Biological Resource Survey
Project Pioneer Track I ECP

Prepared by:

Floyd Hayes, PhD

Aimee Wyrick-Brownworth, MSc

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1.0 REGULATORY SETTING

1.1 SPECIAL STATUS SPECIES

Federal Endangered Species Act

The United States Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) implement the Federal Endangered Species Act (FESA) of 1973 (16 USC Section 1531 et seq.). Threatened and endangered species on the federal list (50 CFR Subsection 17.11, 17.12) are protected from "take" (direct or indirect harm), unless a Section 10 Permit is granted to an individual or a Section 7 consultation and a Biological Opinion with incidental take provisions are rendered to a lead federal agency. Pursuant to the requirements of FESA, an agency reviewing a proposed project within its jurisdiction must determine whether any federally listed species may be present in the project area and determine whether the proposed project would have a potentially significant impact upon such species. Under FESA, habitat loss is considered to be an impact to the species. In addition, the agency is required to determine whether the project is likely to jeopardize the continued existence of any species proposed to be listed under FESA or result in the destruction or adverse modification of critical habitat proposed to be designated for such species (16 USC Section 1536 (3), (4)). Therefore, project-related impacts to these species, or their habitats, would be considered significant and require mitigation. The United States Fish and Wildlife Service (USFWS) also designates species of concern. Species of concern receive attention from federal agencies during environmental review, although they are not otherwise protected under FESA. Project-related impacts to such species would also be considered significant and require mitigation.

California Endangered Species Act

The California Department of Fish and Wildlife (CDFW) implements State regulations pertaining to fish and wildlife and their habitat. The California Endangered Species Act (CESA) of 1970 (California Fish and Game Code Section 2050 et seq., and CCR Title 14, Subsection 670.2, 670.51) prohibits the take (interpreted to mean the direct killing of a species) of species listed under CESA (14 CCR Subsection 670.2, 670.5). A CESA permit must be obtained if a proposed project would result in the take of listed species, either during construction or over the life of the project. Under CESA, CDFW is responsible for maintaining a list of threatened and endangered species designated under state law (California Fish and Game Code 2070). The CDFW also maintains lists of species of special concern, which serve as "watch lists." Pursuant to requirements of CESA, an agency reviewing a proposed project within its jurisdiction must determine whether any state listed species may be present in the project area and determine whether the proposed project would have a potentially significant impact upon such species. Project-related impacts to species on the CESA list would be considered significant and require mitigation.

California Environmental Quality Act (CEQA) Guidelines Section 15380

Although threatened and endangered species are protected by specific federal and state statutes, California Environmental Quality Act (CEQA) Guidelines Section 15380(b) and (d) provide that a species not listed on the federal or state list of protected species may be considered rare or endangered if the species can be shown to meet certain specified criteria. These criteria have been modeled after the definition of FESA and the section of the California Fish and Game Code (CFGC) dealing with rare or endangered plants or animals. This section was included in the guidelines primarily to deal with situations in which a public agency is reviewing a project that may have a significant effect on, for example, a candidate species that has not yet been listed by either the USFWS or CDFW. Thus, CEQA provides the ability to protect a species from potential impacts until the respective government agencies have an opportunity to designate the species as protected, if warranted.

Other

Birds

Most bird species, especially those that are breeding, migrating, or of limited distribution, are protected under federal and state regulations. Under the Migratory Bird Treaty Act of 1918 (16 USC Subsection 703-712), migratory bird species and their nests and eggs are protected from injury or death. Project-related disturbances must be reduced or eliminated during the nesting cycle. CFGC Subsections 3503, 3503.5, and 3800 prohibit the possession, incidental take, or needless destruction of birds, their nests, and eggs. CFGC Section 3511 lists birds that are "fully protected", which identifies those species that may not be taken or possessed except under specific permit.

Plants

The California Native Plant Protection (CNPP) Act of 1977 (California Fish and Game Code Section 1900 et seq.) requires CDFW to establish criteria for determining if a species or variety of native plant is endangered or rare. The California Native Plant Society (CNPS) inventories the native flora of California and ranks species according to rarity; plants with California Rare Plant Rank (CRPR) 1A, 1B, 2A and 2B are considered special status species. CRPR 1A plants are presumed extinct in California, CRPR 1B plants rare or endangered in California and elsewhere, and CRPR 2A plants presumed extirpated in California, but more common elsewhere. CRPR 2B plants are rare, threatened, or endangered in California, but are more common elsewhere. CRPR 3 is a watch list for plants about which more information is needed. CRPR 4 is a watch list for plants of limited distribution.

1.2 SENSITIVE HABITAT TYPES

Sensitive natural communities not discussed above include habitats that fulfill special functions or have special values. Natural communities considered sensitive are those identified in local or

regional plans, policies, regulations, or by the CDFW. CDFW ranks sensitive communities as "threatened" or "very threatened" and keeps records of their occurrences in its California Natural Diversity Database (CNDDB). CNDDB vegetation alliances are ranked 1 through 5 based on NatureServe's (2018) methodology, with those alliances ranked globally (G) or statewide (S) as 1 through 3 considered sensitive. Impacts to sensitive natural communities identified in local or regional plans, policies, or regulations or those identified by the CDFW or U.S. Fish and Wildlife Service (USFWS) must be considered and evaluated under CEQA (CCR Title 14, Div. 6, Chap. 3, Appendix G). The Napa County Baseline Data Report (NCBDR) identifies sensitive Napa County natural communities, discussed further in Section 1.4 below (Napa County 2005).

1.3 WETLANDS AND WATERS OF THE U.S.

Waters of the United States

The United States Army Corps of Engineers (Corps) regulates "Waters of the United States" under Section 404 of the Clean Water Act (CWA). Waters of the United States are defined in the Code of Federal Regulations (CFR) as waters susceptible to use in commerce, including interstate waters and wetlands, all other waters (intrastate waterbodies, including wetlands), and their tributaries (33 CFR 328.3). Potential wetland areas, according to the three criteria used to delineate wetlands as defined in the Corps Wetlands Delineation Manual (Environmental Laboratory 1987), are identified by the presence of (1) hydrophytic vegetation, (2) hydric soils, and (3) wetland hydrology. Areas that are inundated at a sufficient depth and for a sufficient duration to exclude growth of hydrophytic vegetation are subject to Section 404 jurisdiction as "other waters" and are often characterized by an ordinary high water mark (OHWM). Other waters, for example, generally include lakes, rivers, and streams. The placement of fill material into Waters of the United States generally requires an individual or nationwide permit from the Corps under Section 404 of the CWA.

Waters of the State

The term "Waters of the State" is defined by the Porter-Cologne Act as "any surface water or groundwater, including saline waters, within the boundaries of the state." The Regional Water Quality Control Board (RWQCB) protects all waters in its regulatory scope and has special responsibility for wetlands, riparian areas, and headwaters. These waterbodies have high resource value, are vulnerable to filling, and are not systematically protected by other programs. RWQCB jurisdiction includes "isolated" wetlands and waters that may not be regulated by the Corps under Section 404. Waters of the State are regulated by the RWQCB under the State Water Quality Certification Program which regulates discharges of fill and dredged material under Section 401 of the CWA and the Porter-Cologne Water Quality Control Act. Projects that require a Corps permit, or fall under other federal jurisdiction, and have the potential to impact Waters of the State, are required to comply with the terms of the Water Quality Certification determination. If a project does not require a federal permit, but does involve dredge or fill activities that may result in a

discharge to Waters of the State, the RWQCB has the option to regulate the dredge and fill activities under its state authority in the form of Waste Discharge Requirements. The San Francisco Bay RWQCB, which has jurisdiction over projects in the Napa River watershed, recently adopted the General Permit for Vineyard Properties in the Napa River and Sonoma Creek Watersheds to comply with the WDRs for sediment and nutrient discharge from vineyards.

Oak Woodlands Conservation Act

The Oak Woodlands Conservation Act (California State Senate Bill 1334) became law on January 1, 2005 and was added to the CEQA statutes as 21083.4. This act requires that a county must determine whether or not a project would result in a significant impact on oak woodlands. If it is determined that a project may result in a significant impact on oak woodlands, then one or more of the following mitigation measures are required:

1) Conserve oak woodlands through the use of conservation easements;
2) Plant an appropriate number of trees, including maintenance of plantings and replacement of failed plantings;
3) Contribute funds to the Oak Woodlands Conservation Fund for the purpose of purchasing oak woodlands conservation easements; and
4) Other mitigation measures developed by the county.

The conversion of oak woodlands on agricultural land used to produce or process plant and animal products for commercial purposes is exempt from mitigation.

1.4 LOCAL REGULATIONS, GOALS AND POLICIES

Napa County Baseline Data Report

Specific sensitive biological communities are identified in the NCBDR (Napa County 2005). In addition to those biological communities identified by CDFW, the NCBDR also identifies biotic communities of limited distribution that "encompass less than 500 acres of cover within the County and are considered by local biological experts to be worthy of conservation" (Napa County 2005).

Napa County General Plan

Natural resource use in Napa County is regulated by the Napa County General Plan (Napa County, 2008). Below are relevant goals and policies from the General Plan pertaining to wetlands and biological resources in the project area:

Open Space Conservation Policies

Policy CON-1: The County will preserve land for greenbelts, forest, recreation, flood control, adequate water supply, air quality improvement, habitat for fish, wildlife and wildlife movement,

native vegetation, and natural beauty. The County will encourage management of these areas in ways that promote wildlife habitat renewal, diversification, and protection.

Policy CON-2: The County shall identify, improve, and conserve Napa County's agricultural land by:

a) Requiring existing significant vegetation be retained and incorporated into agricultural projects to reduce soil erosion and to retain wildlife habitat. When retention is found to be infeasible, replanting of native or non-invasive vegetation shall be required, and
b) Minimizing pesticide and herbicide use and encourage research and use of Integrated pest control methods such as cultural practices, biological control, host resistance, and other factors.

Policy CON-5: The County shall identify, improve, and conserve Napa County's rangeland through the following measures:

a) Providing a permanent means of preservation of open space areas for rangeland.
b) Encouraging responsible brush removal techniques with adequate environmental safeguards, leaving uncleared islands and peninsulas to provide cover for wildlife.
c) Staging land conversion operations to minimize adverse environmental impact on the watershed.
d) Encouraging livestock management activities to avoid long-term destruction of rangeland productivity and watershed capacity through overgrazing, erosion, or damage to riparian areas.
e) Encouraging replanting of depleted areas to restore rangeland productivity and/or restore native biological resource values.
f) Coordinating rangeland management programs with those of other counties, the State of California, and the federal government in areas where vegetation conversion programs are planned.
g) Protecting trees and shrubs on rangelands for wildlife habitat and aesthetic purposes and encouraging alternate uses of rangelands, such as wildlife and open space, if grazing is phased out.

Natural Resource Goals and Policies

Goal CON-1: The County of Napa will conserve resources by determining the most appropriate use of land, matching land uses and activities to the land's natural suitability, and minimizing conflicts with the natural environment and the agriculture it supports.

Goal CON 2: Maintain and enhance the existing level of biodiversity.

