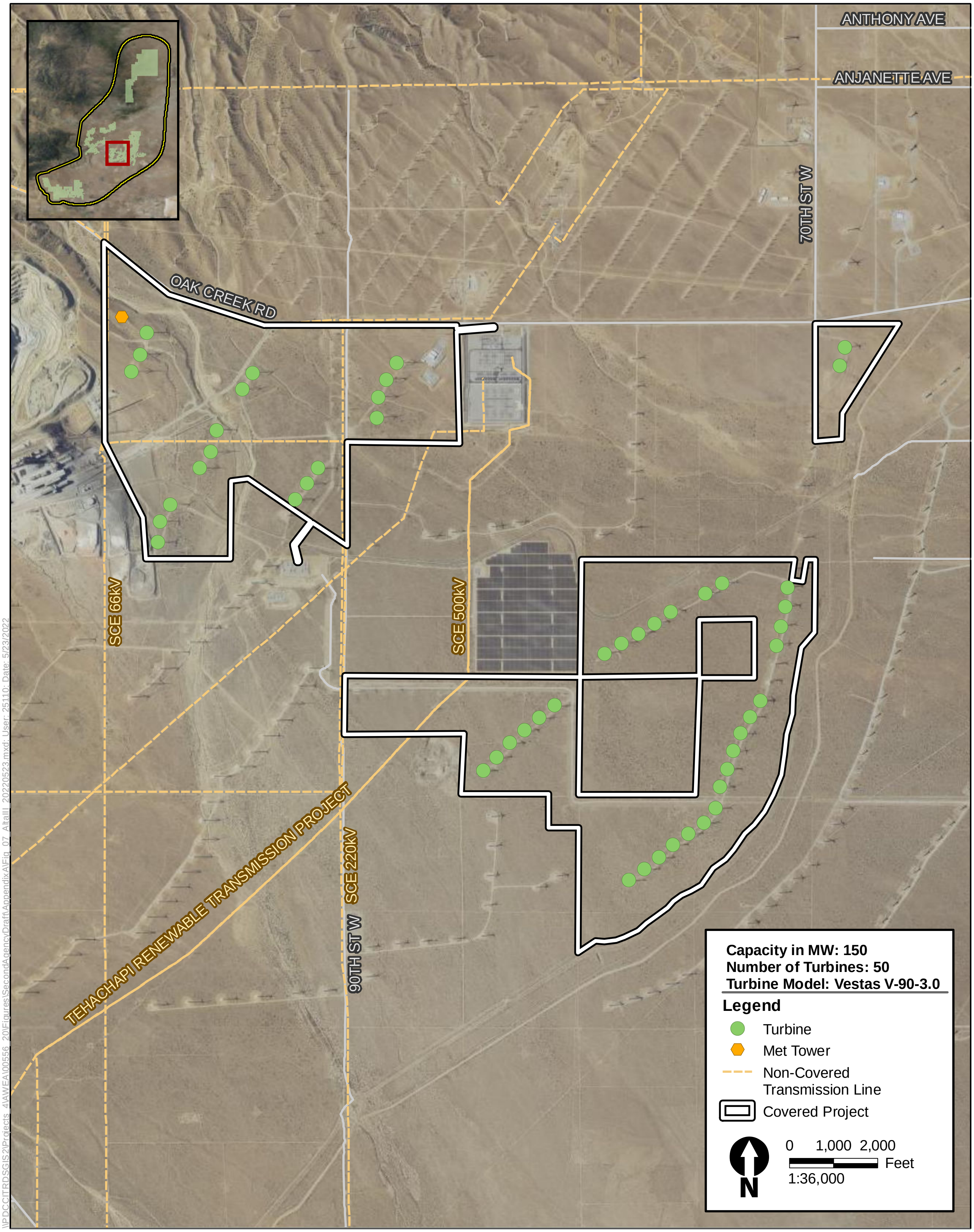

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Clearway Energy
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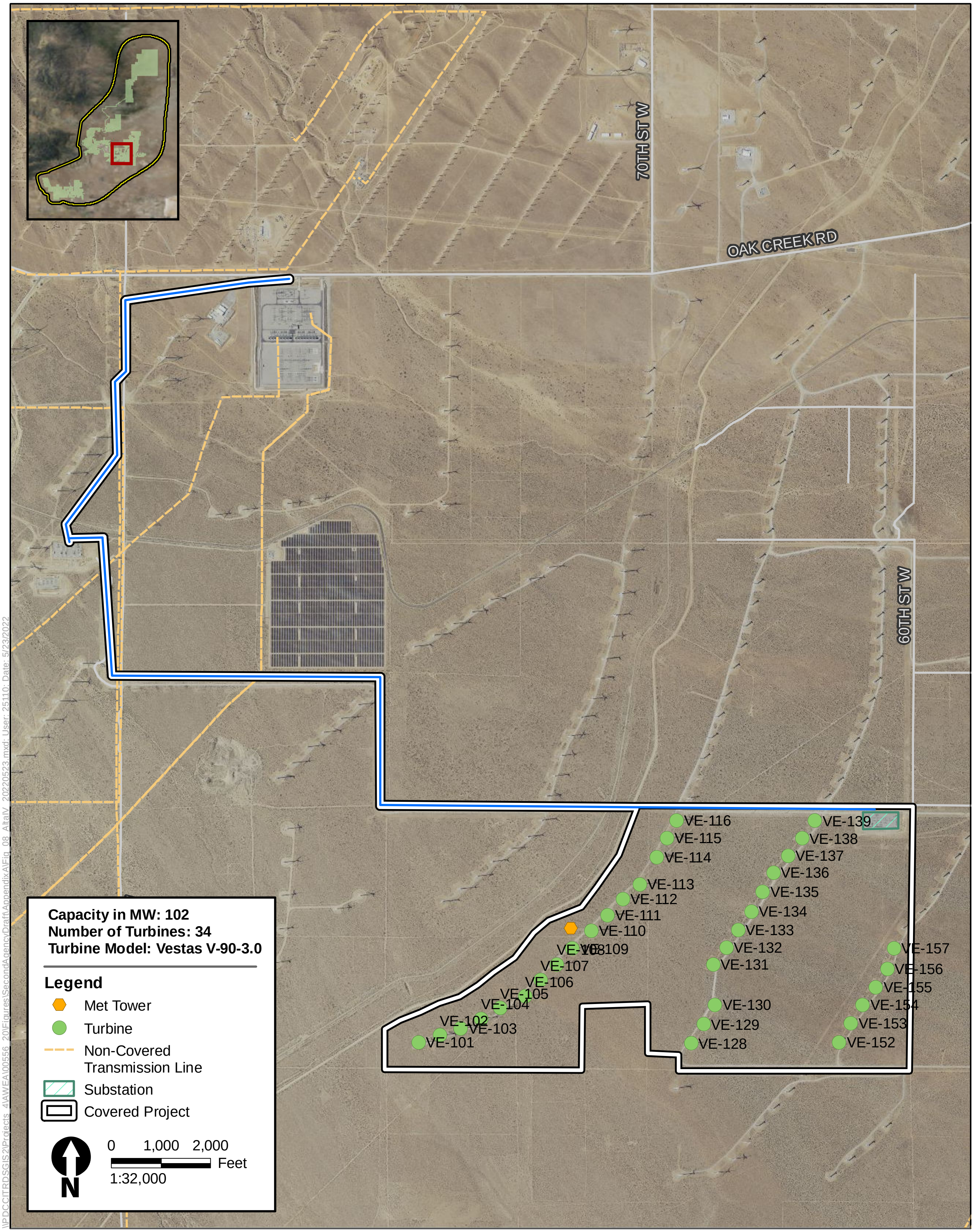

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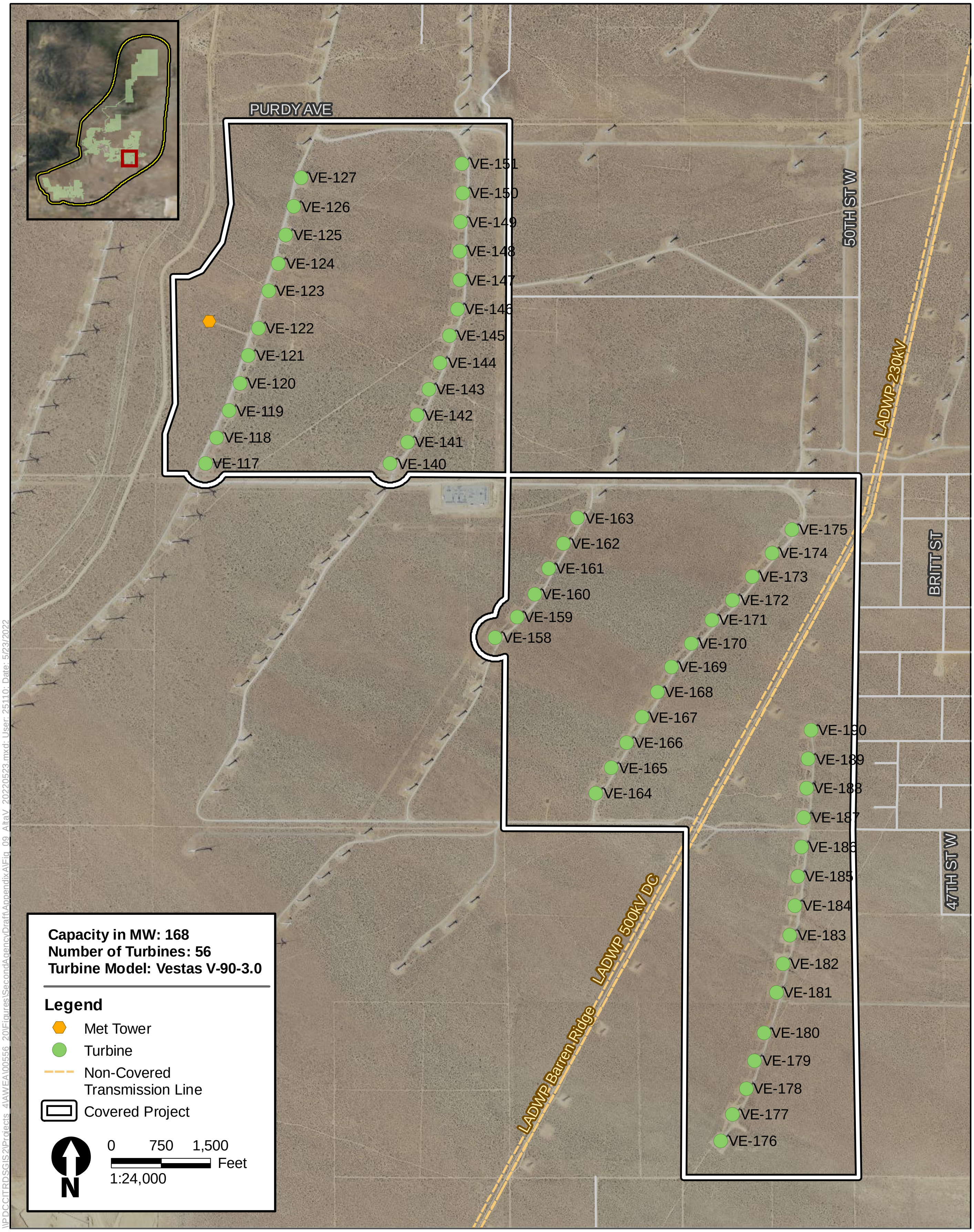

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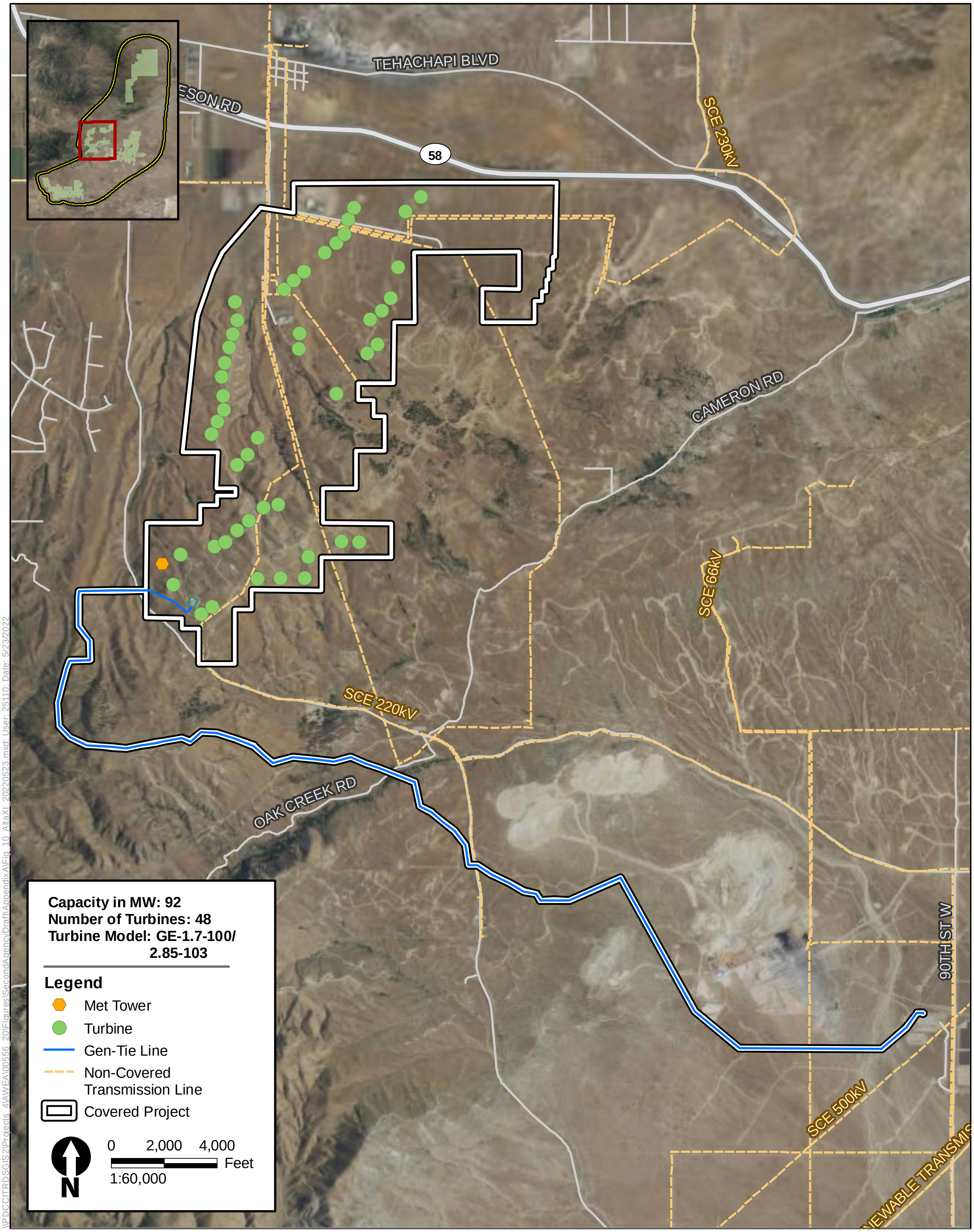

Clearway Energy
Alta XI Project
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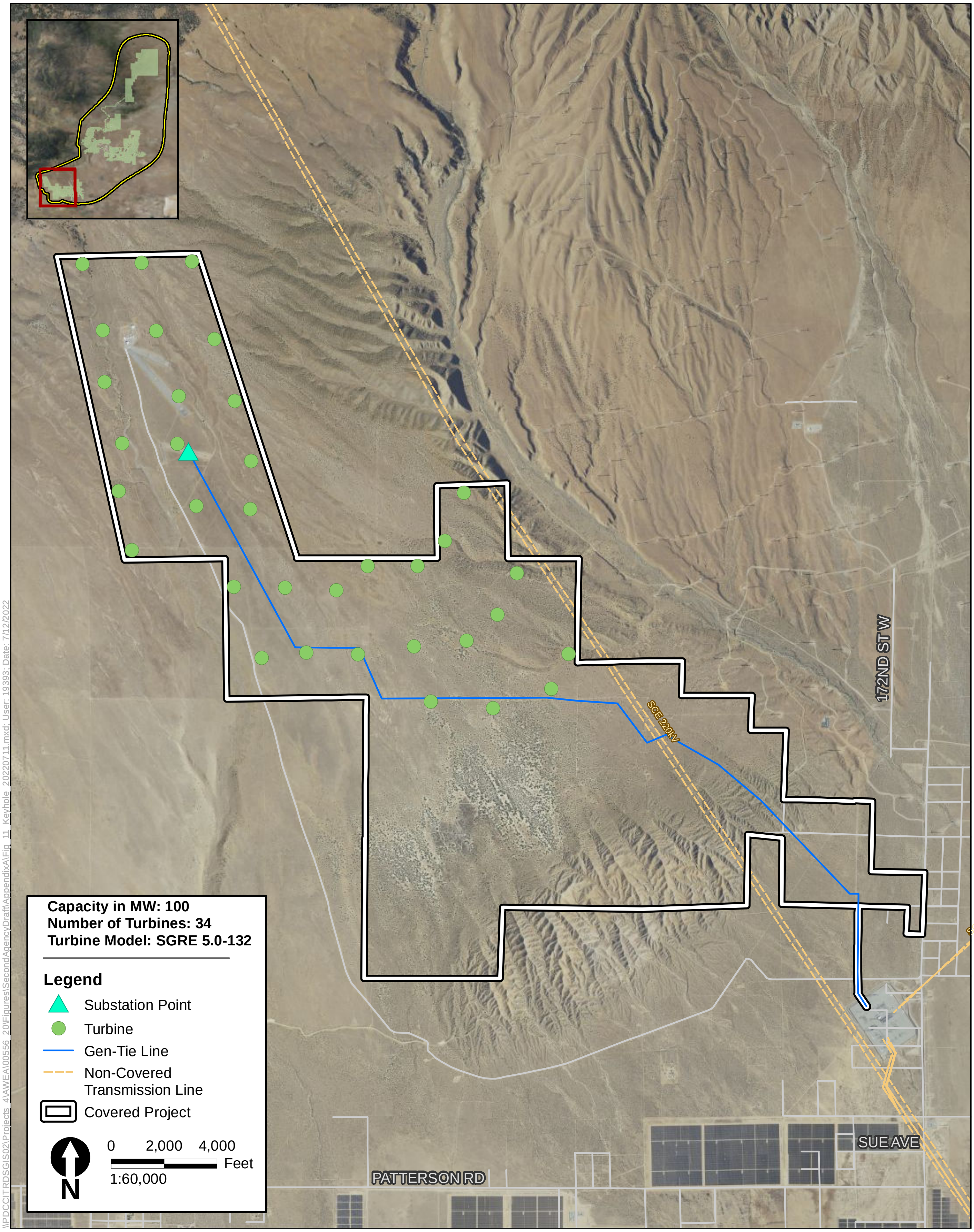

