

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



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Prepared for



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Section 1. INTRODUCTION

The purpose of this report is to present survey results of select covered plant species on East Contra Costa County Habitat Conservancy (Conservancy) preserve system acquisitions in 2011 (Figure 1). The purpose of this study was to survey for covered¹ and no-Take² HCP plant species on preserves under the management of the Conservancy. This report includes a description of the methods used; an assessment of population health based on HCP/NCCP reporting requirements; recommendations for management; and photographs.

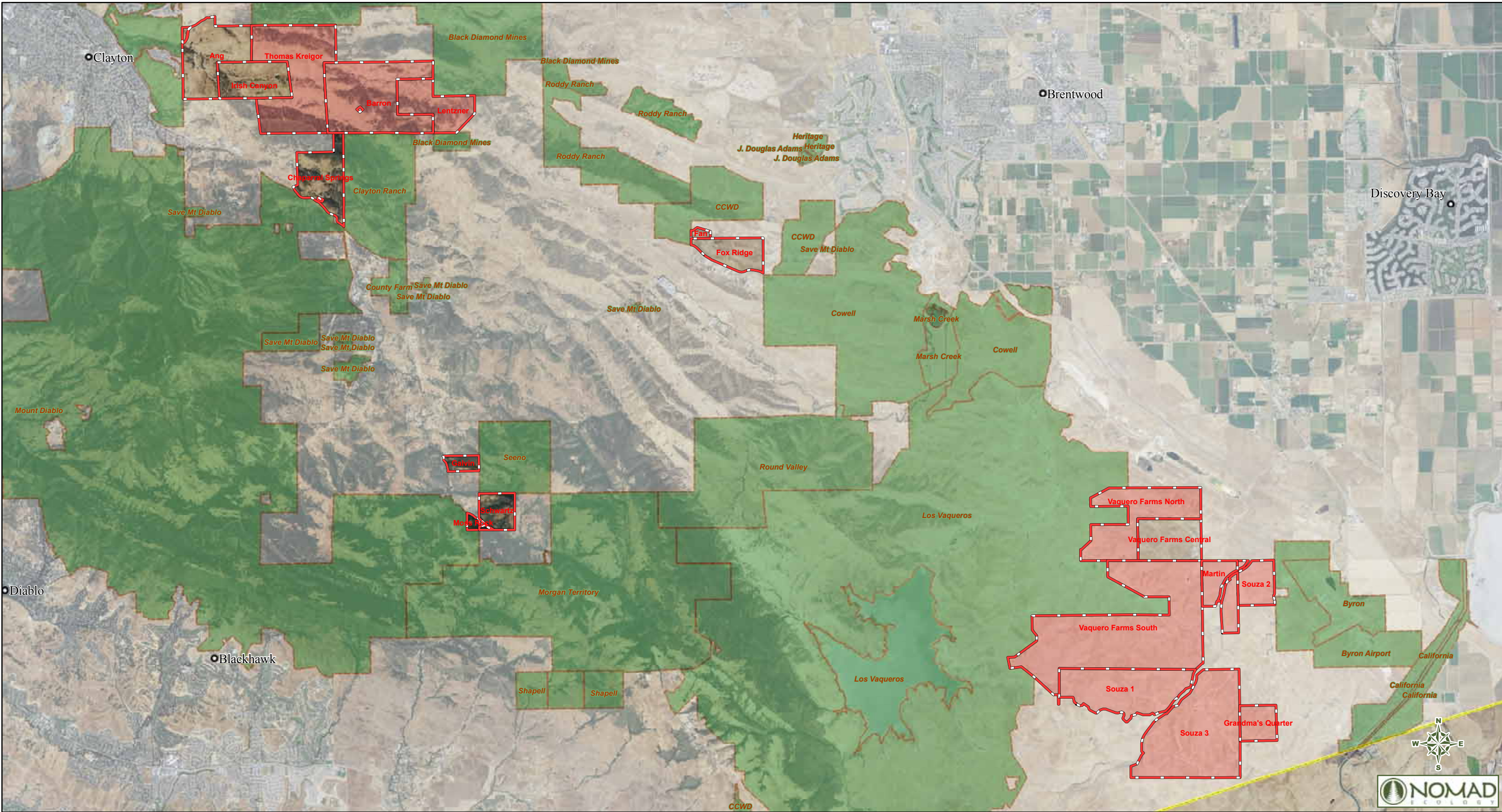
The Conservancy is the implementing entity of the East Contra Costa Habitat Conservation Plan/Natural Community Conservation Plan, referred to herein as the “HCP” or “Plan” (Jones & Stokes 2006). The purpose of this Plan is to protect and enhance ecological diversity and function within the rapidly urbanizing region of eastern Contra Costa County. To that end, the Plan describes how to avoid, minimize, and mitigate, to the maximum extent practicable, impacts on covered species and their habitats and wetlands 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 presents these 17 plant species.

During the course of these studies four covered plant species were observed within acquisition properties: brittlescale (*Atriplex depressa*), San Joaquin spearscale (*Atriplex joaquinana*), big tarplant (*Blepharizonia plumosa*), and Diablo helianthella (*Helianthella castanea*). In addition, crownscale (*Atriplex coronata* var. *coronata*; CRPR³ 4.2) was also observed.

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 CRPR = California Rare Plant Rank which is formerly known as CNPS List.



December 2011 2011 Covered Plant Species Inventory

Legend

Acquisition Parcels

Parcels Surveyed

Public Land and Easements

County Boundaries

Figure 1
Preserve Acquisitions
Surveyed in 2011
East Contra Costa County
Habitat Conservancy

East Contra Costa County
Habitat Conservancy

1:79,200

0 0.625 1.25

Miles

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

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

As a component of the HCP/NCCP a conservation strategy was designed to achieve biological goals and objectives developed for each natural community and the covered species that each community supports. This conservation strategy was implemented to protect and recover listed covered species in the inventory area and 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 this 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.

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 because the 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.

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 healthy⁴ as populations lost to covered activities.
 - Objective 17.2: Protect at least **two** occurrences⁵ 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 plant 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
 - Objective 27.5: Protect at least **one** occurrence of **Mount Diablo fairy lantern** outside currently protected public lands

⁴ 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.

⁵ A plant occurrence is defined in the same way as an element occurrence is defined by the California Department of Fish and Game CDFG: a location record of a plant in the CNDDDB that is a population or group of populations within 0.25 mile and not separated by significant habitat discontinuities.

Section 2. STUDY METHODS

2.1. DATA RESOURCES

Background information on potentially occurring endangered, threatened and rare plant 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 1999, 2008)
- Federal Endangered and Threatened Species that Occur in or may be Affected by Projects in Contra Costa County (USFWS 2011)

California Department of Fish and Game (CDFG):

- State and Federally Listed Endangered, Threatened and Rare Plants of California (CDFG 2011a)
- Special Vascular Plants, Bryophytes, Lichens List (CDFG 2011b)
- California Natural Diversity Database (CNDDDB) (CDFG 2011c)
- List of California Vegetation Alliances. The Vegetation Classification and Mapping Program (CDFG 2010)

Other Sources:

- The Jepson Manual: Higher Plants of California (Hickman 1993)
- The California Native Plant Society's Inventory of Rare and Endangered Plants of California (CNPS 2001, 2011)
- Consortium of California Herbaria (CCH 2011)
- East Contra Costa County Habitat Conservation Plan and Natural Community Conservation Plan (Jones & Stokes 2006)
- Annotated Checklist of the East Bay Flora (CNPS 1997)
- 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)
- Unusual and Significant Plants of Alameda and Contra Costa Counties. Eighth Edition (Lake 2010)

Botanical taxonomy and nomenclature conforms to *The Jepson Manual* (Hickman 1993), except for recent circumscriptions posted on the Jepson eFlora (Jepson Flora Project 2011). Common names of plant species are derived from The Calflora Database (Calflora 2011). Nomenclature for special-status plant species conform to the Inventory of Rare and Endangered Plants of California (CNPS 2001, 2011) and Special Vascular Plants, Bryophytes and Lichens List (CDFG 2011b).

2.2. SURVEY METHODOLOGY

2.2.1 PERSONNEL AND FIELD INVESTIGATIONS

The following personnel conducted focused botanical surveys and report preparation:

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Nomad botanists Heath Bartosh and Erin McDermott conducted HCP plant species inventories on April 5, 7, 15, and 18; May 6, 9, 10, and 27; and September 13 and 14, 2011. 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 parcels, and the directive 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, John Kopchick and Abigail Fateman, preserves identified as high priority for inventorying are presented in Table 2. This table also includes relevant target species based on available habitat and timing of the surveys.

Table 2. High Priority Acquisition Properties Surveyed

TARGET SPECIES	BARRON	GRANDMA'S QUARTER	LAND WASTE MANAGEMENT	LENTZNER	V AQUERO FARMS NORTH	V AQUERO FARMS SOUTH	MARTIN	SOUZA I	SOUZA III	THOMAS KREIGOR
<i>Amsinckia grandiflora</i> large-flowered fiddleneck	---	E	P	---	P	P	---	---	E	---
<i>Astragalus tener</i> var. <i>tener</i> alkali milkvetch	---	E	P	---	E	E	---	---	E	---
<i>Atriplex depressa</i> brittlescale	---	E	P	---	E	E	E	P	E	---
<i>Atriplex joaquinana</i> San Joaquin spearscale	---	E	P	---	E	E	E	P	E	---
<i>Blepharizonia plumosa</i> big tarplant	P	E	---	P	P	P	---	---	E	P
<i>California macrophylla</i> round-leaved filaree	---	E	P	---	P	P	---	---	E	---
<i>Delphinium recurvatum</i> recurved larkspur	---	E	P	---	E	E	E	P	E	---
<i>Helianthella castanea</i> Diablo helianthella	P		---	P	---	---	---	---		---
<i>Lasthenia conjugens</i> Contra Costa goldfields	---	E	P	---	P	P	---	P	E	---
<i>Madia radiata</i> showy madia	---	E	P	---	P	P	---	---	E	---
<i>Navarretia nigelliformis</i> subsp. <i>Nigelliformis</i> adobe navarretia	---	E	P	---	E	E	E	P	E	---

E = Entire area of suitable habitat surveyed within property

P = Partial survey of suitable habitat within property

Surveys for target species were conducted within suitable habitat (Table 3) by walking transects up to 10 meters apart depending on the topography or subject plant community. These visual surveys are considered adequate for determining the presence or absence of special-status plant species that have a potential to occur within preserve acquisitions. This adequacy is based on the size and habit of the target species and the condition of the habitat at the time of the surveys. 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 recorded.