Goal CON-3: Protect the continued presence of special-status species, including special-status plants, special-status wildlife, and their habitats, and comply with all applicable state, federal or local laws or regulations.

Goal CON-4: Conserve, protect, and improve plant, wildlife, and fishery habitats for all native species in Napa County.

Goal CON-5: Protect connectivity and continuous habitat areas for wildlife movement.

Policy CON-10: The County shall conserve and improve fisheries and wildlife habitat in cooperation with governmental agencies, private associations and individuals in Napa County.

Policy CON-11: The County shall maintain and improve fisheries habitat through a variety of appropriate measures, including the following as well as best management practices developed over time.

m) Control sediment production from mines, roads, development projects, agricultural activities, and other potential sediment sources.
n) Implement road construction and maintenance practices to minimize bank failure and sediment delivery to streams.

Policy CON-13: The County shall require that all discretionary residential, commercial, industrial, recreational, agricultural, and water development projects consider and address impacts to wildlife habitat and avoid impacts to fisheries and habitat supporting special-status species to the extent feasible. Where impacts to wildlife and special-status species cannot be avoided, projects shall include effective mitigation measures and management plans including provisions to:

a) Maintain the following essentials for fish and wildlife resources:
    1. Sufficient dissolved oxygen in the water.
    2. Adequate amounts of proper food.
    3. Adequate amounts of feeding, escape, and nesting habitat.
    4. Proper temperature through maintenance and enhancement of streamside vegetation, volume of flows, and velocity of water.
c) Employ supplemental planting and maintenance of grasses, shrubs and trees of like quality and quantity to provide adequate vegetation cover to enhance water quality, minimize sedimentation and soil transport, and provide adequate shelter and food for wildlife and special-status species and maintain the watersheds, especially stream side areas, in good condition.
d) Provide protection for habitat supporting special-status species through buffering or other means.

e) Provide replacement habitat of like quantity and quality on- or off-site for special status species to mitigate impacts to special-status species.
f) Enhance existing habitat values, particularly for special-status species, through restoration and replanting of native plant species as part of discretionary permit review and approval.
g) Require temporary or permanent buffers of adequate size (based on the requirements of the subject special-status species) to avoid nest abandonment by birds and raptors associated with construction and site development activities.
h) Demonstrate compliance with applicable provisions and regulations of recovery plans for federally listed species.

Policy CON-14: To offset possible losses of fishery and riparian habitat due to discretionary development projects, developers shall be responsible for mitigation when avoidance of impacts is determined to be infeasible. Such mitigation measures may include providing and permanently maintaining similar quality and quantity habitat within Napa County, enhancing existing riparian habitat, or paying in-kind funds to an approved fishery and riparian habitat improvement and acquisition fund. Replacement habitat may occur either on- site or at approved off-site locations, but preference shall be given to on-site replacement.

Policy CON-15: The County shall establish and update management plans protecting and enhancing the County's biodiversity and identify threats to biological resources within appropriate evaluation areas, and shall use those plans to create programs to protect and enhance biological resources and to inform mitigation measures resulting from development projects.

Policy CON-16: The County shall require a biological resources evaluation for discretionary projects in areas identified to contain or potentially contain special-status species based upon data provided in the Baseline Data Report (BDR), California Natural Diversity Database (CNDDB), or other technical materials. This evaluation shall be conducted prior to the approval of any earthmoving activities. The County shall also encourage the development of programs to protect special-status species and disseminate updated information to state and federal resource agencies.

Policy CON 17: Preserve and protect native grasslands, serpentine grasslands, mixed serpentine chaparral, and other sensitive biotic communities and habitats of limited distribution. The County, in its discretion, shall require mitigation that results in the following standards:

a) Prevent removal or disturbance of sensitive natural plant communities that contain special-status plant species or provide critical habitat to special-status animal species.
b) In other areas, avoid disturbances to or removal of sensitive natural plant communities and mitigate potentially significant impacts where avoidance is infeasible.
c) Promote protection from overgrazing and other destructive activities.

d) Encourage scientific study and require monitoring and active management where biotic communities and habitats of limited distribution or sensitive natural plant communities are threatened by the spread of invasive non-native species.
e) Require no net loss of sensitive biotic communities and habitats of limited distribution through avoidance, restoration, or replacement where feasible. Where avoidance, restoration, or replacement is not feasible, preserve like habitat at a 2:1 ratio or greater within Napa County to avoid significant cumulative loss of valuable habitats.

Policy CON 18: To reduce impacts on habitat conservation and connectivity:

a) In sensitive domestic water supply drainages where new development is required to retain between 40 and 60 percent of the existing (as of June 16, 1993) vegetation onsite, the vegetation selected for retention should be in areas designed to maximize habitat value and connectivity.
b) Outside of sensitive domestic water supply drainages, streamlined permitting procedures should be instituted for new vineyard projects that voluntarily retain valuable habitat and connectivity, including generous setbacks from streams and buffers around ecologically sensitive areas.
c) Preservation of habitat and connectivity of adequate size, quality, and configuration to support special-status species should be required within the project area. The size of habitat and connectivity to be preserved shall be determined based on the specifics needs of the species.
d) The County shall require discretionary projects to retain movement corridors of adequate size and habitat quality to allow for continued wildlife use based on the needs of the species occupying the habitat.
e) The County shall require new vineyard development to be designed to minimize the reduction of wildlife movement to the maximum extent feasible. In the event the County concludes that such development will have a significant impact on wildlife movement, the County may require the applicant to relocate or remove existing perimeter fencing installed on or after February 16, 2007 to offset the impact caused by the new vineyard development.
f) The County shall disseminate information about impacts that fencing has on wildlife movement in wild land areas of the County and encourage property owners to use permeable fencing.
g) The County shall develop a program to improve and continually update its database of biological information, including identifying threats to wildlife habitat and barriers to wildlife movement.
h) Support public acquisition, conservation easements, in-lieu fees where on-site mitigation is infeasible, and/or other measures to ensure long-term protection of wildlife movement areas.

Policy CON-19: The County shall encourage the preservation of critical habitat areas and habitat connectivity through the use of conservation easements or other methods as well as through continued implementation of the Napa County Conservation Regulations associated with vegetation retention and setbacks from waterways.

Policy CON-20: The County shall monitor biodiversity and habitat connectivity throughout the County and apply appropriate adaptive management practices as necessary to achieve applicable Natural Resources Goals. Changing conditions may include external forces such as changing state or federal requirements, or changes in species diversity, distribution, etc.

Policy CON-21: The County shall initiate and support efforts relating to the identification, quantification, and monitoring of species biodiversity and habitat connectivity throughout Napa County.

Policy CON-22: The County shall encourage the protection and enhancement of natural habitats which provide ecological and other scientific purposes. As areas are identified, they should be delineated on environmental constraints maps so that appropriate steps can be taken to appropriately manage and protect them.

Policy CON-26: Consistent with Napa County's Conservation Regulations, natural vegetation retention areas along perennial and intermittent streams shall vary in width with steepness of the terrain, the nature of the undercover, and type of soil. The design and management of natural vegetation areas shall consider habitat and water quality needs, including the needs of native fish and special status species and flood protection where appropriate. Site-specific setbacks shall be established in coordination with Regional Water Quality Control Boards, California Department of Fish and Game, U.S. Fish and Wildlife Service, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, and other coordinating resource agencies that identify essential stream and stream reaches necessary for the health of populations of native fisheries and other sensitive aquatic organisms within the County's watersheds. Where avoidance of impacts to riparian habitat is infeasible along stream reaches, appropriate measures will be undertaken to ensure that protection, restoration, and enhancement activities will occur within these identified stream reaches that support or could support native fisheries and other sensitive aquatic organisms to ensure a no net loss of aquatic habitat functions and values within the county's watersheds.

Policy CON-27: The County shall enforce compliance and continued implementation of the intermittent and perennial stream setback requirements set forth in existing stream setback regulations, provide education and information regarding the importance of stream setbacks and the active management and enhancement/restoration of native vegetation within setbacks, and develop incentives to encourage greater stream setbacks where appropriate. Incentives shall

include streamlined permitting for certain vineyard proposals on slopes between 5 and 30 percent and flexibility regarding yard and road setbacks for other proposals.

Oak Woodlands Goals and Policies

Goal CON-6: Preserve, sustain, and restore forests, woodlands, and commercial timberland for their economic, environmental, recreation, and open space values.

Policy CON-24: Maintain and improve oak woodland habitat to provide for slope stabilization, soil protection, species diversity, and wildlife habitat through appropriate measures including one or more of the following:

a) Preserve, to the extent feasible, oak trees and other significant vegetation that occur near the heads of drainages or depressions to maintain diversity of vegetation type and wildlife habitat as part of agricultural projects.
b) Comply with the Oak Woodlands Preservation Act (PRC Section 21083.4) regarding oak woodland preservation to conserve the integrity and diversity of oak woodlands, and retain, to the maximum extent feasible, existing oak woodland and chaparral communities and other significant vegetation as part of residential, commercial, and industrial approvals.
c) Provide replacement of lost oak woodlands or preservation of like habitat at a 2:1 ratio when retention of existing vegetation is found to be infeasible. Removal of oak species limited in distribution shall be avoided to the maximum extent feasible.
d) Support hardwood cutting criteria that require retention of adequate stands of oak trees sufficient for wildlife, slope stabilization, soil protection, and soil production be left standing.
e) Maintain, to the extent feasible, a mixture of oak species which is needed to ensure acorn production. Black, canyon, live, and brewer oaks as well as blue, white, scrub, and live oaks are common associations.
f) Encourage and support the County Agricultural Commission's enforcement of state and federal regulations concerning Sudden Oak Death and similar future threats to woodlands.

Policy CON-28: To offset possible additional losses of riparian woodland due to discretionary development projects and conversions, developers shall provide and maintain similar quality and quantity of replacement habitat or in-kind funds to an approved riparian woodland habitat improvement and acquisition fund in Napa County. While on-site replacement is preferred where feasible, replacement habitat may be either on-site or off-site as approved by the County.

Policy CON-30: All public and private projects shall avoid impacts to wetlands to the extent feasible. If avoidance is not feasible, projects shall mitigate impacts to wetlands consistent with state and federal policies providing for no net loss of wetland function.

Water Resources Policies

Policy CON-6: The County shall impose conditions on discretionary projects which limit development in environmentally sensitive areas such as those adjacent to rivers or streamside areas and physically hazardous areas such as floodplains, steep slopes, high fire risk areas and geologically hazardous areas.

Policy CON-42: County shall work to improve and maintain the vitality and health of its watersheds. Specifically, the County shall:

d) Support environmentally sustainable agricultural techniques and best management practices (BMPs) that protect surface water and groundwater quality and quantity (e.g., cover crop management, integrated pest management, informed surface water withdrawals and groundwater use).

Policy CON-45: Protect the County's domestic supply drainages through vegetation preservation and protective buffers to ensure clean and reliable drinking water consistent with state regulations and guidelines. Continue implementation of current Conservation Regulations relevant to these areas, such as vegetation retention requirements, consultation with water purveyors/system owners, implementation of erosion controls to minimize water pollution, and prohibition of detrimental recreational uses.

