COVERED PLANT SPECIES INVENTORY OF PRESERVE SYSTEM ACQUISITIONS, EAST CONTRA COSTA COUNTY HABITAT CONSERVANCY, CONTRA COSTA COUNTY, CALIFORNIA

DECEMBER 2015

Prepared for

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Section 1. INTRODUCTION

The purpose of this report is to present the results of surveys conducted by Nomad Ecology (Nomad) in 2015 for select covered[1] and no-take[2] plant species on East Contra Costa County Habitat Conservancy (Conservancy) preserve system acquisition properties (Figure 1). This report includes a description of the methods used; an assessment of population health based on HCP/NCCP reporting requirements for all populations observed; photographs; and recommendations for management.

During the course of these surveys, populations of three covered plant species were observed within acquisition properties: Mount Diablo fairy-lantern (*Calochortus pulchellus*) and shining navarretia (*Navarrettia nigelliformis* subsp. *radians*[3]). In addition, non-covered but special status plant species including hogwallow starfish (*Hesperevax caulescens;* CRPR 4.2) and oval-leaved viburnum (*Viburnum ellipticum*, CRPR 2B.3) were also observed within acquisition properties.

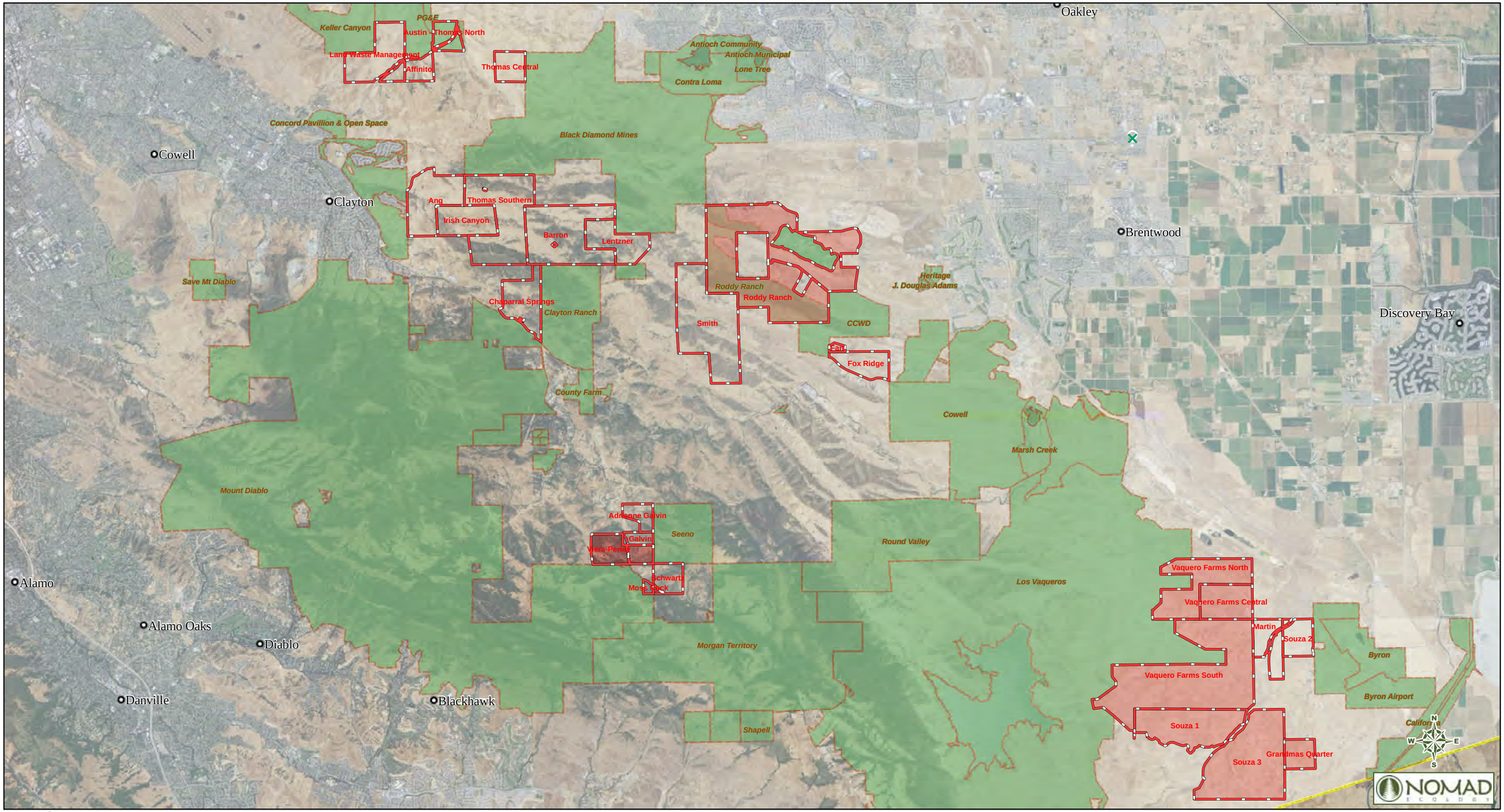
1.1. HCP/NCCP BACKGROUND

The Conservancy is the implementing entity of the East Contra Costa County Habitat Conservation Plan/Natural Community Conservation Plan, referred to herein as the "HCP/NCCP" or "Plan" (Jones & Stokes 2006). The purpose of this Plan is to protect and enhance ecological diversity and function within the rapidly urbanizing region of eastern Contra Costa County (County). To that end, the Plan describes how to avoid, minimize, and mitigate, to the maximum extent practicable, impacts on covered species and their habitats, wetlands, and other sensitive communities while allowing for the growth of selected regions of the County. The Plan also describes the responsibilities associated with operating and maintaining the new preserves created to mitigate for the anticipated impacts. The Plan includes conservation measures to protect 11 covered and 6 no-take plant species (Table 1).

[1] Covered species are plants proposed for coverage for which the plan provides for their conservation and management, and for which take authorization may be required during the term of the HCP/NCCP.

[2] No-take species are plants for which take is not authorized under the Natural Community Conservation Plan Act.

[3] The species *Navarretia nigelliformis* subsp. *nigelliformis* is no longer considered to occur within Contra Costa County based on specimen annotations at the UC and Jepson Herbaria at the University of California Berkeley as well as the opinions of experts in the genus. This taxon is now recognized as *Navarretia nigelliformis* subsp. *radians.* This change is discussed in more detail in a separate memo (Nomad 2015).



December 2015

2015 Covered Plant Inventory

Legend

- Acquisition Parcels
- Parcels Surveyed in 2015
- Public Land and Easements
- County Boundaries

Figure 1

Preserve Acquisitions

Surveyed in 2015

East Contra Costa County

Habitat Conservancy

1:95,040

0 0.75 1.5

Miles

East Contra Costa County Habitat Conservancy

Sources: NAIP 2009; Contra Costa County. Projection: NAD 83 UTM Zone 10 North.

Contra Costa County, California

Table 1. Covered and No-Take Plant Species of the HCP/NCCP

SPECIES NAME	COMMON NAME
COVERED SPECIES	
Arctostaphylos auriculata	Mount Diablo manzanita
Atriplex depressa	brittlescale
Blepharizonia plumosa	big tarplant
California macrophylla	round-leaved filaree
Calochortus pulchellus	Mount Diablo fairy lantern
Delphinium recurvatum	recurved larkspur
Extriplex joaquinana	San Joaquin spearscale
Helianthella castanea	Diablo helianthella
Hesperolinon breweri	Brewer's dwarf flax
Madia radiata	showy madia
Navarretia nigelliformis subsp. *nigelliformis*[4]	adobe/shining navarretia
NO-TAKE SPECIES	
Amsinckia grandiflora	large-flowered fiddleneck
Astragalus tener var. *tener*	alkali milk-vetch
Eriogonum truncatum	Mount Diablo buckwheat
Eschscholzia rhombipetala	diamond-petaled poppy
Lasthenia conjugens	Contra Costa goldfields
Tropidocarpum capparideum	caper-fruited tropidocarpum

Conservation Strategy

As a component of the HCP/NCCP a conservation strategy, designed to achieve biological goals and objectives, was developed for each natural community and the covered species that each natural community supports. The conservation strategy was implemented to protect and recover listed covered species in the inventory area, and to help avoid the listing of non-listed covered species by protecting and, where appropriate, enhancing their populations. The conservation strategy is a program of conservation measures that, when implemented in concert, will achieve the biological goals and objectives of the Plan. Goals are broad, guiding principles based on the conservation needs of the resources. Biological objectives are expressed as conservation targets or actions. Objectives are measurable and achievable within a given time frame; they clearly state a desired result and will collectively achieve the biological goals (Jones & Stokes 2006).

The goals and objectives related to plan species of the HCP/NCCP are listed below. Based on these goals and objectives the Conservancy must ensure that an adequate number of populations of covered plants are included in the Preserve System. In order to meet these goals and objectives conducting baseline inventories of acquired properties is a crucial step of Plan implementation. After acquisitions are secured, baseline data will be used as a reference point from which to begin to measure Plan success by measuring the number of covered and no-take plant populations preserved.

[4] See footnote 3 above.

Goals and Objectives

Goals and objectives related to covered plant species of the HCP/NCCP include the following:

- Goal 9: Protect populations of adobe navarretia within wetlands
    - Objective 9.1: Identify, protect, and maintain populations of **adobe navarretia** in the inventory area
- Goal 17: Protect in the Preserve System at least 11 unprotected occurrences of grassland-dependent covered plants
    - Objective 17.1: Protect populations of covered plants that are at least as large and healthy[5] as populations lost to covered activities.
    - Objective 17.2: Protect at least **two** occurrences[6] of **brittlescale** outside currently protected public lands
    - Objective 17.3: Protect at least **three** occurrences of **big tarplant** outside currently protected public lands
    - Objective 17.4: Protect at least **two** occurrences of **recurved larkspur** outside currently protected public lands
    - Objective 17.5: Protect at least **two** occurrences of **round-leaved filaree** outside currently protected public lands
- Goal 18: Enhance populations of grassland-dependent covered plants
    - Objective 18.1: Increase population size and distribution of grassland-dependent covered plants, where feasible and biologically desirable.
- Goal 23: Protect populations of showy madia within oak woodland and grassland.
    - Objective 23.1: Identify and maintain or increase populations of **showy madia** in the inventory area
- Goal 27: Protect in the Preserve System at least eight occurrences of chaparral-dependent covered plants
    - Objective 27.1: Protect populations of covered plants that are at least as large and as healthy as populations lost to covered activities
    - Objective 27.2: Protect at least **two** occurrences of **Mt. Diablo manzanita** outside currently protected public lands
    - Objective 27.3: Protect at least **two** occurrences of **Diablo helianthella** outside currently protected public lands
    - Objective 27.4: Protect at least **three** occurrences of **Brewer's dwarf flax** outside currently protected public lands

[5] A healthy population of covered plants is defined as one that has a stable or increasing population growth rate or has a high potential to increase in size with improved management.

[6] A plant occurrence is defined in the same way that an element occurrence is defined by the California Department of Fish and Wildlife CDFW: a location record of a plant in the CNDDB that is a population or group of populations within 0.25 mile and not separated by significant habitat discontinuities.

- Objective 27.5: Protect at least **one** occurrence of **Mount Diablo fairy lantern** outside currently protected public lands

Section 2. STUDY METHODS

2.1. DATA RESOURCES

Background information on potentially occurring endangered, threatened or rare plants, and sensitive natural communities was compiled through a review of the following resources:

U.S. Fish and Wildlife Service (USFWS):

- Endangered and Threatened Wildlife and Plants (USFWS 2014)
- Federal Endangered and Threatened Species that Occur in or may be Affected by Projects in Contra Costa County (USFWS 2015)

California Department of Fish and Wildlife (CDFW):

- State and Federally Listed Endangered, Threatened and Rare Plants of California (CDFW 2015a)
- Special Vascular Plants, Bryophytes, Lichens List (CDFW 2015b)
- California Natural Diversity Database (CNDDB) (CDFW 2015c)
- List of California Vegetation Alliances. The Vegetation Classification and Mapping Program (CDFG 2010)

Other Sources:

- The Jepson Manual: Vascular Plants of California (Baldwin et al. 2012)
- The California Native Plant Society's Inventory of Rare and Endangered Plants of California (CNPS 2001, 2015)
- Consortium of California Herbaria (CCH 2015)
- East Contra Costa County Habitat Conservation Plan and Natural Community Conservation Plan (Jones & Stokes 2006)
- Annotated Checklist of the East Bay Flora, Second Edition (CNPS 2013)
- Unusual and Significant Plants of Alameda and Contra Costa Counties. Eighth Edition (Lake 2010)
- Flowering Plants and Ferns of Mount Diablo, California (Ertter and Bowerman 2002)

Botanical taxonomy and nomenclature conform to *The Jepson Manual* (Baldwin et al. 2012) and recent circumscriptions in the *Jepson eFlora* (JFP 2015). Common names of plant species are derived from *The Calflora Database* (Calflora 2015). Nomenclature for special-status plant species conform to the *Inventory of Rare and Endangered Plants of California* (CNPS 2001, 2015) and *Special Vascular Plants, Bryophytes and Lichens List* (CDFW 2015b).