Table 3. Habitat Requirements of 2011 Survey Targets

SPECIES	LAND COVER TYPES	ADDITIONAL HABITAT NOTES
<i>Amsinckia grandiflora</i> large-flowered fiddleneck (N)	Annual grassland	None
<i>Astragalus tener</i> var. <i>tener</i> alkali milk-vetch (N)	Alkali wetland Annual grassland Seasonal wetland	None
<i>Atriplex depressa</i> brittlescale (C)	Alkali grassland Alkali wetland	Restricted to soils of the Pescadero or Solano soil series; generally found in southeastern region of plan area
<i>Atriplex joaquinana</i> San Joaquin spearscale (C)	Alkali grassland Alkali wetland	None
<i>Blepharizonia plumosa</i> big tarplant (C)	Annual grassland	Elevation below 1,500 feet; almost always found on soils of the Altamont Series or Altamont-Fontana complex
<i>California macrophylla</i> round-leaved filaree (C)	Annual grassland	Heavy clay soils
<i>Delphinium recurvatum</i> recurved larkspur (C)	Alkali grassland	None
<i>Helianthella castanea</i> Diablo helianthella (C)	Chaparral and scrub Oak savanna Oak woodland	Elevation above 650 feet; typically found on the ecotone of these habitats
<i>Lasthenia conjugens</i> Contra Costa goldfields (N)	Alkali grassland Annual grassland Seasonal wetland	Generally found in vernal pools
<i>Madia radiata</i> showy madia (C)	Annual grassland Oak woodland	None
<i>Navarettia nigelliformis</i> subsp. <i>nigelliformis</i> Adobe navarretia (C)	Seasonal wetland	Generally found in vernal pools

2.2.2 HERBARIUM SPECIMENS

To ensure the timing of focused botanical surveys coincided with the flowering phenology of targeted HCP/NCCP covered and no-take species, collection dates of herbaria specimens were examined using the Consortium of California Herbaria Database (CCH 2011). 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 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 4 for HCP/NCCP covered and no-take species considered targets during the 2011 studies. All of the species appearing in Table 4 have peak blooming

periods during the months of April, May, and September which matches the months during which botanical surveys were conducted for this effort.

Table 4. 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
<i>Amsinckia grandiflora</i> Large-flowered fiddleneck (N)	0%	0%	25%	60%	15%	0%	0%	0%	0%	0%	0%	0%
<i>Astragalus tener</i> var. <i>tener</i> alkali milk-vetch (N)	0%	0%	18%	61%	20%	2%	0%	0%	0%	0%	0%	0%
<i>Atriplex depressa</i> brittle scale (C)	0%	0%	0%	4%	4%	16%	33%	20%	16%	8%	0%	0%
<i>Atriplex joaquinana</i> San Joaquin spearscale (C)	0%	0%	1%	11%	33%	15%	17%	8%	3%	7%	3%	1%
<i>Blepharizonia plumosa</i> big tarplant (C)	0%	0%	0%	0%	0%	3%	3%	27%	33%	30%	3%	0%
<i>California macrophylla</i> round-leaved filaree (C)	1%	1%	17%	50%	28%	3%	0%	0%	0%	0%	0%	0%
<i>Delphinium recurvatum</i> recurved larkspur (C)	0%	0%	15%	61%	20%	4%	0%	0%	0%	0%	0%	0%
<i>Helianthella castanea</i> Diablo helianthella (C)	0%	0%	6%	33%	58%	3%	0%	0%	0%	0%	0%	0%
<i>Lasthenia conjugens</i> Contra Costa goldfields (N)	0%	0%	11%	49%	33%	4%	0%	0%	0%	2%	0%	0%
<i>Madia radiata</i> showy madia (C)	0%	0%	30%	51%	17%	1%	0%	1%	0%	0%	0%	0%
<i>Navarretia nigelliformis</i> ssp. <i>nigelliformis</i> adobe navarretia (C)	0%	1%	1%	9%	73%	16%	0%	0%	0%	0%	0%	0%

Note: Shaded areas indicate months when focused 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”. To ensure long-term survival of these populations maintaining healthy populations is also 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 more healthy 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.

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. Polygon data was also incorporated into GIS based on those drawn of aerial photo based field maps. These field maps depict 2009 NAIP 1-meter resolution for Contra Costa County at 1:2,400 scale.

2.2.5 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 specifics of this inventory.

Based on the timing of this assessment, a determination of presence/absence within the study area were possible for special-status plant species with blooming periods corresponding to the April, May, and September 2011 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. In these cases *cf* (compares to) is used

to indicate provisional species identification based on gestalt, vegetative morphology, and/or its known range. It is highly unlikely that any of the provisional species identifications would be revised to recognize a sensitive taxon.

Section 3. ENVIRONMENTAL SETTING

3.1. Setting

Of the ten preserve acquisitions surveyed, three Acquisition Zones are represented: Pittsburg Hills, Watersheds of Northern Tributaries of Marsh Creek, and the Byron Hills. Table 5 summarizes preserve acquisitions surveyed by Acquisition Zone.

Table 5. Acquisition Properties by Zone

ACQUISITION ZONE	BARRON	GRANDMA'S QUARTER	LAND WASTE MANAGEMENT	LENTZNER	Vaquero Farms North	Vaquero Farms South	MARTIN	SOUZA I	SOUZA III	THOMAS KREIGOR
Zone 1: Pittsburg Hills	---	---	•	---	---	---	---	---	---	---
Zone 2: Watersheds of Northern Tributaries of Marsh Creek	•	---	---	•	---	---	---	---	---	•
Zone 5: Byron Hills	---	•	---	---	•	•	•	•	•	---

3.1.1 ZONE 1

Surveys conducted in Zone 1 took place on one property, Land Waste Management. This Zone represents the westernmost extension of the San Joaquin Valley characteristics in Contra Costa County. The Land Waste Management acquisition straddles Kirker Pass Road and includes headwaters of Hess Creek. Land cover types within this property include alkali grassland, alkali wetland, grassland, oak woodland, oak savannah, permanent wetland, ponds, riparian, and urban. Floristically, this property is located within the San Joaquin Valley Subregion of the California Floristic Province.

Areas surveyed within this property only focused on work areas associated with the Upper Hess Restoration Project footprint. The project footprint included alkali grassland, alkali wetland, grassland, and permanent wetland habitats.

3.1.2 ZONE 2

Surveys conducted in Zone 2 included three properties, Barron, Lentzner, and Thomas Kreigor. These properties are located north of Mount Diablo and Marsh Creek Road and connect East Bay Regional Park District's (EBRPD) Clayton Ranch Land Bank with Black Diamond Mines Regional Preserve. Prominent geographic features include Kreigor Peak, headwaters of Irish Canyon, Keller Ridge, and Oil Canyon. These properties include land cover types such as alkali wetland, chaparral, grassland, oak savannah, oak woodland, pond, and seasonal wetland. A small population of Desert Olive (*Forestiera pubescens*) Scrub, which is considered a sensitive natural community (CDFG 2010), was also observed in the northern portion of the western parcel of the Barron Property. This vegetation community is not a recognized land cover type of the HCP. These properties are located within the San Francisco Bay Subregion of the California Floristic Province.

Within the Barron and Lentzner properties, surveys focused on wetland habitats during late spring and grasslands supported by Altamont Series and Altamont-Fontana Complex soils during the month of

September. Only areas along the access route through the Thomas Kreigor property (to access Barron) were surveyed as this parcel had not yet closed escrow.

3.1.3 ZONE 5

A majority of properties surveyed were in Zone 5 and include six parcels: Vaquero Farms North, Vaquero Farms South, Martin, Souza I, and Grandma's Quarter, and Souza III. 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, although a larger acreage is 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. What contributes to this basic chemistry is runoff influenced by the marine sedimentary rocks. 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, oak woodland, 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 wetland and grassland habitats during the spring and summer months and portions of the grasslands supported by Altamont Series and Altamont-Fontana Complex soils during the month of September.

Section 4. SURVEY FINDINGS

During covered plant species surveys conducted in April, May, and September 2011, four Plan species were observed by Nomad botanists. These species include: brittlescale (*Atriplex depressa*), San Joaquin spearscale (*Atriplex joaquinana*), big tarplant (*Blepharizonia plumosa*), and Diablo helianthella (*Helianthella castanea*). Overall, a total of ten⁶ populations of covered plant species were recorded with an estimated number of 3,846 individuals represented. Table 6 breaks down populations by acquisition property. No-take species were not observed during these studies.

In addition to these surveys, Insignia Environmental conducted surveys for the covered plant species, round-leaved filaree (*California macrophylla*). These surveys were requested by the Conservancy as part of the mitigation and restoration strategy for impacts to this species as a result of the Pacific Gas and Electric Company's Contra Costa-Las Positas 230 kV Transmission Line Reconductoring Project (Insignia 2011). A single population (Cama1), consisting of 38 individuals and occupying approximately 400 square feet, was observed during these surveys. This population was observed in the northwest corner of the Vaquero Farms North property. This result is included in Table 6 and Figure 4 below.

Crownscale (*Atriplex coronata* var. *coronata*; CRPR⁷ 4.2) was also observed at multiple locations within Conservancy property. Although not a covered or no-take species it is considered rare and is therefore included in this inventory.

During 2011, soils containing a seed bank of San Joaquin spearscale were translocated to Souza II from an impact area within the Vasco Road Safety Improvements project area. This population is also tallied in the table below.

Table 6. Number of Covered Species Populations Recorded by Acquisition

TARGET SPECIES	BARRON	GRANDMA'S QUARTER	LAND WASTE MANAGEMENT	LENTZNER	Vaquero Farms North	Vaquero Farms South	MARTIN	SOUZA I	SOUZA II	SOUZA III	THOMAS KREIGOR	TOTAL # OF POPULATIONS
<i>Atriplex depressa</i> brittlescale	0	0	0	0	0	1	0	0	0	0	0	1
<i>Atriplex joaquinana</i> San Joaquin spearscale	0	0	0	0	2	0	0	0	1**	3	0	6
<i>Blepharizonia plumosa</i> big tarplant	1	0	0	0	0	0	0	0	0	0	1	2
<i>Helianthella castanea</i> Diablo helianthella	1	0	0	0	0	0	0	0	0	0	0	1
<i>California macrophylla</i> round-leaved filaree	0	0	0	0	1*	0	0	0	0	0	0	1

* Observation is a result from surveys by Insignia Environmental

** Population a result of translocation efforts

⁶ This total includes the results of surveys by Insignia Environmental.

⁷ CRPR = California Rare Plant Rank which is formerly known as CNPS List.

Details of each of these populations are discussed below. Voucher specimens of all covered plant species populations encountered were collected. These 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 included in Attachment A.

4.1. POPULATION ASSESSMENTS

4.1.1 ZONE 1 – PITTSBURG HILLS

No populations of covered or no-take plant species were observed during 2011 surveys.