Policy CON-48: Proposed developments shall implement project-specific sediment and erosion control measures (e.g., erosion control plans and/or storm water pollution prevention plans) that maintain pre-development sediment erosion conditions or at minimum comply with state water quality pollution control (i.e., Basin Plan) requirements and are protective of the County's sensitive domestic supply watersheds. Technical reports and/or erosion control plans that recommend site-specific erosion control measures shall meet the requirements of the County Code and provide detailed information regarding site specific geologic, soil, and hydrologic conditions and how the proposed measure will function.

Napa County Code

Stream and Wetland Setbacks

Napa County Code defines streams and provides setbacks for land clearing for agricultural development. Under Section 18.108.030, a "stream" means any of the following:

1) A watercourse designated by a solid line or dash and three dots symbol on the largest scale of the United State Geological Survey maps most recently published, or any replacement to that symbol;
2) Any watercourse which has a well-defined channel with a depth greater than four feet and banks steeper than 3:1 (horizontal to vertical bank ratio) and contains hydrophilic (i.e.,

water-adapted) vegetation, riparian vegetation or woody vegetation including tree species greater than ten feet in height; or

3) Those watercourses listed in Resolution No. 94-19 and incorporated herein by reference.

Erosion gullies and ravines being repaired with the technical assistance and/or under the direction of the Napa County Resource Conservation District/National Resource Conservation Service, "scour-holes", and other non-linear features are not considered streams.

Napa County Code 18.108.025 applies setbacks for agricultural development adjacent to streams. Setbacks included in the Code range from 35 to 150 feet measured from the top of bank and increase with the slope of the terrain parallel to the top of bank.

Ephemeral or intermittent streams that do not meet the criteria of a stream listed above receive a minimum 35-foot setback.

Pursuant to County Code 18.108.025, all wetlands receive a minimum 50-foot setback.

2.0 PROJECT DESCRIPTION

2.1 PROJECT BACKGROUND

Pacific Union College owns nearly 1600 acres in unincorporated Angwin, Napa County, California. The college has planted nearly 200 acres with oats, annual rye, and other forbs on an annual basis for many decades. Project Pioneer Track I ECP will be used for ag-cropland uses other than oats, etc., which is the subject of an Erosion Control Plan (ECP) from Napa County. These plots are located to the north and south of Howell Mountain Road and are found within the St. Helena 7.5' USGS Quadrangle.

Multiple surveys were completed in spring 2019 to document the biological resources that occur on and adjacent to the three agricultural fields – Stump (PUC07), Parrett-Lower (PUC08) and Belleau (PUC09). Project Pioneer Track I ECP involves the installation of three new vineyard blocks totaling approximately 35.9 net acres within 42.2 gross acres of disturbance (Figure 1).

Associated with the installation of the grape vines will be vineyard avenues, fences, irrigation lines, etc. Site preparation (ripping, installation of erosion control measures, seeding cover crop, and installation of irrigation pipelines and trellis) will occur during the grading window of April 1 through September 1. By September 15, the site will be winterized with placement of straw wattles, seeding of vineyard avenues and planting areas, and straw mulch spread over disturbed areas as required by the Erosion Control Plan (ECP) prepared for the Project.

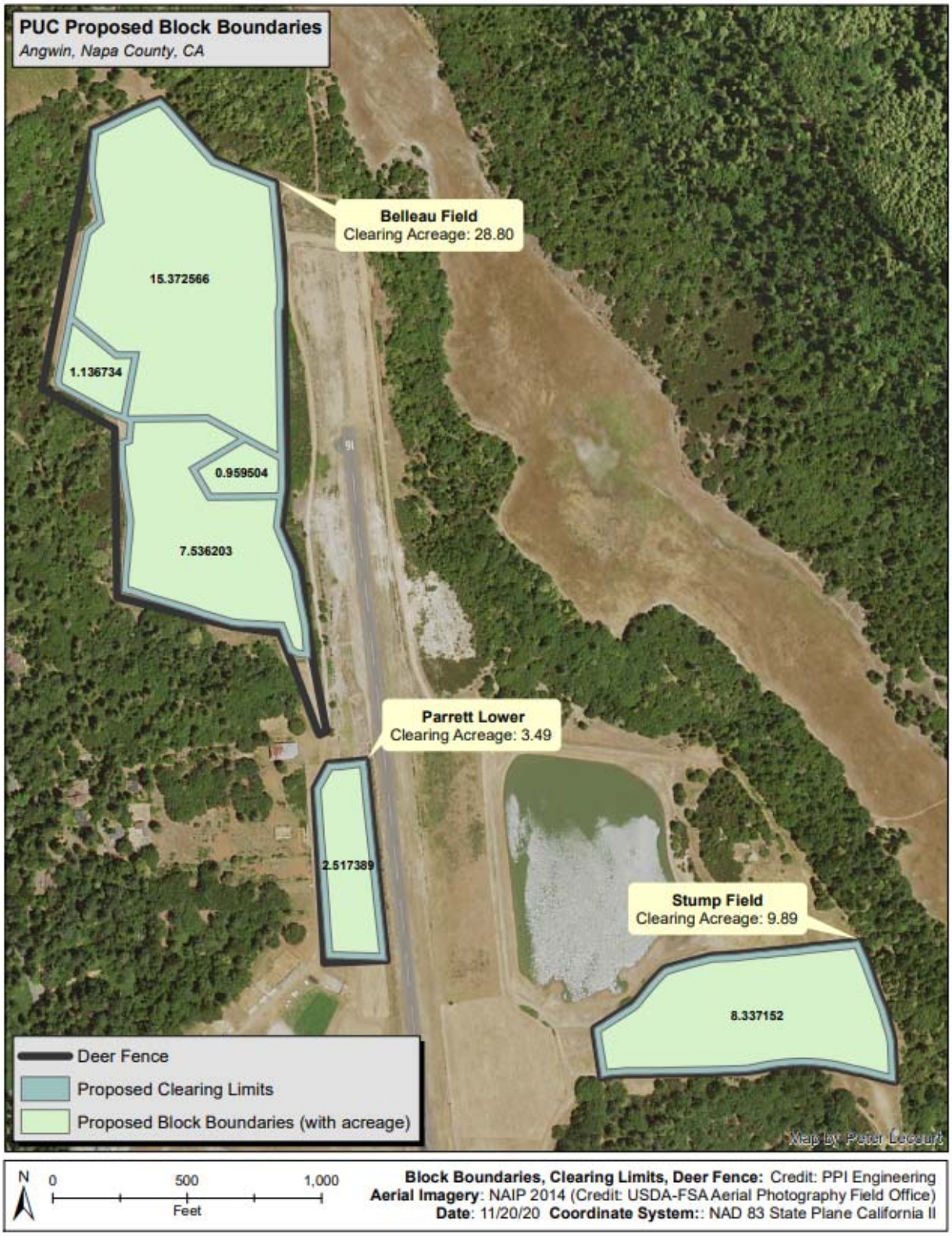

Figure 1. PUC proposed block boundaries. Block 1 (Parrett Lower), Block 2A-D (Belleau Field), and Block 3 (Stump Field)

2.2 REGIONAL TOPOGRAPHY, SOILS, AND CLIMATE

Howell Mountain is located where the Mayacamas and Vaca Mountain Ranges meet and lies northwest of St. Helena, California and the Napa Valley. Howell Mountain is an extinct volcano and much of Angwin sit within the crater that was formed after its final eruption. As such, the area is dominated by volcanic soils (VOLC) and the topography is variable (Figure 2).

Howell Mountain bedrock is dominated by tuff and erosion has formed a native soil with a very high clay content. Perennial flow of Conn Creek is fed by winter and spring rainfall and the Friesen Lakes that are located at the headwaters. Mixed alluvial soils (MIAL) dominate those areas adjacent to Conn Creek. Low-lying areas experience seasonal wetland and ephemeral stream activity.

The highest point on Howell Mountain is just over 2500 feet asl and the lowest areas within the crater are approximately 1750 feet asl. Parrett-Lower, Belleau Field, and Stump Field are uplands. Parrett-Lower has a nearly flat topography (1848 feet asl), Belleau Field has a variable and undulating topography >5-25º (1800-1848 feet asl), and Stump Field has a west-sloping (>5-25º) topography (1848-1900 feet asl). Refer to Figure 1 for the location of these areas.

The Napa Valley experiences a typical Mediterranean climate where winters are cool and wet and summers are hot and dry. Average annual high temperature is 68.6 ºF and average annual low temperature is 45.6 ºF. Howell Mountain and Angwin are frequently influenced by morning coastal fog conditions in the summer and, on occasion, light snowfall occurs during the winter. Average annual precipitation is 40.67 inches (Western Regional Climate Center).

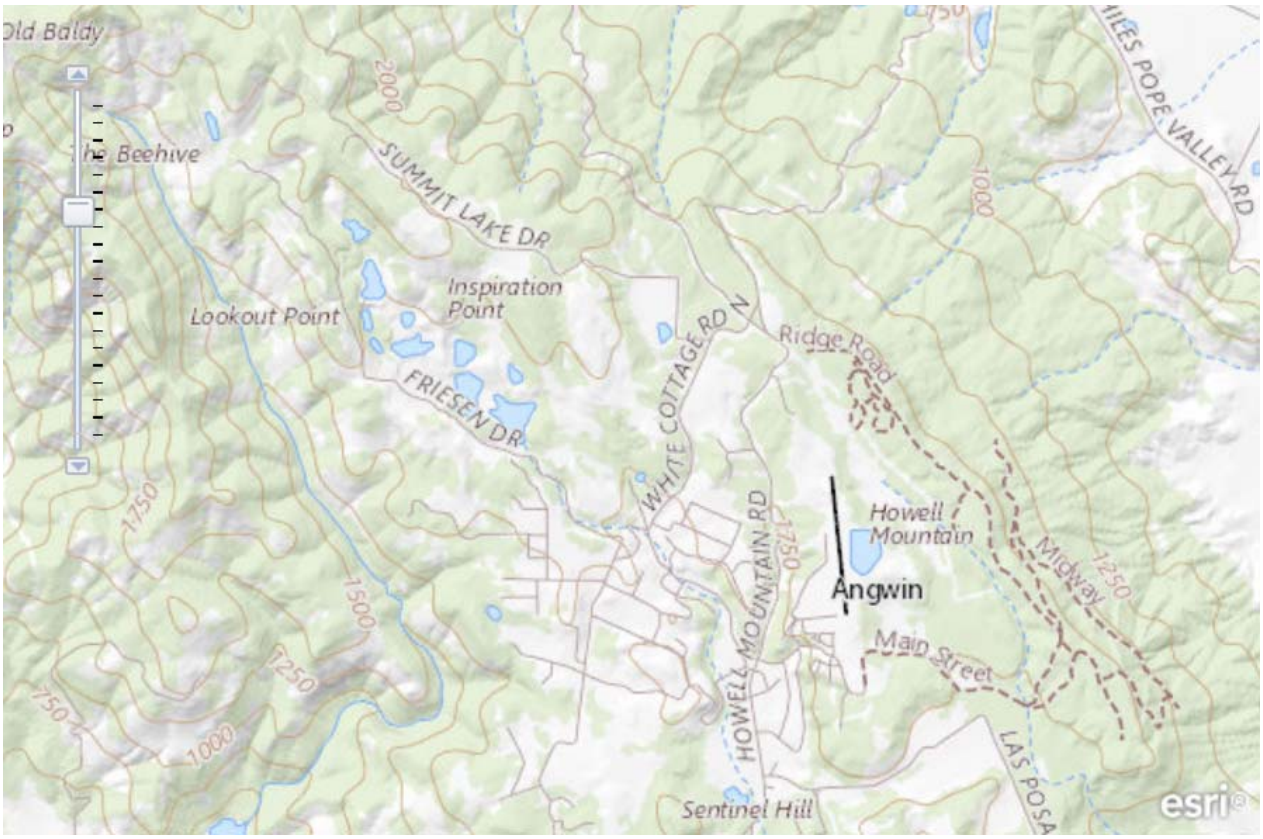

Figure 2. A topographic view of Howell Mountain, Angwin, Napa County, California, as depicted by St. Helena 7.5' USGS Quadrangle.