EDF Renewables (EDFR)
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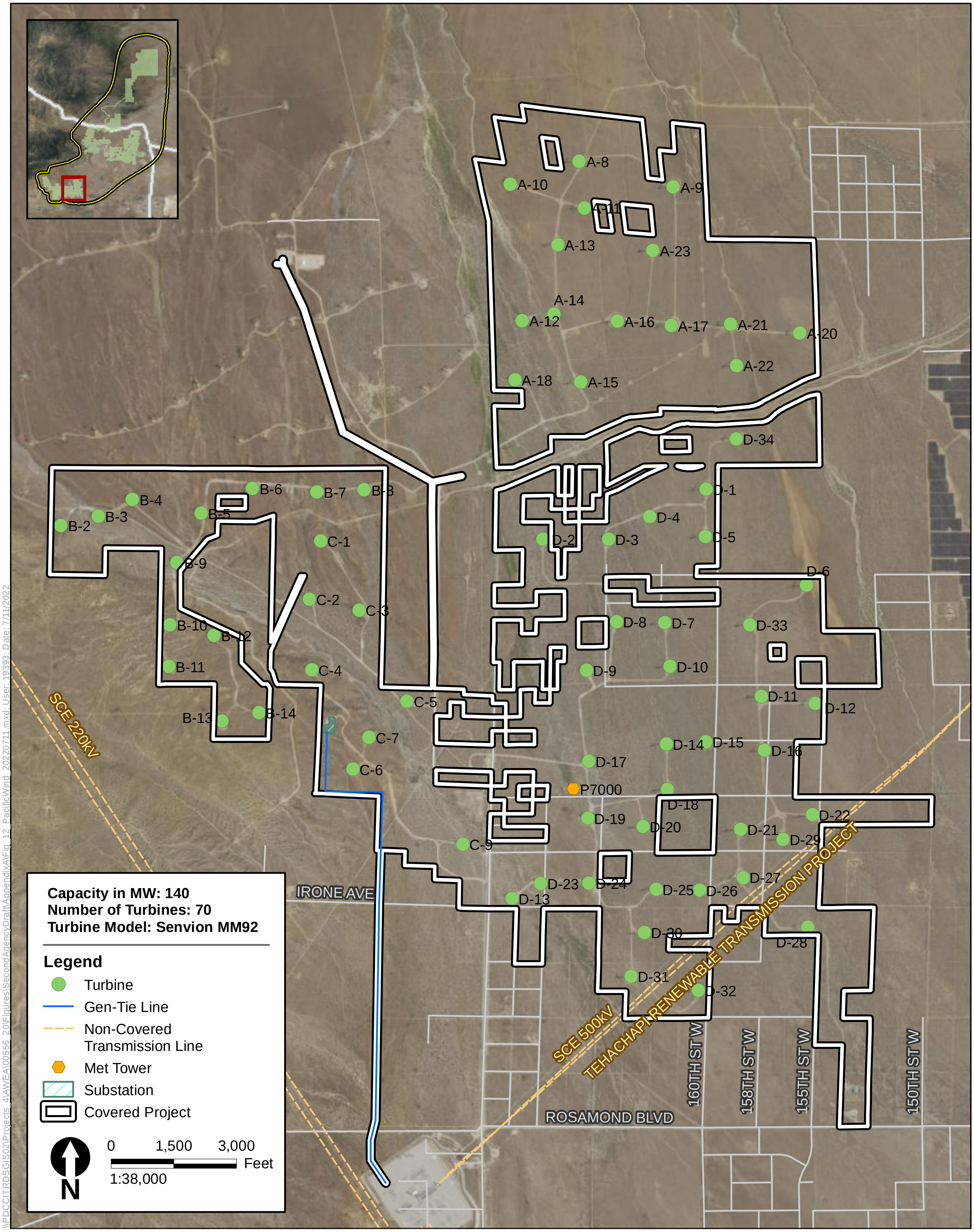

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Pacific Wind Project
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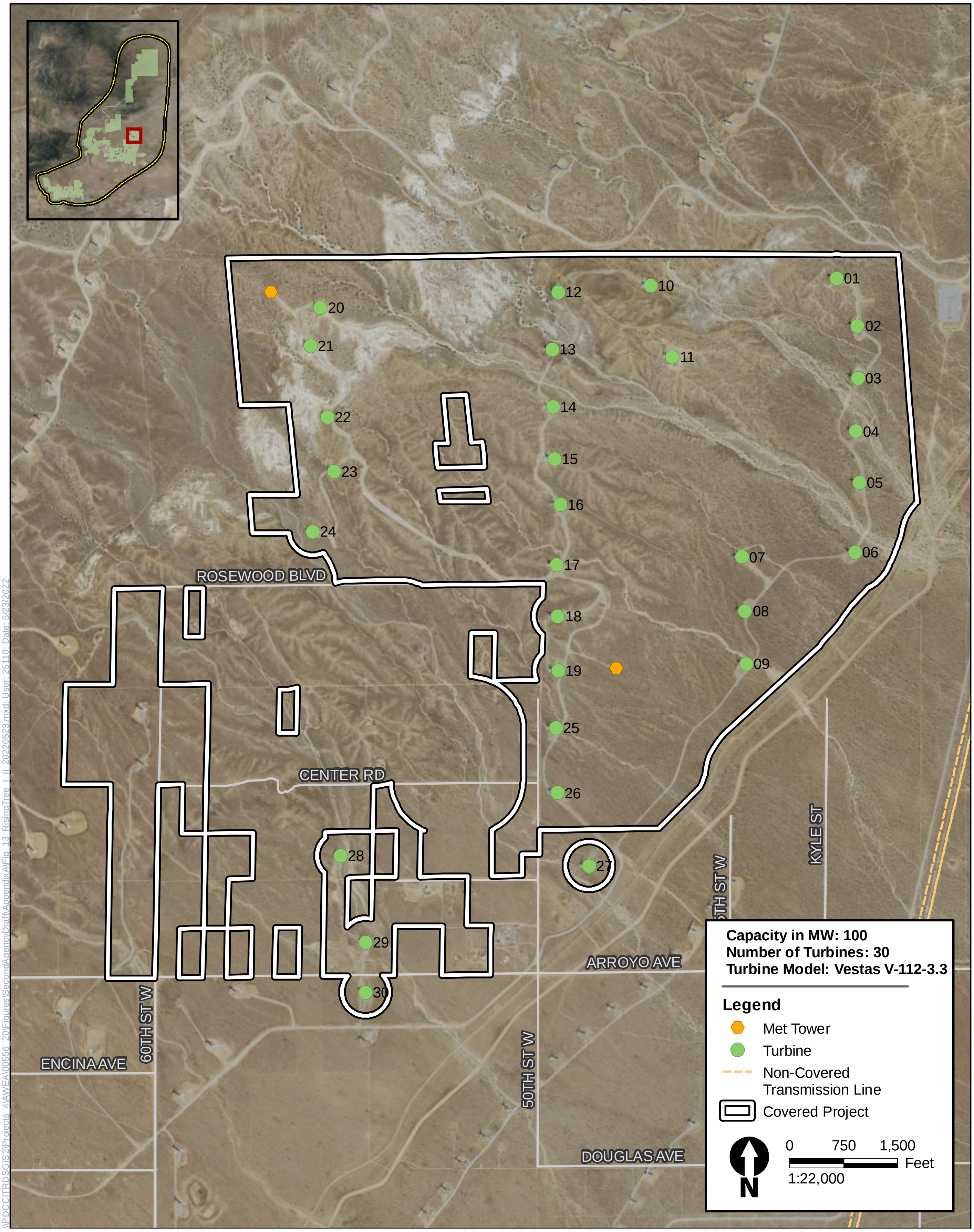

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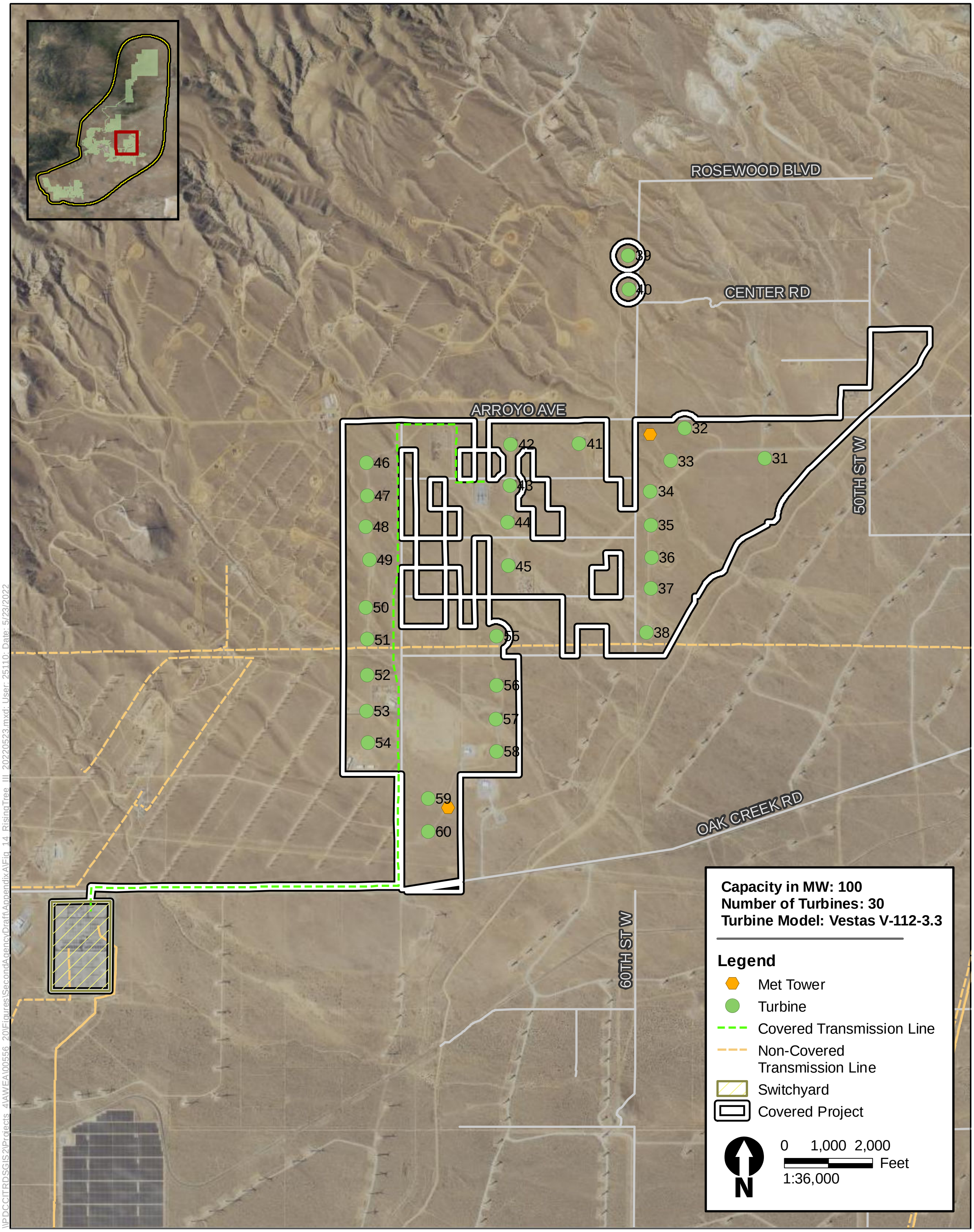
Rising Tree I/II Projects
WECAT Condor Conservation Plan



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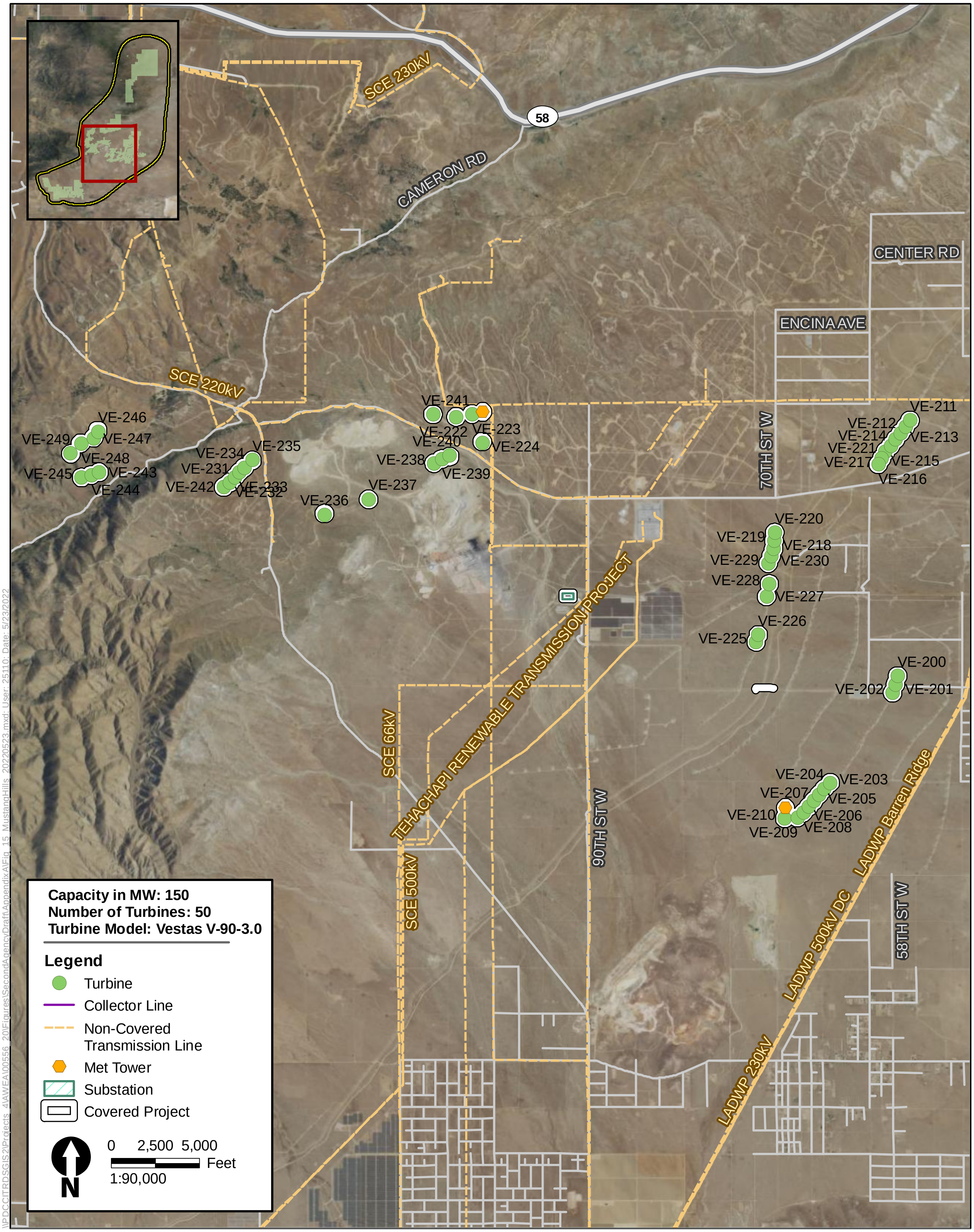
EDP Renewables (EDPR)
Rising Tree III Project
WECAT Condor Conservation Plan