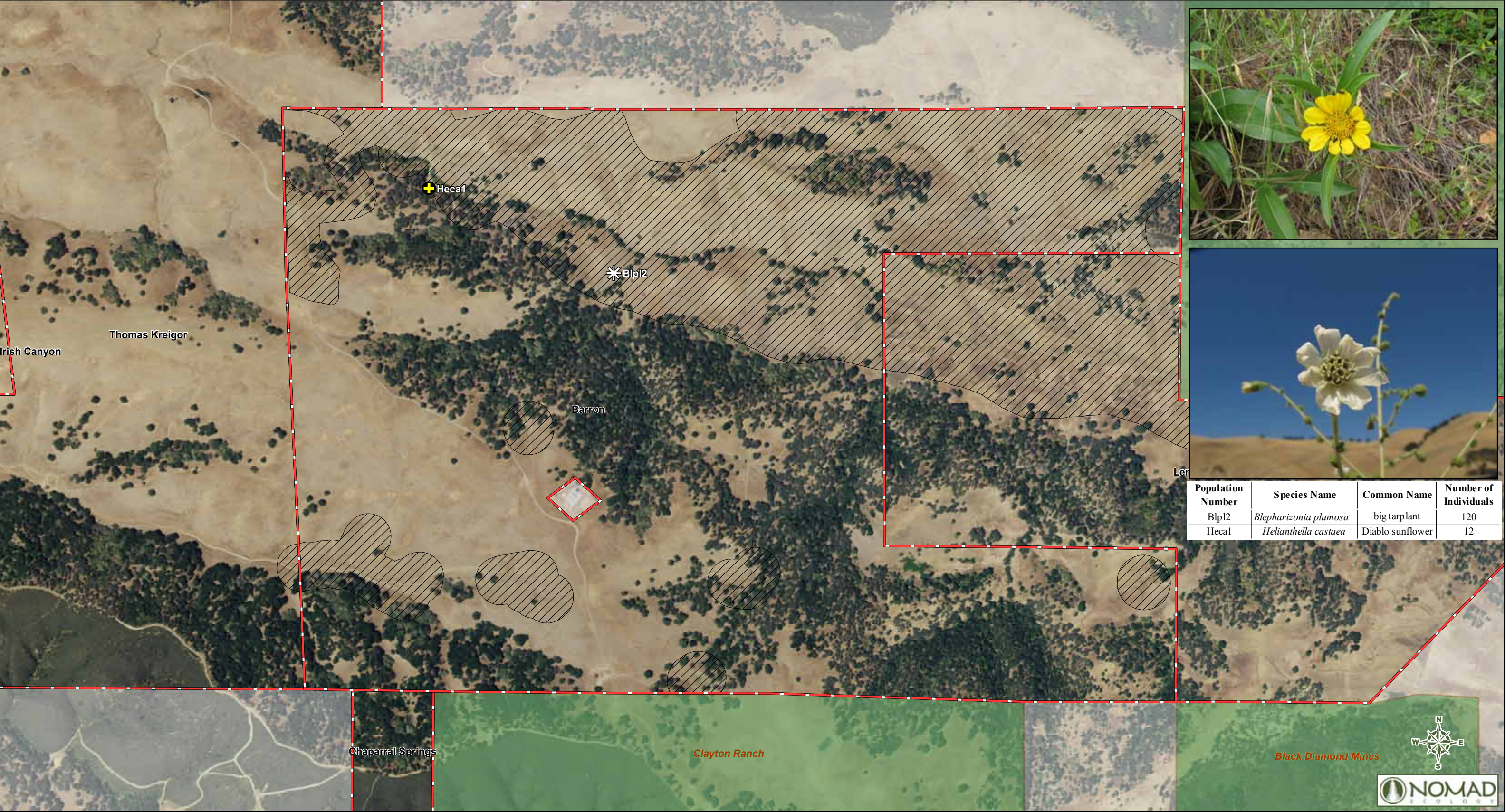
4.1.2 ZONE 2 – WATERSHEDS OF NORTHERN TRIBUTARIES OF MARSH CREEK

Barron

Two populations of covered plant species were observed within the Barron Property (Table 7, Figure 2). No extant populations of rare plant species were known from this property prior to these studies. No-take plant populations were not observed within this zone.

Table 7. Covered Plant Species Populations Recorded on the Barron Property

POPULATION NUMBER	SPECIES NAME	COMMON NAME	STATUS	NUMBER OF INDIVIDUALS
Blpl2	<i>Blepharizonia plumosa</i>	big tarplant	Covered CRPR 1B.1	120
Heca1	<i>Helianthella castanea</i>	Diablo sunflower	Covered CRPR 1B.2	12



Population Number	Species Name	Common Name	Number of Individuals
Blp12	<i>Blepharizonia plumosa</i>	big tarplant	120
Heca1	<i>Helianthella castanea</i>	Diablo sunflower	12

December 2011

2011 Covered Plant Species Inventory

Legend

Covered Plant Species

Scientific Name

Blepharizonia plumosa

Helianthella castanea

Acquisition Parcels

Public Land and Easements

Survey Areas

Figure 2
Covered Plant Species of Barron
East Contra Costa County
Habitat Conservancy

1:9,600

0 400 800

Feet

Big tarplant (Blpl2)

On September 14, 2011 a single population (Blpl2) of big tarplant was observed within Oil Canyon on the Barron property (Attachment A). This population totaled an estimated 120 individuals and occupied approximately 2,970 square feet (0.068 acres) of grassland habitat at 1,004 feet in elevation. It is located on both sides of a dirt access road on a northeast facing slope (approximately 30°), immediately east of the property line that separates the two Barron parcels. The soils that support this population are of the Altamont-Fontana Complex, 30 to 50 percent slopes mapping unit (USDA 1977). Associate plant species observed include wild oats (*Avena fatua**), dove weed (*Croton setigerus*), prickly lettuce (*Lactuca serriola**), soft chess (*Bromus hordeaceus**), Italian thistle (*Carduus pycnocephalus**), and hedge parsley (*Torilis nodosa**).



Photo 1. Blpl2 Looking east at occupied habitat



Photo 2. Flowering individual of Blpl2

- **Physical Condition:** All plants appeared in excellent physical condition. No signs of disease, virus, herbivory, or nutrient deficiencies were observed on any individuals. Due to the presence of terpenoids produced by this plant species, they are unpalatable to cattle and are therefore not grazed by cattle. This population is expected to survive and reproduce. Size of individuals ranged from approximately 8 inches to 46 inches (3'10").
- **Age Structure:** This characteristic is not applicable as big tarplant is an annual species.
- **Reproductive Success:** All individuals had produced buds, flowers, and fruits at the time of the surveys. Approximately 25 percent of the individuals of this population were fruiting, 25 percent were in flower, and the remaining 50 percent were in bud. All of the fruits/seeds inspected were either mature or maturing. An average of 5 aborted fruits were observed within fruiting inflorescences. An average of 38 inflorescences was estimated per individual. The total number of seeds potentially produced in each inflorescence is 48, which includes the total number of disk and ray fruits (cypsela). Based on the number of individuals at this population, possible number of seeds produced, and an assumption of aborted cypsela it is presumed that 196,080 seeds (1,634 seeds per plant) were produced by this population in 2011. It is unknown at this time whether a

population size of 120 individuals is self-sustaining over the long term, given this is an annual plant population prone to fluctuations in population numbers based on climactic conditions and it was only observed at one time (not over multiple years).

- **Availability of Suitable Habitat:** Throughout its range, especially within Contra Costa County, this taxon prefers northerly aspects on Altamont series or Altamont-Fontana complex soils in annual grassland habitat (Bartosh pers. observation). Population Blpl2 is small in relation to the unoccupied suitable habitat it is surrounded by. There is also an abundance of Altamont soils of north facing slopes to the west in Oil Canyon on the Barron and Lentzner properties. Therefore there is potential for expanding this population. It should be noted that non-native plant species such as prickly lettuce (*Lactuca serriola**) and Italian thistle (*Carduus pycnocephalus**) were observed as associates of this population. Although growing sympatrically with these species it is possible that big tarplant may compete for resources with these weeds. Routine monitoring should be conducted to ensure these non-native weed species are not outcompeting this population.
- **Diversity of Suitable Habitat:** Based on the information associated with specific California Natural Diversity Database (CNDDDB) (CDFG 2011) locations in Contra Costa County and personal observations (Bartosh pers. observation) habitat requirements for this taxon are slope, aspect, soil, and elevation (98 to 1,657 feet) are fairly strict. This population occupies habitat that is typical for this taxon in Contra Costa County. Therefore diversity of habitat that this taxon can occupy is limited to grasslands on north-facing aspects, slopes generally ranging between 30 to 50 percent, and on Altamont soils. Surveys, acquisition, and any introduction activities related to this taxon should be directed at these criteria.

Diablo Helianthella (Heca1)

On May 2 2011 a single population (Heca1) of Diablo helianthella was observed within upper Oil Canyon on the Barron property (Attachment A). This population totaled an estimated 12 individuals and occupied approximately 383 square feet (0.01 acres) of oak woodland/scrub/grassland ecotone habitat at 1,257 feet in elevation. It is located immediately upslope of an access road on a northeast facing slope (approximately 55°) in partial shade, in the north-central portion of the western Barron parcel. The soils that support this population are of the Los Gatos loam, 15 to 30 percent slopes mapping unit (USDA 1977). Plant species associated with this population include bush monkeyflower (*Mimulus aurantiacus*), western hop tree (*Ptelea crenulata*), Italian ryegrass (*Lolium multiflorum**), soft chess*, farwell to spring (*Clarkia affinis*), hedge parsley (*Torilis arvensis**), wild oats*, buckeye (*Aesculus californica*), and poison oak (*Toxicodendron diversilobum*).

* Denotes a nonnative species that has an origin other than that of California



Photo 3. Hecal Looking southwest at occupied habitat



Photo 4. Flowering individual of Hecal

- **Physical Condition:** All plants appeared in excellent physical condition. Of the twelve individuals observed only one was in flower the rest were either vegetative or in bud. 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 10 inches to 26 inches (2'2") in basal diameter.
- **Age Structure:** Of the twelve plants eight were considered mature in age. The remaining four were younger plants. This assessment is based on the circumference of individuals and the number of basal leaves of an individual. The smaller the circumference (or fewer number basal leaves) the younger the plant is presumed to be. No assessment of the seed bank was attempted.
- **Reproductive Success:** Only one individual was in flower at the time of the surveys and this individual had not begun to produce seed. Approximately 8 percent of the individuals of this this population were flowering, 59 percent were in bud, and the remaining 33 percent were only presented vegetative structures. Because none of the individuals had begun to produce seed an assessment of reproductive success is difficult to present. However, had all of the potential fruiting flowers, of this single inflorescence, set seed the total number of seed potentially produced in each inflorescence is 111 (number of fertile disk flowers estimated). It is unknown at this time whether a population size of 12 individuals is self-sustaining over the long term. Given this is a perennial plant population that can be stable from year to year we presume that it is reproducing and presumed stable.
- **Availability of Suitable Habitat:** Throughout its range, which almost entirely occurs within Contra Costa County, this taxon prefers partially shaded habitat on the ecotone of oak woodland, scrub or chaparral, and grassland habitats on loamy soils (CDFG 2011c; Bartosh pers. observation). This species also prefers slopes between 30 to 75 percent (CDFG 2011c; Bartosh pers. observation). Population Hecal is small in relation to the unoccupied suitable habitat it is surrounded by. There is also an abundance of loam soils with the appropriate vegetation associations throughout the Barron and Lentzner properties. Therefore there is potential for

expanding this population. No directly competing weed or native plant species were observed within or adjacent to this population.