2.3 BIOLOGICAL SETTING

Project Pioneer Track I ECP and the surrounding Angwin community are atop Howell Mountain. Nearby is the core PUC campus which is developed and includes various campus buildings, staff and student housing, roadways, and airstrip.

Several biotic communities occur in the surrounding intact wildlands. Much of this undisturbed wildland is coniferous forest (Douglas-fir – Ponderosa Pine Alliance 2224) with chaparral/scrub (Evergreen Oak Woodland NFD Super Alliance 1101) at some of the forest edges. With the help of the Land Trust of Napa County (LTNC) nearly 900 acres of these wildlands were recently placed into a conservation easement and work is ongoing to conserve another 200 (contiguous) acres. Approximately 55 acres of agriculture-cropland (Parrett-Lower, Belleau and Stump fields) are the subject of this report which have been planted with oats, annual rye, and other forbs since the 1970s (Table 1, Figure 3).

Table 1. Fields to be used for project. Currently, these fields are planted and harvested for oats and other forage grasses.

Block	Plot Name	Survey Number	Habitat Type	Total Surveyed Acres	Net Acres	Gross Acres	%Impacted by Project
1	Parrett-Lower	PUC08	Ag-cropland	15.4	2.5	3.5	23
2A-D	Belleau	PUC09	Ag-cropland	28.8	25.1	28.8	100
3	Stump	PUC07	Ag-cropland	9.9	8.3	9.9	100


Belleau
28.9 Acres
PUC09
Mill Valley
44.8 Acres
PUC07
Stump Field
9.5 Acres
Parrett - Lower
15.4 Acres
Parrett - Upper
15.8 Acres
PUC08
Window Tree - Upper
26.6 Acres
Brookside
7 Acres
Window Tree - Lower
13 Acres
Field 1
12.6 Acres
Field 2
16.5 Acres
Irrigated - 132.3 Acres
Non-irrigated - 57.8 Acres
N
0
1,000
2,000
Feet

3.0 SURVEY METHODOLOGY

3.1 FLORISTIC SURVEY

Vegetation surveys of all plots were conducted following California Native Plant Society (CNPS) and California Department of Fish and Wildlife (CDFW) protocols and as dictated by the Napa County Planning, Building, and Environmental Services guidelines. The CNPS Manual of California Vegetation (MCV) was used to classify and describe vegetation alliances (Sawyer et al. 2009).

Acreage of each plot can be viewed fully from any nearby and on-the-ground location. Though the vegetation within each plot was very similar throughout, at least two representative areas were assessed and surveyed for most plots on the first visit.

A plot was accessed from its edge and a survey was conducted by up to four people simultaneously walking ≥ 10 meters apart along an unmarked transect line directly into the plot interior. Representative areas were each at least 50 m^2 and when more than one representative area was surveyed within the same plot, these were located far enough away from each other to ensure complete capture of plant diversity there (Table 2). Each person involved in a survey took note of the plant species that were encountered, collecting unknown species for later identification. Individual information was compiled and recorded on a Combined Vegetation Rapid Assessment and Relevé Field Form (original data sheets are on file). Information from a second and, sometimes, a third representative area was compiled on the same datasheet.

Table 2. Areas assessed during the first visit to each plot and the survey dates.

Block	Plot Name	Survey Number	# Representative Areas (≥ 50 m^2)	Date of 1st Survey	Date of 2nd Survey
1	Parrett-Lower	PUC08	2	4/29/19	5/30/19
2A-D	Belleau	PUC09	2	4/30/19	5/30/19
3	Stump	PUC07	2	4/23/19	6/5/19

Due to the consistent distribution of plant species in ag-cropland plots, a single representative area was surveyed for both plots on the second visit.

A vegetation survey was also conducted of the adjacent property within 500 m of each plot. The vegetation adjacent to the agriculture-cropland is dominated by trees and shrubs which are easily identified from a distance and by looking at aerial maps. Intermittent transects were conducted within these forest and chaparral/scrub perimeters to ground-truth woody species and to document herbaceous species not visible from a distance and/or on aerial maps. There is also significant development along the boundaries of PUC08, including farm buildings and structures (some of which are abandoned), horse stables, a recycling center, a junkyard, fencing, and an airport runway.

3.2 VERTEBRATE SURVEY

Vertebrate surveys of the agricultural plots were conducted by slowly walking along accessible portions of the perimeter or interior of each plot and tallying the number of individuals of each species observed or heard within each plot as well as within 100 yards beyond the perimeter of each plot. The time (hr) and distance (mi) of each survey were recorded on a cell phone. Three surveys were conducted for each plot. All surveys were conducted in good weather with clear or mostly clear skies.

Surveys of mammal abundance in the PUC Demonstration and Experimental Forest and in the adjacent Las Posadas State Forest were conducted by setting up motion-activated trail cameras in two habitats: (1) forest interior, > 300 yards from forest edges; and (2) forest edge, including the plots of Window Tree–Upper, Window Tree–Lower, and Mill Valley. The cameras were programmed to take three photos at 1 second intervals whenever an object moved in front of the cameras. The cameras were visited periodically to swap SD cards, the data were downloaded to a laptop computer, and photographs were scrutinized to identify mammals. For each encounter with a mammal we recorded the date and time. Data collection began as a student research project in September 2015. The data provided for this report are summarized through May 2018, comparing the abundance of mammals between forest interior and forest edge habitats based on the number of encounters per 100 camera nights. Yates chi-square values compare abundance between the two habitats (based on proportions of encounters vs number of nights in each habitat) and *P* values test the null hypothesis that abundance is equal between the two habitat types.

Because many of the vertebrates on the campus are secretive and difficult to detect during surveys (e.g., snakes and bats), lists of the vertebrates on the neighboring wildlands were compiled based on observations and specimens deposited in PUC's Donald V. Hemphill Museum of Natural History, mostly by previous professors, students, and collaborators. Virtually all of the vertebrate species on these lists potentially occur within 100 yards of the agricultural plots.

4.0 RESULTS

4.1 SPECIAL STATUS SPECIES

These are plants and animals designated by Federal or State agencies as rare, threatened, or endangered. CNDDB RareFind lists four species that are federally and/or state protected that occur within the St. Helena 7.5' USGS Quadrangle and two that are candidates for listing (Table 3).

Table 3. Federal (FESA) and state (CESA) protected species according to CDFW 2020.

Scientific Name, Common Name	State Rank	CESA	FESA
Astragalus claranus, Clara Hunt's milk-vetch	S1	Threatened	Endangered
Oncorhynchus mykiss irideus pop. 8, Steelhead – central California coast	S2S3	None	Threatened
Rana boylii, foothill yellow-legged frog	S3	Endangered	None
Rana draytonii, California red-legged frog	S2S3	None	Threatened
Haliaeetus leucocephalus, Bald eagle	S3	Endangered	Delisted
Corynorhinus townsendii, Townsend's big-eared bat	S2	None	None

131 plant species that occur in Napa County are listed on the California Native Plant Society (CNPS) Inventory of Rare and Endangered Plants of California as 1B (rare, endangered), 2B (endangered in CA), 3 (needs review) and 4 (uncommon in CA). Of these, 71 species qualify as special-status but only seven are presumed extant within the St. Helena 7.5' USGS Quadrangle, at elevations > 1400 feet asl, and on Howell Mountain (CNDDB RareFind).

Several rare plant species have potential to occur in the area as documented by Calflora and the California Consortium of Herbaria but are not listed by CNDDB RareFind. These include *Antirrhinum virga* (tall snapdragon), *Ceanothus confusus* (Rincon Ridge ceanothus), *Ceanothus divergens* (Calistoga ceanothus), *Ceanothus sonomensis* (Sonoma ceanothus), *Erigeron biolettii* (streamside daisy), *Erigeron greenei* (Greene's narrow-leaved daisy), *Harmonia nutans* (nodding madia), *Leptosiphon jepsonii* (Jepson's leptosiphon), *Lupinus sericatus* (Cobb Mountain lupine), *Navarretia leucocephala* ssp. *bakeri* (Baker's navarretia), and *Trichostema ruygtii* (Napa bluecurls) (Appendix 7.1).

No special-status plant species were encountered within the survey areas. In addition, there are no species with federal or state-level protection found in the study area.

4.2 WETLAND DELINEATION

Wetland delineation followed protocol as defined in the Corps Wetlands Delineation Manual (Environmental Laboratory 1987) and was completed by WRA, Inc. in spring 2019. Parrett-Lower, Belleau, and Stump fields lack perennial streams or seasonal wetland activity. A small ephemeral stream exists on the western edge of Belleau and flows for approximately 0.03 miles (50 meters) downslope from northeast to southwest (Figure 3).

4.3 FLORISTIC SURVEY

Crop and other introduced plants dominate as is expected based on their historical and current use as agriculture-cropland. Percent cover estimates reflect species distribution throughout the plot and are based on the data collected from one or more representative areas within each plot (Table 4). Fields are dominated by planted crops, mostly oats (*Avena sativa*) and perennial rye (*Bromus perennis*), and non-crop and introduced species, mostly wild radish (*Raphanus sativus*) and vetch (*Vicia sativa* and *V. villosa*).

Intact wildlands surrounding the agricultural fields are classified as coniferous forest (Douglas-fir – Ponderosa Pine Alliance 2224) with chaparral/scrub (Evergreen Oak Woodland NFD Super Alliance 1101) at some forest edges. The intact wildlands bordering and within 500 meters of several of the fields is clearly dominated by Douglas fir (*Pseudotsuga menziesii*), Ponderosa pine (*Pinus ponderosa*), and interior live oak (*Quercus wislizeni*) although several crop and introduced species (e.g., *Avena sativa* and *Genista monspessulana*) commonly occur (Table 5).

4.3 VERTEBRATE SURVEY

Survey data are provided in Table 6. The raw data for each survey are provided in Tables 7-9. Lists of all vertebrate species known to occur on Howell Mountain are provided in Appendices 2-5. No special-status vertebrate species were encountered within the survey areas and there were no vertebrate species with federal or state-level protection observed in the study area during the multiple surveys.