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Mustang Hills Project
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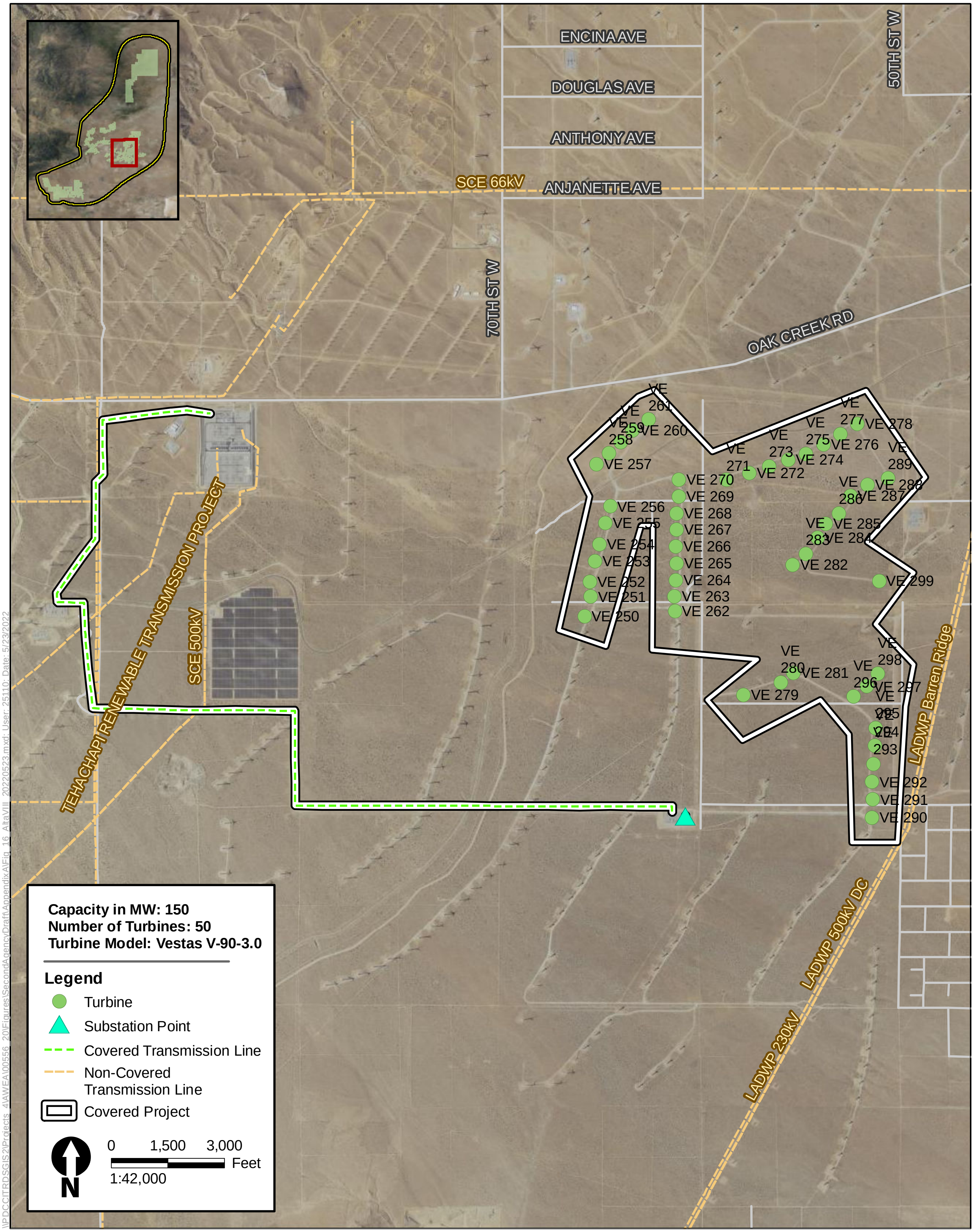

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NextEra Energy Resources
Alta VIII Project
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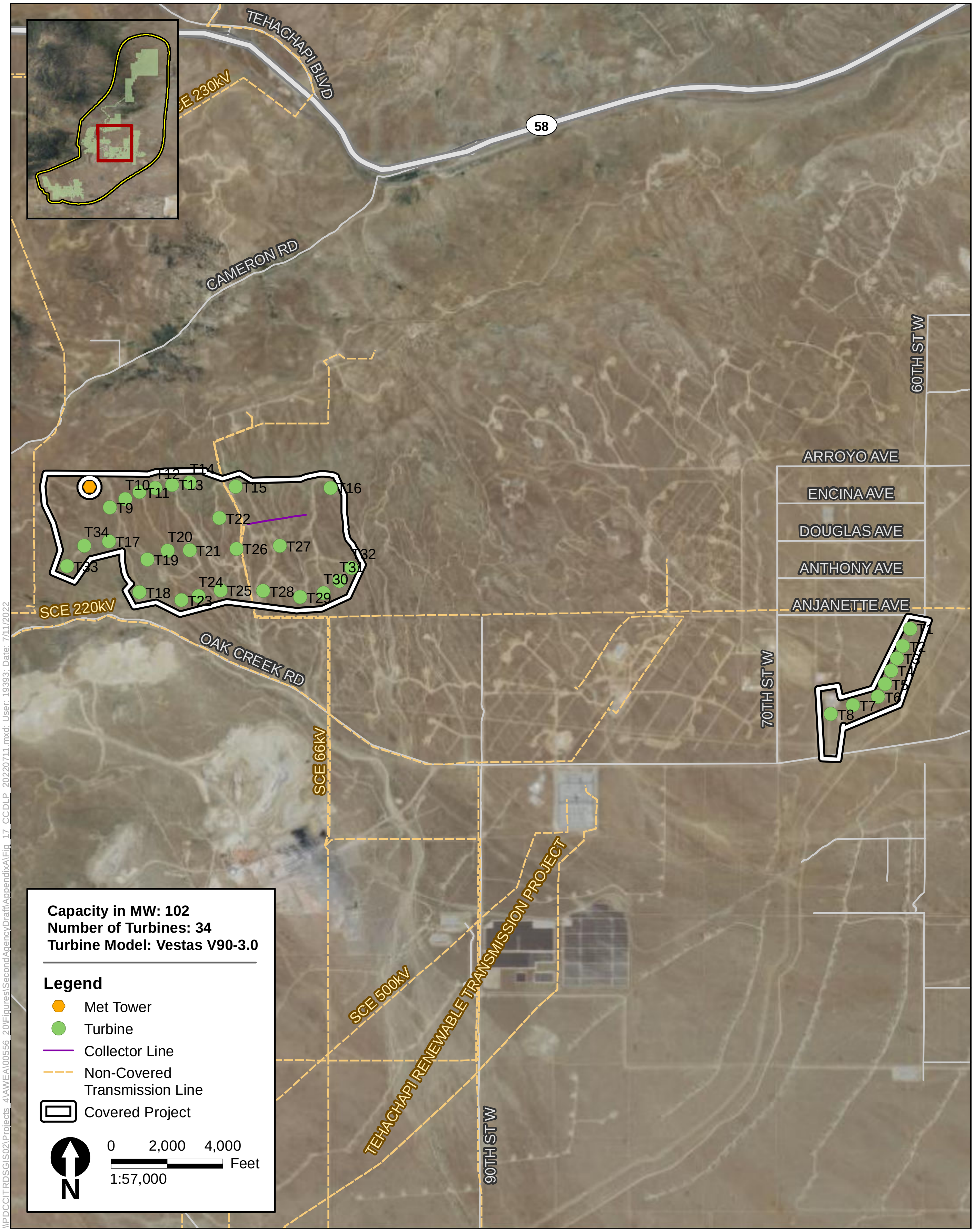

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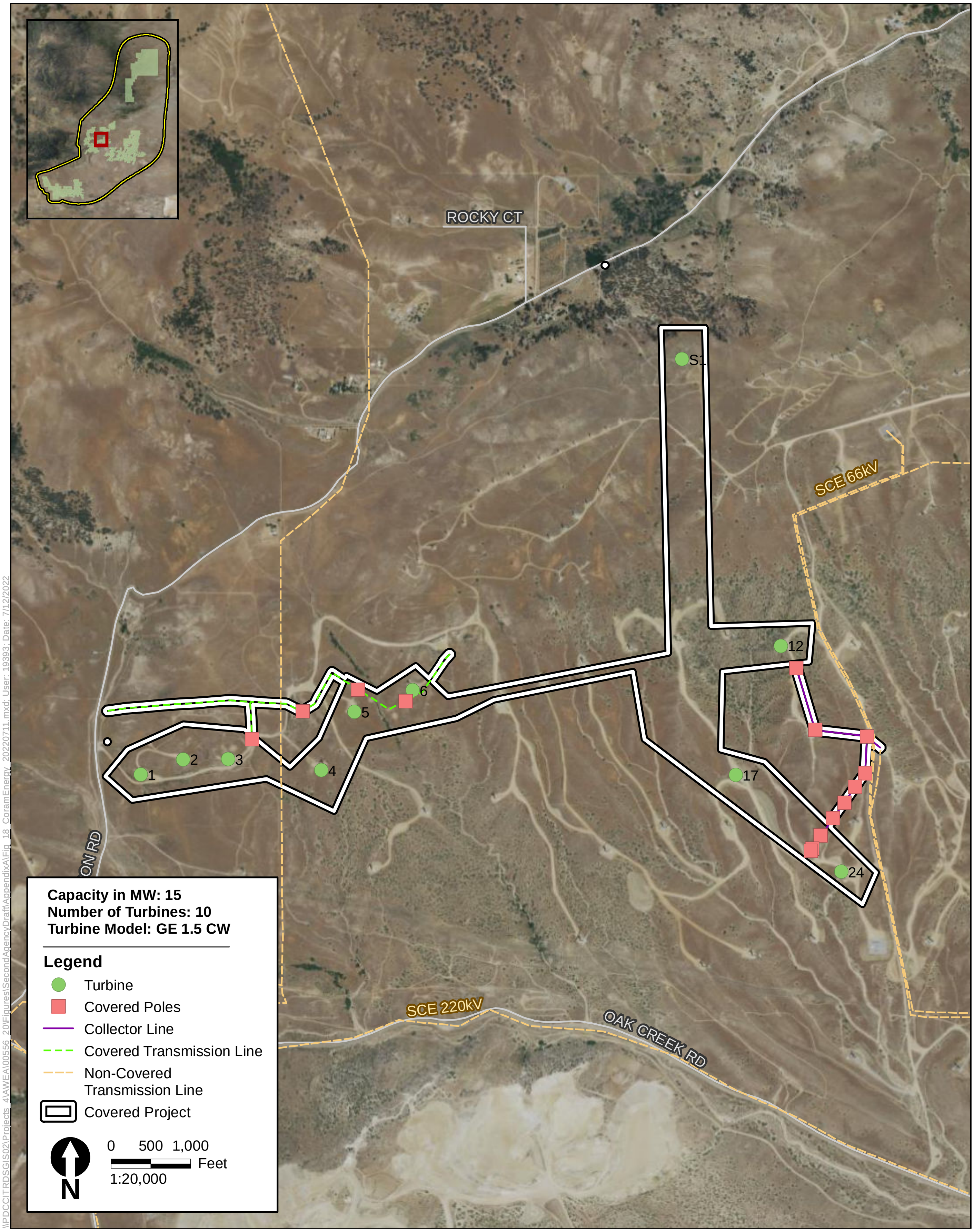

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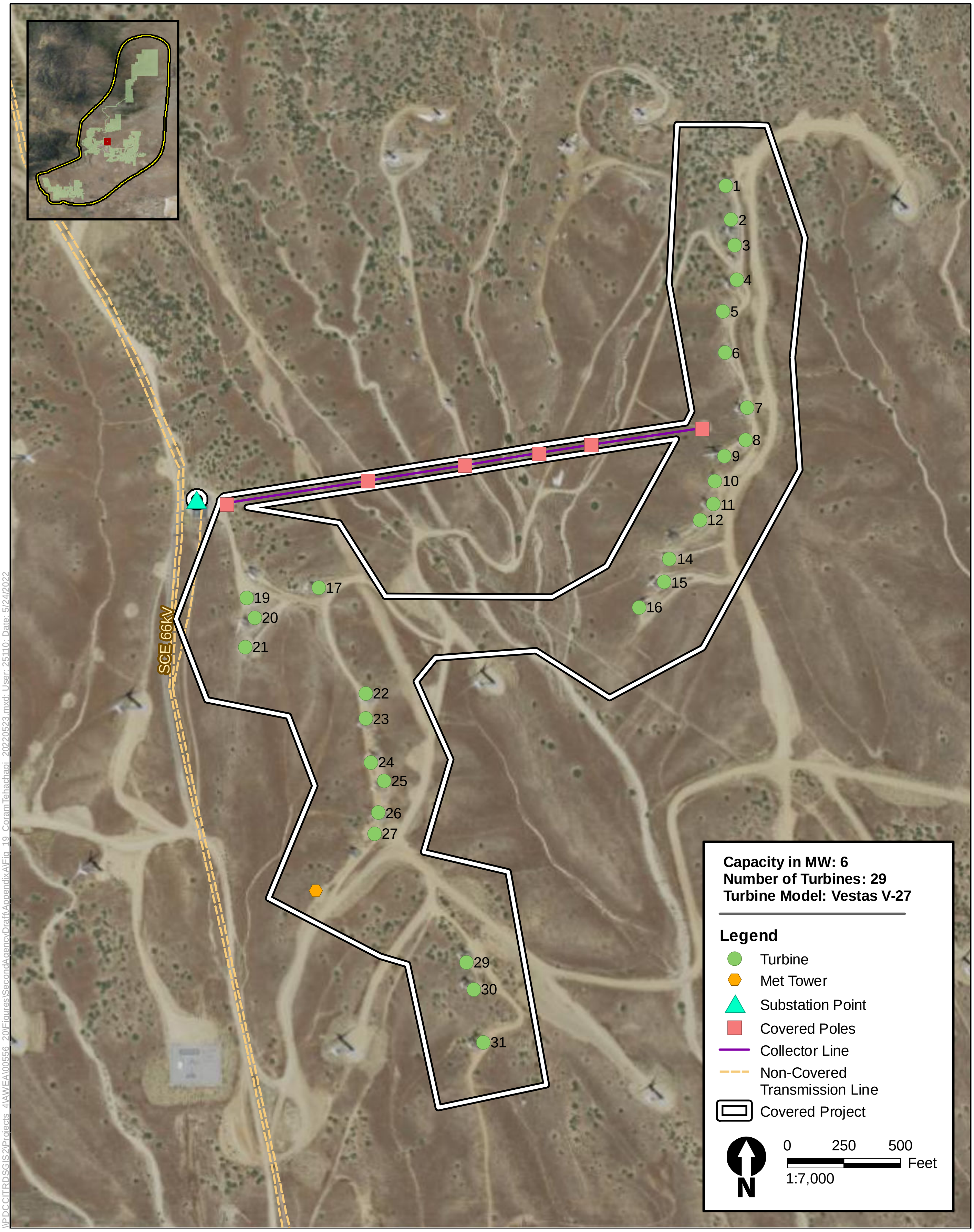
Coram Energy Project
WECAT Condor Conservation Plan



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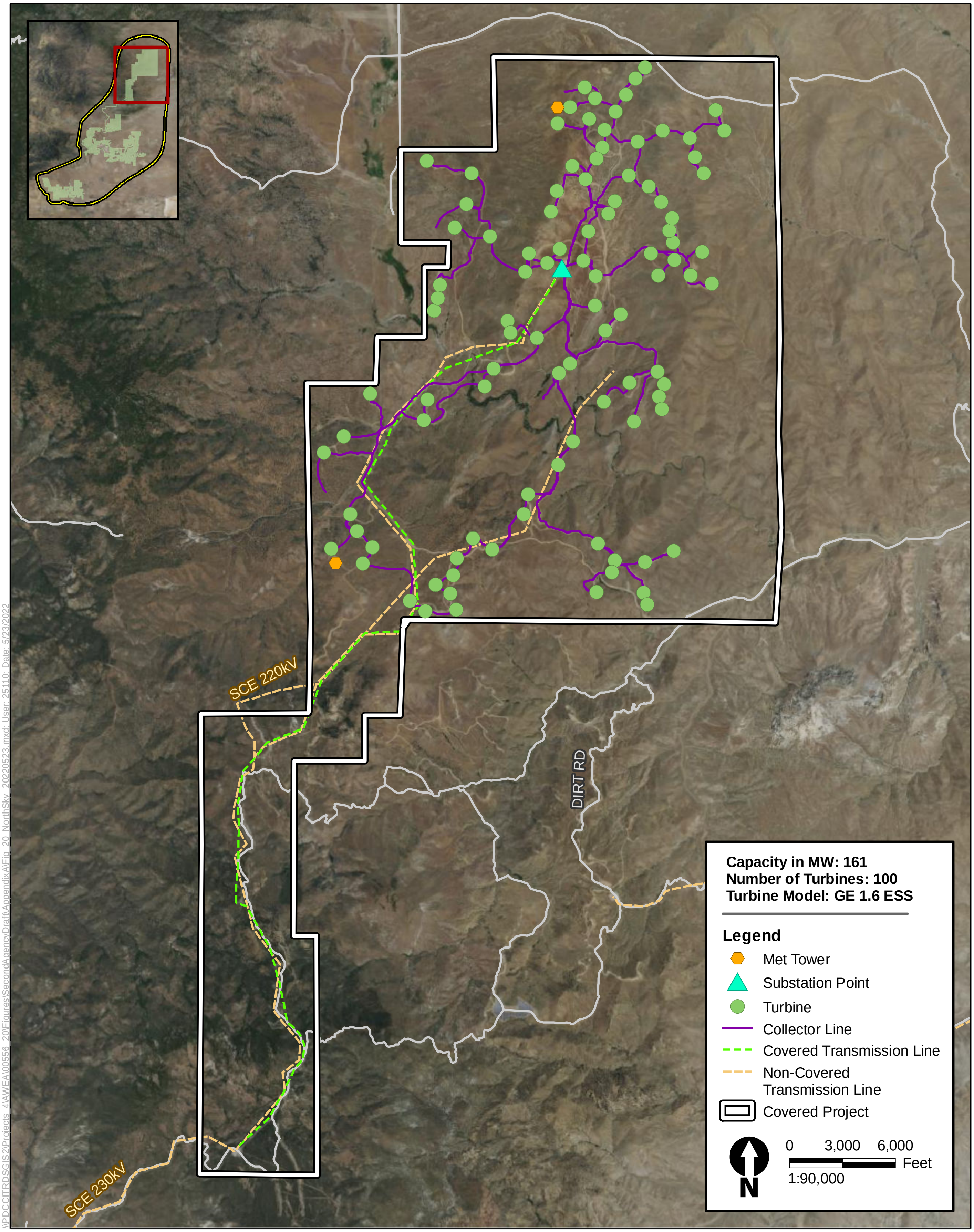
Coram Tehachapi Project
WECAT Condor Conservation Plan