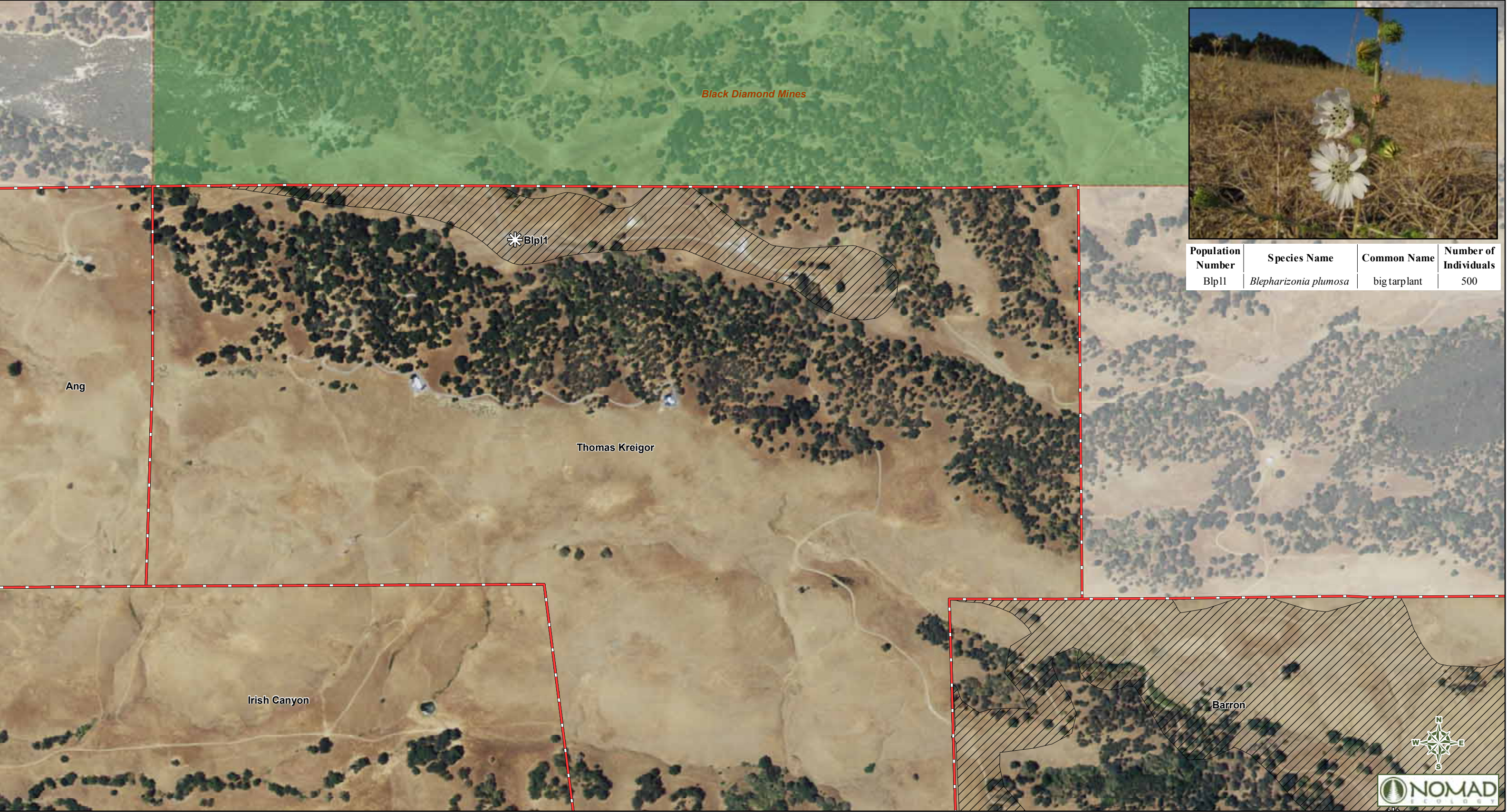
- **Diversity of Suitable Habitat:** Based on the information associated with specific California Natural Diversity Database (CNDDDB) (CDFG) locations in Contra Costa County and personal observations (Bartosh pers. observation) habitat requirements for this taxon are more general in nature. The only requirements this taxon prefers is loamy soils, moderately steep slopes, and the appropriate vegetation ecotones. This population occupies habitat that is typical for this taxon in Contra Costa County. Surveys, acquisition, and any introduction activities related to this taxon should be directed at these criteria.

Thomas Kreigor

A single covered plant species population was observed within the Thomas Kriekor Property (Table 8, Figure 3). No extant populations of rare plant species were known from this property prior to these studies. No-take plant populations were not observed within this zone.

Table 8. Covered Plant Species Populations Recorded on the Thomas Kreigor Property

POPULATION NUMBER	SPECIES NAME	COMMON NAME	STATUS	NUMBER OF INDIVIDUALS
Blp11	<i>Blepharizonia plumosa</i>	big tarplant	Covered CRPR 1B.1	500




December 2011


2011 Covered Plant Species Inventory


Covered Plant Species

Scientific Name

 *Blepharizonia plumosa*

Legend

 Acquisition Parcels

 Public Land and Easements


 Survey Areas

Figure 3
Covered Plant Species of
Thomas Kreigor (North Parcel)
East Contra Costa County
Habitat Conservancy



East Contra Costa County
Habitat Conservancy

1:7,200

0 300 600

Feet

Big tarplant (Blpl1)

On September 14, 2011 a single population (Blpl2) of big tarplant was observed on the north slope of Krieger Peak on the Thomas Kreigor property (Attachment A). This population totaled an estimated 500 individuals and occupied approximately 7,578 square feet (0.17 acres) of grassland habitat at 1,653 feet in elevation. It is located on the south side of a paved access road on a northeast facing slope (approximately 45°), in the north-central portion of the northern parcel of this acquisition. The soils that support this population are of the Altamont-Fontana Complex, 30 to 50 percent slopes mapping unit (USDA 1977). Plant species associated with this population include wild oats*, hare barley (*Hordeum murinum* subsp. *leporinum**), Italian ryegrass*, prickly lettuce*, and yellow starthistle (*Centaurea solstitialis**)



Photo 5. Blpl1 Looking west at occupied habitat



Photo 6. Flowering individual of Blpl1

- **Physical Condition:** All plants appeared in excellent physical condition. No signs of disease, virus, herbivory, or nutrient deficiencies were observed on any individuals. Due to the presence terpenoids produced by this plant species, they are unpalatable to cattle and are therefore not grazed by cattle. This population is expected to survive and reproduce. Size of individuals was shorter on average than Blpl2 and ranged from approximately 6 inches to 35 inches (2'11").
- **Age Structure:** This characteristic is not applicable as big tarplant is an annual species.
- **Reproductive Success:** All individuals had produced buds, flowers, and fruits at the time of the surveys. Approximately 50 percent of the individuals of this this population were fruiting and 50 percent were in flower. All of the fruits/seeds inspected are either mature or maturing. An average of 10 aborted fruits were observed within fruiting inflorescences. An average of 26 inflorescences was estimated per individual. The total number of seed potentially produced in each inflorescence is 48, which includes the total number of disk and ray fruits (cypsela). Based on the number of individuals at this population, possible number of seeds produced, and an assumption of aborted cypsela it is presumed that 494,000 seeds (988 seeds per plant) were produced by this population in 2011. It is unknown at this time whether a population size of 500 individuals is self-sustaining over the long term, given this is an annual plant population prone to fluctuations in population

numbers based on climactic conditions and it was only observed at one time (not over multiple years).

- **Availability of Suitable Habitat:** Throughout its range, especially within Contra Costa County, this taxon prefers northerly aspects on Altamont series or Altamont-Fontana complex soils in annual grassland habitat (Bartosh pers. observation). Population Blpl1 supports a large number of individuals within its occupied habitat therefore there is little unoccupied habitat here. Although there is an abundance of Altamont soils within the Thomas Kreigor property north facing slopes are a limiting factor. However there is potential for expanding this population to the east of where it is currently positioned. It should be noted that non-native plant species such as prickly lettuce (*Lactuca serriola**) and yellow starthistle (*Centaurea solstitialis**) were observed as associates of this population. Although growing sympatrically with these species it is possible that big tarplant may compete for resources with these weeds. Routine monitoring should be conducted to ensure these non-native weed species are not outcompeting this population.
- **Diversity of Suitable Habitat:** Based on the information associated with specific California Natural Diversity Database (CNDDDB) (CDFG) locations in Contra Costa County and personal observations (Bartosh pers. observation) habitat requirements for this taxon are slope, aspect, soil, and elevation (98 to 1,657 feet) are fairly strict. This population occupies habitat that is typical for this taxon in Contra Costa County. Therefore diversity of habitat that this taxon can occupy is limited to grasslands on north-facing aspects, slopes generally ranging between 30 to 50 percent, and on Altamont soils. Surveys, acquisition, and any introduction activities related to this taxon should be directed at these criteria.