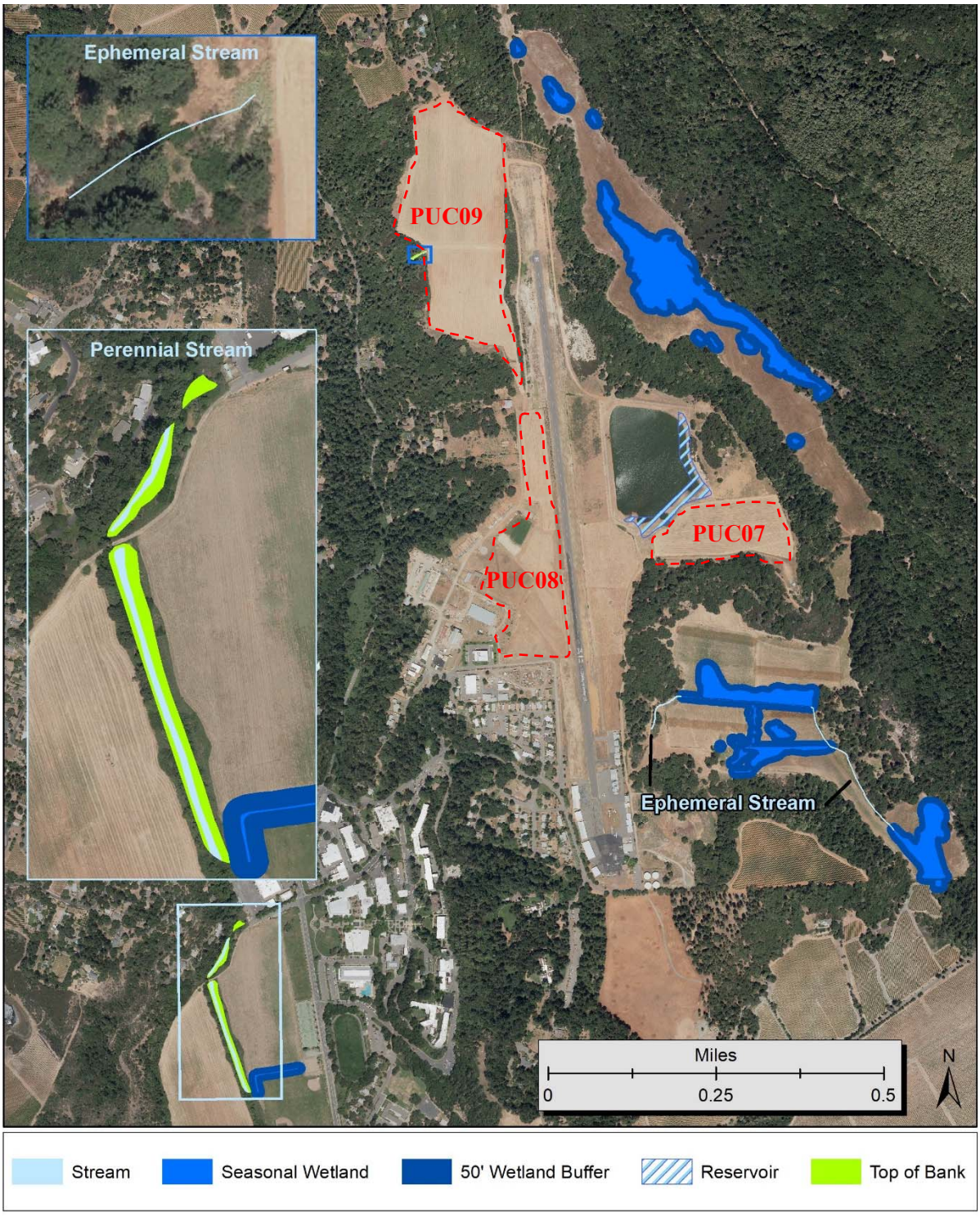

Figure 3. Pacific Union College Waters Mapping, Angwin, Napa County, California. Map created by WRA, Inc. Stump (PUC07), Parrett-Lower (PUC08), and Belleau (PUC09) field perimeters are marked in red and lack perennial streams or seasonal wetland activity.

Table 4. Plant species and % cover of each parcel included in the Project Pioneer Track I ECP. Invasive species listed by California Invasive Plant Council (Cal-IPC) are in red.

	PUC07		PUC08		PUC09		CDFW Listed?	USFWS Listed?
Species	**1st**	**2nd**	**1st**	**2nd**	**1st**	**2nd**	no	no
Agrostis capillaris	<1			1-5			no	no
Amsinckia menziesii	15-25		5-15	5-15	r		no	no
Anthriscus caucalis		1-5		1-5			no	no
Avena sativa	25-50	25-50	25-50	25-50	15-25	25-50	no	no
Brassica rapa		5-15						
Bromus commutatus		1-5		1-5		15-25	no	no
Bromus diandrus	<1		5-15	1-5	1-5	1-5	no	no
Bromus perennis			5-15				no	no
Calindrinia ciliata	1-5							
Carduus pycnocephalus			1-5	1-5			no	no
Centaurea solstitalsis		5-15	1-5			1-5	no	no
Claytonia perfoliata				<1			no	no
Convolvulus arvensis				1-5			no	no
Dactylis glomerata		1-5				1-5	no	no
Dichelostemma congestum						r	no	no
Elymus glaucus				1-5			no	no
Erodium botrys					<1		no	no
Festuca perennis	1-5	1-5		5-15	15-25	1-5	no	no
Geranium dissectum					1-5		no	no
Hordeum murinum	1-5	1-5		15-25		1-5	no	no
Hordeum vulgare	<1	1-5	1-5		<1		no	no
Hypochaeris radicata					<1		no	no
Lupinus bicolor	<1				1-5		no	no
Matricaria discoidea				<1			no	no
Medicago polymorpha				<1	1-5		no	no
Ranunculus muricatus					r		no	no
Raphanus sativus	15-25	5-15		5-15	15-58	5-15	no	no
Spergula arvensis					<1		no	no
Thysanocarpus curvipes			1-5	<1			no	no
Trifolium repens			1-5			1-5	no	no
Vicia sativa	5-15	1-5		1-5	<1		no	no
Vicia tetrasperma					r		no	no
Vicia villosa	1-5			1-5	1-5	<1	no	no

Table 5. Plant species and % cover of each within a 500-meter perimeter of each agriculture-cropland. Perimeter was surveyed only once during the first visit. *PUC08 is entirely surrounded by development and/or other agriculture-croplands. Invasive species listed by California Invasive Plant Council (Cal-IPC) are in red.

Species	PUC07	PUC08*	PUC09	CDFW Listed?	USFWS Listed?
Angelica californica			1-5	no	no
Arbutus menziesii	5-15		5-15	no	no
Arctostaphylos manzanita	25-50			no	no
Baccharis pilularis			1-5	no	no
Genista monspessulana	5-15		1-5	no	no
Hypericum perforatum			1-5	no	no
Notholithocarpus densiflorus			15-25	no	no
Pinus ponderosa	5-15		25-50	no	no
Pseudotsuga menziesii	25-50		15-25	no	no
Quercus kelloggii	1-5		15-25	no	no
Quercus wislizeni	15-25		5-15	no	no
Rubus armeniacus	<1		<1	no	no
Spartium junceum	5-15			no	no
Toxicodendron diversilobum	<1		1-5	no	no

Table 6. Dates for each vertebrate survey and the ranges (min-max) of time (hr) and distance (mi) surveyed for each plot.

Block	Plot Name	Survey Number	Date of 1st Survey	Date of 2nd Survey	Date of 3rd Survey	Hr of Surveys (min-max)	Mi of Surveys (min-max)
1	Parrett-Lower	PUC08	04/23/19	04/25/19	06/02/19	0.25-0.58	0.70-1.80
2A-D	Belleau	PUC09	04/23/19	04/25/19	06/02/19	0.25-0.42	0.40-0.85
3	Stump	PUC07	04/24/19	06/03/19	06/23/19	0.12-0.33	0.25-0.50

Table 7. Vertebrates detected at Stump (PUC07). Species considered invasive by the California Department of Fish and Wildlife (CDFW) are in red.

Species	Vertebrate Group	1st Survey	2nd Survey	3rd Survey	CDFW Listed?	USFWS Listed?
American Bullfrog	Amphibian	1	0	0	no	no
American Wigeon	Bird	3	0	0	no	no
Mallard	Bird	1	7	0	no	no
Bufflehead	Bird	15	0	0	no	no
California Quail	Bird	0	1	0	no	no
Anna's Hummingbird	Bird	1	0	0	no	no
Killdeer	Bird	0	0	2	no	no
Acorn Woodpecker	Bird	1	0	0	no	no
Pileated Woodpecker	Bird	1	0	1	no	no
Pacific-slope Flycatcher	Bird	1	0	0	no	no
California Scrub-Jay	Bird	1	0	0	no	no
American Crow	Bird	1	0	0	no	no
Northern Rough-winged Swallow	Bird	0	0	1	no	no
European Starling	Bird	2	0	0	no	no
Lesser Goldfinch	Bird	30	0	0	no	no
Orange-crowned Warbler	Bird	2	0	0	no	no
Black-throated Gray Warbler	Bird	1	0	0	no	no
Western Tanager	Bird	1	0	0	no	no
Spotted Towhee	Bird	1	1	1	no	no
California Towhee	Bird	1	1	0	no	no
Dark-eyed Junco	Bird	0	1	1	no	no
Black-headed Grosbeak	Bird	1	0	0	no	no
Red-winged Blackbird	Bird	5	0	1	no	no
Bullock's Oriole	Bird	1	0	0	no	no

Table 8. Vertebrates detected at Parrett–Lower (PUC08).

Species	Vertebrate Group	1st Survey	2nd Survey	3rd Survey	CDFW Listed?	USFWS Listed?
Western Fence Lizard	Reptile	3	0	0	no	no
Acorn Woodpecker	Bird	5	5	6	no	no
American Crow	Bird	1	3	7	no	no
American Pipit	Bird	1	0	0	no	no
Bewick's Wren	Bird	0	1	0	no	no
Black-headed Grosbeak	Bird	1	0	0	no	no
Brown-headed Cowbird	Bird	1	0	3	no	no
Bullock's Oriole	Bird	1	0	0	no	no
California Quail	Bird	1	0	1	no	no
California Scrub-Jay	Bird	0	0	1	no	no
California Towhee	Bird	2	0	1	no	no
Cedar Waxwing	Bird	20	0	0	no	no
Cliff Swallow	Bird	5	0	1	no	no
Common Raven	Bird	1	1	0	no	no
Dark-eyed Junco	Bird	0	1	0	no	no
Eurasian Collared-Dove	Bird	4	3	3	no	no
European Starling	Bird	1	1	0	no	no
House Finch	Bird	9	5	2	no	no
House Wren	Bird	2	0	1	no	no
Lesser Goldfinch	Bird	15	11	0	no	no
Mourning Dove	Bird	0	0	6	no	no
Northern Rough-winged Swallow	Bird	5	1	0	no	no
Red-shouldered Hawk	Bird	0	0	1	no	no
Red-winged Blackbird	Bird	20	10	0	no	no
Rock Pigeon	Bird	0	1	0	no	no
Tree Swallow	Bird	10	5	0	no	no
Turkey Vulture	Bird	0	10	0	no	no
Violet-green Swallow	Bird	10	0	0	no	no
Western Bluebird	Bird	0	4	2	no	no
Wilson's Warbler	Bird	1	0	0	no	no

Table 9. Vertebrates detected at Belleau (PUC09).