2.2. SURVEY METHODOLOGY

2.2.1 PERSONNEL AND FIELD INVESTIGATIONS

The following personnel directed and conducted botanical surveys and/or report preparation:

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Covered and no-take plant species surveys were conducted by Nomad senior botanist Heath Bartosh (HB) and botanists Erin McDermott (EM), Brian Peterson (BP), and Gregg Weber (GW) during the months of March, April, and June 2015 (Table 2).

Table 2. 2015 Survey Effort Details for Covered Plant Species

SURVEY TIMING		LOCATION	TARGETS	PERSONNEL
MONTH	DAY(S)			
March	17	Grandmas Quarter Souza 1 Souza 3 Vaquero Farms North Vaquero Farms South	large flowered fiddleneck alkali-milk vetch round-leaved filaree diamond petaled poppy recurved larkspur showy madia shining navarretia caper-fruited tropidocarpum	HB, EM, BP
March	23	Roddy Ranch	large flowered fiddleneck alkali-milk vetch round-leaved filaree diamond petaled poppy recurved larkspur showy madia shining navarretia caper-fruited tropidocarpum	HB, BP
March	25	Vaquero Farms Central	large flowered fiddleneck alkali-milk vetch round-leaved filaree diamond petaled poppy recurved larkspur showy madia shining navarretia caper-fruited tropidocarpum	HB

Survey Timing		Location	Targets	Personnel
Month	Day(s)			
March	27	Viera-Perley	Mount Diablo manzanita	HB
April	10	Viera-Perley	Mount Diablo manzanita Mount Diablo fairy lantern Diablo helianthella Mount Diablo buckwheat	BP, HB, EM
May	8	Viera-Perley	Mount Diablo manzanita Mount Diablo fairy lantern Diablo helianthella Mount Diablo buckwheat Brewer's dwarf flax	HB
June	6	Viera-Perley	Mount Diablo manzanita Mount Diablo fairy lantern Diablo helianthella Mount Diablo buckwheat Brewer's dwarf flax	EM, BP

Covered and/or no-take species that were targeted during the course of these surveys were determined by recent preserve acquisitions, habitat present within the preserves, and the direction of Conservancy personnel with input from Nomad. Once the species or preserve was determined, the survey timing was identified by Nomad. Based on discussions with Conservancy staff, Abigail Fateman, the Viera Perley Property was identified as high priority for inventorying. Table 3 shows which preserves contain habitat for each target covered/no-take plant species. If habitat is present, either the entire or partial area of suitable habitat was surveyed in 2015. Table 3 only contains covered/no-take plant species for which there is suitable habitat present within the acquisitions, and does not include all 17 covered/no-take plant species. A narrative discussion of the survey timing and habitat targeted for each preserve is presented in Section 3.

The 2015 survey effort was primarily focused on the Viera-Perley property since it was the newest of the acquisitions, and had not been previously surveyed for rare plants. Although precipitation totals were low during the 2014/2015 rainy season, reference populations indicated favorable conditions to survey for covered species populations still needed to meet the conservation objectives, therefore efforts were made to locate covered and no-take species at previously surveyed preserves including Grandmas Quarter, Roddy Ranch, Souza 1, Souza 3, Vaquero Farms Central, Vaquero Farms North, and Vaquero Farms South (Table 3).

Table 3. High Priority Acquisition Properties Surveyed in 2013

Target Species	Grandmas Quarter	Roddy Ranch	Souza 1	Souza 3	Vaquero Farms Central	Vaquero Farms North	Vaquero Farms South	Viera-Perley
Arctostaphylos auriculata Mount Diablo manzanita	---	NT	---	---	---	---	---	E
Amsinckia grandiflora large-flowered fiddleneck	P	P	P	P	P	P	P	---
Astragalus tener var. *tener* alkali milk vetch	P	P	P	P	P	P	P	---
California macrophylla round-leaved filaree	P	P	P	P	P	P	P	E
Calochortus pulchellus Mount Diablo fairy lantern	---	NT	---	---	---	---	---	E
Delphinium recurvatum recurved larkspur	P	P	P	P	P	P	P	---
Eriogonum truncatum Mount Diablo buckwheat	---	NT	---	---	---	---	---	E
Escholzia rhombipetala diamond-petaled poppy	P	P	P	P	P	P	P	---
Extriplex joaquinana San Joaquin spearscale	P	NT	P	P	P	P	P	---
Helianthella castanea Diablo helianthella	---	NT	---	---	---	---	---	E
Hesperolinon breweri Brewer's dwarf flax	---	NT	---	---	---	---	---	P
Madia radiata showy madia	P	P	P	P	P	P	P	---
Navarretia nigelliformis subsp. *radians*[7] shining navarretia	P	NT	P	P	P	P	P	---
Tropidocarpum capparideum caper-fruited tropidocarpum	P	NT	P	P	P	P	P	---

E = Entire area of suitable habitat surveyed within property in 2015.
NT = Not a target on the property in 2015.
P = Partial survey of suitable habitat within property in 2015.
---= suitable habitat absent or presumed absent from property

[7] See footnote 3 above.

Surveys for target species were conducted within suitable habitat (Table 4) by walking transects up to 10 meters apart depending on the topography or subject plant community. Visual surveys are considered adequate for determining the presence or absence of covered plant species that have a potential to occur within preserve acquisitions. Census information for all populations encountered were enumerated by direct count. All surveys generally began at 08:00 and concluded at approximately 16:00 each day (with short breaks for meals). Protocol-level surveys for special-status plants and animals were not conducted as part of this assessment. However, all plant species in bloom, or otherwise recognizable, were identified to a level necessary to determine their regulatory status. During these surveys an inventory of plant species observed was recorded. If encountered, other special-status species including State and Federally-listed species or species included in the California Native Plant Society rare plant inventory were also recorded.

Table 4. Habitat Requirements of Survey Targets

Species	Land Cover Types	Additional Habitat Notes
Arctostaphylos auriculata Mount Diablo manzanita	Chaparral and scrub	Elevations generally between 700 and 1,860 feet; restricted to the eastern and northern flanks of Mt. Diablo and the vicinity of Black Diamond Mines
Amsinckia grandiflora large-flowered fiddleneck	Annual grassland	None
Astragalus tener var. *tener* alkali milk-vetch	Alkali wetland Annual grassland Seasonal wetland	None
California macrophylla round-leaved filaree	Annual grassland	Heavy clay soils
Calochortus pulchellus Mount Diablo fairy lantern	Annual grassland Chaparral and scrub Oak woodland Oak savanna	Elevation between 650 and 2,600 feet.
Delphinium recurvatum recurved larkspur	Alkali grassland	None
Eriogonum truncatum Mount Diablo buckwheat	Annual grassland Chaparral and scrub	Ecotone of grassland and chaparral/scrub
Eschscholzia rhombipetala diamond petaled poppy	Annual grassland	Not enough known about local habitat parameters to add specificity.
Extriplex joaquinana San Joaquin spearscale	Alkali grassland Alkali wetland	None
Helianthella castanea Diablo helianthella	Chaparral and scrub Oak savanna Oak woodland	Elevation above 650 feet; typically found on the ecotone of these habitats.
Hesperolinon breweri Brewer's western flax	Annual grassland Chaparral and scrub Oak woodland	Restricted to grassland areas within a 500+ foot buffer from oak woodland and chaparral scrub. Typically associated with foothill pine (*Pinus sabiniana*).
Madia radiata showy madia	Annual Grassland	Primarily occupies open grassland or grassland on edge of oak woodland.

SPECIES	LAND COVER TYPES	ADDITIONAL HABITAT NOTES
Navarretia nigelliformis subsp. *radians* shining navarretia	Annual Grassland	Generally found on clay barrens in Annual Grassland.
Tropidocarpum capparideum caper-fruited tropidocarpum	Alkali Grassland	None

2.2.2 REFERENCE SITES AND HERBARIUM SPECIMENS

To ensure the timing of surveys coincided with the flowering phenology of targeted HCP/NCCP covered and no-take species, reference populations and collection dates of herbaria specimens were examined.

Reference Sites

Known populations of alkali milk-vetch (*Astragalus tener* var. *tener*), round-leaved filaree (*California macrophylla*), Mount Diablo fairy lantern (*Calochortus pulchellus*), diamond-petaled poppy (*Escholzia rhombipetala*), San Joaquin spearscale (*Etriplex joaquinana*), Diablo helianthella (*Helianthella castanea*), Brewer's dwarf flax (*Hesperolinon breweri*), and shining navarretia (*Navarretia nigelliformis* subsp. *radians*[8]) were visited at reference sites with similar characteristics to the acquisition properties such as habitat, topography, and climate.

On March 16, 2015 a known population of alkali milk-vetch was visited. This population is located on the corner of Lorraine and Hartford Roads in the north Livermore Valley and is not yet recorded in the CNDDB. Approximately 500 individuals were observed in peak flower on this date, therefore the March survey date was adequately timed.

On March 16, 2015 a known population of round-leaved filaree was visited. This population is located on the Roddy Ranch property in the western portion of Horse Valley. This occurrence is not yet recorded in the CNDDB. Approximately 1,000 individuals were observed at this location and of these a majority of the inflorescences were in flower and fruit, therefore it was determined that the March survey date was adequately timed.

Also on March 16, 2015 a known population of shining navarretia was visited at the same location as round-leaved filaree as these species co-occur at this location. This occurrence is not recorded in the CNDDB. Approximately 4,000 individuals were observed at this location and of these a majority of the inflorescences were in flower, therefore it was determined that the March survey timing was equally adequate for shining navarretia.

Additionally on March 16, 2015 a recently discovered population of diamond-petaled poppy was visited. This population is located in the grasslands east of Bethany Reservoir and is not yet recorded in the CNDDB. Approximately 2 individuals were observed in fruit, therefore it was determined that the March survey was adequately timed for diamond petaled poppy.

Also on March 25, 2015 a new population of San Joaquin spearscale was encountered at Vaquero Farms Central, north of the caretakers' residence. On this date this population was in flower and beginning to fruit which is earlier than average. Therefore it was considered a target during March and April surveys through the 2015 survey season.

[8] See footnote 3 above.

On April 9, 2015, a known population of Diablo helianthella was evaluated at Lime Ridge Open Space in the City of Walnut Creek. This population is approximately 1,000 feet in elevation and is not yet recorded in the CNDDB. Approximately 85 individuals were observed however a majority of these were only in bud. Regardless of the lack of individuals in peak bloom the leaves of this species are distinctive in the Diablo region and it was therefore determined that surveys for this species could be conducted at this time in April and for the next two months.

On May 7, 2015, an extant population of Brewer's dwarf flax was visited within the Thomas Southern property of Black Diamond Mines Regional Preserve. This population is located on the northern slope of Kreigor Peak at approximately 1,500 feet in elevation. It is not yet recorded in the CNDDB. Approximately 1,500 individuals were observed at this location in early flower. Although this population had not yet reached peak bloom on this date the population was identifiable, therefore it was determined that surveys for this species could be conducted within the week and over the next month.

Also on May 7, 2015, a known population of Mt. Diablo fairy lantern was visited. The population is located within Mt. Diablo State Park near the mouth of Perkins Creek on the east side of the park. This occurrence is recorded in the CNDDB (EONDX #29947). Hundreds of individuals in peak flower were observed; therefore, it was determined that conducting surveys for this species within 1 week of this observation was suitable timing.

Herbaria Specimens

An examination of herbaria specimens was performed for the remaining potentially occurring taxa that did not have available reference populations to examine, using the Consortium of California Herbaria Database (CCH 2015). An estimation of blooming periods was attained by averaging the collection dates of herbarium specimens by month. Duplicate collections and specimens with label information lacking a collection month were not included in the averages. The purpose of this analysis is to ensure survey timing corresponds with flowering and reproductive maturation since plant species are typically collected at peak flowering phenology. Specimen collection dates and corresponding survey timing are presented in Table 5 for HCP/NCCP covered and no-take species considered targets during the 2015 studies. All of the species appearing in Table 5 have peak blooming periods during the months of April which match the months during which botanical surveys were conducted. Although Mount Diablo manzanita (*Arctostaphylos auriculata*) has a peak blooming period outside of the survey months, vegetative material of this woody shrub would have been detectable within the acquisition properties during surveys.