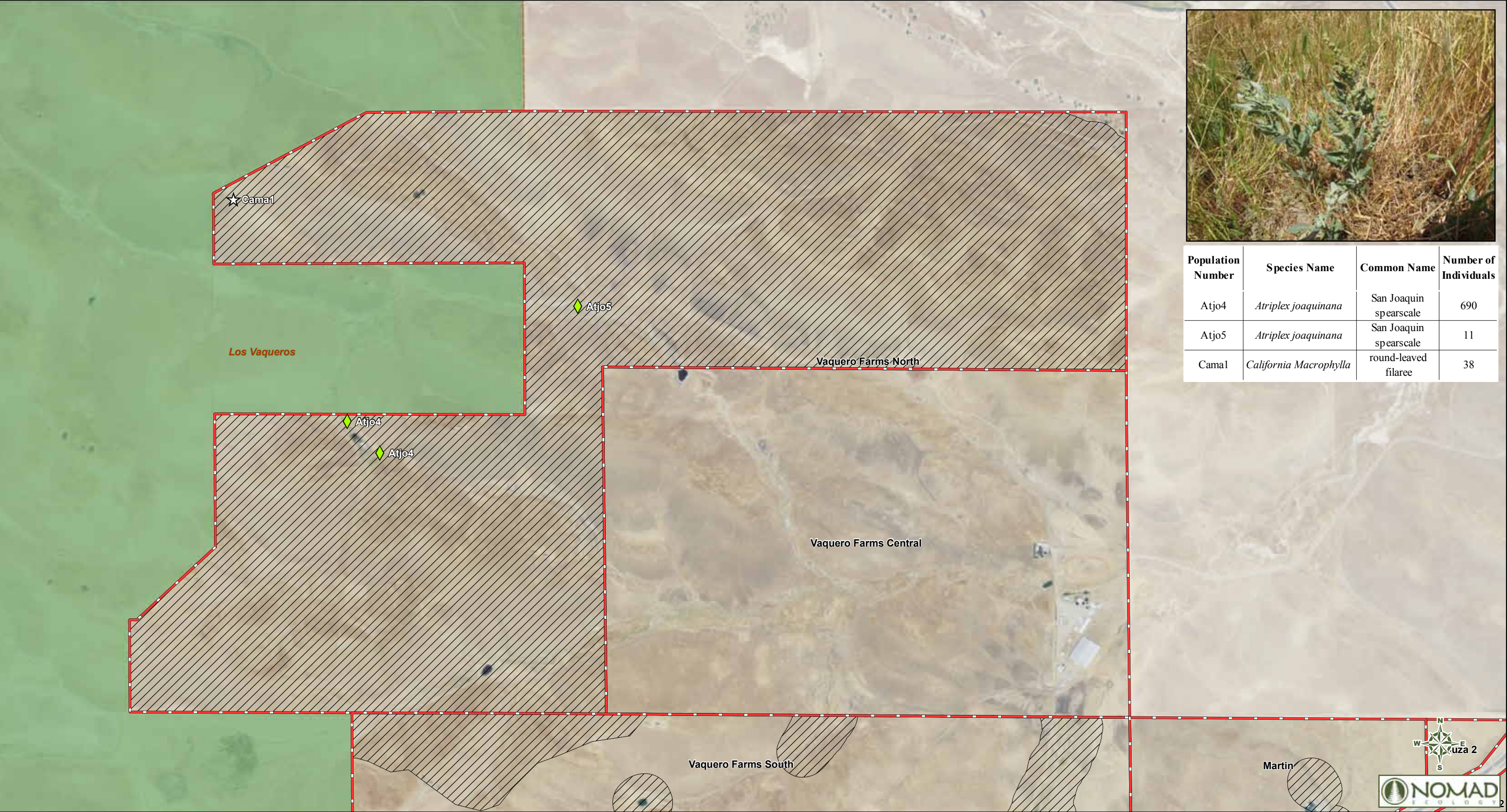
4.1.3 ZONE 5 – BYRON HILLS

Vaquero Farms North

Two populations of covered plant species were observed within the Vaquero Farms North Property (Table 9, Figure 4). A single extant population of San Joaquin spearscale (discussed below) is known from this property prior to these studies. No-take plant populations were not observed within this zone.

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

POPULATION NUMBER	SPECIES NAME	COMMON NAME	STATUS	NUMBER OF INDIVIDUALS
Atjo4	<i>Atriplex joaquinana</i>	San Joaquin spearscale	Covered CRPR 1B.2	690
Atjo5	<i>Atriplex joaquinana</i>	San Joaquin spearscale	Covered CRPR 1B.2	11




Population Number	Species Name	Common Name	Number of Individuals
Atjo4	<i>Atriplex joaquinana</i>	San Joaquin spearscale	690
Atjo5	<i>Atriplex joaquinana</i>	San Joaquin spearscale	11
Cama1	<i>California Macrophylla</i>	round-leaved filaree	38


December 2011

2011 Covered Plant Species Inventory


Covered Plant Species


Scientific Name

 *Atriplex joaquinana*

 *California macrophylla*

Legend

 Acquisition Parcels

 Public Land and Easements




 Survey Areas

Figure 4
Covered Plant Species of
Vaquero Farms North
East Contra Costa County
Habitat Conservancy



1:9,600

0400800

Feet

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

San Joaquin Spearscale (Atjo 4 and Atjo5)

On May 10, 2011 two populations (Atjo4⁸ and Atjo5) of San Joaquin spearscale were observed within an alkali drainage in the western portion of the Vaquero Farms North property. (Attachment A). These populations are separated by a distance of 0.5 mile. Although they are technically treated as two separate populations by the CNDDDB (>0.25 mile apart) their discussion here is lumped together as the alkaline drainage they occupy is contiguous, though the portion of the drainage that separates these two populations is owned by Contra Costa Water District (CCWD). It is likely that this CCWD portion of the drainage also supports San Joaquin spearscale individuals and would thus connect these two occurrences. Plant species associated with these populations include crownscale (*Atriplex coronata* var. *coronata*), alkali heath (*Frankenia salina*), alkali mallow (*Malvella leprosa*), wild oats*, meadow barley (*Hordeum brachyantherum* subsp. *brachyantherum*), and yellow lotus (*Melilotus indica**).

These two populations totaled an estimated 701 individuals and occupied approximately 7,605 square feet (0.17 acres) of alkali wetland and alkali grassland habitat between 217 and 248 feet in elevation. The drainage they are located in flows north off of this property onto CCWD land where it turns east. It is a gently sloping decent from Atjo4 to Atjo5. As a valley bottom these populations do not have an aspect. The soils that support these populations are of the Pescadero Series which is an alkaline soil type. Both of these populations occupy scald habitat (USDA 1977).

The downstream population (Atjo5) is a known CDNDDDB occurrence (Occurrence #101; EONDX# 82137). This occurrence was reported in 2008 by Rob Preston of ICF. At the time this population was noted as consisting of 50 to 100 individuals. However, this occurrence is represented by two separate polygons and one of the polygons is located off of Conservancy property. Therefore it cannot be assumed that all of these individuals are present on Vaquero Farms North.



Photo 7. Atjo5 Looking east at occupied habitat



Photo 8. Flowering individual of Atjo4

- **Physical Condition:** Most plants appeared in excellent physical condition. Although there were no signs of disease, virus, herbivory, or nutrient deficiencies some individuals appeared to have been trampled by cattle. These trampled individuals still exhibited vigorous growth and were fruiting. These populations were expected to have survived and reproduced. Size of individuals ranged from approximately 2 inches to 8 inches.

⁸ This population (Atjo4) is represented by two colonies. These colonies occupy alkaline habitat above an in-channel stock pond.

- **Age Structure:** This characteristic is not applicable as San Joaquin spearscale is an annual species.
- **Reproductive Success:** All individuals had produced buds, flowers, and fruits at the time of the surveys. Approximately 30 percent of the individuals of these populations were fruiting and the remaining 70 percent were in flower. All of the fruits/seeds inspected are either mature or maturing. 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 flower) 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 132,489 seeds (189 seeds per plant) were produced by these populations in 2011. It is unknown at this time whether populations sizes of 701 (690 and 11, respectively) are 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).
- **Availability of Suitable Habitat:** Throughout its range, especially within Contra Costa County, this taxon prefers the margins of alkaline scalds and vernal 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 (CDFG 2011c; Bartosh pers. observation).

Population Atjo4 supports an abundance of individuals within the area of habitat it occupies which may not be suitable for population enhancement. However, upstream along the western fork of this drainage is ample unoccupied suitable habitat on vernal wet heavy clay soils where population expansion could be attempted.

Population Atjo5 is extremely small in relation to the unoccupied suitable habitat it is surrounded by up and downstream of its current location. Both occupied and unoccupied habitat areas are supported by Pescadero Series soils. This drainage also continues on the recently acquired Vaquero Farms Central where there may be additional colonies of San Joaquin spearscale and undoubtedly more suitable habitat.

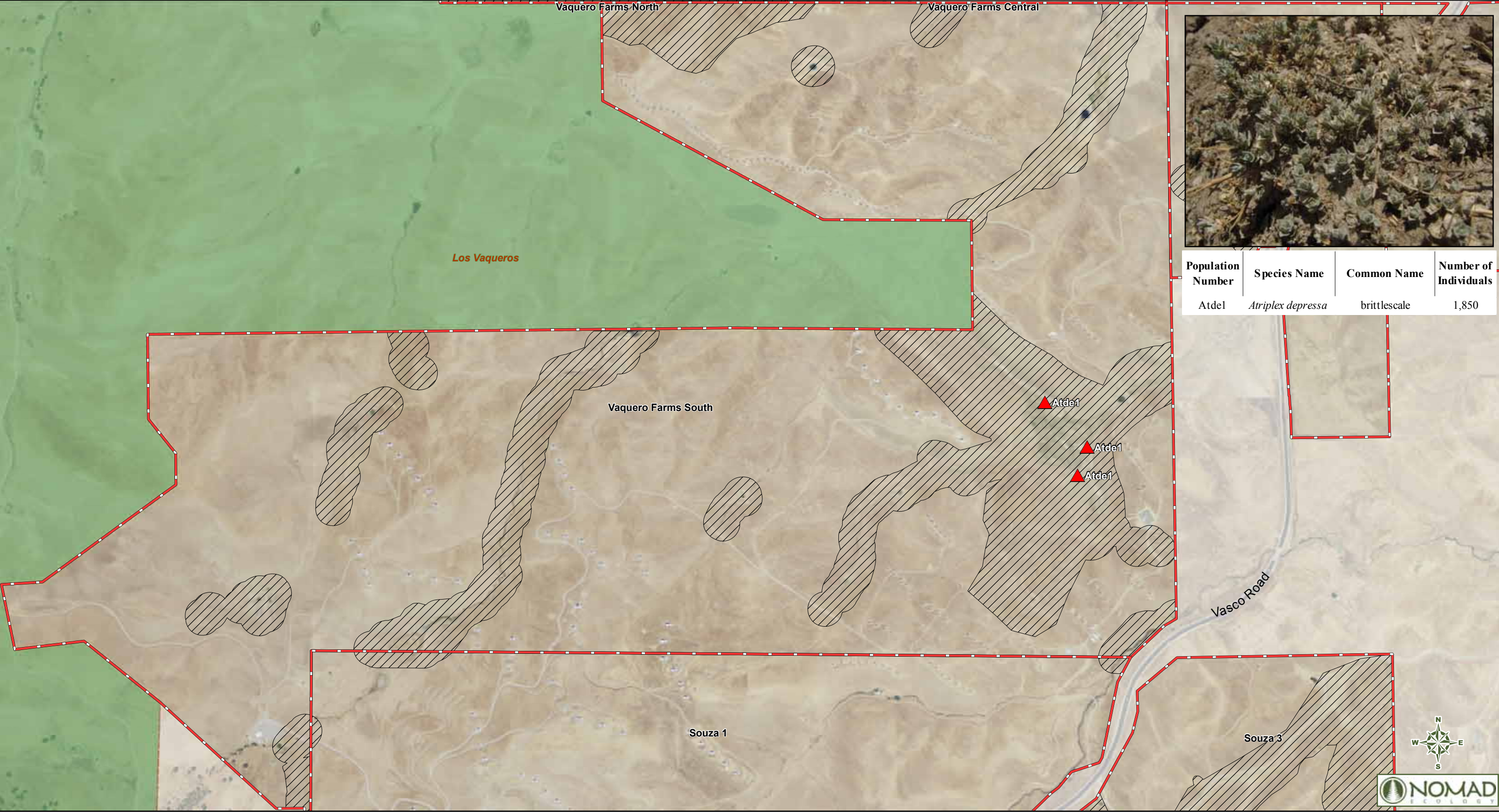
- **Diversity of Suitable Habitat:** This taxon can occupy a variety of soil types as long as the landscape position and early spring hydrology are appropriate (CDFG 2011c; Bartosh pers. observation). These populations can tolerate alkaline conditions which may indicate that they represent genotypes adapted to soils with an elevated pH. This should be taken into consideration if population expansion is a goal.