Species	Vertebrate Group	1st Survey	2nd Survey	3rd Survey	CDFW Listed?	USFWS Listed?
Acorn Woodpecker	Bird	0	2	1	no	no
American Crow	Bird	1	1	1	no	no
Anna's Hummingbird	Bird	1	0	0	no	no
Band-tailed Pigeon	Bird	2	0	0	no	no
Bewick's Wren	Bird	0	2	0	no	no
Blue-gray Gnatcatcher	Bird	1	0	0	no	no
Bullock's Oriole	Bird	1	0	0	no	no
Bushtit	Bird	0	1	0	no	no
California Quail	Bird	12	10	2	no	no
California Scrub-Jay	Bird	0	1	1	no	no
California Towhee	Bird	1	1	0	no	no
Cassin's Vireo	Bird	0	0	1	no	no
Common Raven	Bird	1	0	0	no	no
Dark-eyed Junco	Bird	1	0	0	no	no
House Wren	Bird	0	1	1	no	no
Killdeer	Bird	1	0	0	no	no
Lesser Goldfinch	Bird	0	0	1	no	no
Orange-crowned Warbler	Bird	1	0	0	no	no
Red-winged Blackbird	Bird	5	5	2	no	no
Spotted Towhee	Bird	2	0	1	no	no
Wilson's Warbler	Bird	1	0	0	no	no
Wrentit	Bird	2	0	1	no	no

5.0 ASSESSMENT OF IMPACTS

5.1 WATERS OF THE U.S.

There is a single ephemeral drainage in Belleau field (Figure 2). Appropriate setbacks of 35 feet from this stream will be maintained in compliance with Napa County code to protect water quality. There should be no impact of the project on hydrology or water quality in the area.

5.2 PLANTS

No special-status plants species were encountered within the survey areas. The acreage under consideration is currently under agricultural use and has been used for this purpose for many decades. The nearly 55 acres of Parrett-Lower, Belleau, and Stump fields are dominated by crop and other introduced species. In many cases, common plants are invasive species (e.g., *Carduus pycnocephala* and *Bromus diandrus*) according to Cal-IPC. The existing acreage that is converted to new agricultural use should have minimal effect on the intact neighboring wildlands. Though plant species diversity and abundance in the agriculture-cropland footprint will change under new uses, the impact will be felt primarily on introduced and invasive species which currently dominate this acreage.

5.3 AMPHIBIANS

No special-status amphibian species were encountered within the survey areas. Foothill yellow-legged frogs (*Rana boylii*) occur in riparian areas with at least some shading while California red-legged frogs (*Rana draytonii*) require a variety of habitats both access to permanent aquatic habitats for breeding and areas of downed woody vegetation or leaf litter for protection from predators and dessication. Three native species, the Western Toad (*Anaxyrus boreas*), Pacific Treefrog (*Pseudacris regilla*), and California Newt (*Taricha torosa*), frequently wander through grasslands in search of water, especially during the breeding season (winter and spring), when a significant body of water is required for successful reproduction. These three species are vulnerable to agricultural activities in Stump Field which is adjacent to a pond.

5.4 REPTILES

No special-status reptile species were encountered or even occur within the survey areas. Several Western fence lizards (*Sceloporus occidentalis*) were observed in Parrett-Lower. This is a very common reptile throughout California and inhabits a variety of disturbed and undisturbed habitats. CDFW considers it one of (if not the) most common reptiles in California. One species, the Western Pond Turtle, inhabits freshwater ponds. Because it occasionally wanders between wetlands, it is vulnerable to agricultural activities in Stump Field which is adjacent to a pond.

5.5 BIRDS

No special-status bird species were encountered within the survey areas. Most species of birds encountered during the surveys are permanent breeding residents. However, some species recorded during the surveys and many others potentially occurring but not recorded during the surveys occur

only as migrants or winter residents. Most bird species recorded during the surveys inhabit forest interior or forest edge habitats and will not be significantly impacted by agriculture within the plots. Relatively few native species of birds typically occur in grasslands, and may be impacted by agriculture within the plots, including the following species:

- Canada Goose (common non-breeding migrant and winter resident, with few remaining during the summer, sometimes joined by rarer species of geese)
- Mourning Dove (common breeding permanent resident, nests at forest edge)
- Killdeer (common breeding permanent resident, nests along edges of sewage ponds)
- Great Blue Heron (uncommon non-breeding permanent resident, occasionally forages on rodents in fields)
- Barn Owl (uncommon breeding permanent resident, nests at forest edge)
- White-tailed Kite (uncommon breeding permanent resident, nests at forest edge)
- American Crow (common breeding permanent resident, nests at forest edge)
- Tree Swallow (common breeding permanent resident, nests at forest edge)
- Violet-green Swallow (uncommon breeding permanent resident, nests at forest edge)
- Cliff Swallow (common breeding permanent resident, nests on buildings)
- Barn Swallow (uncommon breeding permanent resident, nests at forest edge)
- Western Bluebird (common breeding permanent resident, nests at forest edge)
- American Pipit (non-breeding migrant and winter resident)
- Lesser Goldfinch (common breeding permanent resident, nests at forest edge)
- Savannah Sparrow (rare breeding permanent residents, nests in grasslands but not recorded during surveys)
- Western Meadowlark (rare breeding permanent residents, nests in grasslands but not recorded during surveys)
- Red-winged Blackbird (common breeding permanent residents, nests in marshy wetlands)
- Brown-headed Cowbird (common breeding permanent residents, brood parasite of other species nesting at forest edge)
- Brewer's Blackbird (common breeding permanent resident, nests at forest edge)

Only three of these species typically nests in grasslands, but two of the species no longer appear to be nesting on the campus (Savannah Sparrow and Western Meadowlark) and one species nests only near standing water (Red-winged Blackbird), therefore it is highly unlikely that agricultural activities will disturb the nesting of any bird species.

5.6 MAMMALS

No special-status mammal species were encountered within the survey areas. Anecdotal evidence shows that coyotes (*Canis latrans*) often forage for rodents in agricultural fields during early morning. Mule deer (*Odocoileus hemionus*) occasionally bed-down in these fields as indicated by areas of compressed vegetation observed during the floristic survey of PUC09. Though it is possible that Townsend's big-eared bat (*Corynorhinus townsendii*) occurs on Howell Mountain, the agriculture-cropland surveyed does not provide the cover or roosting sites required by this species.

5.7 WILDLIFE MOVEMENT CORRIDORS

The proposed project areas are adjacent to existing developed areas and are historically cultivated. Assuming no new roads are constructed and that any newly installed fencing allows for continued passage of small and large vertebrates, the wildlife corridors that currently exist will remain intact and wildlife movement should not be significantly impacted.

6.0 RECOMMENDATIONS

Any conversion of Parrett-Lower, Belleau, and Stump fields to agricultural use different than what is currently present should use methods to minimize soil erosion. This will be addressed via the implementation of an engineered Erosion Control Plan that meets Napa County standards for no-net-increase in soil loss and runoff. Any irrigation system/s installed should be highly efficient to minimize depletion of the aquifer and to reduce potential soil erosion.

Appropriate setbacks of 35 feet from the ephemeral stream present in Belleau field must be maintained in compliance with Napa County code to protect water quality.

Treatment and care of the crop should avoid use of toxic herbicides and pesticides that may contaminate surface runoff and ground water and poison non-target species. This can be done by following Integrated Pest Management guidelines whenever possible.

Throughout the project initiation and implementation, special care should be given to minimize the disturbance of soils and ground cover litter associated with any nearby shrubs and trees as these provide important resources for native vertebrates.

The cutting down of trees in the intact forest edges should be kept to a minimum though when it must occur, we recommend that tree/vegetation removal and initial ground disturbance occur from August 16 to January 31, outside of the general bird nesting season. If tree/vegetation removal during this time is not feasible, a pre-construction nesting bird survey should be performed by a qualified biologist no more than 14 days prior to the initiation of tree removal or ground disturbance is recommended. The survey should cover the project area (including any tree removal areas) and surrounding areas within 500 feet. If active bird nests are found during the survey, an appropriate no disturbance buffer should be established by the qualified biologist. Once it is determined that the young have fledged (left the nest) or the nest otherwise becomes inactive (e.g., due to predation), the buffer may be lifted and work may be initiated within the buffer.

Currently there are no standing trees or appropriate bat habitat within the designated fields though should it be necessary, tree removal should be performed from September through March, outside of the general bat maternity season. If tree removal during this period is not feasible, it is recommended that a bat habitat assessment and survey effort (the latter if needed) be performed by a qualified biologist no more than 14 days prior to tree removal to determine if bats are present in the trees. If no suitable roosting habitat for bats is found, then no further study is warranted. If special-status bat species or bat maternity roosts are detected, then roost trees should avoided until the end of the maternity roosting season. If this avoidance is not feasible, appropriate species- and roost-specific mitigation measures should be developed in consultation with CDFW. Irrespective

of time of year, all felled trees should remain on the ground for at least 24 hours prior to chipping, off-site removal, or other processing to allow any bats present within the felled trees to escape. New fence installation should be avoided but if fences are necessary, construction should allow animals to jump over and crawl under easily without injury. Fencing should also be highly visible to both deer and birds. A wildlife-friendly fence should also include occasional openings (passes) for other animals that are unable to crawl under or jump over fences.

7.0 APPENDIX

Appendix 7.1 List of the special-status plants with the potential to occur in the survey area based on occurrence data recorded by CNPS Inventory of Rare and Endangered Plants of California, Consortium of California Herbaria (CCH1), and Calflora. Species listed on CNDDB RareFind are shown in red.