Table 5. Herbaria Specimen Collection Dates and Correspondence of Survey Timing

Target Species	Herbaria Specimen Collections Averaged By Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Amsinckia grandiflora Large-flowered fiddleneck	0%	0%	25%	**60%**	15%	0%	0%	0%	0%	0%	0%	0%
Delphinium recurvatum recurved larkspur	0%	0%	15%	**61%**	20%	4%	0%	0%	0%	0%	0%	0%
Eriogonum truncatum Mount Diablo buckwheat	0%	0%	0%	**43%**	**43%**	14%	0%	0%	0%	0%	0%	0%
Eschscholzia rhombipetala diamond-petaled poppy	0%	9%	27%	**46%**	18%	0%	0%	0%	0%	0%	0%	0%
Madia radiata showy madia	0%	0%	30%	**51%**	17%	1%	0%	1%	0%	0%	0%	0%
Tropidocarpum capparideum caper-fruited tropidocarpum	0%	5%	41%	**54%**	0%	0%	0%	0%	0%	0%	0%	0%

Note: Shaded areas indicate months when botanical surveys were conducted. Bolded numbers denote peak period(s) for survey. Species flowering phenology represented as a percent (%) by month, percentages are rounded; months where collection dates have not been reported are designated as 0%. Species followed by (C) are "Covered Species" and (N) are "No-Take Species" in the HCP/NCCP.

2.2.3 Data Collection

Data collected in the field conforms to reporting requirements appearing in Chapter 5 of the Plan, "Incorporating Covered Plant Populations in the Preserve System" (Jones and Stokes 2006). To ensure long-term survival of these populations, maintaining healthy populations is a goal of the Plan. Healthy populations are those that have a stable or increasing population growth rate, or have a high potential to increase in size with improved management. The Plan states that the determination of a healthy population cannot be determined in the field based on a single survey. The health of a plant population will be inferred in the field on the basis of five relevant characteristics. Several surveys per season or surveys over multiple years may be necessary to assess all relevant site and population characteristics to ensure that populations within preserves are healthier than populations lost to covered activities. The five relevant characteristics include:

- Physical Condition: Individuals in good or excellent physical condition for the species (e.g., little or no signs of disease, viruses, severe herbivory, nutrient deficiencies) are more likely to survive, achieve an average or above-average lifespan, and reproduce more successfully than individuals in poor physical condition.

- Age Structure: For perennial plants, having an age structure with many seedlings or juvenile plants relative to adults suggests a stable or positive rate of population growth. Seeds in the soil (*i.e.*, the seed bank) are also part of a plant population's age structure, but this component is generally very difficult to measure. Similarly, for the geophyte Mount Diablo fairy lantern, dormant bulbs in the soil are a stage of the population age structure.

- Reproductive Success: Populations with evidence of average or above average reproductive success for the species (*e.g.*, production of flowers per plant, seed production per flower or per plant, proportion of seeds that appear to be viable based on visual observations) are more likely to be increasing than populations with below-average reproductive success because this is often a key component of population growth rate. If reproductive success cannot be measured, plant size or other physical features may be an appropriate surrogate in some covered species.

- Availability of Suitable Habitat: In order for a plant population to remain stable or grow, enough suitable habitat must be present. Populations near unoccupied suitable habitat or without evidence of shrinking suitable habitat areas (e.g., exotic plants that may be expanding, native shrubs that may be advancing) will be considered healthier than populations without these indicators.
- Diversity of Suitable Habitat: Populations that occupy a wide range of microhabitats for the species may exhibit relatively high genetic diversity and therefore population health. Populations that occupy unusual microhabitats for the species may indicate unusual genetic composition or adaptations that should be preserved.

Detailed notes and measurements of these five relevant characteristics were recorded for each population of covered plant species observed.

2.2.4 MAPPING

Geographic Information System shapefiles (ESRI ArcGIS 9.2) of covered plant species populations were created by incorporating global positioning system (GPS) point data collected in the field or by digitizing locations hand drawn on field maps in areas where accuracy was assured. These field maps depicted 2009 NAIP 1-meter resolution for Contra Costa County at 1:2,400 scale.

2.2.5 SPECIAL-STATUS SPECIES OCCURRENCES

Special-status plants and animals encountered within the study area were recorded using California Natural Diversity Database Field Survey Forms (Appendix A). A GPS data point was recorded for each occurrence and digital photographs were taken. Voucher specimens of the special-status plant species encountered within the study area were also collected and will be donated to the Jepson Herbarium at the University of California Berkeley.

2.2.6 HERBARIUM VOUCHERS

In addition to the collection of special-status species voucher specimens, other plant species with regional significance were collected during the course of our study. Plant species considered as having regional significance include those not previously known as occurring in Contra Costa County. A GPS data point was recorded for each of these locations.

2.2.7 LIMITATIONS

Survey efforts were carefully designed to maximize the likelihood that the timing and effort of the surveys coincided with the optimum timing of phenology and were conducted in appropriate locations for each of the target species. This subsection discusses the unavoidable limitations inherent in rare plant surveys, with respect to the specifics of this inventory.

Based on the timing of this assessment, a determination of presence/absence within the study area was possible for special-status plant species with blooming periods corresponding to the March, April, May, and June 2015 surveys. Based on the timing of the surveys, all plant species growing within the study area may not have been observed due to varying flowering phenologies and life forms, such as bulbs, biennials, and annuals. Annuals may be absent in some years due to annual variations in temperature and rainfall, which influence germination and plant phenology. Colonization of new populations within an area may also occur from year to year.

Some specific plant species identifications in this report are tentative due to the absence of morphological characters, resulting from immature reproductive structures or seasonal desiccation, which is required to

make species level determinations. However, all plant species in bloom or otherwise recognizable were identified to a level necessary to determine their regulatory status.

Section 3. ENVIRONMENTAL SETTING

3.1. Setting

The eight preserve acquisitions surveyed in 2015 represent three of five Acquisition Zones: Watersheds of Northern Tributaries of Marsh Creek; Slopes of Mount Diablo and Main Stem Marsh Creek Watershed; and the Byron Hills. Table 6 summarizes preserve acquisitions surveyed by Acquisition Zone.

Table 6. Acquisition Properties by Zone

Acquisition	Zone 1: Pittsburg Hills	Zone 2: Watersheds of Northern Tributaries of Marsh Creek	Zone 3: Clayton Area, Mount Diablo Foothills	Zone 4: Slopes of Mt. Diablo and Main Stem Marsh Creek Watershed	Zone 5: Byron Hills
Grandmas Quarter	---	---	---	---	●
Roddy Ranch	---	●	---	---	---
Souza 1	---	---	---	---	●
Souza 3	---	---	---	---	●
Vaquero Farms Central	---	---	---	---	●
Vaquero Farms North	---	---	---	---	●
Vaquero Farms South	---	---	---	---	●
Viera-Perley	---	---	---	●	---

3.1.1 Zone 2

Surveys conducted in Zone 2 included a single property: Roddy Ranch which is located west of Deer Valley Road, north of Briones Valley Road, and south of Empire Mine Road and shares its northwestern corner with Black Diamond Mines Regional Preserve. Prominent geographic features on this property include Horse, Deer, and Briones valleys and the ridges that separate them which support land cover types such as grassland, alkali grassland, alkali wetland, chaparral, grassland, oak savanna, oak woodland, pond, and seasonal wetland. Roddy Ranch is located near the boundary between the San Francisco Bay Area and San Joaquin Valley subregions of the California Floristic Province.

Surveys on Roddy Ranch in 2015 focused on grassland habitat, in clay barrens of Altamont series/complex soils and alkali habitat during March and April for species identified in Table 2.

3.1.2 Zone 4

Surveys conducted in Zone 4 included a single property: the newly acquired Viera-Perley. The previous acquisition property, Schwartz, shares a boundary with the southern boundary of the Galvin acquisition and the northwest corner of the Schwartz acquisition. Viera-Perley is connected to the eastern end of Mount Diablo State Park and the Seeno square-mile conservation easement. Land cover types on this property include oak woodland and grassland. These properties are located within the San Francisco Bay Subregion of the California Floristic Province.

Surveys within this property focused on grasslands in March and April and the woodlands and grasslands in April, May, and June for the species identified in Table 2.

3.1.3 ZONE 5

Zone 5 surveys included six parcels: Grandmas Quarter, Souza 1, Souza 3, Vaquero Farms Central, Vaquero Farms North, and Vaquero Farms South. This zone lies on the eastern foothills of the Diablo Range near the edge of the San Joaquin Valley. These acquisitions are located along both sides of Vasco Road, with the larger acreage west of Vasco. Properties on the west side of Vasco Road are connected to Los Vaqueros watershed lands, owned by Contra Costa Water District, and EBRPD's Vasco Caves Land Bank. The acquisitions east of Vasco Road are near the Alameda/Contra Costa County line. The prominent geographic feature here is Brushy Creek. These parcels also include wind farm leases.

These are primarily treeless lands with an abundance of alkaline habitats influenced by the alkaline soils that support them. Brady and Weil (1999) define alkaline soils as any soil that has a pH greater than 7.0. Runoff influenced by the marine sedimentary rocks contributes to this basic chemistry. These rocks add sodium chloride as well as carbonates and sulfates to the system, which are then concentrated upward in the soils through capillary action driven by evaporation rates that are four times the local rainfall (Edwards and Thayer 2008). In some swales within east Contra Costa County, this accumulation of salt and high levels of sodium in the soil has led to the development of alkali scalds. Alkali scalds exhibit saline or alkaline crusts on the soil surface, supporting little or no vegetation due to an elevated soil pH, which can be toxic to most plant species.

Land cover types within these acquisitions include alkali grassland, alkali wetland, grassland, permanent wetland, ponds, riparian, ruderal, seasonal wetland, urban, and wind turbines. These properties are located within the San Joaquin Valley Subregion of the California Floristic Province.

Within these parcels, surveys focused on grassland (in clay barrens of Altamont series/complex soils) and alkaline habitats during early spring (March) for species identified in Table 2.

Section 4. SURVEY FINDINGS

During plant surveys conducted in March, April, May, and June 2015, three covered species were observed by Nomad botanists. Covered species observed include Mount Diablo fairy lantern (*Calochortus pulchellus*), San Joaquin spearscale (*Extriplex joaquinana*), and shining navarretia (*Navarretia nigelliformis* subsp. *radians*)[9]. Overall, a total of four populations of covered plant species were recorded with an estimated number of 358 individuals represented. Table 7 shows the number of covered species populations recorded on each acquisition property. No-take species were not observed during these surveys. It should be noted that the physical condition, population size and abundance may have been affected by poor rainfall patterns during the 2014/2015 rainy seasons.

Other special-status plant species including: small-flowered morning glory (*Convolvulus simulans* CRPR[10] 4.2), hogwallow starfish (*Hesperevax caulescens;* CRPR 4.2); and oval-leaved viburnum (*Viburnum ellipticum;* CRPR 2B.3) were also observed within acquisition properties. Although not covered or no-take species they are considered rare by the California Native Plant Society and are therefore included in this inventory.

Table 7. Number of Covered Species Populations Recorded by Acquisition (2015)

TARGET SPECIES	VAQUERO FARMS CENTRAL	VAQUERO FARMS SOUTH	VIERA-PERLEY	TOTAL # OF POPULATIONS
Calochortus pulchellus Mount Diablo fairy lantern	0	0	1	1
Extriplex joaquinana San Joaquin spearscale	1	0	0	1
Navarretia nigelliformis subsp. *radians* shining navarretia	1	1	0	2
Totals	**1**	**1**	**1**	**4**

Details of each of these populations are discussed below. Voucher specimens of all covered plant species populations encountered were collected. Vouchers will be deposited at the UC/Jepson Herbaria at the University of California Berkeley. California Natural Diversity Database field forms were also filled out and are included in Attachment A.

[9] See footnote 3 above.
[10] CRPR = California Rare Plant Rank

4.1. COVERED PLANT POPULATION ASSESSMENTS

4.1.1 ZONE 2 – WATERSHEDS OF NORTHERN TRIBUTARIES OF MARSH CREEK

Roddy Ranch

Although no new populations of covered plant species were observed within Roddy Ranch two colonies of big tarplant (*Blepharizonia plumosa*) were observed by Nomad senior botanist Heath Bartosh and Vollmar Natural Lands Consulting senior ecologist Jake Schweitzer. These colonies are located within Horse Valley, west of Empire Mines Road in the valley bottom. Mr. Bartosh observed six individuals on September 17, 2015 and Mr. Schweitzer observed an estimated 10 to 20 individuals on October 6, 2015. Based on the method used by CDFW to define occurrences in the CNDDB, these colonies would be considered part of the known CNDDB Element Occurrence #32 which was reported in the 2013 Covered Plant Inventory (Nomad 2013). Aside from these colonies no other new covered plant species populations were observed within Roddy Ranch in 2015.

4.1.2 ZONE 4 – CLAYTON AREA, MOUNT DIABLO FOOTHILLS

Viera-Perley

A single population of covered plant species was observed within the Viera-Perley property (Table 8, Figure 2): Mount Diablo fairy lantern. No extant populations of rare plant species were known from this property prior to these studies.

Table 8. Covered Plant Species Populations Recorded on the Viera-Perley Property

POPULATION NUMBER	SPECIES NAME	COMMON NAME	STATUS	NUMBER OF INDIVIDUALS
Capu5	*Calochortus pulchellus*	Mount Diablo fairy lantern	Covered CRPR 1B.2	112[+]

[+] Number of individuals determined by direct population count.