Vaquero Farms South

A single population of covered plant species was observed within the Vaquero Farms South Property (Table 10, Figure 5). A single extant population of brittlescale (discussed below) is known from this property prior to these studies. No-take plant populations were not observed within 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
Atde1	<i>Atriplex depressa</i>	brittlescale	Covered CRPR 1B.2	1,850



December 2011

2011 Covered Plant Species Inventory

Legend

Covered Plant Species
Scientific Name
▲ *Atriplex depressa*

Acquisition Parcels
Public Land and Easements
Survey Areas

Figure 5
Covered Plant Species of
Vaquero Farms South
East Contra Costa County
Habitat Conservancy



NOMAD
ECOLOGY

1:13,200

0 550 1,100

Feet

Brittlescale (Atde1)

On May 9, 2011 a single population (Atde1⁹) of brittlescale was observed on the margins of alkaline scalds within the large alkali wetland in the bowl shaped valley bottom of the southeastern parcels of the Vaquero Farms South Property (Attachment A). This population totaled an estimated 1,850 individuals and occupied approximately 9,871 square feet (0.23 acres) among the three colonies on alkaline wetland habitat. These colonies are between 150 and 160 feet in elevation. As a valley bottom occurrence this population does not have an aspect. The soils that support these populations are of the Pescadero Series which is an alkaline soil type. (USDA 1977). Plant species associated with this population include hare barley*, Mediterranean barley (*Hordeum marinum* subsp. *gussoneanum**), Italian ryegrass*, crownscale, meadow barley, sand spurrey (*Spergularia marina*), sickle grass (*Parapholis incurva**), alkali heath, saltgrass (*Distichlis spicata*), ball scale (*Atriplex fruticulosa*), and alkali pepperweed (*Lepidium dictyotum*).

Although a nearby CNDDDB occurrence polygon (Occurrence #4; EONDX# 27249) does not connect this this area of occupied habitat on Vaquero Farms South with another scald complex downstream, these two colonies are within 0.25 miles of each other and could be considered part of the same population. This occurrence was reported as having 2,500 individuals in 1989.



Photo 9. Atde1, looking northwest at occupied habitat.

⁹ This population is represented by three colonies surrounding the large alkali scald on this property.



Photo 10. Flowering individual of Atde1

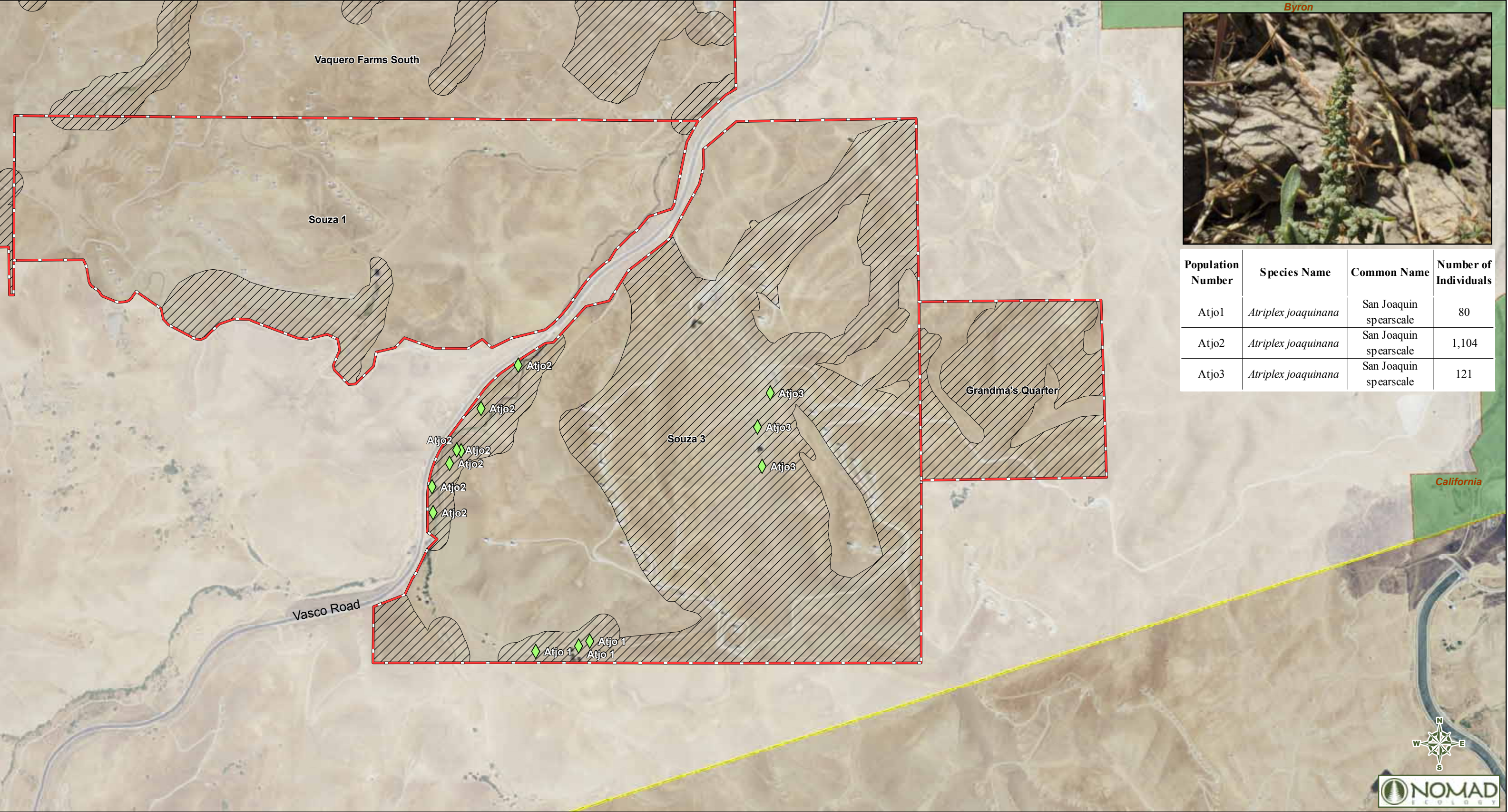
- **Physical Condition:** Most plants appeared in excellent physical condition. Although there were no signs of disease, virus, herbivory, or nutrient deficiencies some individuals appeared to have been trampled by cattle. These trampled individuals still exhibited vigorous growth and were fruiting. This population was expected to have survived and reproduced. These plants are prostrate annuals so the height only ranged from approximately 0.79 to 1.18 inches.
- **Age Structure:** This characteristic is not applicable as brittlescale is an annual species.
- **Reproductive Success:** At the time of the surveys all plants had not yet begun to flower and therefore produce fruit. Therefore an assessment of reproductive success was not attainable. Given this is an annual plant population prone to fluctuations in population numbers based on climactic conditions and it was only observed at one time (not over multiple years) we do not presume that it is reproducing and presumed stable.
- **Availability of Suitable Habitat:** Brittlescale has very strict habitat requirements. Where location information is specific within Contra Costa County, it has only been reported as occurring on Solano or Pescadero series soils (CNDDDB 2011c). Within these soils there is a narrow band of habitat this taxon occupies, the margins of alkaline scalds (Bartosh pers. observation). The area that Atde1 occupies is approximately 50 percent of the suitable habitat in this valley bottom where soils are appropriate. There is also an abundance of these conditions downstream of this population as well as on the western parcel of Vaquero Farms South. Therefore there is potential for expanding this population on this property.
- **Diversity of Suitable Habitat:** Based on the information associated with specific California Natural Diversity Database (CNDDDB) (CDFG 2011c) locations in Contra Costa County and personal observations (Bartosh pers. observation), habitat requirements for this taxon rely on soil type with chemistry the driving force. This population occupies habitat that is typical for this taxon in Contra Costa County. Therefore diversity of habitat that this taxon can occupy is limited to the margins of alkaline scalds in valley bottoms. Surveys, acquisition, and any introduction activities related to this taxon should be directed at these criteria.

Souza III

Three populations of covered plant species were observed within the Souza III Property (Table 11, Figure 6). Two extant population of San Joaquin spearscale (discussed below) are known from this property prior to these studies. No-take plant populations were not observed within this zone.

Table 11. Covered Plant Species Populations Recorded on the Souza III Property

POPULATION NUMBER	SPECIES NAME	COMMON NAME	STATUS	NUMBER OF INDIVIDUALS
Atjo1	<i>Atriplex joaquinana</i>	San Joaquin spearscale	Covered CRPR 1B.2	80
Atjo2	<i>Atriplex joaquinana</i>	San Joaquin spearscale	Covered CRPR 1B.2	1,014
Atjo3	<i>Atriplex joaquinana</i>	San Joaquin spearscale	Covered CRPR 1B.2	121



December 2011

2011 Covered Plant Species Inventory

Covered Plant Species

Scientific Name

Atriplex joaquinana

Legend

Acquisition Parcels

Public Land and Easements

Survey Areas

County Boundaries

Figure 6
Covered Plant Species
of Souza 3
East Contra Costa County
Habitat Conservancy

1:15,840

00.1250.25

Miles

San Joaquin Spearscale (Atjo1, Atjo2, and Atjo3)

On May 6, 9, and 11, 2011 three populations (Atjo1, Atjo2, and Atjo3) of San Joaquin spearscale were observed within three drainages on the Souza III property. One of these populations (Atjo2) is immediately adjacent to Brushy Creek on the north side of the property fronting Vasco Road. The other two populations (Atjo1 and Atjo 3) are located on tributaries of Brushy Creek on the interior of the property (Attachment A). These populations are separated by an average distance of 0.6 mile. Plant species associated with these populations include crownscale, Italian ryegrass*, hare barley*, black mustard (*Brassica nigra**), sickle grass*, curly dock (*Rumex conglomeratus**), saltgrass, soft chess, Great Valley gumweed (*Grindelia camporum*), ball scale, common tarweed (*Centromadia pungens* subsp. *pungens*), and alkali weed (*Cressa truxilensis*).