Scientific Name Common Name	Rare Plant Rank (CNPS)	State Rank	CDFW Listed?	USFWS Listed?	Habitat	Blooming Time	Last Recorded Observation on Howell Mountain (CalFlora and CCH1)	2019 Survey Occurrence
Amorpha californica var. *napensis* Napa false indigo	1B.2	S2	No	No	Broadleafed upland forest (openings), Chaparral, Cismontane woodland	Apr-Jul	2016	none
Antirrhinum virga tall snapdragon	4	S3	No	No	Chaparral, lower montane coniferous forest	Jun-Jul	1893	none
Brodiaea leptandra narrow-anthered brodiaea	1B.2	S3	No	No	Broadleafed upland forest (openings), Chaparral, Cismontane woodland	May-Jul	2004	none
Ceanothus confusus Rincon Ridge ceanothus	1B.1	S1	No	No	Closed-cone coniferous forest, Chaparral, Cismontane woodland	Feb-Jun	never	none
Ceanothus divergens Calistoga ceanothus	1B.2	S2	No	No	Chaparral (serpentinite or volcanic, rocky)	Feb-Apr	1964	none
Ceanothus purpureus holly-leaved ceanothus	1B.2	S2	No	No	Chaparral, Cismontane woodland	Feb-Jun	1904	none
Ceanothus sonomensis Sonoma ceanothus	1B.2	S2	No	No	Chaparral (sandy, serpentinite or volcanic)	Feb-Apr	never	none
Erigeron biolettii Streamside daisy	3	S3	No	No	Broadleafed upland forest, Cismontane woodland, North Coast coniferous forest	Jun-Oct	1978	none
Erigeron greenei Greene's narrow-leaved daisy	1B.2	S3	No	No	Chaparral (serpentinite or volcanic)	May-Sep	never	none
Harmonia nutans Nodding madia	4.3	S3	No	No	Chaparral, Cismontane woodland	Mar-May	2013	none
Hesperolinon bicarpellatum two-carpellate western flax	1B.2	S2	No	No	Chaparral (serpentinite)	May-Jul	1933	none
Layia septentrionalis Colusa layia	1B.2	S2	No	No	Chaparral, Cismontane woodland, Valley and foothill grassland	Apr-May	1897	none
Leptosiphon jepsonii Jepson's leptosiphon	1B.2	S2S3	No	No	Chaparral, Cismontane woodland, Valley and foothill grassland	Mar-May	never	none
Lupinus sericatus Cobb Mountain lupine	1B.2	S2?	No	No	Broadleafed upland forest, Chaparral, Cismontane woodland, Lower montane coniferous forest	Mar-Jun	1933	none
Navarretia leucocephala ssp. *bakeri* Baker's navarretia	1B.1	S2	No	No	Cismontane woodland, Lower montane coniferous forest, Meadows and seeps, Valley and foothill grassland, Vernal pools	Apr-Jul	never	none
Penstemon newberryi var. *sonomensis* Sonoma beardtongue	1B.3	S2	No	No	Chaparral	Apr-Aug	never	none
Streptanthus hesperidis green jewelflower	1B.2	S2	No	No	Chaparral (openings), Cismontane woodland	May-Jul	2007	none
Trichostema ruygtii Napa bluecurls	1B.2	S1S2	No	No	Chaparral, Cismontane woodland, Lower montane coniferous forest, Valley and foothill grassland, Vernal pools	Jun-Oct	1991	none

Appendix 7.2 List of amphibian species known to occur on Howell Mountain. Species observed during the surveys completed for Parrett-Lower, Belleau, and Stump fields are indicated with bold type.

= introduced

ANURA
Bufonidae
    Western Toad (*Anaxyrus boreas*)
Hylidae
    Pacific Treefrog (*Pseudacris regilla*)
Ranidae
    American Bullfrog (*Lithobates catesbeianus*)#

CAUDATA
Dicamptodontidae
    California Giant Salamander (*Dicamptodon ensatus*)
Plethodontidae
    Arboreal Salamander (*Aneides lugubris*)
    California Slender Salamander (*Batrachoseps attenuatus*)
    Ensatina (*Ensatina eschscholtzii*)
Salamandridae
    California Newt (*Taricha torosa*)

Appendix 7.3 List of reptile species known to occur on Howell Mountain. Species observed during the surveys for this study are indicated with bold type.

TESTUDINES
Emydidae
    Western Pond Turtle (*Actinemys marmorata*)

SQUAMATA
Colubridae
    Common Sharp-tailed Snake (*Contia tenuis*)
    Ring-necked Snake (*Diadophis punctatus*)
    California Kingsnake (*Lampropeltis californiae*)
    Gophersnake (*Pituophis catenifer*)
Viperidae
    Western Rattlesnake (*Crotalus oreganus*)
Anguidae
    Northern Alligator Lizard (*Elgaria coerulea*)
    Southern Alligator Lizard (*Elgaria multicarinata*)
Phrynosomatidae
    Western Fence Lizard (*Sceloporus occidentalis*)
Scincidae
    Western Skink (*Plestiodon skiltonianus*)

Appendix 7.4 List of bird species known to occur on Howell Mountain. Species observed during the surveys for this study are indicated with bold type.

ABUNDANCE CODES

YR	Year round resident
SR	Summer resident
WR	Winter resident
YV	Year round visitor
WV	Winter visitor
SM	Spring migrant
FM	Fall migrant
RM	Rare migrant
R	Rare
A	Accidental
*	Current or previous nesters
**	Suspected but unconfirmed nesters

DEFINITIONS

Resident = readily observed on college property in its preferred habitat
Visitor = within its normal range but is observed only occasionally
Migrant = usually observed only during migration
Rare = unusual sighting of a bird species
Accidental = strayed out of its normal range and will most likely not be seen again

ANSERIFORMES

Anatidae

- Snow Goose (*Anser caerulescens*) R
- Ross's Goose (*Anser rossii*) R
- Greater White-fronted Goose (*Anser albifrons*) R
- Cackling Goose (*Branta hutchinsii*) R
- Canada Goose (*Branta canadensis*) WR
- Tundra Swan (*Cygnus columbianus*) R
- Wood Duck (*Aix sponsa*) YR
- Blue-winged Teal (*Spatula discors*) A
- Cinnamon Teal (*Spatula cyanoptera*) R
- Northern Shoveler (*Spatula clypeata*) WR
- Gadwall (*Mareca strepera*) R
- Eurasian Wigeon (*Mareca penelope*) WV
- American Wigeon (*Mareca americana*) WR
- Mallard (*Anas platyrhynchos*) YR*
- Northern Pintail (*Anas acuta*) WV
- Green-winged Teal (*Anas crecca*) WR
- Canvasback (*Aythya valisineria*) R
- Ring-necked Duck (*Aythya collaris*) WV
- Greater Scaup (*Aythya marila*) A
- Lesser Scaup (*Aythya affinis*) R

Bufflehead (*Bucephala albeola*) WR
Common Goldeneye (*Bucephala clangula*) R
Barrow's Goldeneye (*Bucephala islandica*) A
Common Merganser (*Mergus merganser*) EM
Ruddy Duck (*Oxyura jamaicensis*) WR

GALLIFORMES
Odontophoridae
Mountain Quail (*Oreortyx pictus*) R
California Quail (*Callipepla californica*) YR*
Phasianidae
Wild Turkey (*Meleagris gallopavo*) YV

PODICIPEDIFORMES
Podicipedidae
Pied-billed Grebe (*Podilymbus podiceps*) YV
Horned Grebe (*Podiceps auritus*) WV
Eared Grebe (*Podiceps nigricollis*) WV
Clark's Grebe (*Aechmophorus clarkii*) R

COLUMBIFORMES
Columbidae
Rock Pigeon (*Columba livia*) YR*
Band-tailed Pigeon (*Patagioenas fasciata*) YV
Eurasian Collared-Dove (*Streptopelia decaocto*) YR**
Mourning Dove (*Zenaida macroura*) YR**

APODIFORMES
Apodidae
Vaux's Swift (*Chaetura vauxi*) A
White-throated Swift (*Aeronautes saxatalis*) A
Trochilidae
Anna's Hummingbird (*Calypte anna*) YR**
Costa's Hummingbird (*Calypte costae*) A
Rufous Hummingbird (*Selasphorus rufus*) SM
Allen's Hummingbird (*Selasphorus sasin*) SR
Calliope Hummingbird (*Selasphorus calliope*) A

GRUIFORMES
Rallidae
Virginia Rail (*Rallus limicola*) R
Sora (*Porzana carolina*) R
American Coot (*Fulica americana*) YV

CHARADRIIFORMES
Recurvirostridae
Black-necked Stilt (*Himantopus mexicanus*) A
American Avocet (*Recurvirostra americana*) A
Charadriidae
Pacific Golden-Plover (*Pluvialis fulva*) A
Semipalmated Plover (*Charadrius semipalmatus*) A
Killdeer (*Charadrius vociferous*) YR*
Scolopacidae
Baird's Sandpiper (*Calidris bairdii*) FM
Least Sandpiper (*Calidris minutilla*) WV
Western Sandpiper (*Calidris mauri*) FM
Long-billed Dowitcher (*Limnodromus scolopaceus*) FM
Wilson's Snipe (*Gallinago delicate*) WR
Spotted Sandpiper (*Actitis macularius*) SR*
Solitary Sandpiper (*Tringa solitaria*) SM
Lesser Yellowlegs (*Tringa flavipes*) FM
Greater Yellowlegs (*Tringa melanoleuca*) WV
Wilson's Phalarope (*Phalaropus tricolor*) FM
Red-necked Phalarope (*Phalaropus lobatus*) FM
Red Phalarope (*Phalaropus fulicarius*) A
Laridae
Bonaparte's Gull (*Chroicocephalus philadelphia*) WV
Mew Gull (*Larus canus*) R
Caspian Tern (*Hydroprogne caspia*) A

SULIFORMES
Phalacrocoracidae
Double-crested Cormorant (*Phalacrocorax auritus*) YV

PELECANIFORMES
Pelecanidae
American White Pelican (*Pelecanus erythrorhynchos*) R
Ardeidae
Great Blue Heron (*Ardea herodias*) YR
Great Egret (*Ardea alba*) YR
Cattle Egret (*Bubulcus ibis*) A
Green Heron (*Butorides virescens*) R

CATHARTIFORMES
Cathartidae
Turkey Vulture (*Cathartes aura*) YR

ACCIPITRIFORMES
Pandionidae
Osprey (*Pandion haliaetus*) R
Accipitridae
White-tailed Kite (*Elanus leucurus*) YV*
Golden Eagle (*Aquila chrysaetos*) R
Northern Harrier (*Circus hudsonius*) RM
Sharp-shinned Hawk (*Accipiter striatus*) SR
Cooper's Hawk (*Accipiter cooperii*) YR**
Bald Eagle (*Haliaeetus leucocephalus*) A
Red-shouldered Hawk (*Buteo lineatus*) YR*
Red-tailed Hawk (*Buteo jamaicensis*) YR**
Ferruginous Hawk (*Buteo regalis*) R

STRIGIFORMES
Tytonidae
Barn Owl (*Tyto alba*) YR**
Strigidae
Western Screech-Owl (*Megascops kennicottii*) YR**
Great Horned Owl (*Bubo virginianus*) YR**
Northern Pygmy-Owl (*Glaucidium gnoma*) YR**
Spotted Owl (*Strix occidentalis*) YR**

CORACIIFORMES
Alcedinidae
Belted Kingfisher (*Megaceryle alcyon*) YR**

PICIFORMES
Picidae
Acorn Woodpecker (*Melanerpes formicivorus*) YR*
Williamson's Sapsucker (*Sphyrapicus thyroideus*) A
Red-breasted Sapsucker (*Sphyrapicus ruber*) WR
Downy Woodpecker (*Dryobates pubescens*) YR**
Nuttall's Woodpecker (*Dryobates nuttallii*) YR**
Hairy Woodpecker (*Dryobates villosus*) YR*
Northern Flicker (*Colaptes auratus*) YR**
Pileated Woodpecker (*Dryocopus pileatus*) YR**

FALCONIFORMES
Falconidae
American Kestrel (*Falco sparverius*) YR**
Merlin (*Falco columbarius*) WV
Peregrine Falcon (*Falco peregrinus*) YV