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North Sky Project
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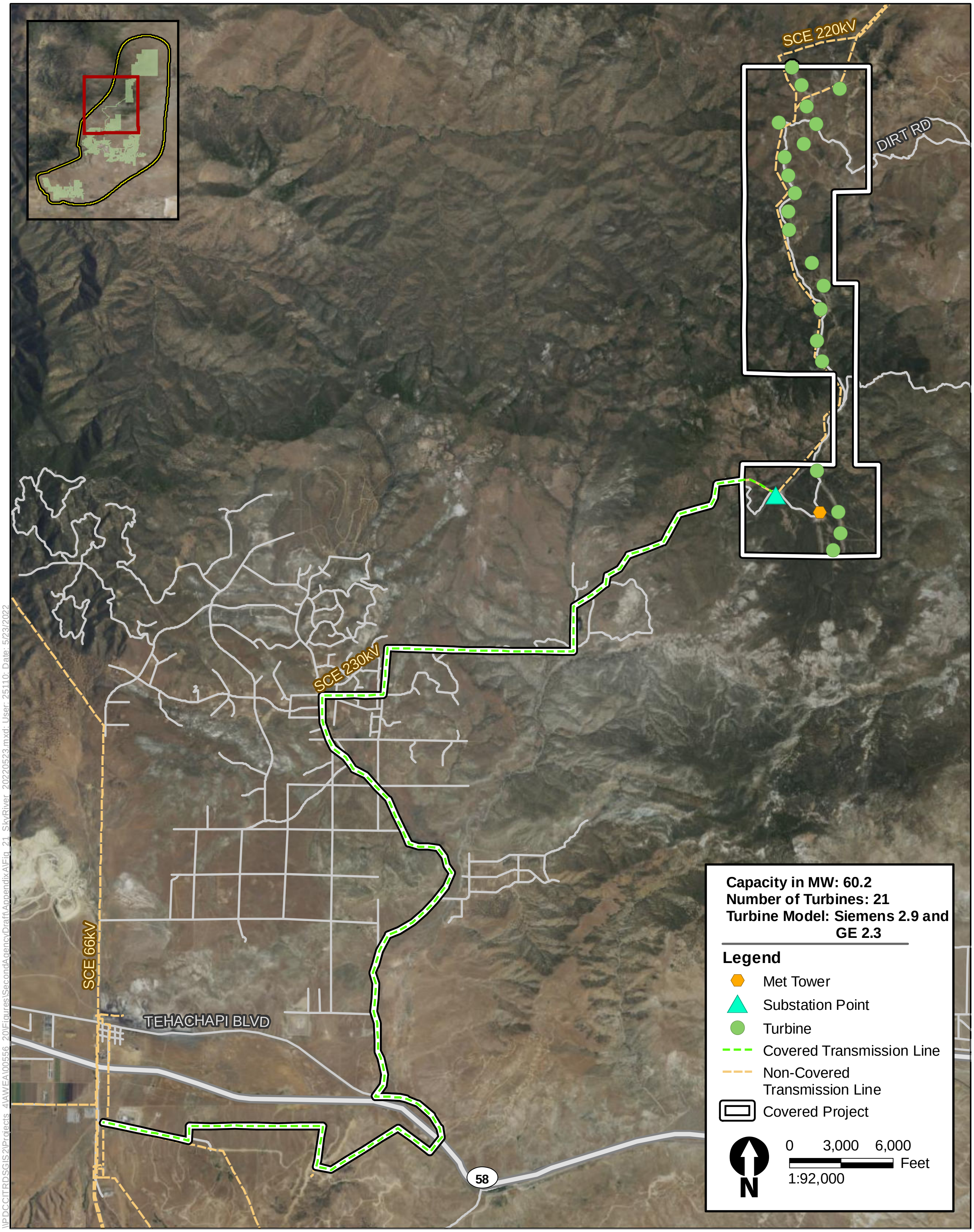

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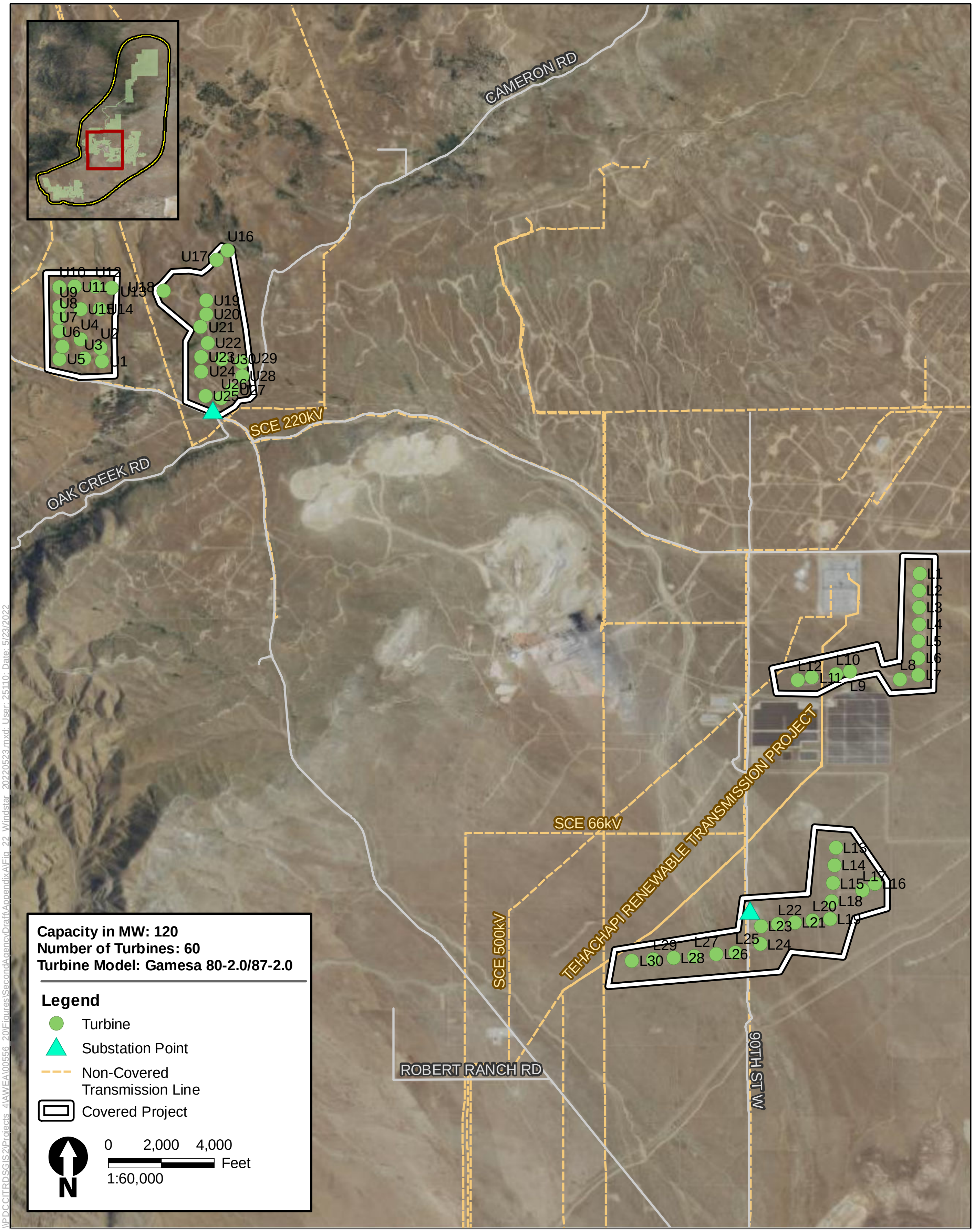
Sky River Project
WECAT Condor Conservation Plan



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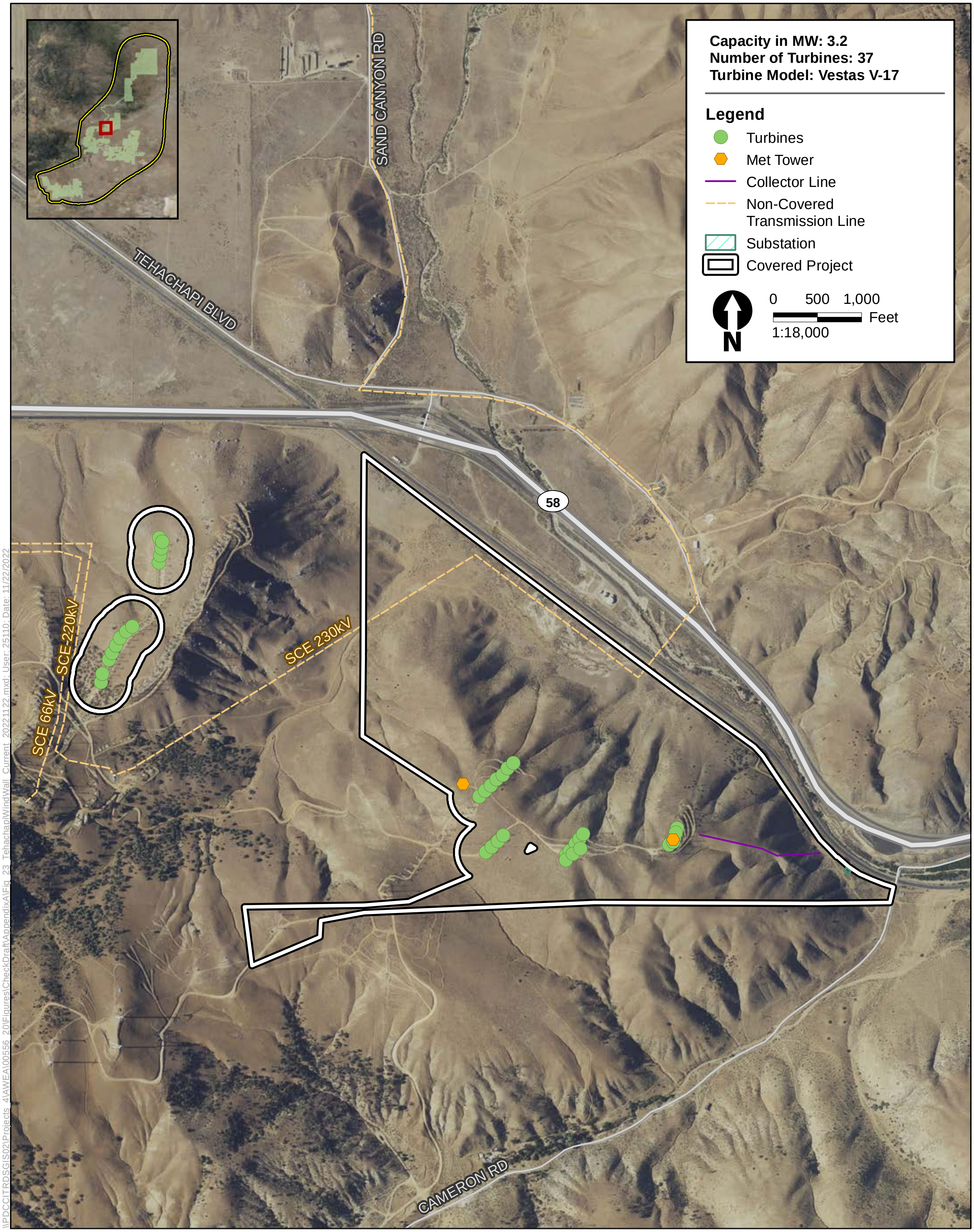
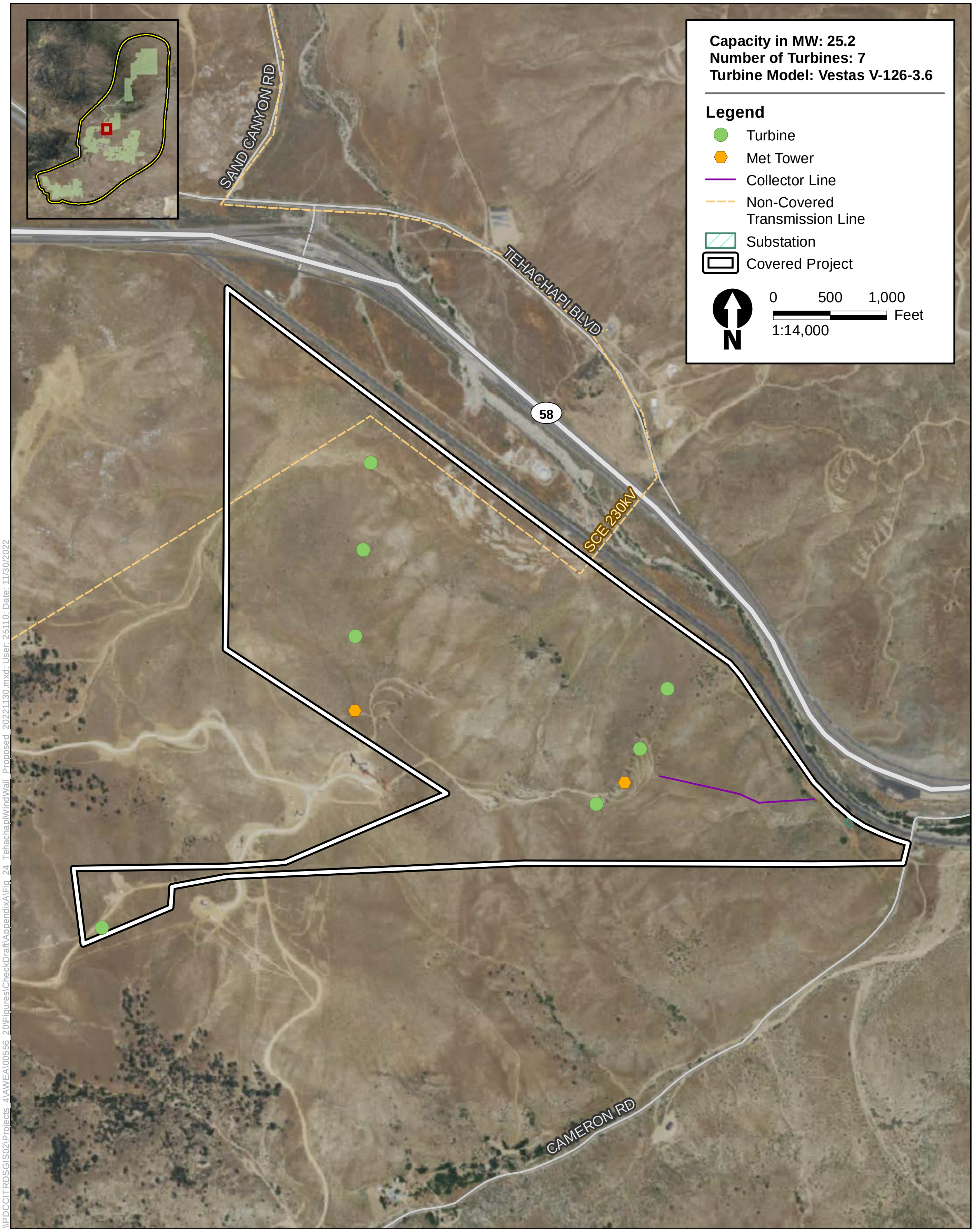
Windstar Energy Project
WECAT Condor Conservation Plan



Wind Wall Development
Wind Wall 2
WECAT Condor Conservation Plan



Wind Wall Development
Wind Wall 2 (Proposed Repower)
WECAT Condor Conservation Plan

Appendix B

Tagging Threshold Analysis

Appendix B.
Tagging Threshold Analyses

Introduction

Analysis 1

WECAT compared the likelihood of live condor detection by GPS/GSM or VHF technology across various scenarios (Table B-1) to examine the relationship between the tagged percentage of the population and the detectability of condor groups of varying sizes. This analysis shows the probability (converted to a percentage) that the presence of a group of California condors of a given size would not be detected by GPS/GSM or VHF technology, such as the geofence, because no condors in the group are tagged, at varying tagging percentages of the Southern California population. Probabilities were calculated as (1-p)^n, where p = proportion of population tagged and n = group size.

Table B-1. Non-detectability of Condor Groups by GPS/GSM or VHF Detection Systems, given Population Tagging Percentages

Group size	Percentage of Population Tagged						
	30%	40%	50%	60%	70%	80%	90%
1	70.00%	60.00%	50.00%	40.00%	30.00%	20.00%	10.00%
2	49.00%	36.00%	25.00%	16.00%	9.00%	4.00%	1.00%
3	34.30%	21.60%	12.50%	6.40%	2.70%	0.80%	0.10%
4	24.01%	12.96%	6.25%	2.56%	0.81%	0.16%	0.01%
5	16.81%	7.78%	3.13%	1.02%	0.24%	0.03%	0.00%
6	11.76%	4.67%	1.56%	0.41%	0.07%	0.00%	0.00%
7	8.24%	2.80%	0.78%	0.16%	0.02%	0.00%	0.00%
8	5.77%	1.68%	0.39%	0.07%	0.01%	0.00%	0.00%
9	4.04%	1.01%	0.20%	0.03%	0.00%	0.00%	0.00%
10	2.83%	0.61%	0.10%	0.01%	0.00%	0.00%	0.00%
11	2.00%	0.36%	0.05%	0.00%	0.00%	0.00%	0.00%
12	1.38%	0.22%	0.02%	0.00%	0.00%	0.00%	0.00%
13	1.00%	0.13%	0.01%	0.00%	0.00%	0.00%	0.00%
14	0.68%	0.08%	0.01%	0.00%	0.00%	0.00%	0.00%
15	0.48%	0.05%	0.00%	0.00%	0.00%	0.00%	0.00%

Table B-1 shows that although the detectability of an individual condor is directly related to the percentage of the population tagged (and thus the likelihood that a given individual is tagged and detectable with GPS/GSM or VHF technology), the detectability of groups of condors remains high even as the percentage of the population tagged decreases. For example, the likelihood that a group of five condors would be missed does not exceed 3% until the percentage of the population tagged falls below 50%. This is important because of the social foraging behavior of condors and the potential for a foraging opportunity within the Permit Area to attract individuals into areas where they may potentially be exposed to risk of collision or electrocution at covered facilities. California condors also occasionally congregate at communal roost sites and there is potential for this behavior in the mountainous forested roosting habitat along the western edge of the Permit Area.