These three populations totaled an estimated 625 individuals and occupied approximately 23,505 square feet (0.54 acres) of alkali wetland and alkali grassland habitat between 330 and 500 feet in elevation. Population Atjo1 is located on the southwestern portion of the property in a tributary of Brushy Creek that flows in from the east. Population Atjo2 is located on the northern portion of Souza III, south of Vasco Road. Colonies of this population straddle both sides of Brush Creek. The Atjo3 population is located in the center of the Souza III property in a northerly flowing tributary to Brushy Creek. As a valley bottom these populations do not have an aspect. Populations Atjo2 and Atjo3 are supported by Pescadero Series soils. Population Atjo1 occurs on soils mapped as Altamont-Fontana Complex. Both these soil types are heavy clays but Altamont-Fontana complex soils are not considered alkaline (USDA 1977).

Population Atjo1 is a known CDNDDDB occurrence (Occurrence #14; EONDX# 9184). This occurrence was reported in 1989. At the time this population was noted as consisting of 1,000 individuals. In 2011 only 80 individuals were observed at this location which is a considerable difference between 1989 and 2011 population estimates.

Population Atjo2 is also a known CNDDDB occurrence (Occurrence #7; EONDX# 18637). In 1989 this occurrence was reported as having 775 individuals. However, this occurrence was recorded as a part of the initial Vasco Road construction surveys and is also located off Conservancy property. Therefore it cannot be assumed that all of these individuals are present on Souza III. Regardless there is an increase in individuals from 1989 to 2011.



Photo 11. Atjo3 Looking southwest at occupied habitat



Photo 12. Flowering individual of Atjo3

- **Physical Condition:** Within all three population most plants appeared in excellent physical condition. Although there were no signs of disease, virus, herbivory, or nutrient deficiencies some individuals appeared to have been trampled by cattle. These trampled individuals still exhibited vigorous growth and were fruiting. These populations were expected to have survived and reproduced. Size of individuals ranged from approximately 2 inches to 8 inches.
- **Age Structure:** This characteristic is not applicable as San Joaquin spearscale is an annual species.
- **Reproductive Success:** Due to similar phenological states of the three San Joaquin spearscale populations on Souza three this discussion of reproductive success has been combined. On average approximately 70 of individuals were in full flower with no obvious fruit developing. All inflorescence spikes of flowering individuals appear to be of equal size and contain a similar number of staminate and pistillate flowers. All of the fruits/seeds inspected are either mature or maturing. Attaining a visual estimate of viable seeds for this taxon is difficult due to immature fruits, 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 flower) 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 229,635 seeds (189 seeds per plant) were produced by these populations in 2011.

Based on CNDDDB information from 1989 population Atjo2 has increased since that time and is considered stable. Population numbers from 1989 to 2011 for Atjo1 indicate that this population may be in decline with a reduction of approximately 900 individuals. It is unknown at this time whether a population size of 121 for Atjo3 is self-sustaining over the long term. As an annual plant species it is presumed that a seed bank exists in the soil supporting these populations and these populations experience annual variation in abundance due to climatic conditions. Based on one year's data it is difficult to state whether these populations are stable and reproducing. With previous survey data from the CNDDDB it is possible to presume that specific populations are reproducing and presumed stable.

- **Availability of Suitable Habitat:** Throughout its range, especially within Contra Costa County, this taxon prefers the margins of alkaline scalds and vernal 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 (CDFG 2011c; personal observation) as noted at Atjo1.

Population Atjo1 is extremely small in relation to the unoccupied suitable habitat it is surrounded by up and downstream of its current location. Both occupied and unoccupied habitat areas are supported by Altamont Series soils. The areas of unoccupied habitat are suitable for population expansion if this population is considered to be in serious decline once multiple year data is established.

Populations Atjo2 and Atjo3 are relatively small in relation to the unoccupied suitable habitat within these valley bottoms on Pescadero series soils. Population expansion would be possible for both of these populations, especially Atjo3 which is represented by a low number of individuals.

- **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 (CDFG 2011c; Bartosh pers. observation). Based on their location Atjo2 and Atjo3 can tolerate alkaline conditions which may indicate that they represent genotypes adapted to soils with an elevated pH. Since the soil type that supports Atjo1 is Altamont-Fontana complex this population may not tolerate expansion into

soils types with an elevated pH. This should be taken into consideration if population expansion is a goal for these populations.

Crownscale

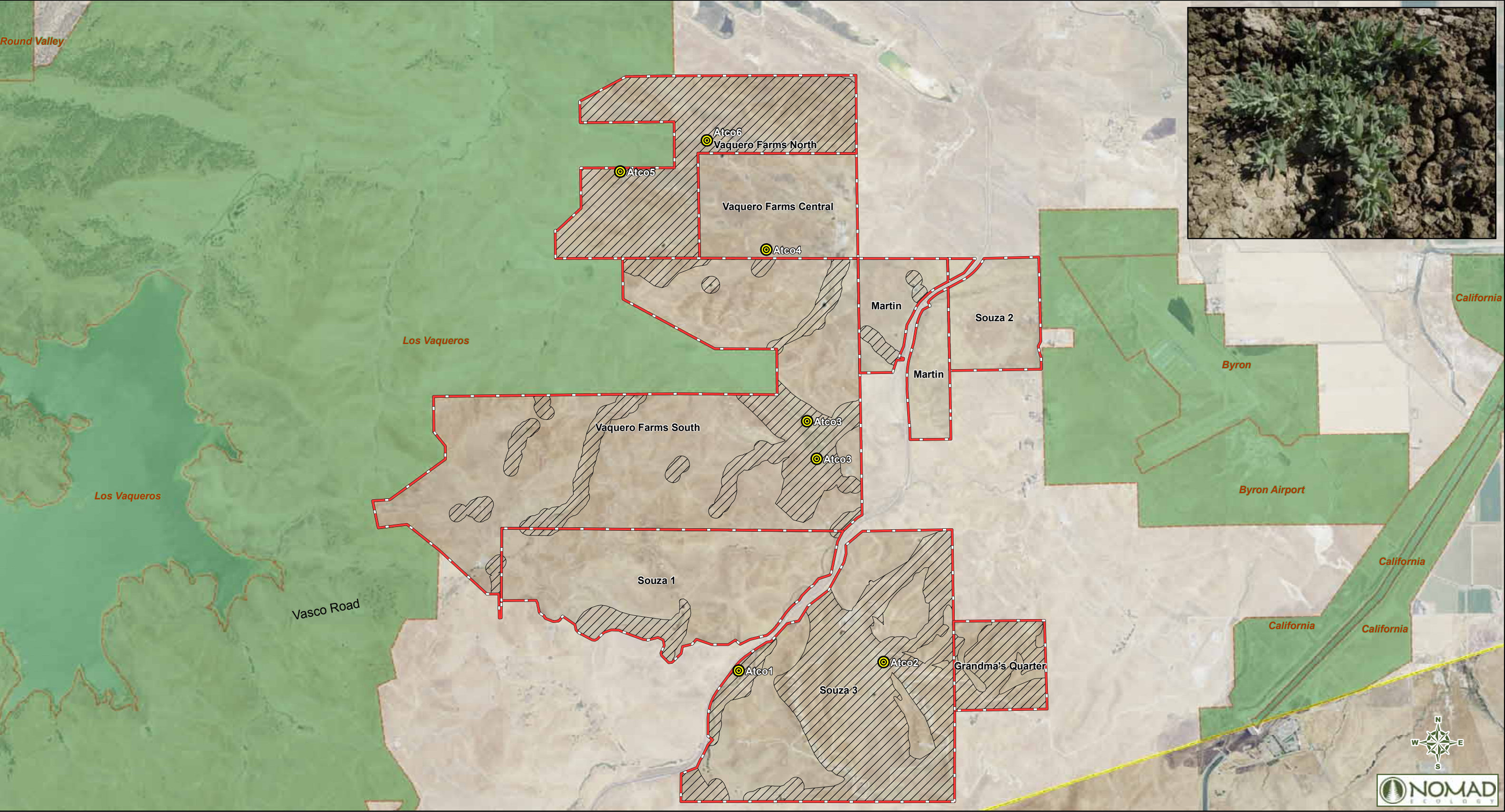
In addition to covered plant species another rare plant species, crownscale, which has a California Rare Plant Rank of 4.2, was also recorded during the course of our studies. A total of 6 populations occur within Conservancy property. These populations total approximately 979 individuals (Table 12, Figure 7). Locations of these populations are included in Figure 7. Population Atco3 on Vaquero Farms South was amplified due to mitigation activities associated with seed salvage from the Vineyards at Marsh Creek Project during 2004 and 2005. The other populations encountered are considered natural.

Table 12. Locations of Crownscale within Preserves.