Population Number	Species Name	Common Name	Status	Number of Individuals
Capu5	*Calochortus pulchellus*	Mount Diablo fairy lantern	Covered CRPR 1B.2	112+

Adrienne Galvin

Galvin

Viera-Perley

Viera-Perley

Mount Diablo

Schwartz

N

W E

S

NOMAD ECOLOGY

December 2015

2015 Covered Plant Species Inventory

Legend

Covered Plant Species
Scientific Name
Calochortus pulchellus (Capu5)

Acquisition Parcels
Public Land and Easements
Survey Areas

A population is defined as a single or group of colonies within 0.25 mile of each other and not separated by significant habitat discontinuities.

Figure 2

Covered Plant Species Observed on Viera-Perley

East Contra Costa County Habitat Conservancy

1:6,000

0 250 500

Feet

East Contra Costa County Habitat Conservancy

Sources: NAIP 2009; Contra Costa County Projection: NAD 83 UTM Zone 10 North.

Contra Costa County, California

Mount Diablo Fairy Lantern (Capu5)

On April 10 and May 8, 2015 a single population (Capu5) of Mount Diablo fairy lantern was observed along the southern boundary of the Viera-Perley property in the understory of interior coast live oak (*Quercus wislizeni* var. *wislizeni*) and blue oak (*Quercus douglasii*) woodlands (Figure 3). The majority of this population (107 individuals) was observed on the west side of Morgan Territory Road on a north facing slope spread out over approximately 261,360 square feet (6 acres) of woodland understory habitat. Individuals were scattered throughout this area with most of the colonies having fewer than 10 individuals and one colony comprised of 30 individuals. The remaining colony of this population (5 individuals) were observed on the east side of Morgan Territory Road on a west facing slope spread over approximately 8,712 square feet (0.20 acre). This population receives filtered light due to the intermittent canopy above and occupies slopes between 950 and 1,080 feet in elevation. The soils that support this population are of the Dibble series (USDA 1977) which is silty clay or silty clay loam. Associate plant species observed include California bay (*Umbellularia californica*), poison oak (*Toxicodendron diversilobum*), snow berry (*Symphoricarpos albus* var. *laevigatus*), hedge parsley (*Torilis arvensis*[*]), Pacific sanicle (*Sanicula crassicaulis*), wood fern (*Dryopteris arguta*), toyon (*Heteromeles arbutifolia*), rough hedge nettle (*Stachys rigida* var. *quercetorum*), and pink honeysuckle (*Lonicera hispidula*). Because this population is located on the same property and essentially contiguous, separated only by Morgan Territory Road, it is treated as a single population. No factors threatening this population were recorded.

Photo 1. Capu5 individuals in flower.

[*] Denotes a species with an origin other than California.

Photo 2. Habitat of Capu5 (western colony).

Photo 2. Habitat of Capu5 (eastern colony).

- Physical Condition: All plants encountered appeared to be in excellent physical condition and phenologically were producing buds, flowers, and fruits at the time of the survey. No signs of disease, virus, herbivory, or nutrient deficiencies were observed on any individuals. This population is expected to survive and reproduce. Size of individuals ranged from approximately 8 to 12 inches tall.
- Age Structure: As a geophyte it is challenging to determine the age structure of any population of a bulbiferous plant due to the difficulty in positively identifying resting leaves to species and estimating the number of immature bulbs under the soil. Therefore an accurate age structure was not possible for this population as no assessment of the abundance of dormant or immature bulbs was made nor positive identification of any resting leaves was made.
- Reproductive Success: The majority of the population was observed in flower or fruit (50 percent in flower and 40 percent in fruit) therefore the population is considered to be successfully reproducing. The number of flowers/fruits observed on an individual plant ranged from one to six with an average of three flowers/fruits. However, if a conservative estimate is assumed and one fruit of each plant successfully produced and set seed, the total number of seed potentially produced for this population is 2,800. This estimation is based on the known anatomy of this taxon as each fruit develops between approximately 20 and 30 seeds. Since germination triggers for this taxon are poorly understood and the percentage of seeds set that reach reproductive maturity is unknown, we can only presume this population is self-sustaining over the long term. Given the healthy size of this population combined with an unknown number of mature bulbs underground, it is likely this population is self-sustaining.
- Availability of Suitable Habitat: Throughout its range this taxon prefers partial to full shade primarily on northerly aspects in the understory or edge of oak woodland or chamise chaparral habitat (Bartosh pers. observation). Population Capu5 is small in relation to the unoccupied suitable habitat it is surrounded by, particularly on the wooded north-facing slope east of Morgan Territory Road as well as the other northerly aspects on the north side of property west of Morgan Territory Road on Dibble series soils. It is feasible that population expansion/enhancement could take place within these areas.
- Diversity of Suitable Habitat: Based on the information associated with specific California Natural Diversity Database (CNDDB) (CDFW) locations in Contra Costa County and personal observations (Bartosh pers. observation) habitat requirements for this taxon are northerly aspects, loam soils, and vegetation such as live oak (interior or coast) or chamise chaparral. These general habitat requirements are abundant in the western portion of the inventory area and allows for this statewide rare species to be locally common. The Viera-Perley population occupies habitat that is typical of oak woodland populations of this species. It could also be considered part of an upper Marsh Creek watershed metapopulation that represents the southernmost stations for this species' range.

4.1.3 ZONE 5 – BYRON HILLS

Vaquero Farms Central

A total of two new covered plant species populations were observed within the Vaquero Farms Central Property (Table 9, Figure 3): San Joaquin spearscale (*Extriplex joaquinana*) and shining navarretia (*Navarretia nigelliformis* subsp. *radians*). Prior to the 2015 surveys two populations of San Joaquin spearscale had been recorded in previous survey efforts. Shining navarretia had not been documented previously from Vaquero Farms Central.

Table 9. Covered Plant Species Populations Recorded on the Vaquero Farms Central Property

Population Number	Species Name	Common Name	Status	Number of Individuals
Atjo8[11]	*Extriplex joaquinana*	San Joaquin spearscale	Covered CRPR 1B.2	200[+]
Nani6	*Navarretia nigelliformis* subsp. *radians*	shining navarretia	Covered CRPR 1B.2	2[+]

[+] Number of individuals determined by direct population count.

[11] Although the genus name has changed for San Joaquin spearscale we have elected to retain the population naming convention based on the old genus name for continuity.

Los Vaqueros

Vaquero Farms North

Nani6

Atjo8

Vaquero Farms Central

Vaquero Farms South

Martin

Population Number	Species Name	Common Name	Status	Number of Individuals
Atjo8[1]	*Extriplex joaquiniana*	San Joaquin spearscale	Covered CEPR 1B.2	200[2]
Nani6	*Navarretia nigelliformis* subsp. *radians*	shining navarretia	Covered CEPR 1B.2	2[2]

December 2015

2015 Covered Plant Species Inventory

Legend

Covered Plant Species
Scientific Name

- Navarretia nigelliformis subsp. radians
- Extirplex joaquiniana

- Acquisition Parcels
- Public Land and Easements
- Survey Areas

A population is defined as a single or group of colonies within 0.25 mile of each other and not separated by significant habitat discontinuities.

Figure 3

Covered Plant Species
Observed on Vaquero Farms Central

East Contra Costa County
Habitat Conservancy

1:6,000

0 250 500 Feet

East Contra Costa County Habitat Conservancy

Sources: NAIP 2009; Contra Costa County Projection: NAD 83 UTM Zone 10 North.

Contra Costa County, California

San Joaquin Spearscale (Atjo8)

On March 25, 2015, a single population (Atjo8) of San Joaquin spearscale was observed within the northwestern quarter of Vaquero Farms Central on an alkaline scald within alkali grassland habitat immediately east of an unnamed drainage opposite a dirt access road (Figure 3). A total of approximately 200 individuals were recorded in a small area covering approximately 100 square feet at 120 feet in elevation. The population occupies an elevated and abandoned flood terrace adjacent to the drainage that is essentially level and is in full sun on soils mapped as Pescadero series (USDA 1977) which is strongly alkaline. Associate species observed with this population include Mediterranean barley (*Hordeum marinum* subsp. *gussoneanum**), hare barley (*Hordeum murinum* subsp. *leporinum**), Italian ryegrass (*Festuca perennis**), Little Oak orach (*Atriplex fruticulosa*), shining pepperweed (*Lepidium nitidum*), and sickle grass (*Parapholis incurva**). It should be noted that observing San Joaquin spearscale with maturing inflorescences on this date in March is highly unusual as evidenced by personal observation and the fact that only one herbarium collection, out of 79, has been vouchered during the month of March (JFP 2015). No factors threatening this population were recorded.

Photo 3. San Joaquin spearscale (Atjo8) in flower.

Photo 4. Alkaline scald habitat of Atjo8.

- Physical Condition: Most plants appeared in excellent physical condition. No signs of disease, virus, herbivory, or nutrient deficiencies were observed on any individuals. This population was expected to have survived and reproduced. Size of individuals ranged from approximately 4 inches to 12 inches tall though the average height of individuals was 5 inches and many were multi-branched.

- Age Structure: This characteristic is not applicable as San Joaquin spearscale is an annual species.

- Reproductive Success: All individuals had produced buds, flowers, and some fruits at the time of the surveys. Approximately 50 percent of the individuals of these populations were fruiting and the remaining 50 percent were in flower. Attaining a visual estimate of viable seeds for this taxon is difficult due to the small size of the seeds and the fact that they are enclosed in pistillate bracts. However, the number of viable fruits per plant was estimated. On average there are 126 fruits (pistillate flowers) per flowering inflorescence spike and 1.5 inflorescence spikes per individual on average. Assuming that one viable seed results from each pistillate flower it is presumed that 37,800 seeds (189 seeds per plant) were produced by this population in 2015. It is unknown at this time whether a populations size of 200 is self-sustaining over the long term, given this is an annual plant population prone to fluctuations in population numbers based on climatic conditions and it was only observed at one time (not over multiple years). However, with such a potentially large volume of seed produced annually it is presumed this population has a robust seed bank.

- Availability of Suitable Habitat: Throughout its range, especially within Contra Costa County, this taxon prefers the margins of alkaline scalds and vernally wet valley bottoms and drainages. It is less particular when it comes to soil types. This taxon can tolerate (and can prefer) clay soil types with a highly elevated pH such as Pescadero and Solano series soils. However it has also been recorded on neutral clay soils, and seldom on loam soil (CDFW 2015c; Bartosh pers. observation). Population Atjo8 supports a very small number of individuals leaving an abundance of suitable unoccupied habitat in the surrounding vicinity on other alkaline scalds, which would

be suitable for population enhancement especially on scalds that straddle the drainage both up and downstream of this location.

- Diversity of Suitable Habitat: This taxon can occupy a variety of soil types as long as the landscape position and early spring hydrology are appropriate (CDFW 2015c; Bartosh pers. observation). This population can tolerate alkaline conditions which may indicate that they represent genotypes adapted to soils with an elevated pH. This should be taken into consideration if population expansion is a goal. In the surrounding area less alkaline soil types that lack alkaline scalds may also be suitable and pilot projects should be conceptualized that identify the broad range of soil types, vegetation communities, microhabitats, and soil saturation duration this species favors.

Shining navarretia (Nani6)

On March 17, 2015, a previously undocumented population of shining navarretia was observed in the northeastern quarter of Vaquero Farms Central approximately 0.10 of a mile north (upstream) of Atjo8, also on the east side of the drainage opposite the dirt access road (Figure 3). This population is comprised of only two individuals that are located on the southern edge of a clay barren that is on a west-facing slope occupying only a few square feet of area. The moderately sloping location it occupies is approximately 150 feet in elevation. The soils that support this population are also of the Pescadero Series, although as mentioned it is near the boundary of the clay barren forming Altamont Series (USDA 1977). Associate plant species observed included Italian ryegrass*, Douglas' microseris (*Microseris douglasii*), few flowered evax (*Hesperevax sparsiflora* var. *sparsiflora*), adobe popcornflower (*Plagiobothrys acathocarpus*), and bur clover (*Medicago polymorpha*). No factors threatening this population were recorded.

Photo 5. Flowering individual of Nani6.

Photo 6. Clay barren habitat of Nani6.

- Physical Condition: All individuals of this population appeared in good condition. No signs of disease, virus, herbivory, or nutrient deficiencies were observed on any individuals. This population is expected to survive and reproduce. Individuals were in flower and beginning to set seed at the time of the observation even though this is earlier than typical for this species. Size of individuals ranged from approximately 1 to 3 inches tall with both individuals having multi-branched inflorescences.

- Age Structure: This characteristic is not applicable as shining navarretia is an annual species.

- Reproductive Success: At the time of the observation, these individuals were flowering and beginning to produce seeds. All of the fruits/seeds inspected were either mature or maturing. An average of 12 flowers was estimated per individual. The total number of seed potentially produced in each capsule is 5. Based on the number of individuals and average number of inflorescences at this population the total possible number of seeds produced is presumed to be 120 seeds (60 seeds per plant) in 2015. It is unknown at this time whether this population, represented by 2 individuals, is self-sustaining over the long term. However, given that this is an annual plant population prone to fluctuations in population numbers based on climatic conditions and it was only observed at one time (not over multiple years), it is possible the seed bank is abundant enough to maintain this population over the long term.