The detection of the presence of multiple condors within the Permit Area, such as the gathering of condors at a carcass to forage, is likely to occur even with a lower percentage of the population being tagged because only one individual in a group needs to be detected to alert the covered operators to the presence of condors. Thus, WECAT selected a tagging threshold for adaptive management to ensure a multiple-condor take event would not exceed half of the impact covered by the CCP or preclude WECAT's ability to respond through adaptive management.

WECAT selected a 50% tagging threshold for adaptive management because it provides a very low (i.e., 3.13%) chance that five condors would go undetected and a near-zero (i.e., 0.05%) chance that a group of 11 condors would go undetected. A 70% tagging threshold was used in the CCPs prepared for the Manzana Wind Power Project and Pine Tree Wind Farm (Avangrid Renewables LLC et al. 2020) to trigger adaptive management; statistically this allow for a 9% chance that a group of two condors may go undetected.

Overall, the more condors that are tagged, the better to ensure that individual condors are protected by GPS/GSM/VHF-based detection and curtailment systems. However, this analysis indicates that even with declining tagging percentages, there is still a high likelihood that condors will be detectible, particularly in the event of congregated foraging or roosting.

Analysis 2

WECAT compared multiple potential carcass search methods and hypothetical condor carcass count scenarios across various tagging percentages (Table B-2) to examine the relationship between the tagged percentage of the population, the effectiveness of carcass search method options, and the resulting level of statistical confidence in permit compliance (i.e., detecting mortalities and not exceeding the amount of permitted take). The carcass search methods considered included the Condor Incident Reporting System (CIRS) proposed in the CCP (i.e., reporting of incidental observations by O&M staff), and supplemental monitoring methods such as:

1. transects (i.e., periodic walking searches by observers along parallel transects under the turbine)
2. scans (i.e., periodic binocular-assisted scans by observers of the area visible in each cardinal direction from the turbine base), and
3. roads and pads searches (i.e., periodic searches by observers of the turbine pads and access roads).

Some stakeholders have suggested that supplemental monitoring is needed to detect condor fatalities and ensure adherence to the proposed take limit. WECAT conducted the analysis below to determine if this additional monitoring is needed.

The probability of detection of a condor carcass that may be achieved by each of these methods was approximated based on WEST's experience with the probabilities of detection estimated for eagle carcasses resulting from studies using these methods in the Permit Area and other similar environments in California. The probabilities of detection may be underestimated due to the differences in size between eagles and condors, but the relative effectiveness of the search methods to one another is likely similar across these large bird species. The probability of detection, or *g* value in the Evidence of Absence estimator (Dalthorp et al. 2017), is sensitive to the size and location of the area searched, frequency of searches, searcher efficiency, and carcass persistence.

This analysis uses Evidence of Absence to evaluate the relative ability of different monitoring approaches to provide additional information, beyond the ongoing monitoring of tagged condors, to assess the level of take occurring under the CCP. It is important to note that, given the high probability of detection of California condors (based on their size, persistence, and percentage of tagged birds) and the fact that take is not expected to occur in most years of the permit term, this CCP will evaluate compliance based on the number of actual condor take events recorded. The CCP will not evaluate compliance with a take estimate calculated using Evidence of Absence because application of this estimator would make an inherent assumption that take is occurring during the period of estimation, which is not appropriate given that no condor take has been documented at a wind energy facility to date.

Table B-2. Confidence in Monitoring Results for Different Methods, given Population Tagging Percentages

Monitoring Method	Tagging *g*	Monitoring *g*[1]	Mean Combined *g* [2]	Number of Condor Carcasses Found	Confidence Take Has Not Exceeded Requested Limit of 11 Free-flying Adult Condors[3]
Scenario 1: 70% population tagged					
Transects	0.7	0.75	0.92 (0.925)	0	1
				1	1
				2	1
				3	1
				4	1
				5	1
Scans	0.7	0.22	0.77	0	1
				1	1
				2	1
				3	1
				4	1
				5	0.99
Roads and Pads	0.7	0.09	0.73	0	1
				1	1
				2	1
				3	1
				4	1
				5	0.98
Condor Incident	0.7	0	0.7	0	1
				1	1

Reporting System				2	1
				3	1
				4	0.99
				5	0.97
Scenario 2: 65% population tagged					
Transects	0.65	0.75	0.91	0	1
				1	1
				2	1
				3	1
				4	1
				5	1
Scans	0.65	0.22	0.73	0	1
				1	1
				2	1
				3	1
				4	1
				5	0.98
Roads and Pads	0.65	0.09	0.68	0	1
				1	1
				2	1
				3	1
				4	1
				5	0.96
Condor Incident Reporting System	0.65	0	0.65	0	1
				1	1
				2	1
				3	1
				4	0.98
				5	0.93
Scenario 3: 60% population tagged					
Transects	0.6	0.75	0.9	0	1
				1	1
				2	1
				3	1
				4	1
				5	1
Scans	0.6	0.22	0.69	0	1
				1	1
				2	1
				3	1

				4	0.99
				5	0.96
Roads and Pads	0.6	0.09	0.64	0	1
				1	1
				2	1
				3	1
				4	0.98
				5	0.92
Condor Incident Reporting System	0.6	0	0.6	0	0
				1	0
				2	1
				3	1
				4	0.96
				5	0.87
Scenario 4: 55% population tagged					
Transects	0.55	0.75	0.89	0	1
				1	1
				2	1
				3	1
				4	1
				5	1
Scans	0.55	0.22	0.65	0	1
				1	1
				2	1
				3	1
				4	0.98
				5	0.93
Roads and Pads	0.55	0.09	0.59	0	1
				1	1
				2	1
				3	0.99
				4	0.95
				5	0.86
Condor Incident Reporting System	0.55	0	0.55	0	1
				1	1
				2	1
				3	0.98
				4	0.92
				5	0.78

Scenario 5: 50% population tagged					
Transects	0.5	0.75	0.87 (0.875)	0	1
				1	1
				2	1
				3	1
				4	1
				5	1
Scans	0.5	0.22	0.61	0	1
				1	1
				2	1
				3	0.99
				4	0.96
				5	0.89
Roads and Pads	0.5	0.09	0.54 (.545)	0	1
				1	1
				2	1
				3	0.97
				4	0.91
				5	0.77
Condor Incident Reporting System	0.5	0	0.5	0	1
				1	1
				2	0.99
				3	0.95
				4	0.85
				5	0.67
Scenario 6: 25% population tagged					
Transects	0.25	0.75	0.81	0	1
				1	1
				2	1
				3	1
				4	1
				5	1
Scans	0.25	0.22	0.41 (.415)	0	1
				1	0.99
				2	0.96
				3	0.85
				4	0.67
				5	0.44
Roads and Pads	0.25	0.09	0.32	0	1
				1	0.96
				2	0.85

				3	0.64
				4	0.4
				5	0.19
Condor Incident Reporting System	0.25	0	0.25	0	0.99
				1	0.91
				2	0.71
				3	0.44
				4	0.21
				5	0.08

[1] These estimates are from WEST's experience conducting thousands of hours of monitoring across hundreds of projects across the United States over the past 25 years. Zero is used for the CIRS, though employee training and incidental carcass reporting would contribute to detections.
2 The mean combined g was calculated by combining the tagged and monitoring g distributions using standard statistical methods (i.e., the moment matching method), and then taking a weighted mean based on the tagging proportion.
3 These rates are based on a simplifying assumption that g is constant over time, though g will change over time based on the percent of population tagged in a given year.

The results of this analysis indicate that very little additional information about the impact of the CCP would be gained through supplemental monitoring, unless a low percentage of the condor population is tagged. The confidence that the level of condor take is within the CCP's requested take authorization amount is essentially the same across all monitoring scenarios unless the tagging percentage is low (i.e., 25%) or several (i.e., 5) condor carcasses have been found – each of which would trigger further investigation through the CCP's prescribed Condor Take Response Actions (Section 5.4.2). Moreover, supplemental monitoring efforts involving scans or transect searches would require a substantial expenditure of resources by the covered operators. The covered operators will require O&M staff, who are present at the covered projects daily and make regular visits to turbines and other covered facilities for inspection and maintenance, to report any condor carcasses through the CIRS (Section 5.4.1 *Condor Take Detection Program*).

Given the current lack of a robust statistical analysis to estimate the probability of detection for a CIRS program, no additional probability of detection beyond the tagged percentage of the population was included in the analysis. However, the probability of detection of a CIRS for condors is not expected to be zero and may in reality be similar to the roads and pads probability of detection (Table B-2). Given their size and typically long persistence on the landscape, large birds are the most highly detectable type of carcass at wind energy facilities, and California condors are the largest species in this category. In many areas, eagles (which are smaller than condors) are often detected as fatalities at wind energy facilities by landowners or O&M staff (e.g., more than half of the eagle fatalities reported in Pagel et al. 2013 were found incidentally by landowners or O&M staff). O&M staff trained to scan access roads, turbines pads, and a surrounding 100-m radius during monthly turbine maintenance visits have had large bird searcher efficiency rates of 0.22 and 0.36, annually (i.e., 22% and 36% of trial carcasses successfully found per study year; Leckband 2022).

WECAT selected a 50% tagging threshold for adaptive management because it provides a high level of confidence in assessing the impact under the CCP and ensuring that take does not exceed the covered amount. The probabilities of detection provided by the monitoring proposed in the CCPs prepared for the Manzana Wind Power Project and Pine Tree Wind Farm (Avangrid Renewables LLC et al. 2020) are likely similar to the values provided in this analysis for scans (at Manzana) and roads and pads searches (at Pine Tree). However, the monitoring requirements and the 70% tagging thresholds in those plans may be necessary to help ensure that they remain within their permitted take of only two free-flying adult condors.

Overall, transects, scans, and roads and pads searches would provide little additional value for management of the CCP because the current percentage of tagged condors is so high, condor carcasses have high detectability, and covered facilities are frequently traveled by operator staff. Even if the percent of the population tagged drops to 50%, WECAT is confident that the combination of tracking of tagged birds and the CIRS will provide the necessary data to ensure compliance with the requested permit.

Appendix C
Population Viability Analysis

Updated quantitative analyses to inform conservation planning efforts associated with California condors (*Gymnogyps californianus*)

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April 22nd 2022

Background

California condors (*Gymnogyps californianus*, hereafter referred to as condor[s]) are an endangered species recovering from very low population sizes. They exhibit a *K*-selected life history strategy characterized by high adult survival, long life expectancy, and low reproductive rates (Stearns 1992). Condors do not reach reproductive maturity until at least age five, often initiating breeding several years later. Breeding pairs lay a single egg and typically produce at most one fledgling every other year. Because of their life history strategy, their population growth rate is limited even in the absence of threats and is particularly sensitive to adult survival (Crowder et al. 1994; Saether et al. 1996).

The primary threat to the recovery of the condor is lead toxicosis from ingestion of lead-based ammunition while feeding on contaminated carcasses (Finkelstein et al. 2012). However, at least 20 condors have died from electrocution or trauma resulting from collisions with overhead power lines; these collisions are the second most common anthropogenic cause of death of free flying condors after lead poisoning (USFWS 2021a). Because they soar over large distances, taking advantage of thermal winds, and have relatively low maneuverability, condors may be susceptible to collisions with wind turbines, especially as condors expand their range and wind energy facilities exist within or in close proximity to the condor's current and historical range in California (USFWS 2013, 2021b). To date there have been no known collisions of condors with wind turbines.

We previously conducted analyses (Bakker and Finkelstein 2020) to inform conservation planning efforts associated with condors and wind energy facilities in southern California. We conducted similar analyses here but incorporated updated survival and reproductive rates through 2018 and added parameter uncertainty to model runs. The scenarios and model assumptions for these analyses were developed in collaboration with the U.S. Fish and Wildlife Service (USFWS) Palm Springs Office and Condor Recovery Program at the USFWS Hopper Mountain National Wildlife Refuge Complex.

We conducted two separate analyses to inform conservation planning efforts associated with condors and wind energy facilities in southern California. The objective of the first analysis was to estimate the number of captive-bred juvenile condor releases needed to offset the mortality of a free-flying adult condor and any dependent progeny (e.g., dependent egg or chick). The objective of the second analysis was to quantify the relative impact on condor population growth from potential mortalities at wind energy facilities in the absence of mitigation to offset such losses (i.e., additional rearing and releases of captive condors). These analyses could be used to inform mitigation and assess impacts to condors from various sources of anthropogenic mortality but, in this case, we targeted analyses to inform conservation planning efforts associated with wind energy facilities.

Analysis 1: California condor replacement ratios: Estimating the number of captive-bred juvenile releases needed to offset the mortality of a free-flying adult

Introduction

The loss of adult condors due to collisions with wind turbines or other anthropogenic sources of mortality would slow their population growth rate if unmitigated. One pillar of condor recovery has been the propagation and release of captive-bred individuals, with releases typically occurring when captive birds are about 1.5 years of age (approximately one year after fledging). The release of captive-bred juveniles also has the potential to offset the effects of adult mortality that could occur from wind turbine collisions. Released juveniles have a higher impact on population growth than wild-hatched chicks, but they make a smaller contribution to population growth rate compared to adults for several reasons. First, 1.5-year-old juveniles require several years before they are sexually mature and attain breeder status, during which time the lost adult would have had the potential to contribute offspring. Second, juveniles may not survive their pre-breeder years and recruit into the breeding population. Third, captive-bred birds experience elevated mortality for the first two years after release compared to wild-fledged birds of similar age, even after accounting for management actions such as power pole aversion training (Bakker et al. 2017). Thus, the number of captive-bred juveniles needed to maintain the population growth potential of a single adult is greater than one. Here we estimate the value of an adult condor of breeding age in terms of 1.5-year-old captive-bred juveniles, such that the adult's contribution to population growth is fully replaced, which we refer to as the California condor replacement ratio (CCRR).

Methods

We followed the methods of Bakker and Finkelstein (2020) but incorporated updated survival and reproductive rates through August 2018 and added parameter uncertainty to model runs. We simulated the loss of adult females and the release of juvenile females, but for this monogamous species with shared parental investment, the results are assumed to apply to birds of either sex.

We considered two scenarios for condor population growth: current growth and previous growth. We simulated previous growth conditions by assuming lead mortality decreased by 50% and other mortality decreased by 25%, which achieved a growth rate comparable to the 'current growth' conditions reported in Bakker and Finkelstein (2020).

Similar to Bakker and Finkelstein (2020), we explored two scenarios for the lost adult's breeder class: 1) random expectation, in which all individuals age young adult or older were equally likely to die (mortality proportional to abundance in the wild population) and 2) precautionary approach, in which the lost adult was assumed to be a successful breeder actively rearing a chick, with older adults (10 years post-fledge or older), which have the highest survival, taken first, followed by younger age classes of successful breeders. For both scenarios (random and precautionary), we assumed that if a successful breeder was killed at any time throughout the year, their chick also died.

We initiated the model in 2018 at the observed southern California flock size and age distribution and simulated removals of wild adults in 2025; if insufficient numbers of target breeder classes were present, removals continued in 2026, with releases of captive-bred 1.5-year-olds in 2027. **Our simulations calculate a CCRR by determining how many captive-bred 1.5-year-olds, released in a single event (the year after the final adult condors are removed), offset lost population growth resulting from the removal of an adult condor.** To increase the mathematical precision of the estimated CCRR, we simulated the removal of 5 adults and the release of between 5 and 20 juveniles, or CCRRs of 1:1 to 4:1 juveniles to adults. The CCRR estimates the value of a single adult condor, and the intent of simulating the removal of five adults was to achieve greater resolution in our estimate of this ratio.

For each scenario, we ran 40,000 replicate simulations for 50 years (~ two condor generations) after the one-time removal of five adults spanning 2025 - 2026 and release of juveniles in 2027 and tracked the number of total females and adult females through time. To represent uncertainty, for every year of each scenario, we drew 40,000 bootstrapped samples and took the difference of medians of bootstrapped samples for release scenarios and the baseline scenario (i.e., no wind energy mortality). CCRRs are the juvenile release scenarios for which the median number of females was greater than or equal to the baseline scenario for the entire interval from 2027 through the evaluation year in 2065. Bootstrapped 95% confidence intervals (CI) bracket the middle 95% of CCRR values and represent the juvenile release scenario for which the 2.5th and 97.5th percentile of number of females was greater than or equal to the baseline scenario.

Results (Figure 1)

1) Current population growth with releases (declining population if releases discontinued) (Figures 2 and 3):

    a. *Estimated lower CCRR* – random removal: **2.6 (95% CI: 2.4, 2.8)**
    b. *Estimated upper CCRR* – precautionary removal: **3.2 (95% CI: 2.8, 3.6)**

2) Previous population growth with releases (growing population if releases discontinued) (Figures 4 and 5):

    a. *Estimated lower CCRR* – random removal: **2.4 (95% CI: 2.2, 2.8)**
    b. *Estimated upper CCRR* – precautionary removal: **2.8 (95% CI: 2.6, 3.2)**

Importantly, results for the CCRR analysis assume an equal sex ratio for birds removed and released. To avoid exacerbating the current male bias observed in the free-flying condor population, the sex ratio of the birds released should reflect the sex ratio of the birds taken.