PASSERIFORMES
Tyrannidae
Ash-throated Flycatcher (*Myiarchus cinerascens*) SR**
Western Kingbird (*Tyrannus verticalis*) SR**
Olive-sided Flycatcher (*Contopus cooperi*) SR
Western Wood-Pewee (*Contopus sordidulus*) SR*
Willow Flycatcher (*Empidonax traillii*) FM
Gray Flycatcher (*Empidonax wrightii*) A
Pacific-slope Flycatcher (*Empidonax difficilis*) SR*
Black Phoebe (*Sayornis nigricans*) YR*
Say's Phoebe (*Sayornis saya*) YV
Vireonidae
Hutton's Vireo (*Vireo huttoni*) SR**
Cassin's Vireo (*Vireo cassinii*) SR**
Warbling Vireo (*Vireo gilvus*) SR*
Corvidae
Steller's Jay (*Cyanocitta stelleri*) YR*
California Scrub-Jay (*Aphelocoma californica*) YR*
Clark's Nutcracker (*Nucifraga columbiana*) A
American Crow (*Corvus brachyrhynchos*) YR*
Common Raven (*Corvus corax*) YR**
Hirundinidae
Purple Martin (*Progne subis*) R*
Tree Swallow (*Tachycineta bicolor*) SR*
Violet-green Swallow (*Tachycineta thalassina*) SR**
Northern Rough-winged Swallow (*Stelgidopteryx serripennis*) SR*
Cliff Swallow (*Petrochelidon pyrrhonota*) SR*
Barn Swallow (*Hirundo rustica*) SR*
Paridae
Mountain Chickadee (*Poecile gambeli*) A
Chestnut-backed Chickadee (*Poecile rufescens*) YR*
Oak Titmouse (*Baeolophus inornatus*) YR**
Aegithalidae
Bushtit (*Psaltriparus minimus*) YR**
Sittidae
Red-breasted Nuthatch (*Sitta canadensis*) YR**
White-breasted Nuthatch (*Sitta carolinensis*) YR**
Pygmy Nuthatch (*Sitta pygmaea*) YR*
Certhiidae
Brown Creeper (*Certhia americana*) YR*
Troglodytidae
House Wren (*Troglodytes aedon*) SR**
Pacific Wren (*Troglodytes pacificus*) WR
Bewick's Wren (*Troglodytes hiemalis*) YR**
Polioptilidae
Blue-gray Gnatcatcher (*Polioptila caerulea*) YR**

Cinclidae
American Dipper (*Cinclus mexicanus*) A
Regulidae
Golden-crowned Kinglet (*Regulus satrapa*) WV
Ruby-crowned Kinglet (*Regulus calendula*) WR
Sylviidae
Wrentit (*Chamaea fasciata*) YR**
Turdidae
Western Bluebird (*Sialia mexicana*) YR*
Townsend's Solitaire (*Myadestes townsendi*) A
Swainson's Thrush (*Catharus ustulatus*) R
Hermit Thrush (*Catharus guttatus*) YR**
American Robin (*Turdus migratorius*) YR*
Varied Thrush (*Ixoreus naevius*) WR
Mimidae
California Thrasher (*Toxostoma redivivum*) R**
Northern Mockingbird (*Mimus polyglottos*) YR**
Sturnidae
European Starling (*Sturnus vulgaris*) YR*
Bombycillidae
Bohemian Waxwing (*Bombycilla garrulous*) A
Cedar Waxwing (*Bombycilla cedrorum*) YV
Ptilogonatidae
Phainopepla (*Phainopepla nitens*) A
Passeridae
House Sparrow (*Passer domesticus*) YR
Motacillidae
American Pipit (*Anthus rubescens*) WR
Fringillidae
Evening Grosbeak (*Coccothraustes vespertinus*) R
House Finch (*Haemorhous mexicanus*) YR*
Purple Finch (*Haemorhous purpureus*) YR
Red Crossbill (*Loxia curvirostra*) R
Pine Siskin (*Spinus pinus*) WV
Lesser Goldfinch (*Spinus psaltria*) YR**
Lawrence's Goldfinch (*Spinus lawrencei*) R
American Goldfinch (*Spinus tristis*) WV
Passerellidae
Spotted Towhee (*Pipilo maculatus*) YR*
California Towhee (*Melozone crissalis*) YR*
American Tree Sparrow (*Spizelloides arborea*) A
Chipping Sparrow (*Spizella passerina*) R
Lark Sparrow (*Chondestes grammacus*) YV
Savannah Sparrow (*Passerculus sandwichensis*) YR**
Fox Sparrow (*Passerella iliaca*) WR
Song Sparrow (*Melospiza melodia*) YR**

Lincoln's Sparrow (*Melospiza lincolnii*) FM, SM
White-throated Sparrow (*Zonotrichia albicollis*) WR
Harris' Sparrow (*Zonotrichia querula*) A
White-crowned Sparrow (*Zonotrichia leucophrys*) WR
Golden-crowned Sparrow (*Zonotrichia atricapilla*) WR
Dark-eyed Junco (*Junco hyemalis*) YR*

Icteriidae
Yellow-breasted Chat (*Icteria virens*) R

Icteridae
Western Meadowlark (*Sturnella neglecta*) YR**
Bullock's Oriole (*Icterus bullockii*) SR*
Red-winged Blackbird (*Agelaius phoeniceus*) YR*
Tricolored Blackbird (*Agelaius tricolor*) WV
Brown-headed Cowbird (*Molothrus ater*) YR
Brewer's Blackbird (*Euphagus cyanocephalus*) YR*

Parulidae
Orange-crowned Warbler (*Oreothlypis celata*) SR*
Nashville Warbler (*Oreothlypis ruficapilla*) A
MacGillivray's Warbler (*Geothlypis tolmiei*) FM
Common Yellowthroat (*Geothlypis trichas*) WV
Yellow Warbler (*Setophaga petechia*) FM
Yellow-rumped Warbler (*Setophaga coronata*) WR
Black-throated Gray Warbler (*Setophaga nigrescens*) YR*
Townsend's Warbler (*Setophaga townsendi*) WV
Hermit Warbler (*Setophaga occidentalis*) YR**
Wilson's Warbler (*Cardellina pusilla*) SR**

Cardinalidae
Western Tanager (*Piranga ludoviciana*) SR**
Black-headed Grosbeak (*Pheucticus melanocephalus*) SR*
Lazuli Bunting (*Passerina amoena*) SR**

Appendix 7.5 List of mammal species known to occur on Howell Mountain. Species observed during the surveys for this study are indicated with bold type.

= Introduced

DIDELPHIMORPHIA
Didelphidae
Virginia Opossum (*Didelphis virginiana*)#

LAGOMORPHA
Leporidae
Black-tailed Jackrabbit (*Lepus californicus*)
Brush Rabbit (*Sylvilagus bachmani*)

SORICOMORPHA
Soricidae
Ornate Shrew (*Sorex ornatus*)
Trowbridge's Shrew (*Sorex trowbridgii*)
Talpidae
American Shrew Mole (*Neurotrichus gibbsii*)
Broad-footed Mole (*Scapanus latimanus*)

CHIROPTERA
Molossidae
Brazilian Free-tailed Bat (*Tadarida brasiliensis*)
Vespertilionidae
Pallid Bat (*Antrozous pallidus*)
Big Brown Bat (*Eptesicus fuscus*)
Silver-haired Bat (*Lasionycteris noctivagans*)
Western Red Bat (*Lasiurus blossevillii*)
Hoary Bat (*Lasiurus cinereus*)
California Myotis (*Myotis californicus*)
Long-eared Myotis (*Myotis evotis*)
Fringed Myotis (*Myotis thysanodes*)
Long-legged Myotis (*Myotis volans*)

CARNIVORA
Canidae
Coyote (*Canis latrans*)
Common Gray Fox (*Urocyon cinereoargenteus*)
Felidae
Bobcat (*Lynx rufus*)
Mountain Lion (*Puma concolor*)
Mephitidae
Striped Skunk (*Mephitis mephitis*)

Mustelidae
    Northern River Otter (*Lontra canadensis*)
    Long-tailed Weasel (*Mustela frenata*)
Procyonidae
    Northern Raccoon (*Procyon lotor*)
Ursidae
    American Black Bear (*Ursus americanus*)

ARTIODACTYLA
Cervidae
    Mule Deer (*Odocoileus hemionus*)
Suidae
    Feral Pig (*Sus scrofa*)#

RODENTIA
Cricetidae
    California Vole (*Microtus californicus*)
    Dusky-footed Woodrat (*Neotoma fuscipes*)
    Common Muskrat (*Ondatra zibethicus*)
    Brush Deermouse (*Peromyscus boylii*)
    North American Deermouse (*Peromyscus maniculatus*)
    Piñon Deermouse (*Peromyscus truei*)
    Western Harvest Mouse (*Reithrodontomys megalotis*)
Geomyidae
    Botta's Pocket Gopher (*Thomomys bottae*)
Heteromyidae
    Heermann's Kangaroo Rat (*Dipodomys heermanni*)
Muridae
    House Mouse (*Mus musculus*)#
    Black Rat (*Rattus rattus*)#
Sciuridae
    California Ground Squirrel (*Otospermophilus beecheyi*)
    Western Gray Squirrel (*Sciurus griseus*)
    Sonoma Chipmunk (*Tamias sonomae*)

Appendix 7.6 Author Qualifications

Floyd E. Hayes, Ph.D., is a Professor of Biology at Pacific Union College in Angwin, Napa County, California. Dr. Hayes is a zoologist specializing in the ecology, behavior and biogeography of birds, but has also studied a diversity of other critters including cnidarians, echinoderms, crustaceans, amphibians, fishes, reptiles and mammals. He has published data from field research in 14 countries in North America, Central America, the Caribbean, South America and tropical Pacific islands. While an undergraduate student, Dr. Hayes took off a year to teach in an elementary school on the island of Kosrae in Micronesia. He worked for three years as a vertebrate biologist for the US Peace Corps, based in the National Museum of Natural History of Paraguay. He also taught biology for nine years at Caribbean Union College (now University of the Southern Caribbean) and the University of the West Indies in Trinidad and Tobago, and spent a year working as a wildlife biologist for the Division of Fish and Wildlife in St. Thomas, US Virgin Islands. Dr. Hayes has been teaching biology and environmental studies at Pacific Union College since 2004 and has been studying the breeding biology of grebes on Clear Lake with students since 2010. Dr. Hayes served as the editor-in-chief of Journal of Caribbean Ornithology from 2005-2014.

Aimee C. Wyrick-Brownworth, MSc, is Chair and Associate Professor of Biology at Pacific Union College in Angwin, Napa County, California. Aimee earned an MSc in Organismal Biology and Ecology from the University of Montana where she studied the effects of introduced trout on native amphibians. Since coming to PUC in 2004 she has worked on a variety of restoration and research projects focusing on introduced, invasive, and rare plant species in the Napa Valley. Most recently she has initiated research to study salamander ecology on the wildlands surrounding the PUC campus. Aimee teaches undergraduate courses in conservation biology, plant taxonomy, and geology and is also responsible for the PUC Herbarium collection. Aimee is a member of the California Native Plant Society and has worked with the CNPS on a campus Rare Plant Treasure Hunt, annual plant sale and Martha Walker Native Garden projects in Napa.

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