- Availability of Suitable Habitat: Within Contra Costa County, this taxon prefers gentle slopes that are slightly elevated valley bottoms; aspects are less of a factor although a majority of populations in the region are southerly. The soil types that support this species in Contra Costa County include Altamont-Fontana complex and Los Gatos or Rincon series soils in annual grassland habitat (Bartosh pers. observation). The habitat typical of this soil type where shining navarretia is found is similar to where round-leaved filaree occurs: clay barrens in annual grassland habitat. Population Nani6 appeared to be underutilizing available and unoccupied clay

barren habitat which is available in all of Vaquero Farms Central. An estimated 40 to 50 acres of suitable unoccupied clay barrens are present within this property.

- Diversity of Suitable Habitat: Based on the information associated with specific California Natural Diversity Database (CNDDB) (CDFW) locations in Contra Costa County and personal observations (Bartosh pers. observation) habitat requirements for this taxon include the proper slope, aspect, and soil types and are fairly strict. This population occupies habitat that is typical for this taxon in Contra Costa County even though it falls within mapped Pescadero series soils; we believe it is likely to be a soil mapping error. The soils appeared to be similar to what is recognized as Altamont series in the region. Therefore diversity of habitat that this taxon can occupy is limited to grasslands, on gentle slopes above valley bottoms, and on Altamont-Fontana complex and Los Gatos or Rincon series soils. Surveys, acquisition, and any introduction activities related to this taxon should be directed at these habitat criteria.

Vaquero Farms South

A single covered plant population was observed within the Vaquero Farms South Property (Table 10, Figure 4): shining navarretia (*Navarretia nigelliformis* subsp. *radians*). Prior to 2015 no known populations of shining navarretia had been documented on this property.

Table 10. Covered Plant Species Populations Recorded on the Vaquero Farms South Property

Population Number	Species Name	Common Name	Status	Number of Individuals
Nani7	*Navarretia nigelliformis* subsp. *radians*	shining navarretia	Covered CRPR 1B.2	44+

Vaquero Farms North

Vaquero Farms Central

Los Vaqueros

Vaquero Farms South

Nani7

Souza 1

Souza 3

Population Number	Species Name	Common Name	Status	Number of Individuals
Nani7	*Navarretia nigelliformis* subsp. *radians*	shining navarretia	Covered CRPR 1B.2	44*

December 2015

2015 Covered Plant Species Inventory

Legend

Covered Plant Species

Scientific Name

Navarretia nigelliformis subsp. radians (Nani7)

Acquisition Parcels

Public Land and Easements

Survey Areas

A population is defined as a single or group of colonies within 0.25 mile of each other and not separated by significant habitat discontinuities.

Figure 4

Covered Plant Species

Observed on Vaquero Farms South

East Contra Costa County

Habitat Conservancy

1:14,400

0 600 1,200

Feet

East Contra Costa County Habitat Conservancy

Sources: NAIP 2009; Contra Costa County Projection: NAD 83 UTM Zone 10 North.

Contra Costa County, California

Shining navarretia (Nani7)

Also on March 17, 2015, a previously undocumented population of shining navarretia was observed in the south-central portion of Vaquero Farms South west of the large alkali wetland valley (Figure 4). This population was comprised of a single colony on a south west aspect above a small drainage near a wood power pole. It was observed on a clay barren in grassland with low cover (15 to 25 percent) of annual grasses and forbs. A total of 44 individuals, enumerated by direct count, occupied approximately 300 square feet of habitat. This population is on a gently falling slope at approximately 220 feet in elevation. The soils that support this population are of the Altamont series (USDA 1977). Associate plant species observed include long beaked filaree (*Erodium botrys**), red stemmed filaree (*Erodium cicutarium**), Italian ryegrass*, and soft chess (*Avena fatua**). Although this population shares habitat with non-native species they are not perceived as threats to long-term persistence of shining navarretia at this time. However, there are concerns associated with inappropriately timed access to the power line at this location that could directly impact individuals from vehicles and equipment.

Photo 7. Nani7 individual surrounded by low cover of grasses and forbs.

Photo 8. Habitat of Nani7 with wood pole to the right.

- Physical Condition: All individuals of this population appeared in good condition. No signs of disease, virus, herbivory, or nutrient deficiencies were observed on any individuals. This population is expected to survive and reproduce. Individuals were primarily in bud however 30 percent were in flower and 25 percent had begun producing mature seed at the time of the observation. Size of individuals ranged from approximately 2 to 3 inches tall and one-quarter of the individuals produced multi-branched inflorescences.

- Age Structure: This characteristic is not applicable as shining navarretia is an annual species.

- Reproductive Success: At the time of the observation a low percentage of individuals were in flower and fruit while almost half (45 percent) were only in bud. The difference in flowering phenology compared to other shining navarretia populations observed during 2015 is likely due to the elevation microsite water holding capacity. Although this site is mapped as Altamont series soils they appeared lighter in color than is typical for Altamont types, which may indicate a lower clay but higher sand content. An average of 10 flowers was estimated per individual. The total number of seed potentially produced in each capsule is 5. Based on the number of individuals and average number of inflorescences at this population the total possible number of seeds produced is presumed to be 2,200 seeds (50 seeds per plant) in 2015. This is a small population that may not be self-sustaining. It should be monitored annually for several years to record annual fluctuations based on seasonal weather patterns to better understand the population dynamics and relative stability.

- Availability of Suitable Habitat: Within Contra Costa County, this taxon prefers gentle slopes that are slightly elevated valley bottoms; aspects are less of a factor although a majority of populations in the region are southerly. The soil types that support this species in Contra Costa County include Altamont-Fontana complex and Altamont, Los Gatos, Rincon series soils in annual grassland habitat (Bartosh pers. observation). Population Nani7 appeared to be underutilizing available and unoccupied clay barren habitat within the Vaquero Farms South

Property. Approximately 100 acres of unoccupied habitat is available for expansion in this property.

- Diversity of Suitable Habitat: Based on the information associated with specific California Natural Diversity Database (CNDDB) (CDFW) locations in Contra Costa County and personal observations (Bartosh pers. observation) habitat requirements for this taxon, including the proper slope, aspect, and soil types, are fairly strict. However, this population of shining navarretia does occur at a higher elevation than is typical for this species and its conservation as a potential ecotype should be a priority. Therefore diversity of habitat that this taxon can occupy is limited to grasslands, on gentle slopes above valley bottoms (especially at lower elevations), and on Altamont-Fontana complex and, Altamont, Los Gatos, or Rincon series soils. Surveys, acquisition, and any introduction activities related to this taxon should be directed at these habitat criteria.

4.2. NON-COVERED RARE PLANT OCCURRENCES

In addition to covered plant species, four rare plant species (Table 11) not covered by the HCP/NCCP were observed during 2015 surveys. These plant species are included in the California Native Plant Society's *Inventory of Rare and Endangered Plants* (CNPS 2001; 2015). These species include: small-flowered morning glory (*Convolvulus simulans* CRPR[12] 4.2), hogwallow starfish (*Hesperevax caulescens;* CRPR 4.2); and oval-leaved viburnum (*Viburnum ellipticum;* CRPR 2B.3).

Table 11. Number of Non-Covered Rare Plant Populations Recorded by Acquisition (2015)

NON-COVERED RARE PLANTS	SOUZA 3	VAQUERO FARMS CENTRAL	VAQUERO FARMS SOUTH	VIERA-PERLEY	TOTAL # OF POPULATIONS
Convolvulus simulans small-flowered morning glory	0	1	0	0	1
Hesperevax caulescens hogwallow starfish	1	0	1	0	2
Viburnum ellipcitum oval-leaved viburnum	0	0	0	1	1
Totals	**1**	**1**	**2**	**1**	**4**

4.2.1 SMALL-FLOWERED MORNING GLORY

During surveys conducted March 17, 2015 a single population of small-flowered morning glory was recorded on the Vaquero Farms Central property (Table 12, Figure 5). At the onset of covered plant inventories this plant, which is widely distributed from the interior East Bay south to Baja California (Baldwin et al. 2012), was considered extremely rare in Contra Costa County. However based on the

[12] CRPR = California Rare Plant Rank

results of covered plant inventories since 2011, eight population have been recorded within the HCP inventory area.

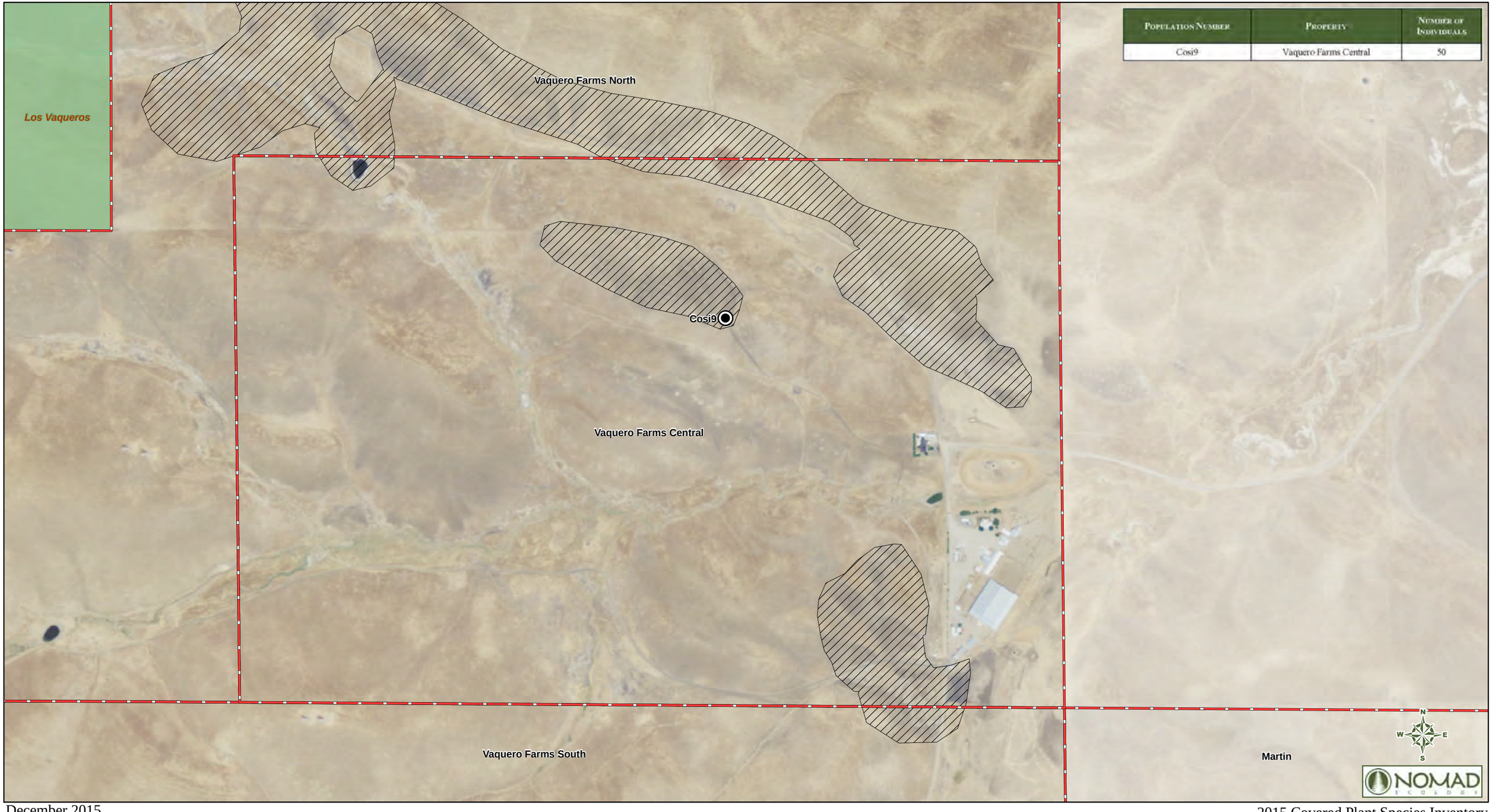
Table 12. Populations of Small-Flowered Morning Glory within Preserves

Population Number	Property	Number of Individuals
Cosi9	Vaquero Farms Central	50

Photo 9. Cosi9 individual in flower.

Population Cosi9 was observed on Vaquero Farms Central on March 17, 2015 totaling an estimated 50 individuals on a clay barrens with sparse vegetation cover, supported by soils mapped as Altamont-Fontana Complex (USDA 1977). This population is located on south and southwest facing aspect west of the care taker residence at approximately 220 feet in elevation.

Population Number	Property	Number of Individuals
Cosi9	Vaquero Farms Central	50



December 2015

2015 Covered Plant Species Inventory

Legend

Covered Plant Species
Scientific Name
Convolvulus simulans

Acquisition Parcels
Public Land and Easements
Survey Areas

A population is defined as a single or group of colonies within 0.25 mile of each other and not separated by significant habitat discontinuities.