Figure 1. CCRR values (and 95% bootstrapped confidence intervals) for two removal scenarios and two population growth scenarios based on 40,0000 replicate runs for each scenario.

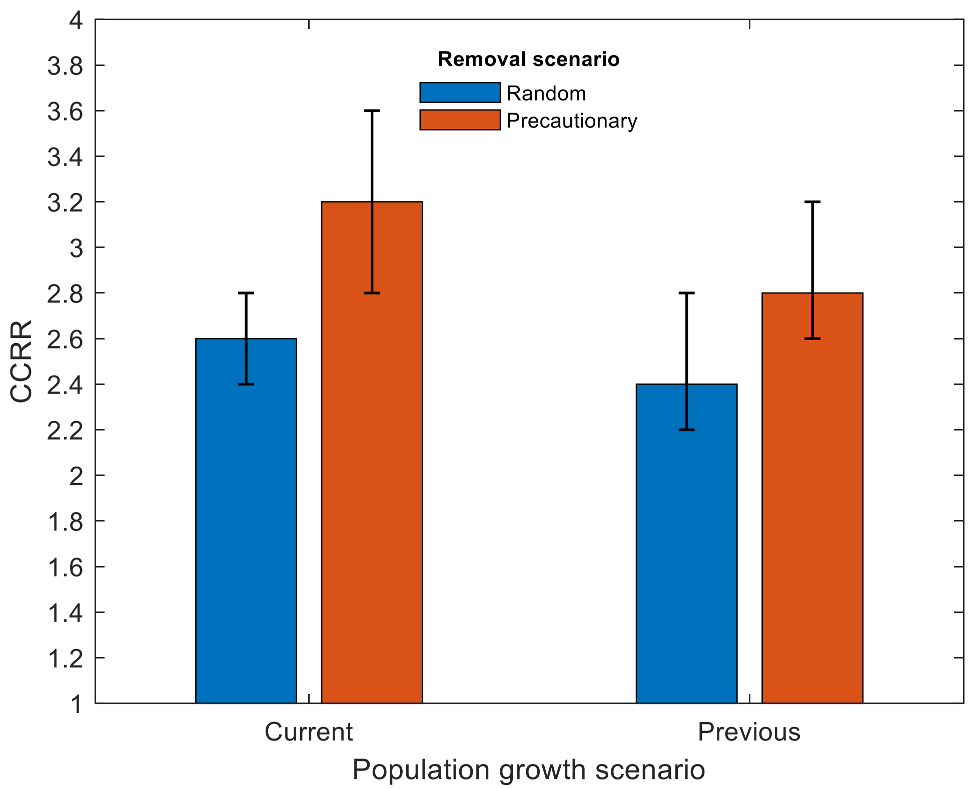


Figure 2. Current growth scenario – random removal: 5 adults (i.e., breeder classes) removed at random (proportional to breeder class abundance in the population) and scenarios of 5 to 20 juveniles released into the flock. If a successful breeder was randomly selected for removal, their chick was also removed. Simulations depict change in population size with no wind energy mortality, no release of juveniles (no replacement), replacement of 5 juveniles to 5 adults (1:1 replacement) increasing to replacement of 20 juveniles to 5 adults (4.0:1). Panels 'a' and 'c' depict median change in total number of females in the population while panels 'b' and 'd' depict change in the number of adult females; panels 'c' and 'd' include 95% bootstrapped confidence intervals around the median value.

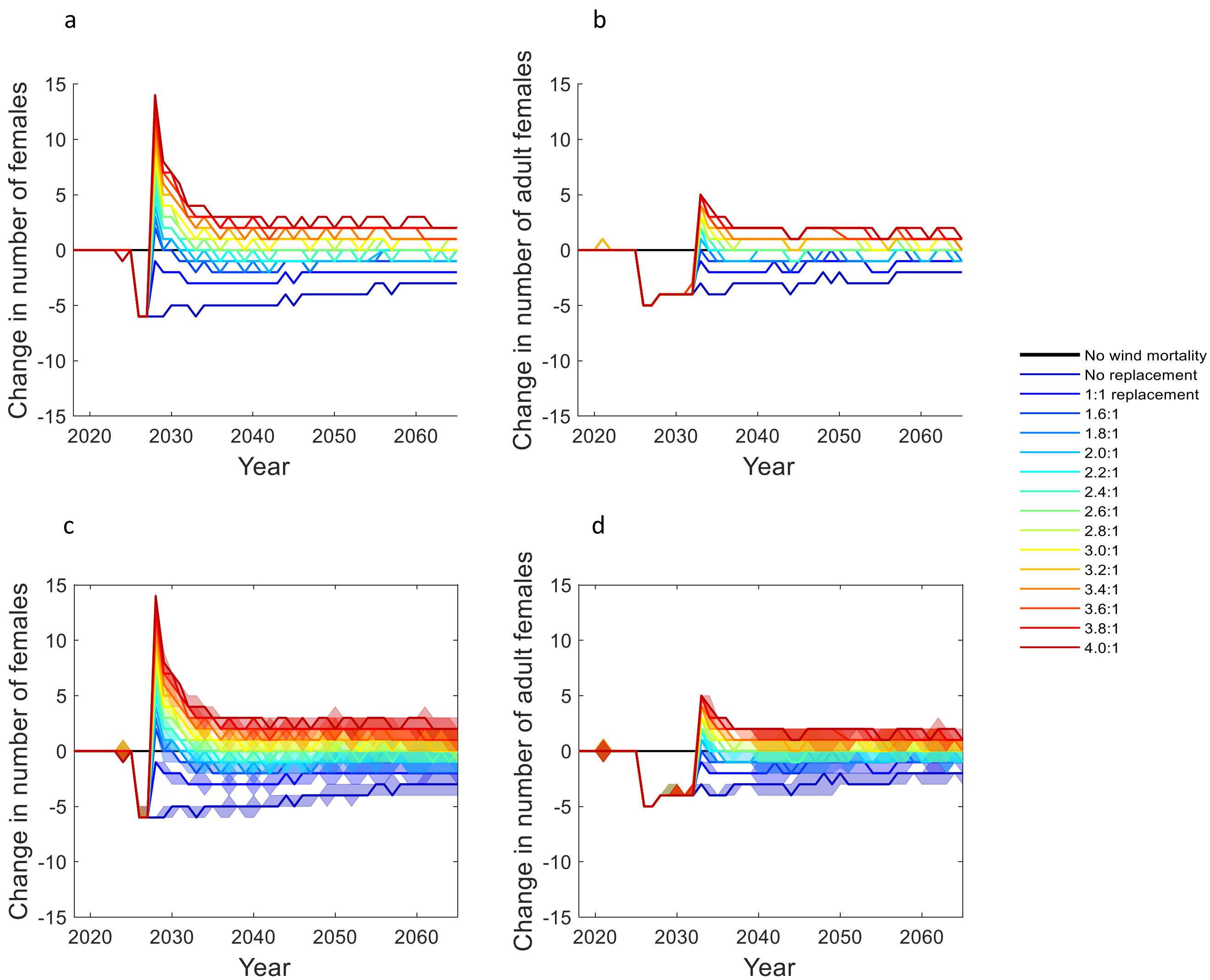


Figure 3. Current growth scenario – precautionary removal: 5 adults (i.e., breeder classes) removed at random (proportional to breeder class abundance in the population) and scenarios of 5 to 20 juveniles released into the flock. If a successful breeder was randomly selected for removal, their chick was also removed. Simulations depict change in population size with no wind energy mortality, no release of juveniles (no replacement), replacement of 5 juveniles to 5 adults (1:1 replacement) increasing to replacement of 20 juveniles to 5 adults (4.0:1). Panels ‘a’ and ‘c’ depict median change in total number of females in the population while panels ‘b’ and ‘d’ depict change in the number of adult females; panels ‘c’ and ‘d’ include 95% bootstrapped confidence intervals around the median value.

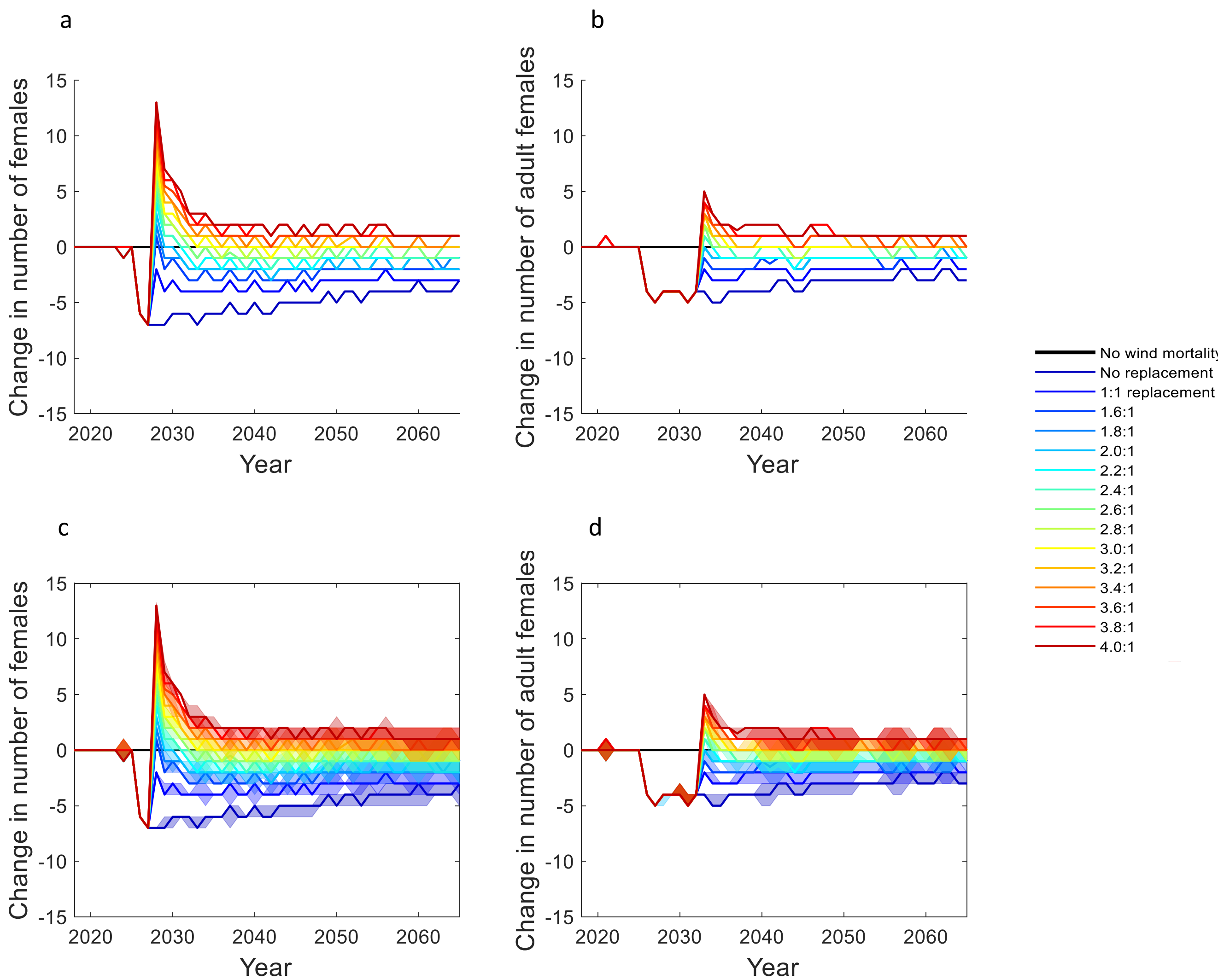


Figure 4. Previous growth scenario – random removal: 5 adults (i.e., breeder classes) removed at random (proportional to breeder class abundance in the population) and scenarios of 5 to 20 juveniles released into the flock. If a successful breeder was randomly selected for removal, their chick was also removed. Simulations depict change in population size with no wind energy mortality, no release of juveniles (no replacement), replacement of 5 juveniles to 5 adults (1:1 replacement) increasing to replacement of 20 juveniles to 5 adults (4.0:1). Panels 'a' and 'c' depict median change in total number of females in the population while panels 'b' and 'd' depict change in the number of adult females; panels 'c' and 'd' include 95% bootstrapped confidence intervals around the median value.

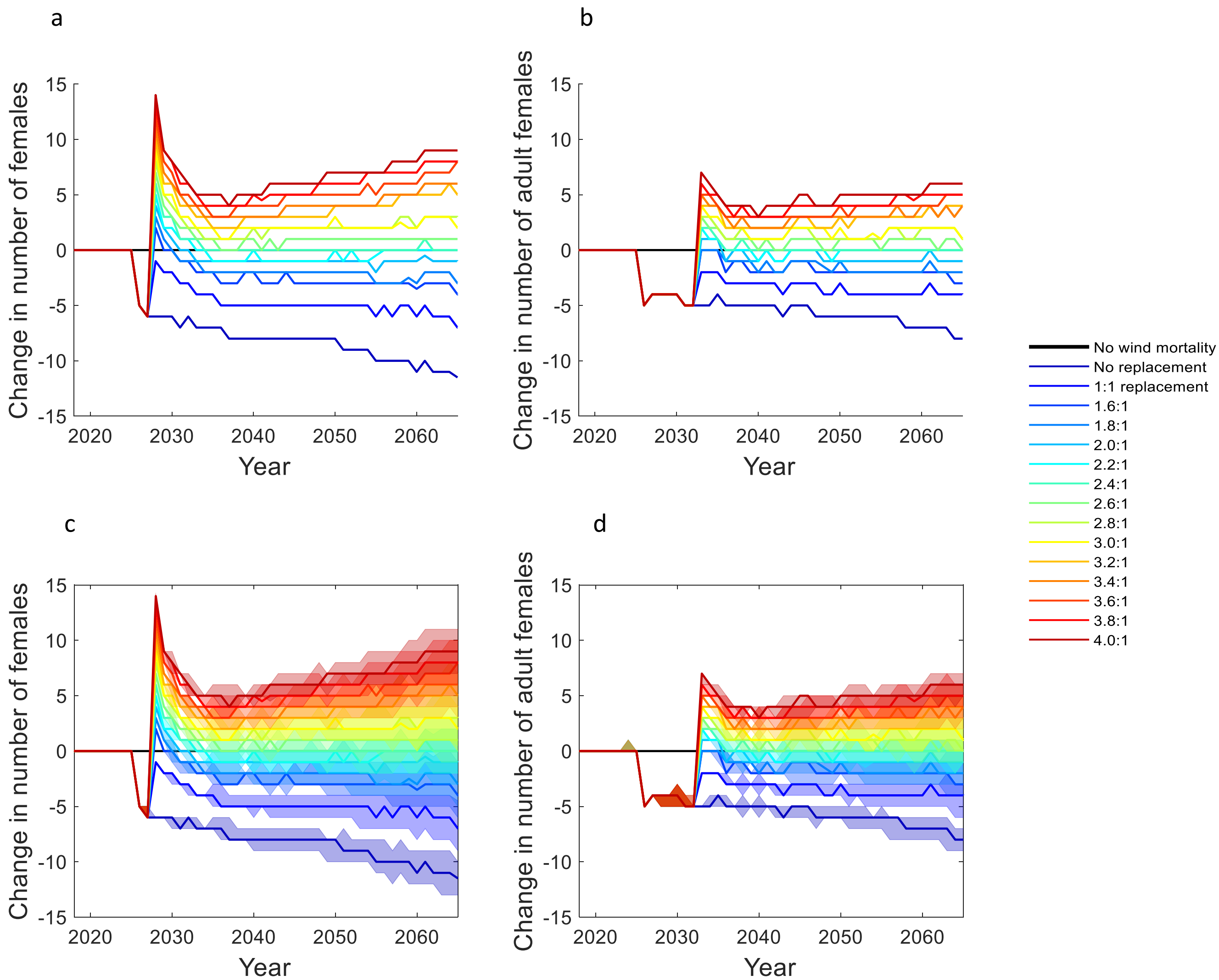
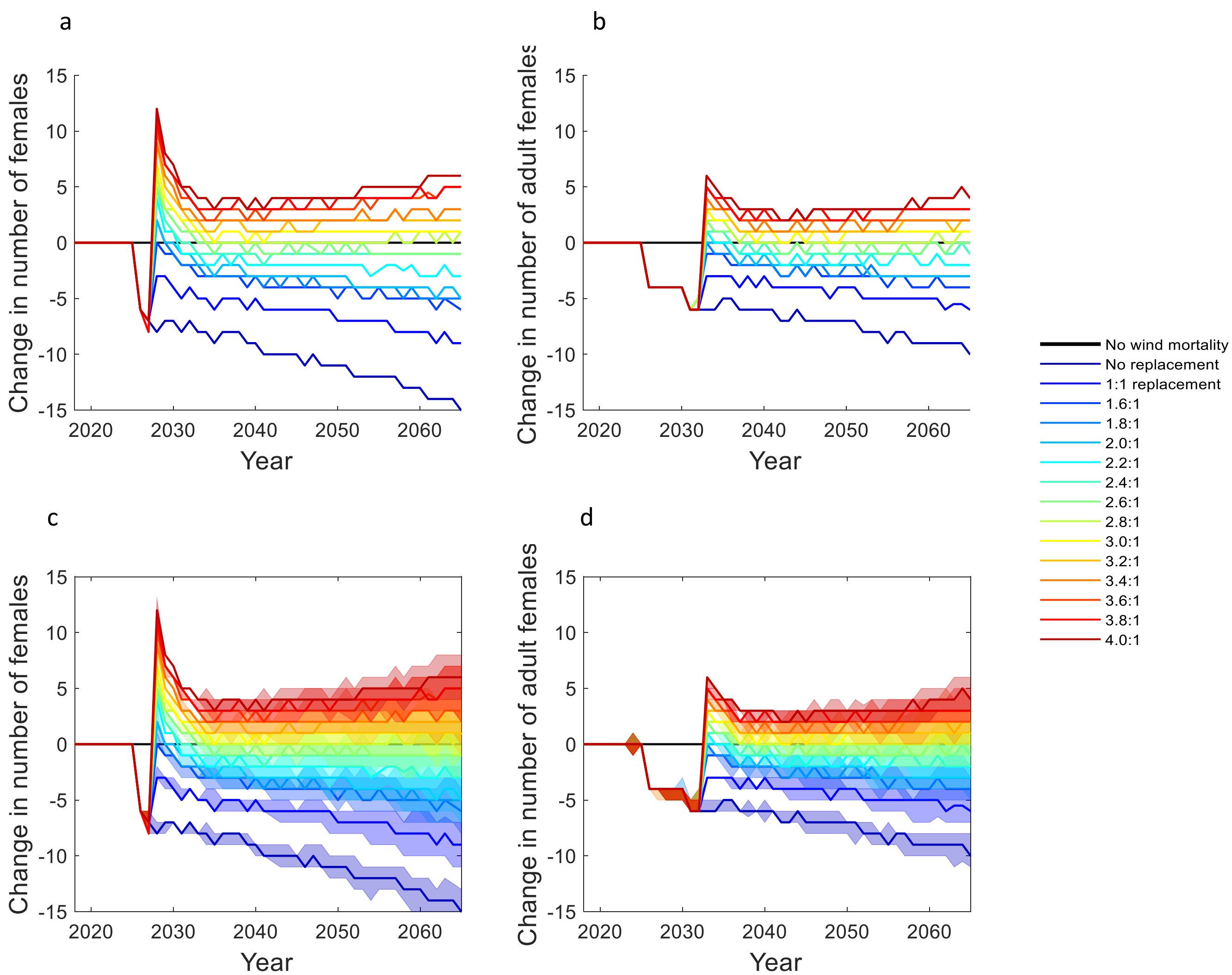