Figure 5

Small-flowered Morning Glory

Location

East Contra Costa County
Habitat Conservancy

1:6,000

0 250 500

Feet

East Contra Costa County Habitat Conservancy

Sources: NAIP 2009; Contra Costa County Projection: NAD 83 UTM Zone 10 North.

Contra Costa County, California

4.2.1 HOGWALLOW STARFISH

During surveys conducted in 2015 two populations (Hesc3 & Hesc4) of hogwallow starfish were recorded; one at Vaquero Farms South and one at Souza 3 (Table 13; Figure 6). Together these two populations total 47 individuals. These populations co-occurred with other rare plants recorded from previous years such as crownscale (*Atriplex coronata* var. *coronata*), small-flowered morning glory, or shining navarretia.

Table 13. Populations of hogwallow starfish within Preserves

POPULATION NUMBER	PROPERTY	NUMBER OF INDIVIDUALS
Hesc3	Vaquero Farms South	14
Hesc4	Souza 3	33

Photo 10. Individuals (top center) of HESC3 in full flower.

Population Hesc3 was observed on Vaquero Farms South on March 17, 2015 with an estimated 14 individuals on a clay barren with sparse vegetation cover, supported by soils mapped as Altamont-Fontana Complex (USDA 1977).This population is located on gentle east facing slopes in the western portion of the property at approximately 500 feet elevation.

Population Hesc4 was also observed on March 17, 2015 but was recorded on the Souza 3 property with an estimated 33 individuals, growing on alkaline scalds of Pescadero Series soils (USDA 1977). This population is in a valley bottom southeast of the main corral on the property at approximately 330 feet in elevation.

Population Number	Property	Number of Individuals
Hesc3	Vaquero Farms South	14
Hesc4	Souza 3	33

Los Vaqueros

Hesc3

Vaquero Farms South

Martin

Souza 1

Souza 3

Hesc4

GW

Quarter

N

S

December 2015

2015 Covered Plant Species Inventory

Legend

Covered Plant Species

Scientific Name

Hesperevax caulescens

Acquisition Parcels

Public Land and Easements

Survey Areas

A population is defined as a single or group of colonies within 0.25 mile of each other and not separated by significant habitat discontinuities.

Figure 6

Hogwallow Starfish Locations

East Contra Costa County Habitat Conservancy

1:14,400

0 600 1,200

Feet

East Contra Costa County Habitat Conservancy

Sources: NAIP 2009; Contra Costa County Projection: NAD 83 UTM Zone 10 North.

Contra Costa County, California

4.2.2 OVAL-LEAVED VIBURNUM

During 2015 surveys one population (Viel1) of oval-leaved viburnum was recorded on the Viera-Perley property (Table 14; Figure 7). This is the first occurrence of this species recorded from ECCCHCP acquisition property. Oval-leaved viburnum is a woody shrub that prefers shaded slopes, typically north facing, and is very uncommon in the Mount Diablo region.

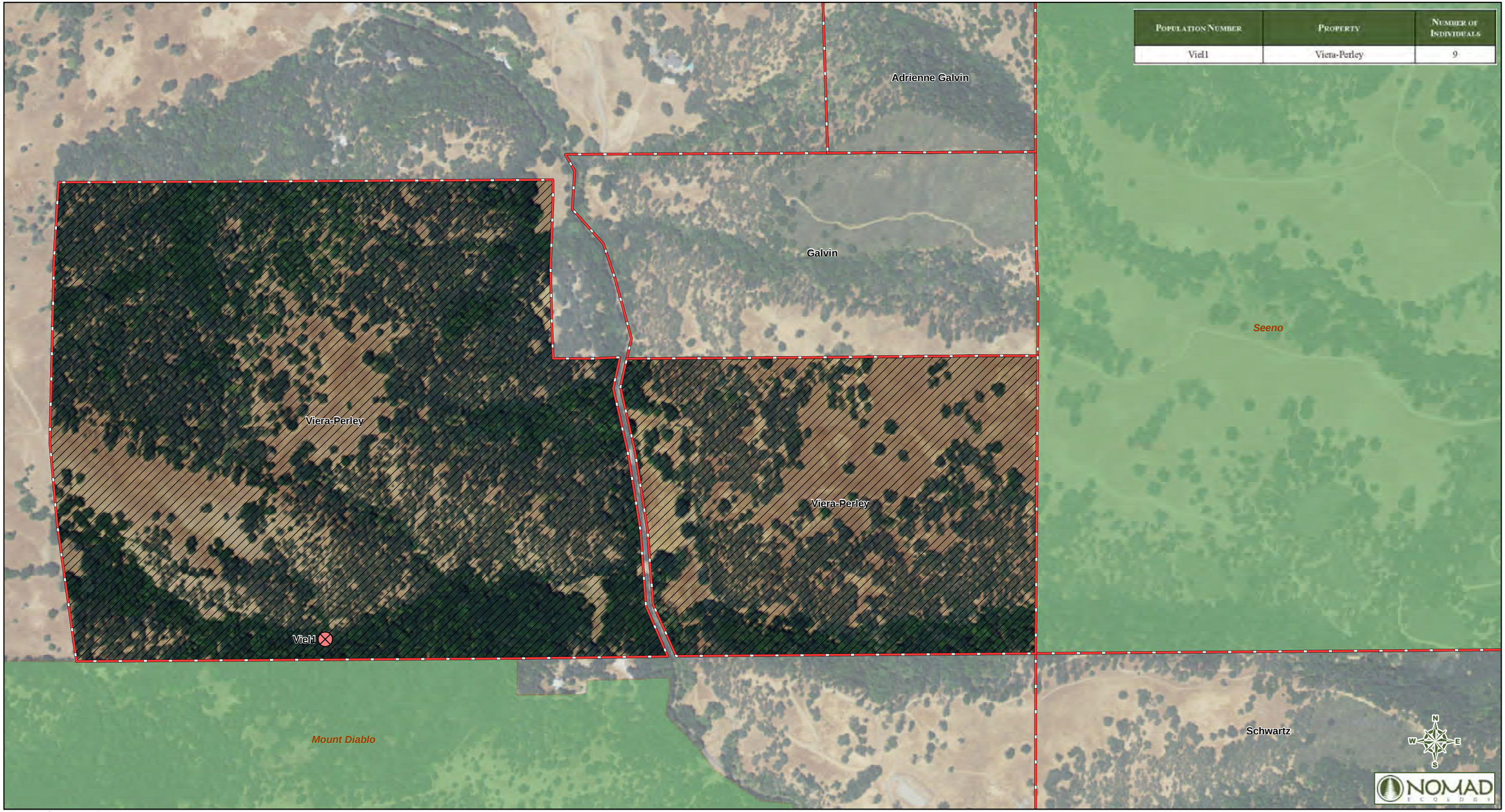
Table 14. Populations of Oval-leaved Viburnum within Preserves

POPULATION NUMBER	PROPERTY	NUMBER OF INDIVIDUALS
Viel1	Viera-Perley	9

Photo 11. Oval-leaved viburnum individual in flower.

Population Viel1 was observed on the Viera Perley property on May 8, 2015 comprising 9 individuals, supported by soils mapped as Dibble Series (USDA 1977). This population is located in the western portion of the property above a drainage and a nearby seep on a north-facing slope in deep shade of interior live oak and California bay woodland. It occurs at approximately 1,000 feet.

Population Number	Property	Number of Individuals
Viel1	Viera-Perley	9



December 2015

2015 Covered Plant Species Inventory

Legend

Covered Plant Species
Scientific Name
Viburnum ellipticum

Acquisition Parcels
Public Land and Easements
Survey Areas

A population is defined as a single or group of colonies within 0.25 mile of each other and not separated by significant habitat discontinuities.

Figure 7

Oval-leaved Viburnum

Location

East Contra Costa County
Habitat Conservancy

East Contra Costa County Habitat Conservancy

1:6,000

0 250 500 Feet

Sources: NAIP 2009; Contra Costa County Projection: NAD 83 UTM Zone 10 North.

Contra Costa County, California

Section 5. SUMMARY AND RECOMMENDATIONS

5.1. SUMMARY

Based on the results of the 2015 surveys conducted during the months of March, April, May, and June, a total of four populations of covered plant species were recorded. Since new populations of covered plant species observed in 2015 do not represent target covered species populations needed to continue achieving biological goals, there is no change in specific goals needed compared to 2014. A total of 26 percent of populations needed to meet specific goals for all covered species is still required (Table 15), which translates to five population of specific species. No population specific goals were identified for San Joaquin spearscale or shining (adobe) navarretia other than landscape- and community-level measures aimed at maintaining or enhancing its preserve populations. Overall, populations of covered plant species are considered healthy based on positive observations of physical condition, reproductive success, and abundance and diversity of suitable habitat. None of the populations of covered species recorded in 2015 appeared to be immediately threatened by biotic or abiotic stressors.

Table 15. Summary of Biological Goals Met Based on 2011- 2015 Surveys.

Species Recorded	Biological goals – # of Populations Targeted for Protection	2011 Populations Recorded (Nomad 2011)	2012 Populations Recorded (Nomad 2012)	2013 Populations Recorded (Nomad 2013)	2014 Populations Recorded (Nomad 2014)	2015 Populations Recorded	Populations Needed to Meet Biological Goals
Arctostaphylos auriculata Mount Diablo manzanita	2	0	0	0	0	0	2
Atriplex depressa brittlescale	2	1	0	0	0	0	1
Blepharizonia plumosa big tarplant	5^	2	1	8	1	0	0
California macrophylla round-leaved filaree	2	1**	0	0	1	1	0
Calochortus pulchellus Mt. Diablo fairy lantern	1	0	1	3	0	0	0
Delphinium recurvatum recurved larkspur	2	0	0	0	0	0	2
Extriplex joaquinana San Joaquin spearscale	N/A	6*	1	1	0	1	N/A

Species Recorded	Biological goals – # of Populations Targeted for Protection	2011 Populations Recorded (Nomad 2011)	2012 Populations Recorded (Nomad 2012)	2013 Populations Recorded (Nomad 2013)	2014 Populations Recorded (Nomad 2014)	2015 Populations Recorded	Populations Needed to Meet Biological Goals
Helianthella castanea Diablo helianthella	2	1	5	3	3	0	0
Hesperolinon breweri Brewer's dwarf flax	3	0	0	0	3	0	0
Navarretia nigelliformis subsp. *radians* shining navarretia	N/A	0	0	0	5	2	N/A

^ There is a discrepancy between Biological Goals as presented in Table 5-1 (3 populations) and page 5-126 (5 populations) of the HCP/NCCP.
* One of these populations a result of translocation efforts.
** Observation is a result from surveys by Insignia Environmental (2011).

5.2. RECOMMENDATIONS

Recommendations are based on details of field observations with the purpose of meeting biological goals as outlined in the HCP/NCCP.

5.2.1 COVERED PLANT INVENTORIES

Since population specific biological goals have not been fully met, covered plant inventories should be conducted during the appropriate blooming periods, based on suitable habitat, in 2016. These surveys should be directed at new acquisitions or within the remaining portions of surveyed Conservancy parcels, for relevant covered and no-take plant species. Covered and/or no-take species and preserves targeted for next year should be determined based on the current needs of the HCP/NCCP and the direction of Conservancy personnel. However, efforts in 2016 should focus on covered plant species that have yet to be found on Conservancy acquisitions, particularly, recurved larkspur and brittlescale on the Vaquero Farms preserves. Additionally, a new and closely accessible reference population of the no-take species diamond-petaled poppy (*Eschscholzia rhombipetala*) was discovered in northeastern Alameda County in 2015. Now that an accessible reference population of this species is locally available, efforts should be made to model species habitat based on this population's soil characteristics and landscape position and apply them to the ECCCCHP inventory area. Based on the timing observed at this reference population in 2015 diamond-petaled poppy is likely to reach peak flower in late February or early March. This phenology is earlier than most of the covered species and may require a separate survey effort based on this timing. Surveys targeting the Byron/Vasco acquisitions in 2016 could result in new population discoveries of diamond-petaled poppy, which has not been observed or collected in Contra Costa County since 1889 (CNDDB 2015c).

5.2.2 POPULATION MONITORING

Of the covered plant species populations recorded in 2015, two were recorded as having small population numbers (Table 16), which we define as 100 individuals or less. Based on 2015 observations, it is possible these populations may either be in decline or too small to be viable for the long term. The HCP/NCCP states that several surveys per season or surveys over multiple years may be necessary to assess all relevant site and population characteristics to ensure that populations within potential preserves are healthier than populations lost to covered activities (Jones and Stokes 2006). Population monitoring should be conducted on a regular basis. However, priorities for monitoring should be based on populations that are in danger of becoming extirpated because of low population numbers or showing signs of decline. For these populations a census should be conducted annually and should result in recommendations for enhancing and/or expanding the population to ensure survivability. Populations that have large numbers of individuals or are known to be sustaining themselves based on existing data could be monitored less frequently, such as every two or three years.