Figure 5. Previous growth scenario – precautionary removal: 5 adults (i.e., breeder classes) removed at random (proportional to breeder class abundance in the population) and scenarios of 5 to 20 juveniles released into the flock. If a successful breeder was randomly selected for removal, their chick was also removed. Simulations depict change in population size with no wind energy mortality, no release of juveniles (no replacement), replacement of 5 juveniles to 5 adults (1:1 replacement) increasing to replacement of 20 juveniles to 5 adults (4.0:1). Panels 'a' and 'c' depict median change in total number of females in the population while panels 'b' and 'd' depict change in the number of adult females; panels 'c' and 'd' include 95% bootstrapped confidence intervals around the median value.



Analysis 2: Quantification of the relative population-level impact of potential California condor mortality associated with wind energy facilities in southern California

Introduction

We used a population viability analysis (PVA) to assess the relative impact to population growth of condors in the southern California flock from potential mortalities associated with wind energy facilities (wind energy mortalities) in the absence of mitigation. The PVA was based upon the methods of Bakker and Finkelstein (2020) but incorporated updated survival and reproductive rates through August 2018 and added parameter uncertainty to model runs to estimate relative changes in the condor population growth rate and number of birds under a wide range of scenarios as explained below.

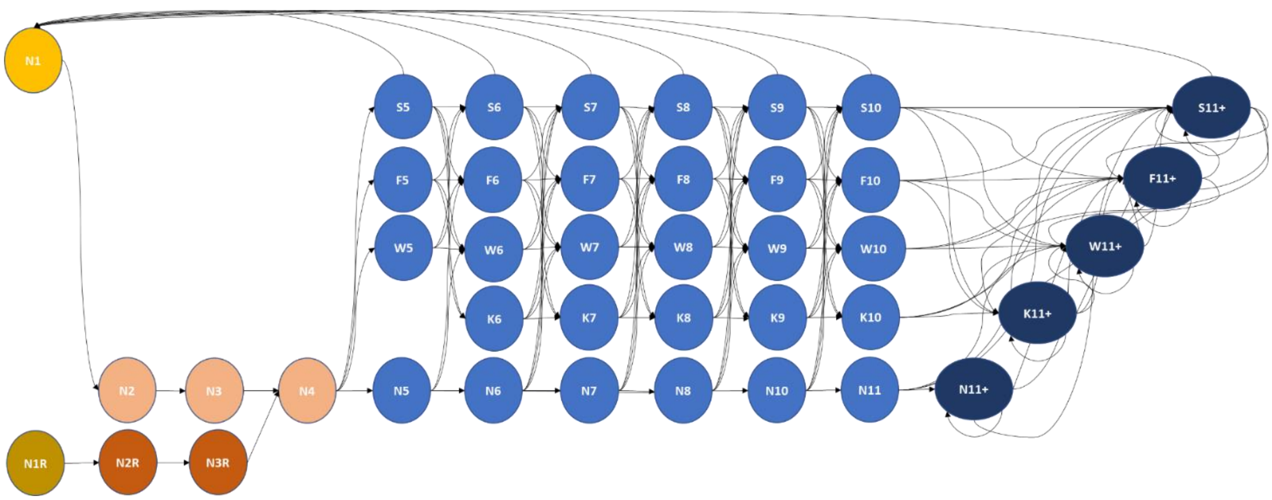
Methods

Population Model. We based our simulations of the effects of different levels of wind energy mortalities on our established condor demographic model. The model uses a stochastic demographic matrix with demographic rates driven by statistical relationships with ecological and intrinsic covariates, including full parameter uncertainty, and by additional stochastic variance not explained by these covariates (Bakker et al. 2009) using Matlab (R2016b. Natick, MA: The MathWorks Inc., 2016).

The population model is a stage + age-based projection matrix with a fledging-time census prior to fledging at ~0.5 years old with classes reflecting the following observed differences in demographic rates (Figure 6).

- Captive-release status: Wild-hatched and captive-reared juveniles were tracked separately for two years as captive-reared juveniles have lower survival for their first two years after release (Bakker et al. 2017).
- Age: Hatch-year birds (0 to 1 year post-fledge, or ~age 0.5 ~age 1.5, N1 in Fig. 1), juveniles (1 to 6 years post-fledge), young adults (6 to 10 years post-fledge), and older adults (>10 years post-fledge) have different survival and reproductive rates.
- Condors start recruiting into the breeder classes at the end of their 4th year. Probability of recruitment, rebreeding, and fledging a chick generally increases with age up through age 11.
- Breeder status: We used data on state-dependent breeding probabilities that allowed separation of recruited breeders into four classes: successful breeders (breeding-age birds that successfully fledged a chick in the previous breeding season), failed breeders (breeding-age birds that attempted but failed to fledge a chick in the previous breeding season), widows (unpaired breeding-age birds whose most recent mate has died), and skippers (breeding-age birds that skipped breeding activities in the previous breeding season, which typically occurs in the year following successful breeding) (e.g., Bakker et al. 2018). Depending on their breeding fate in the previous year, birds have different probabilities of breeding in a given year (e.g., last year's successful breeders and widows have a lower probability of breeding).

Figure 6. Life cycle diagram of the California condor population model used for model simulations to assess impacts from potential wind energy mortalities. As the hatch year (N1) age class is 0.5 -1.5 years, the one-year increments in the model results in age classes being 0.5–1.5 years, 1.5-2.5 years, 3.5-4.5 years, etc. Lines represent transition probabilities based on empirical data (e.g., Bakker et al. 2017).



N = Non-breeder
K = Skipping breeder
W = Widowed breeder
F = Failed breeder
S = Successful breeder
R = Captive Release

Scenarios. Multiple model scenarios were analyzed to explore the range of potential impacts to population growth of the southern condor flock from different levels of simulated wind energy mortalities. Note that the different levels of simulated mortality rates we investigated were not based on actual predictions of wind energy mortalities but instead were intended to assess potential impacts to the future growth of the southern condor flock from a range of wind energy mortality levels. All scenarios simulated wind energy mortalities in the absence of mitigation specifically intended to offset such losses (i.e., additional rearing and releases of captive birds) and included a range of captive release scenarios as detailed below.

Scenarios conservatively assumed wind energy mortalities were breeding age adults and the breeding class of the individuals – successful breeder, failed breeder, widow, or skipper – was selected at random in proportion to the prevalence of each breeding class present in the population at the time of mortality. Chicks are generally dependent on two parents at least until fledging and require extended post-fledgling care (Finkelstein et al. 2015). As such, we conservatively assumed that if a successful breeder was killed at any time throughout the year, their progeny of that year also died.

Model assumptions for all scenarios: We assumed that the effects of USFWS management actions on condor survival and reproduction in the southern California condor flock remained constant throughout the analysis timeframe including the ongoing management of 10 nests.

Wind energy mortality rates (3 scenarios): The analysis included three different levels of wind energy mortalities (i.e., incidental take) of adult condors and their associated young over a 30-year period, starting in year 2025: lower, intermediate, and upper. The mortality rates described below were selected to assess impacts from different levels of simulated wind energy mortality and inform decisions on conservation planning and incidental take permits.

Lower = 4 adult condors taken over 30 years. Because we used a female-only model, this scenario involved removal of 2 females.

Intermediate = 15 adult condos taken over 30 years. Because we used a female-only model, for each year we randomly removed either 7 or 8 females.

Upper = 25 adult condors taken over 30 years. Because we used a female-only model, for each year we randomly removed either 12 or 13 females.

Wind energy mortality timing (3 scenarios): We explored scenarios in which wind energy mortalities occurred at three different time points over a 30-year period. These scenarios all assume that any mortalities would occur in full (see above 'removal rate' scenarios) and do not account for minimization programs at wind energy facilities that could influence the level and timing of when mortalities might actually occur during each scenario. The 'early focus' scenario assumed mortalities occurred mainly within the first 10 years, the 'late focus' scenario assumed mortalities occurred mainly in the last ten years, and the 'even spread' scenario assumed mortalities occurred evenly throughout the 30-year analysis period. For each of these scenarios, we used a probabilistic method that randomized when mortalities occurred across the thirty-year time frame (Table 1).

Table 1. Distribution of removal across the 30-year time frame for three scenarios of wind energy mortality: late focus, in which probability of removal is highest late in the simulation time frame, even spread, in which the probability of removal is distributed across the time frame, and early focus, in which probability of removal is highest early in the simulation time frame.

	Probability of wind energy mortality 5-year (annual)					
Timing of mortalities	Years 1-5	Years 6-10	Years 11-15	Years 16-20	Years 21-25	Years 26-30
Late focus	0.010 (0.002)	0.020 (0.004)	0.030 (0.006)	0.040 (0.008)	0.300 (0.060)	0.600 (0.120)
Even spread	0.167 (0.033)	0.167 (0.033)	0.167 (0.033)	0.167 (0.033)	0.167 (0.033)	0.167 (0.033)
Early focus	0.600 (0.120)	0.300 (0.060)	0.040 (0.008)	0.030 (0.006)	0.020 (0.004)	0.010 (0.002)

Mortality rate. Similar to the CCRR analysis, we considered two scenarios for condor population growth: current growth and previous growth. We simulated previous growth conditions by assuming lead mortality decreased by 50% and other mortality decreased by 25%, which achieved a growth rate comparable to the 'current growth' conditions reported in Bakker and Finkelstein (2020). **Condor population growth for current conditions with no releases is declining ($\lambda < 1$) while condor population growth with previous conditions with no releases is increasing ($\lambda > 1$).**

Captive releases (3 scenarios): We considered three scenarios of annual captive release levels: current, discontinued, and no releases. For all scenarios, individuals were assumed to be 1.5 years of age when released (i.e., 1-year post-fledging). We selected the sex of released individuals based on binomial proportions assuming a mean sex ratio of 0.5.

Current captive release rates: This scenario assumed the release of 12 individuals (i.e., 6 females as model is female-only) into the southern California flock each year for the entire timeframe of model simulations. It is based on the current high rate of releases of captive individuals.

Discontinued releases: This scenario assumed the current release rate of 12 individuals per year for the first 15 years of the simulations and then the cessation of releases starting in year 16. It explores the influence of wind energy mortality if future captive rearing and release efforts cease because the focus of recovery efforts changes, available funding decreases, or some other unknown factor.

No releases: We included a scenario with no releases to bracket results and assess the impact of mortalities on natural demographic processes because the condor population is currently reliant upon captive-bred released birds for population growth (Finkelstein et al. 2012).

Evaluation. To allow time for the model simulations to capture the impacts of removals for the late focus timing, we report results after 40 years, 10 years beyond the 30-year time window for when removals occurred.

Confidence bands for median trajectories were obtained from the medians of 1,000 bootstrapped samples (i.e., resampling from the 40,000 simulated trajectories with replacement) for each year and scenario. Confidence intervals for the percent reduction in evaluation year 2065 were based on 10,000 bootstrapped medians for year 2065 for each scenario.

Summary of results

An important point to consider while evaluating the following results is that the life history strategy for California condors results in a low maximum attainable growth rate (Mertz 1971). Thus, a 'healthy' population will oscillate around a stable or low growth rate and small decreases in population growth can have large consequences for overall population health. In addition, the population's life history dictates that the population is unable to rebound quickly from decreases in adult mortality, especially if the population is declining as we found is the case for the current mortality scenario with no releases.

Wind energy mortality rates. As expected, the higher the number of condors removed from the population due to simulated wind energy mortality, the greater the reduction in 40-year stochastic population growth (λ_{40}, Table 2, Figure 7). In simulations with no releases and current mortality rates, late focus mortality of 4 condors lowered λ_{40} by 0.5 percentage points while late focus mortality of 25 condors lowered λ_{40} by 3.5 percentage points. For scenarios in which the population is growing (reduced mortality scenarios), the lost growth potential in terms of numbers of condors continues to accrue over time beyond the evaluation year of 2060 (Figure 8, d-f).

Wind energy mortality timing. For the reduced mortality scenario, early focus wind energy mortality resulted in both greater numbers of condors lost after 40 years (higher net difference in condors, Table 3, Figure 8) and a greater reduction in stochastic growth rates (λ_{40}, Table 2, Figure 7). In contrast, for the current growth scenario, late focus wind energy mortality had the greatest effect. This occurs because timing of wind energy mortality influences both the relative size of the population from which wind energy mortalities occur and the number of years over which lost growth potential occurs.

Captive release rate. As expected, the higher the release rate, the lower the effect of simulated wind energy mortalities on λ_{40} (Figure 7). In contrast, the net difference in numbers of condors after 40 years was insensitive to release rate (Figure 8). For the current release scenario, 480 individuals were released into the population over the 40-year evaluation window, and for the discontinued releases scenario, which continues the current release rate for 15 years, the number released was 180. With these release rates, the number of condors removed as a result of wind energy mortality is a relatively small proportion of the number added, and the impact of mortalities on λ_{40} is reduced. For example, with the current release rate, late focus wind energy mortality of 25 birds reduces λ_{40} by 0.3 and 0.2 percentage points for current mortality and reduced scenarios, while with no releases, the late focus wind energy mortality of 25 birds reduces λ_{40} by 3.5 and 1.1 percentage points (Table 2, Figure 7).

Probability of extinction. The predicted risk of extinction was ~0 for all current release scenarios and for the reduced mortality discontinued release scenario. Risk remained low (≤0.02) for the current mortality discontinued release scenario and for the reduced mortality no release scenario. However, baseline extinction risk rose to ~7% for the current mortality no release scenario and was as high as 43% for the late focus wind energy mortality of 25 condors. For all scenarios with extinction risk >0, risk was highest for late focus wind energy mortality, because these scenarios remove birds from a declining population, thereby removing a larger fraction of the total population.

Table 2. Reduction in mean stochastic growth rates, expressed as a percentage, over 40 years (λ_{40}) of California condors (condors) in the southern flock in the presence of simulated wind energy mortalities. Shown are results for three wind energy mortality scenarios (lower, intermediate, and upper) and three timing scenarios for wind energy mortalities (late, even, early, see Table 1) as well as three ongoing management release scenarios and two lead mortality rate scenarios. Results shown graphically in Figure 7. Growth rate changes are expressed in percentage points (e.g., a change from 1.022 to 1.020 is 0.002, or 0.2%). All scenarios simulated wind energy mortalities in the absence of mitigation specifically intended to offset such losses (i.e., additional rearing and releases of captive birds).

		Lower removal rate: 4 adult condors			**Intermediate removal rate: 15 adult condors**			**Upper removal rate: 25 adult condors**		
Wind energy mortality timing		*Late*	*Even*	*Early*	*Late*	*Even*	*Early*	*Late*	*Even*	*Early*
Ongoing management release rate	**Mortality rate**									
Current (12 condors annually)	reduced	0.03	0.03	0.04	0.10	0.12	0.14	0.17	0.20	0.23
	current	0.04	0.03	0.03	0.15	0.13	0.11	0.27	0.23	0.19
Discontinued (12 condors annually stopping 2040)	reduced	0.04	0.05	0.06	0.15	0.18	0.21	0.27	0.31	0.35
	current	0.10	0.09	0.07	0.42	0.34	0.27	0.78	0.59	0.47
None	reduced	0.14	0.16	0.17	0.54	0.63	0.72	1.05	1.21	1.39
	current	0.46	0.35	0.31	2.02	1.71	1.35	3.50	3.15	2.65

Table 3. Percent reduction in total population size of California condors (condors) in the southern California flock in the presence of simulated wind energy mortalities as a proportion of population size with no wind energy mortalities in evaluation year 2065. Shown are bootstrapped median percent reduction and 95% confidence intervals (10,000 bootstrap samples) for three wind energy mortality scenarios (low, medium, and high) and three timing scenarios for wind energy mortalities (late, even, early, see Table 1) as well as three ongoing management release scenarios and two lead mortality rate scenarios. Reductions in population size through time for each scenario shown graphically in Figure 8. All scenarios simulated wind energy mortalities in the absence of mitigation specifically intended to offset such losses (i.e., additional rearing and releases of captive birds).