It should be noted that low numbers for shining navarretia may be due to below average rainfall totals for the 2014/2015 rainy season or unfavorable germination cues such as temperatures after the first major rainfall event (Levine et al. 2008). As annual plant species they are more susceptible to fluctuations in annual weather patterns and precipitation. Nevertheless these populations should be priorities for monitoring efforts. Management considerations for these taxa should be focused on annual population monitoring paying particular attention to number of individuals. These efforts should be conducted in all types of rainfall years to understand how these populations are affected by varying rainfall patterns.

Table 16. Covered Plant Species Populations with Low Population Numbers.

POPULATION NUMBER	SPECIES NAME/ COMMON NAME	PROPERTY	PREVIOUS CNDDB CENSUS DATA (# OF INDIVIDUALS)	NUMBER OF INDIVIDUALS (2015)
Nani6	*Navarretia nigelliformis* subsp. *radians* shining navarretia	Vaquero Farms Central	No Data	2
Nani7	*Navarretia nigelliformis* subsp. *radians* shining navarretia	Vaquero Farms South	No Data	44

Section 6. REFERENCES

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Personal Observations

Bartosh, Heath. 2002-2015. Rare plant field observations of numerous populations in Contra Costa County.

APPENDIX A CNDDB FIELD FORMS

Mail to:
California Natural Diversity Database
California Dept. of Fish & Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: (916) 324-0475 email: CNDDB@wildlife.ca.gov

For Office Use Only
Source Code: _____ Quad Code: _____
Elm Code: _____ Occ No.: _____
EO Index: _____ Map Index: _____

Date of Field Work (mm/dd/yyyy): 03/17/2015

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: *Hesperevax caulescens*

Common Name: hogwallow starfish

Species Found? (●) Yes ( ) No _____ If not found, why?

Total No. Individuals: 14 Subsequent Visit? ( ) Yes (●) No

Is this an existing NDDB occurrence? _____ Yes, Occ. # [X] No [ ] Unk.

Collection? If yes: _____ Number _____ Museum / Herbarium

Reporter: Heath Bartosh
Address: 822 Main St, Martinez CA 94553
E-mail Address: hbartosh@nomadecology.com
Phone: (925) 228-3027

Plant Information

Phenology:

_____ % vegetative _____ % flowering _____ % fruiting

Animal Information

_____ # adults _____ # juveniles _____ # larvae _____ # egg masses _____ # unknown

[ ] wintering [ ] breeding [ ] nesting [ ] rookery [ ] burrow site [ ] lek [ ] other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

Observed on gentle east facing slopes in the western portion of the Vaquero Farms South property at approximately 500 feet in elevation.

County: Contra Costa Landowner / Mgr: East Contra Costa County Habitat Conservancy

Quad Name: _____ Elevation: 500

T___ R___ Sec___, ___¼ of ___ ¼, Meridian: H ( ) M ( ) S ( ) Source of Coordinates (GPS, topo. map & type): GPS

T___ R___ Sec___, ___¼ of ___ ¼, Meridian: H ( ) M ( ) S ( ) GPS Make & Model: _____

DATUM: NAD27 ( ) NAD83 ( ) WGS84 ( ) Horizontal Accuracy: _____ meters/feet

Coordinate System: UTM Zone 10 (●) UTM Zone 11 ( ) *OR* Geographic (Latitude & Longitude) ( )

Coordinates: 10 S 614898 4187117

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

Observed on clay barrens with sparse vegetation cover, supported by soils mapped as Altamont-Fontana Complex.

Please fill out separate form for other rare taxa seen at this site.

Site Information

Overall site/occurrence quality/viability (site + population): ( ) Excellent (●) Good ( ) Fair ( ) Poor

Immediate AND surrounding land use: East Contra Costa Habitat Conservation Plan property

Visible disturbances: None

Threats: None.

Comments:

Determination: *(check one or more, and fill in blanks)*

- [ ] Keyed (cite reference): _____
- [ ] Compared with specimen housed at: _____
- [ ] Compared with photo / drawing in: _____
- [ ] By another person (name): _____
- [X] Other: identified by professional botanist, Heath Bartosh

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	[ ]	[ ]	[X]
Habitat	[ ]	[ ]	[ ]
Diagnostic feature	[ ]	[ ]	[ ]

May we obtain duplicates at our expense? ( ) yes ( ) no

Mail to:
California Natural Diversity Database
California Dept. of Fish & Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: (916) 324-0475 email: CNDDB@wildlife.ca.gov

For Office Use Only
Source Code: _____ Quad Code: _____
Elm Code: _____ Occ No.: _____
EO Index: _____ Map Index: _____

Date of Field Work (mm/dd/yyyy): 03/17/2015

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: *Hesperevax caulescens*

Common Name: hogwallow starfish

Species Found? (●) Yes ( ) No _____ If not found, why?

Total No. Individuals: 33 Subsequent Visit? ( ) Yes (●) No

Is this an existing NDDB occurrence? _____ Yes, Occ. # [X] No [ ] Unk.

Collection? If yes: _____ Number _____ Museum / Herbarium

Reporter: Heath Bartosh
Address: 822 Main St, Martinez CA 94553
E-mail Address: hbartosh@nomadecology.com
Phone: (925) 228-3027

Plant Information

Phenology:

_____ % vegetative _____ % flowering _____ % fruiting

Animal Information

_____ # adults _____ # juveniles _____ # larvae _____ # egg masses _____ # unknown

[ ] wintering [ ] breeding [ ] nesting [ ] rookery [ ] burrow site [ ] lek [ ] other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

This population is in a valley bottom southeast of the main corral on the Souza 3 property at approximately 330 feet in elevation.

County: Contra Costa Landowner / Mgr: East Contra Costa County Habitat Conservancy

Quad Name: _____ Elevation: 330

T___ R___ Sec___, ___¼ of ___ ¼, Meridian: H ( ) M ( ) S ( ) Source of Coordinates (GPS, topo. map & type): GPS

T___ R___ Sec___, ___¼ of ___ ¼, Meridian: H ( ) M ( ) S ( ) GPS Make & Model: _____

DATUM: NAD27 ( ) NAD83 ( ) WGS84 ( ) Horizontal Accuracy: _____ meters/feet

Coordinate System: UTM Zone 10 (●) UTM Zone 11 ( ) *OR* Geographic (Latitude & Longitude) ( )

Coordinates: 10 S 617970 4185448

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

Observed growing on alkaline scalds of Pescadero Series soils.

Please fill out separate form for other rare taxa seen at this site.

Site Information

Overall site/occurrence quality/viability (site + population): ( ) Excellent (●) Good ( ) Fair ( ) Poor

Immediate AND surrounding land use: East Contra Costa Habitat Conservation Plan property

Visible disturbances: None

Threats: None.

Comments:

Determination: *(check one or more, and fill in blanks)*

- [ ] Keyed (cite reference): _____
- [ ] Compared with specimen housed at: _____
- [ ] Compared with photo / drawing in: _____
- [ ] By another person (name): _____
- [X] Other: identified by professional botanist, Heath Bartosh

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	[ ]	[ ]	[ ]
Habitat	[ ]	[ ]	[ ]
Diagnostic feature	[ ]	[ ]	[ ]

May we obtain duplicates at our expense? ( ) yes ( ) no

Mail to:
California Natural Diversity Database
California Dept. of Fish & Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: (916) 324-0475 email: CNDDB@wildlife.ca.gov

For Office Use Only
Source Code: _____ Quad Code: _____
Elm Code: _____ Occ No.: _____
EO Index: _____ Map Index: _____

Date of Field Work (mm/dd/yyyy): 04/10/2015

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: *Calochortus pulchellus*

Common Name: Mount Diablo fairy lantern

Species Found? (●) Yes ( ) No _____ If not found, why?

Total No. Individuals: 112 Subsequent Visit? ( ) Yes ( ) No

Is this an existing NDDB occurrence? _____ Yes, Occ. # [X] No [ ] Unk.

Collection? If yes: _____ Number _____ Museum / Herbarium

Reporter: Heath Bartosh
Address: 822 Main St, Martinez CA 94553
E-mail Address: hbartosh@nomadecology.com
Phone: (925) 228-3027

Plant Information

Phenology:
10 % vegetative | 50 % flowering | 40 % fruiting

Animal Information

_____ # adults _____ # juveniles _____ # larvae _____ # egg masses _____ # unknown

[ ] wintering [ ] breeding [ ] nesting [ ] rookery [ ] burrow site [ ] lek [ ] other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

The southern boundary of the Viera Perley property. The majority of this population (107 ind.) was observed on the west side of Morgan Territory Road on a north facing slope spread out over 6 acres. A smaller colony was observed on the east side of Morgan Territory Rd.

County: Contra Costa Landowner / Mgr: East Contra Costa County Habitat Conservancy

Quad Name: _____ Elevation: 950-1,080 feet

T___ R___ Sec___, ___¼ of ___ ¼, Meridian: H ( ) M ( ) S ( ) Source of Coordinates (GPS, topo. map & type): GPS

T___ R___ Sec___, ___¼ of ___ ¼, Meridian: H ( ) M ( ) S ( ) GPS Make & Model: _____

DATUM: NAD27 ( ) NAD83 ( ) WGS84 ( ) Horizontal Accuracy: _____ meters/feet

Coordinate System: UTM Zone 10 ( ) UTM Zone 11 ( ) *OR* Geographic (Latitude & Longitude) ( )

Coordinates: 10 S 601256 4190214

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

Understory of interior coast live oak and blue oak woodlands, with the majority on a north facing slope and a smaller colony on a west facing slope. The population receives filtered light due to the intermettent canopy above and occupies slopes between 950 and 1,080 feet in elevation. The soils are of the Dibble series, which is silty clay or silty clay loam. Associate plant species include California bay, poison oak, snow berry, hedge parsley, Pacific sanicle, wood fern, toyon, rough hedge nettle, and pink honeysuckle.

Please fill out separate form for other rare taxa seen at this site.

Site Information

Overall site/occurrence quality/viability (site + population): ( ) Excellent (●) Good ( ) Fair ( ) Poor

Immediate AND surrounding land use: East Contra Costa Habitat Conservation Plan property

Visible disturbances: None.

Threats: None.

Comments:

Determination: *(check one or more, and fill in blanks)*

[ ] Keyed (cite reference): _____
[ ] Compared with specimen housed at: _____
[ ] Compared with photo / drawing in: _____
[ ] By another person (name): _____
[X] Other: Identified by professional botanist, Heath Bartosh

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	[ ]	[ ]	[X]
Habitat	[ ]	[ ]	[X]
Diagnostic feature	[ ]	[ ]	[ ]

May we obtain duplicates at our expense? (●) yes ( ) no

Mail to:
California Natural Diversity Database
California Dept. of Fish & Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: (916) 324-0475 email: CNDDB@wildlife.ca.gov

For Office Use Only
Source Code: _____ Quad Code: _____
Elm Code: _____ Occ No.: _____
EO Index: _____ Map Index: _____

Date of Field Work (mm/dd/yyyy): 05/08/2015

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: *Viburnum ellipcitum*

Common Name: oval-leaved viburnum

Species Found? (●) Yes ( ) No _____ If not found, why?

Total No. Individuals: 9 Subsequent Visit? ( ) Yes (●) No

Is this an existing NDDB occurrence? _____ Yes, Occ. # [X] No [ ] Unk.

Collection? If yes: _____ Number _____ Museum / Herbarium

Reporter: Heath Bartosh
Address: 822 Main St, Martinez CA 94553
E-mail Address: hbartosh@nomadecology.com
Phone: (925) 228-3027

Plant Information

Phenology:

_____ % vegetative _____ % flowering _____ % fruiting

Animal Information

_____ # adults _____ # juveniles _____ # larvae _____ # egg masses _____ # unknown

[ ] wintering [ ] breeding [ ] nesting [ ] rookery [ ] burrow site [ ] lek [ ] other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

This population is located in the western portion of the Viera Perley property, above a drainage and a nearby seep on a north-facing slope in deep shade of interior live oak and California bay woodland.

County: Contra Costa Landowner / Mgr: East Contra Costa County Habitat Conservancy

Quad Name: _____ Elevation: 1,000 feet

T___ R___ Sec___, ___¼ of ___¼, Meridian: H ( ) M ( ) S ( ) Source of Coordinates (GPS, topo. map & type): GPS

T___ R___ Sec___, ___¼ of ___¼, Meridian: H ( ) M ( ) S ( ) GPS Make & Model: _____

DATUM: NAD27 ( ) NAD83 ( ) WGS84 ( ) Horizontal Accuracy: _____ meters/feet

Coordinate System: UTM Zone 10 (●) UTM Zone 11 ( ) *OR* Geographic (Latitude & Longitude) ( )

Coordinates: 10 S 600767 4190159

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

Observed on soils mapped as Dibble Series.

Please fill out separate form for other rare taxa seen at this site.

Site Information

Overall site/occurrence quality/viability (site + population): ( ) Excellent (●) Good ( ) Fair ( ) Poor

Immediate AND surrounding land use: East Contra Costa Habitat Conservation Plan property

Visible disturbances: None

Threats: None.

Comments:

Determination: *(check one or more, and fill in blanks)*

- [ ] Keyed (cite reference): _____
- [ ] Compared with specimen housed at: _____
- [ ] Compared with photo / drawing in: _____
- [ ] By another person (name): _____
- [X] Other: identified by professional botanist, Heath Bartosh

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	[ ]	[ ]	[X]
Habitat	[ ]	[ ]	[ ]
Diagnostic feature	[ ]	[ ]	[ ]

May we obtain duplicates at our expense? ( ) yes ( ) no

Mail to:
California Natural Diversity Database
California Dept. of Fish & Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: (916) 324-0475 email: CNDDB@wildlife.ca.gov

For Office Use Only
Source Code: _____ Quad Code: _____
Elm Code: _____ Occ No.: _____
EO Index: _____ Map Index: _____

Date of Field Work (mm/dd/yyyy): 03/25/2015

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: *Extriplex joaquinana*

Common Name: San Joaquin spearscale

Species Found? (●) Yes ( ) No _____ If not found, why?

Total No. Individuals: 200 Subsequent Visit? (●) Yes ( ) No

Is this an existing NDDB occurrence? _____ Yes, Occ. # [ ] No [ ] Unk.

Collection? If yes: _____ Number _____ Museum / Herbarium

Reporter: Heath Bartosh
Address: 822 Main St, Martinez CA 94553
E-mail Address: hbartosh@nomadecology.com
Phone: (925) 228-3027

Plant Information

Phenology:

% vegetative	% flowering	% fruiting
	50	50

Animal Information

# adults	# juveniles	# larvae	# egg masses	# unknown

[ ] wintering [ ] breeding [ ] nesting [ ] rookery [ ] burrow site [ ] lek [ ] other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

Located within the northwestern quarter of Vaquero Farms Central on an alkaline scald within alkali grassland habitat immediately east of an unnamed drainage opposite a dirt access road.

County: Contra Costa Landowner / Mgr: East Contra Costa County Habitat Conservancy

Quad Name: _____ Elevation: 120

T___ R___ Sec___, ___¼ of ___ ¼, Meridian: H ( ) M ( ) S ( ) Source of Coordinates (GPS, topo. map & type): GPS

T___ R___ Sec___, ___¼ of ___ ¼, Meridian: H ( ) M ( ) S ( ) GPS Make & Model: _____

DATUM: NAD27 ( ) NAD83 ( ) WGS84 ( ) Horizontal Accuracy: _____ meters/feet

Coordinate System: UTM Zone 10 (●) UTM Zone 11 ( ) *OR* Geographic (Latitude & Longitude) ( )

Coordinates: 10 S 617675 4189335

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

The population occupies an elevated and abandoned flood terrace adjacent to the drainage that is essentially level and is in full sun on soils mapped as Pescadero series which is strongly alkaline. Associate species observed include Mediterranean Barley, hare barley, Italian ryegrass, Little Oak orach, shining pepperweed, and sickle grass. It is highly unusual to observe San Joaquin spearscale with maturing inflorescence on this date in March, as only one herbarium collection out of 79 has been vouchered during the month of March.

Please fill out separate form for other rare taxa seen at this site.

Site Information

Overall site/occurrence quality/viability (site + population): ( ) Excellent (●) Good ( ) Fair ( ) Poor

Immediate AND surrounding land use: Habitat Conservancy Land

Visible disturbances: None

Threats: None

Comments:

Determination: *(check one or more, and fill in blanks)*

[ ] Keyed (cite reference): _____
[ ] Compared with specimen housed at: _____
[ ] Compared with photo / drawing in: _____
[ ] By another person (name): _____
[x] Other: identified by professional botanist, Heath Bartosh

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	[ ]	[ ]	[x]
Habitat	[ ]	[ ]	[x]
Diagnostic feature	[ ]	[ ]	[ ]

May we obtain duplicates at our expense? ( ) yes ( ) no

Mail to:
California Natural Diversity Database
California Dept. of Fish & Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: (916) 324-0475 email: CNDDB@wildlife.ca.gov

For Office Use Only
Source Code: _____ Quad Code: _____
Elm Code: _____ Occ No.: _____
EO Index: _____ Map Index: _____

Date of Field Work (mm/dd/yyyy): 03/17/2015

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: *Navarretia nigelliformis subsp. radians*

Common Name: shining navarretia

Species Found? (●) Yes ( ) No _____ If not found, why?

Total No. Individuals: 2 Subsequent Visit? ( ) Yes ( ) No

Is this an existing NDDB occurrence? _____ Yes, Occ. # ☐ No ☐ Unk.

Collection? If yes: _____ Number _____ Museum / Herbarium

Reporter: Heath Bartosh
Address: 822 Main St, Martinez CA 94553
E-mail Address: hbartosh@nomadecology.com
Phone: (925) 228-3027

Plant Information

Phenology:
_____ % vegetative 100 % flowering _____ % fruiting

Animal Information

_____ # adults _____ # juveniles _____ # larvae _____ # egg masses _____ # unknown

☐ wintering ☐ breeding ☐ nesting ☐ rookery ☐ burrow site ☐ lek ☐ other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

Observed in the northeastern quarter of Vaquero Farms Central, on the east side of a drainage opposite of the dirt access road. Population comprised of only 2 individuals located on the southern edge of a clay barren that is on a west-facing slope.

County: Contra Costa Landowner / Mgr: East Contra Costa County Habitat Conservancy

Quad Name: _____ Elevation: 150

T___ R___ Sec___, ___¼ of ___ ¼, Meridian: H ( ) M ( ) S ( ) Source of Coordinates (GPS, topo. map & type): GPS

T___ R___ Sec___, ___¼ of ___ ¼, Meridian: H ( ) M ( ) S ( ) GPS Make & Model: _____

DATUM: NAD27 ( ) NAD83 ( ) WGS84 ( ) Horizontal Accuracy: _____ meters/feet

Coordinate System: UTM Zone 10 (●) UTM Zone 11 ( ) *OR* Geographic (Latitude & Longitude) ( )

Coordinates: 10 S 617598 4189459

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

The soils consist of Pescadero series, although it is near the boundary of the clay barren forming Altamont Series. Associate plant species observed include Italiay ryegrass, Douglas' microseris, few flowered evax, adobe popcorn flower, and bur clover.

Please fill out separate form for other rare taxa seen at this site.

Site Information

Overall site/occurrence quality/viability (site + population): ( ) Excellent (●) Good ( ) Fair ( ) Poor

Immediate AND surrounding land use: East Contra Costa Habitat Conservation Plan property

Visible disturbances: None

Threats: None

Comments:

Determination: *(check one or more, and fill in blanks)*

☐ Keyed (cite reference): _____
☐ Compared with specimen housed at: _____
☐ Compared with photo / drawing in: _____
☐ By another person (name): _____
☒ Other: identified by professional botanist, Heath Bartosh

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☒
Habitat	☐	☐	☒
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? ( ) yes ( ) no

Mail to:
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California Dept. of Fish & Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: (916) 324-0475 email: CNDDB@wildlife.ca.gov

For Office Use Only
Source Code: _____ Quad Code: _____
Elm Code: _____ Occ No.: _____
EO Index: _____ Map Index: _____

Date of Field Work (mm/dd/yyyy): 03/17/2015

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: *Navarretia nigelliformis subsp. radians*

Common Name: shining navarretia

Species Found? (●) Yes ( ) No _____ If not found, why?

Total No. Individuals: 44 Subsequent Visit? ( ) Yes (●) No

Is this an existing NDDB occurrence? _____ Yes, Occ. # [X] No [ ] Unk.

Collection? If yes: _____ Number _____ Museum / Herbarium

Reporter: Heath Bartosh
Address: 822 Main St, Martinez CA 94553
E-mail Address: hbartosh@nomadecology.com
Phone: (925) 228-3027

Plant Information

Phenology:
45 % vegetative | 30 % flowering | 25 % fruiting

Animal Information

_____ # adults _____ # juveniles _____ # larvae _____ # egg masses _____ # unknown

[ ] wintering [ ] breeding [ ] nesting [ ] rookery [ ] burrow site [ ] lek [ ] other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

Observed in the south-central portion of Vaquero Farms South, west of the large alkali wetland valley. Popoulation consists of a single colony on a southwest aspect above a small drainage near a wood power pole.

County: Contra Costa Landowner / Mgr: East Contra Costa County Habitat Conservancy

Quad Name: _____ Elevation: 220

T___ R___ Sec___, ___¼ of ___¼, Meridian: H ( ) M ( ) S ( ) Source of Coordinates (GPS, topo. map & type): GPS

T___ R___ Sec___, ___¼ of ___¼, Meridian: H ( ) M ( ) S ( ) GPS Make & Model: _____

DATUM: NAD27 ( ) NAD83 ( ) WGS84 ( ) Horizontal Accuracy: _____ meters/feet

Coordinate System: UTM Zone 10 (●) UTM Zone 11 ( ) *OR* Geographic (Latitude & Longitude) ( )

Coordinates: 10 S 616983 4187083

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

Observed on a clay barren in grassland with low cover (15 to 25 percent) of annual grasses and forbs. On a gently falling slope, occupies approximately 300 square feet of habitat. Associate plant species observed include long beaked filaree, red stemmed filaree, Italian ryegrass, and soft chess.

Please fill out separate form for other rare taxa seen at this site.

Site Information

Overall site/occurrence quality/viability (site + population): ( ) Excellent (●) Good ( ) Fair ( ) Poor

Immediate AND surrounding land use: East Contra Costa Habitat Conservation Plan property

Visible disturbances: None

Threats: See below.

Comments: Although this population shares habitat with non-native species, they are not perceived as threats to long-term persistence at this time. There are concerns associated with inappropriately timed access to the power lines at this location that could directly impact individuals from vehicles and equipment.

Determination: *(check one or more, and fill in blanks)*

[ ] Keyed (cite reference): _____
[ ] Compared with specimen housed at: _____
[ ] Compared with photo / drawing in: _____
[ ] By another person (name): _____
[X] Other: identified by professional botanist, Heath Bartosh

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	[ ]	[ ]	[X]
Habitat	[ ]	[ ]	[X]
Diagnostic feature	[ ]	[ ]	[ ]

May we obtain duplicates at our expense? ( ) yes ( ) no

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Sacramento, CA 95814
Fax: (916) 324-0475 email: CNDDB@wildlife.ca.gov

For Office Use Only
Source Code: _____ Quad Code: _____
Elm Code: _____ Occ No.: _____
EO Index: _____ Map Index: _____

Date of Field Work (mm/dd/yyyy): 03/17/2015

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: *Convolvulus simulans*

Common Name: small-flowered morning glory

Species Found? (●) Yes ( ) No _____ If not found, why?

Total No. Individuals: 50 Subsequent Visit? ( ) Yes (●) No

Is this an existing NDDB occurrence? _____ Yes, Occ. # [X] No [ ] Unk.

Collection? If yes: _____ Number _____ Museum / Herbarium

Reporter: Heath Bartosh
Address: 822 Main St, Martinez CA 94553
E-mail Address: hbartosh@nomadecology.com
Phone: (925) 228-3027

Plant Information

Phenology:

_____ % vegetative _____ % flowering _____ % fruiting

Animal Information

_____ # adults _____ # juveniles _____ # larvae _____ # egg masses _____ # unknown

[ ] wintering [ ] breeding [ ] nesting [ ] rookery [ ] burrow site [ ] lek [ ] other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

Observed on the Vaquero Farms Central property.

County: Contra Costa Landowner / Mgr: East Contra Costa County Habitat Conservancy

Quad Name: _____ Elevation: 220

T___ R___ Sec___, ___¼ of ___ ¼, Meridian: H ( ) M ( ) S ( ) Source of Coordinates (GPS, topo. map & type): GPS

T___ R___ Sec___, ___¼ of ___ ¼, Meridian: H ( ) M ( ) S ( ) GPS Make & Model: _____

DATUM: NAD27 ( ) NAD83 ( ) WGS84 ( ) Horizontal Accuracy: _____ meters/feet

Coordinate System: UTM Zone 10 (●) UTM Zone 11 ( ) *OR* Geographic (Latitude & Longitude) ( )

Coordinates: 10 S 617344 4189369

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

Observed on clay barrens with sparse vegetation cover, supported by soils mapped as Altamont-Fontana Complex. This population is located on south and southwest facing aspect west of the caretaker residence.

Please fill out separate form for other rare taxa seen at this site.

Site Information Overall site/occurrence quality/viability (site + population): ( ) Excellent (●) Good ( ) Fair ( ) Poor

Immediate AND surrounding land use: East Contra Costa Habitat Conservation Plan property

Visible disturbances: None

Threats: None.

Comments:

Determination: *(check one or more, and fill in blanks)*

- [ ] Keyed (cite reference): _____
- [ ] Compared with specimen housed at: _____
- [ ] Compared with photo / drawing in: _____
- [ ] By another person (name): _____
- [X] Other: identified by professional botanist, Heath Bartosh

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	[ ]	[ ]	[X]
Habitat	[ ]	[ ]	[ ]
Diagnostic feature	[ ]	[ ]	[ ]

May we obtain duplicates at our expense? ( ) yes ( ) no