		Lower removal rate: 4 adult condors			**Intermediate removal rate: 15 adult condors**			**Upper removal rate: 25 adult condors**		
Wind energy mortality timing		*Late*	*Even*	*Early*	*Late*	*Even*	*Early*	*Late*	*Even*	*Early*
Ongoing management release rate	**Mortality rate**									
Current (12 condors annually)	reduced	0.6 (1.3, 0)	1.0 (1.6, 0.3)	1.3 (1.9, 0.6)	3.6 (4.2, 2.9)	4.2 (4.8, 3.6)	5.2 (5.8, 4.5)	6.5 (7.1, 5.8)	7.4 (8.1, 6.8)	8.4 (9, 7.8)
	current	1.7 (2.5, 0.9)	1.7 (1.7, 0)	1.7 (2.5, 0.9)	5.9 (6.8, 5.1)	5.1 (5.9, 4.3)	5.1 (5.1, 3.4)	10.2 (11, 9.3)	9.3 (9.3, 7.7)	7.6 (8.5, 6.8)
Discontinued (12 condors annually stopping 2040)	reduced	1.4 (1.9, 0.5)	1.9 (2.8, 1)	2.4 (2.8, 1.4)	5.7 (6.6, 4.8)	6.6 (7.1, 5.7)	7.6 (8.5, 6.7)	9.5 (10.4, 8.6)	10.9 (11.7, 10)	12.8 (13.7, 11.9)
	current	1.8 (3.6, 1.8)	3.6 (3.6, 1.8)	1.8 (3.6, 1.8)	12.7 (14.5, 11.1)	10.9 (10.9, 9.3)	9.1 (9.1, 7.4)	21.8 (21.8, 20.4)	18.2 (20, 18.2)	16.4 (16.4, 14.5)
None	reduced	3.9 (5.2, 3.9)	5.2 (6.5, 3.9)	6.5 (7.7, 5.2)	15.6 (16.9, 14.5)	18.2 (19.5, 17.1)	22.1 (23.4, 21.1)	26.0 (27.3, 25)	31.2 (32.5, 31.2)	37.7 (38.5, 36.4)
	current	11.8 (11.8, 11.8)	11.8 (11.8, 11.8)	11.8 (11.8, 11.8)	47.1 (47.1, 41.2)	41.2 (41.2, 41.2)	35.3 (35.3, 35.3)	76.5 (76.5, 70.6)	64.7 (64.7, 64.7)	58.8 (58.8, 58.8)

Figure 7 (see also Table 2): Change (±95% confidence intervals) in predicted mean stochastic growth rates over 40 years (λ_{40}) (2025 – 2065) of the southern California flock of California condors (condors) in the presence of simulated wind energy mortality. Shown are difference in stochastic growth rates expressed as a percentage (i.e., percentage points) between the no wind energy mortality scenario and three wind energy mortality scenarios (a) 4 adult condors, (b) 15 adult condors, or (c) 25 adult condors. For each, simulations considered three timing scenarios for wind energy mortalities (late, even, early, see Table 1) as well as three ongoing management release scenarios and two lead mortality rate scenarios. All scenarios simulated wind energy mortalities in the absence of mitigation specifically intended to offset such losses (i.e., additional rearing and releases of captive birds). Note difference in Y-axis among panels.

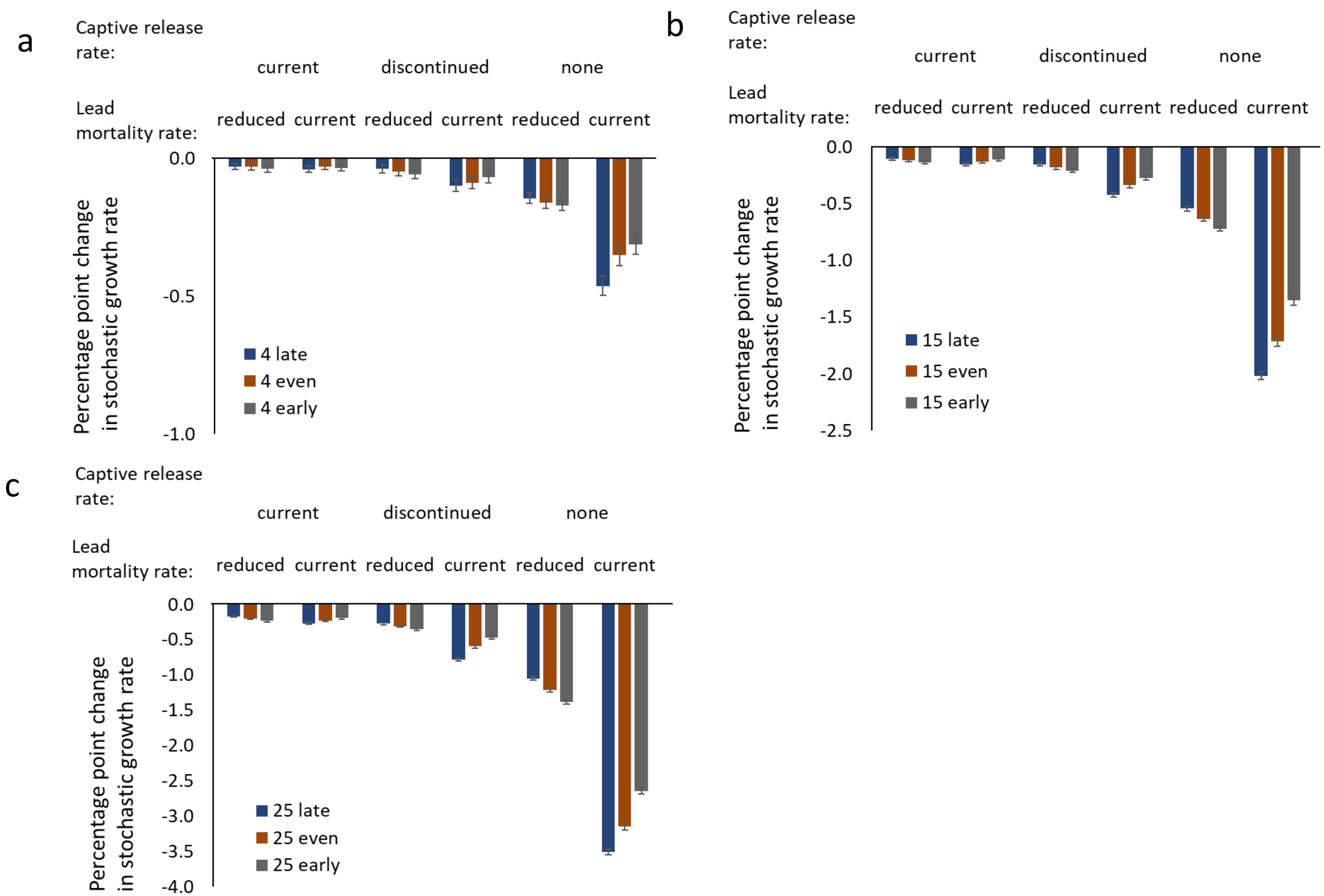


Figure 8. Predicted relative effects of California condor (condor, CACO) mortalities at wind energy facilities in southern California on the population dynamics of the southern California flock. Panels depict the difference in median numbers of total condors through time for lower (4), intermediate (15), and upper (25) wind energy condor mortalities and early, even, and late timing of those mortalities, relative to no mortality, based on 40,000 replicate runs. Top panels (a, b, c) show current lead mortality rate scenario, bottom panels (d, e, f) show the reduced lead and other mortality rate (0.5 and 0.75 times current rate). Columns are grouped by release rate with the first column (a, d) for the current release scenario (12 condors released in southern flock annually), the second column (b, e) for the discontinued release scenario (12 condors released in southern flock annually until 2040, when releases cease), and the final column (c, f) for the no release scenario. Simulated wind energy mortalities start in 2025 and end in 2055 (End analysis year). All results are evaluated 10 years later, in 2065 (Evaluate year). See also Table 3. All scenarios simulated wind energy mortalities in the absence of mitigation specifically intended to offset such losses (i.e., additional rearing and releases of captive birds).

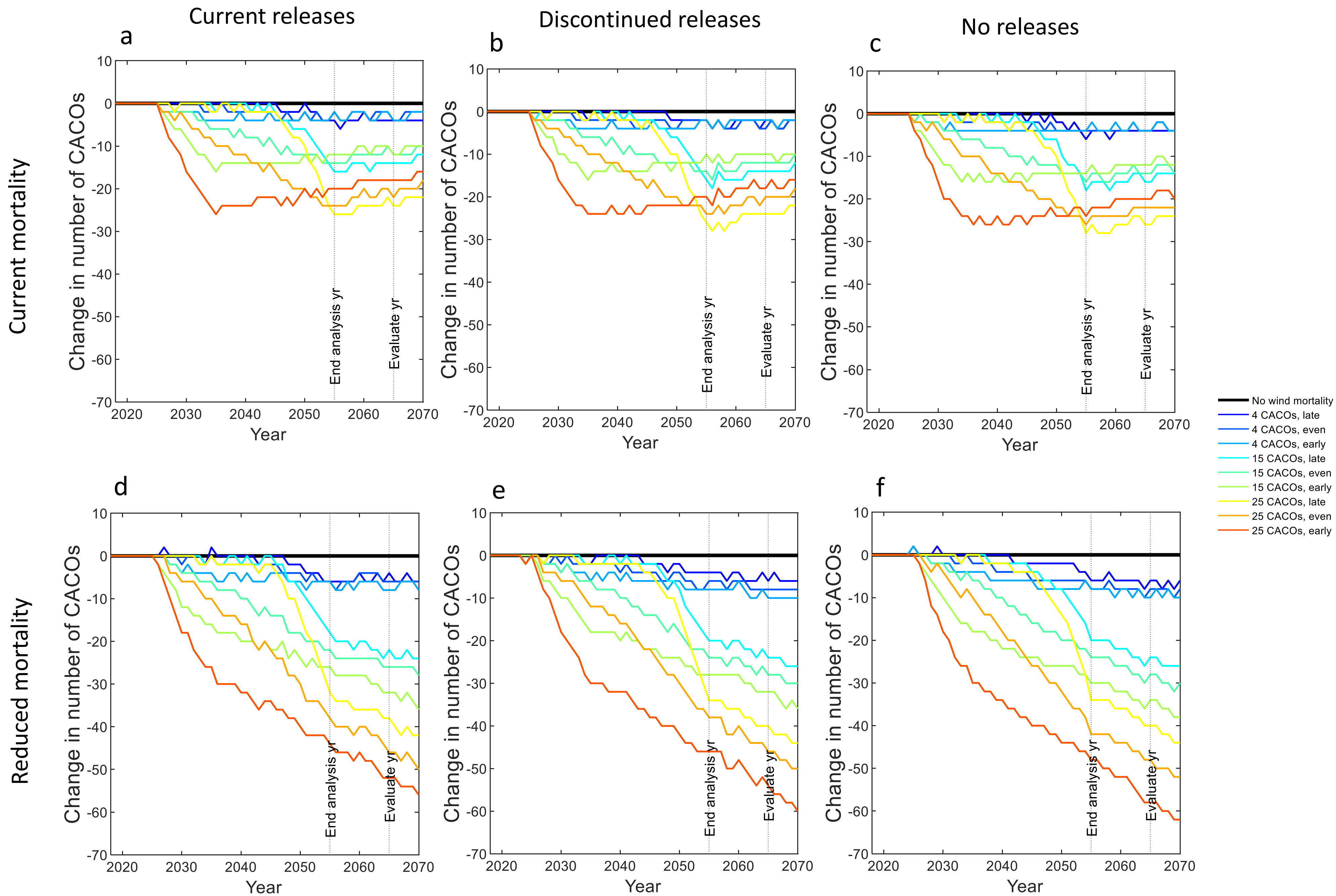
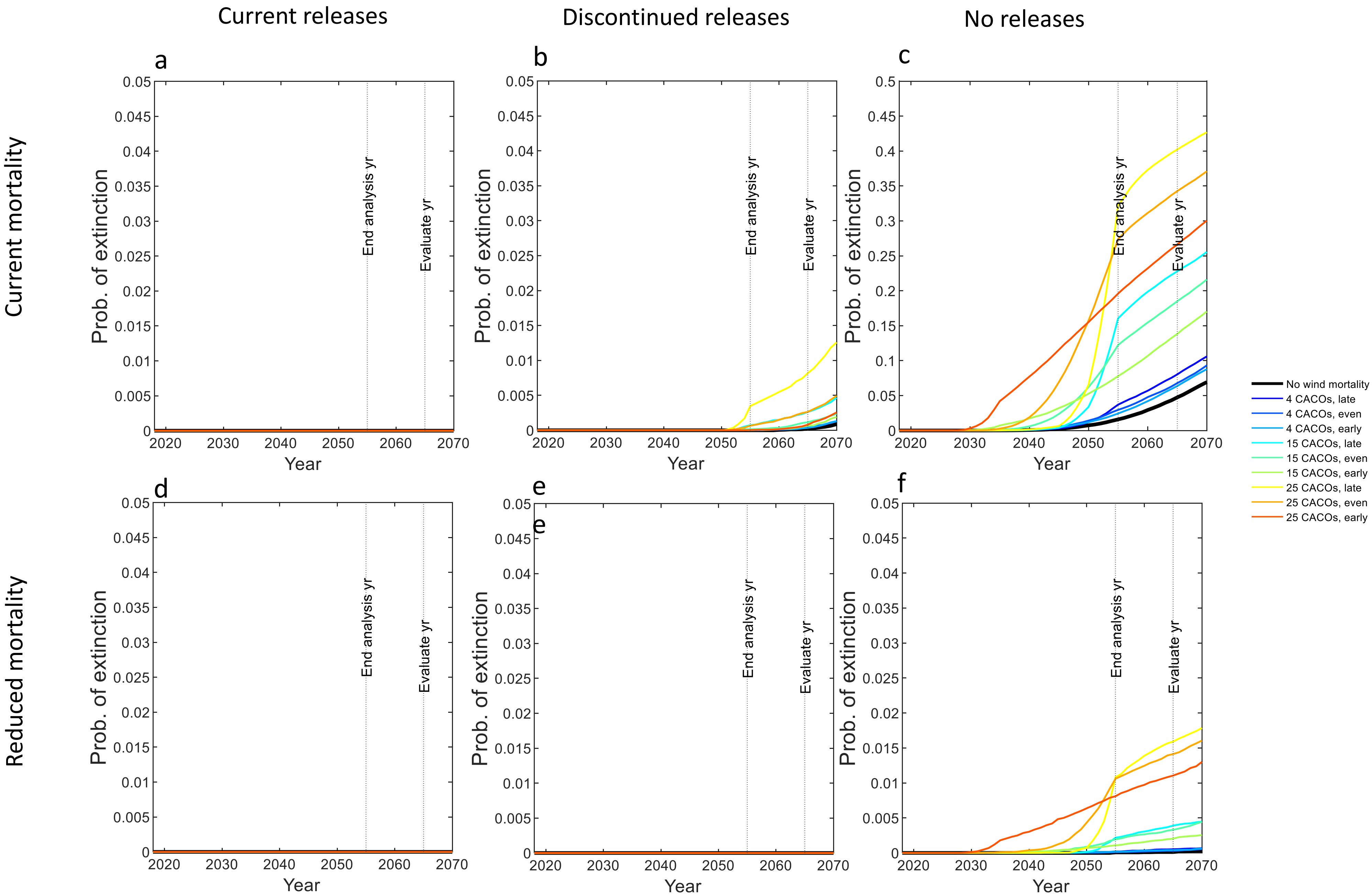

Current releases
Discontinued releases
No releases
Current mortality
Reduced mortality
a
b
c
d
e
f
Change in number of CACOs
Year
End analysis yr
Evaluate yr
No wind mortality
4 CACOs, late
4 CACOs, even
4 CACOs, early
15 CACOs, late
15 CACOs, even
15 CACOs, early
25 CACOs, late
25 CACOs, even
25 CACOs, early

Figure 9. Predicted cumulative risk of extinction the southern flock of California condors (condor, CACO) in the presence of mortalities at wind energy facilities in southern California. Panels depict the proportion of 40,000 replicate runs that are reduced to one male or one female for lower (4), intermediate (15), and upper (25) wind energy mortalities and early, even, and late timing of those mortalities, relative to no mortality. Top panels (a, b, c) show current lead mortality rate scenario, bottom panels (d, e, f) show the reduced lead and other mortality rate (0.5 and 0.75 times current rate). Columns are grouped by release rate with the first column (a, d) for the current release scenario (12 condors released in southern flock annually), the second column (b, e) for the discontinued release scenario (12 condors released in southern flock annually until 2040, when releases cease), and the final column (c, f) for the no release scenario. Simulated wind energy mortalities start in 2025 and end in 2055 (End analysis year). All results are evaluated 10 years later, in 2065 (Evaluate year). All scenarios simulated wind energy mortalities in the absence of mitigation specifically intended to offset such losses (i.e., additional rearing and releases of captive birds).


Current releases
Discontinued releases
No releases
Current mortality
Reduced mortality
a
b
c
d
e
f
Prob. of extinction
Year
End analysis yr
Evaluate yr
No wind mortality
4 CACOs, late
4 CACOs, even
4 CACOs, early
15 CACOs, late
15 CACOs, even
15 CACOs, early
25 CACOs, late
25 CACOs, even
25 CACOs, early

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