POPULATION NUMBER	PROPERTY	NUMBER OF INDIVIDUALS
Atco1	Souza III	300
Atco2	Souza III	215
Atco3	Vaquero Farms South	24
Atco4	Vaquero Farms Central	50
Atco5	Vaquero Farms North	125
Atco6	Vaquero Farms North	265



Photo 13. Crownscale individual at Atco2




December 2011


2011 Covered Plant Species Inventory


Covered Plant Species


Scientific Name

 *Atriplex coronata* var. *coronata*

Legend

 Acquisition Parcels

 Public Land and Easements

 Survey Areas



 County Boundaries

Figure 7
Crownscale
Locations
East Contra Costa County
Habitat Conservancy



1:31,680

0

0.25

0.5

Miles

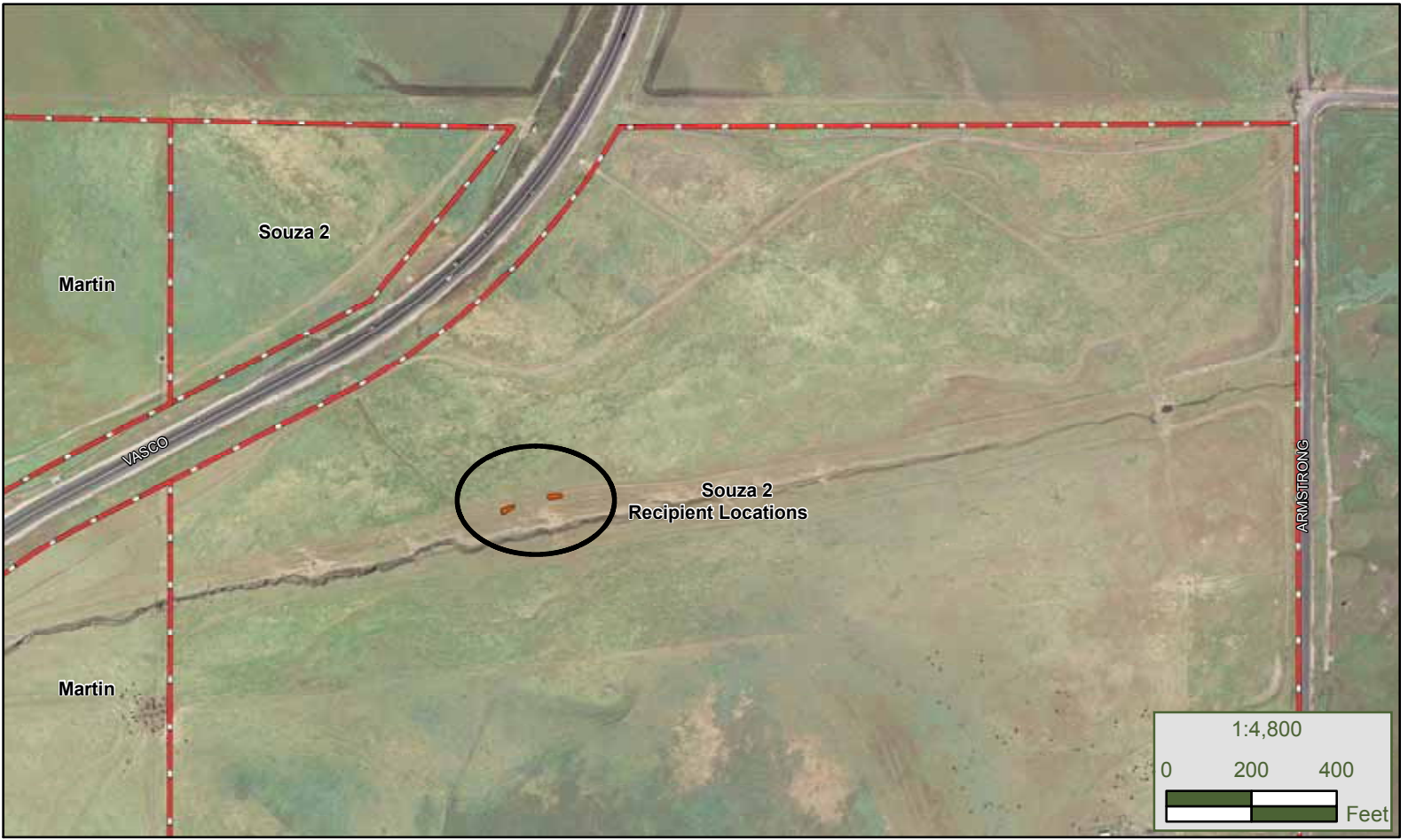
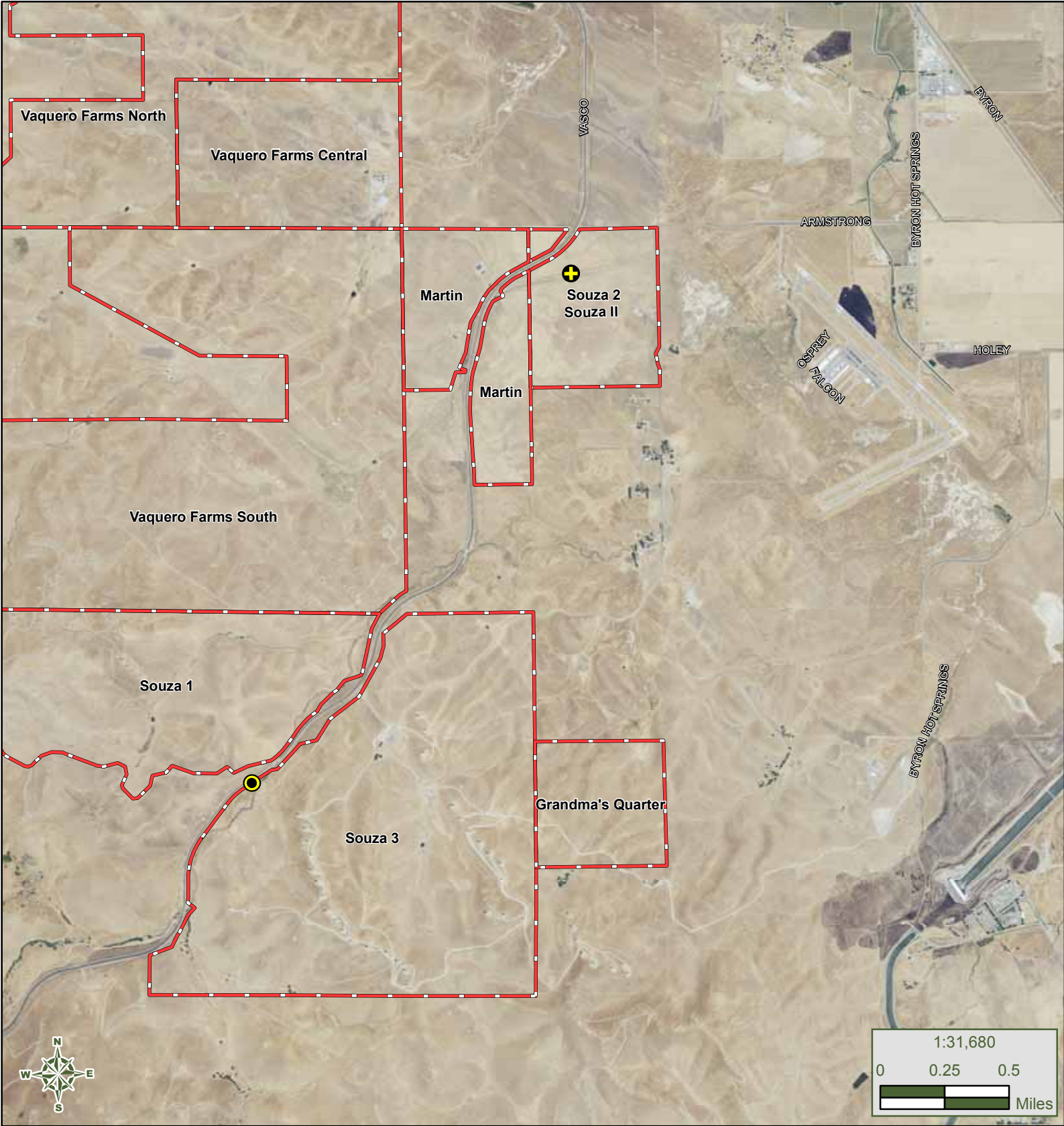
San Joaquin Spearscale Translocation

On February 9, 2011, topsoil containing seeds of San Joaquin spearscale (*Atriplex joaquinana*) was translocated from the Vasco Road Widening Project to the Souza II site (Figure 8). These Vasco Road populations, and its seed bank, were going to be impacted unless the soil was salvaged from the Vasco Road construction site. The first 10 inches of the topsoil was salvaged and distributed into two discrete sites: east (350 square feet) and west (340 square feet) (Figure 8) on Souza II. These soils of these two locations were distributed by dump truck and compacted manually with hand tools. These sites are on the north-central portion of Souza II, north of the creek that bisects this property. At the time of salvage and translocation no San Joaquin spearscale individuals had germinated. During vegetation and hydrologic monitoring activities on Souza II the translocation sites were monitored to record any San Joaquin spearscale individuals that had emerged from the spoils.

On May 13, 2011, seven San Joaquin spearscale and two crownscale individuals were observed within the western spoils site. In the eastern spoils site 17 San Joaquin spearscale and 1 crownscale individuals were observed. Therefore a total of 24 San Joaquin spearscale and three crownscale individuals had successfully reproduced. However, with population numbers this low and an unknown number of seed in the seed bank, the long-term sustainability of this translocated population is unknown.



Photo 14. San Joaquin saltbush in the soil translocation site.



December 2011

2011 Covered Plant Species Inventory

Legend

Atriplex Joaquinana Locations Sites	Recipient Polygon Locations
Salvage Site	Acquisition Parcels
Recipient Site	

Figure 8
Salvage and
Recipient Sites
 East Contra Costa County
 Habitat Conservancy



Section 5. SUMMARY AND RECOMMENDATIONS

5.1. SUMMARY

Based on the results of surveys conducted during the months of April, May, and September, 2011 a total of eleven populations of five covered plant species were recorded. These eleven populations meet 45 percent of the population specific biological goals for the four species recorded that have such goals (Table 13). No population specific goals were identified for San Joaquin spearscale other than landscape- and community-level measures aimed at maintaining or enhancing its preserve populations. Overall, populations of covered plant species are considered healthy resulting from positive observations of physical condition, reproductive success, and abundance and diversity of suitable habitat. Most populations also comprised low cover of non-native invasive weeds. However, populations with a low number of individuals may be declining. The following section discusses recommendations addressing this potential.

Table 13. Summary of Biological Goals Based Met Based on 2011 Surveys.

SPECIES RECORDED	BIOLOGICAL GOALS – # OF POPULATIONS TARGETED FOR PROTECTION	2011 POPULATIONS RECORDED	POPULATIONS NEEDED TO MEET BIOLOGICAL GOALS
<i>Atriplex depressa</i> brittlescale	2	1	1
<i>Atriplex joaquinana</i> San Joaquin spearscale	N/A	6*	N/A
<i>Blepharizonia plumosa</i> big tarplant	5^	2	3
<i>California macrophylla</i> round-leaved filaree	2	1**	1
<i>Helianthella castanea</i> Diablo helianthella	2	1	1

^ There is a discrepancy between Biological Goals as presented in Table 5-1 (3 populations) and page 5-126 (5 populations) of the HCP.

* One of these populations is a result of translocation efforts

** Observation is a result from surveys by Insignia Environmental

5.2. RECOMMENDATIONS

Recommendations are either based on details of field observations, meeting biological goals, and review of the HCP.

5.2.1 POPULATION MONITORING

Of the covered plant species populations recorded in 2011, five were recorded as having small population numbers (Table 14). It should be noted that although only 12 Diablo sunflower individuals were recorded at the Barron property its long-term viability is not in question at this time as it is a perennial species.

For the annual species, based on previous CNDDDB data or 2011 observations these populations may either be in decline or too small to be viable for the long term. The HCP 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. Population monitoring should be conducted on a regular basis. However, priorities for monitoring should be based on those that are in danger of becoming extirpated because of low population numbers or showing signs of decline. For these threatened populations a census should be conducted annually and 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, every two or three years.

Table 14. Covered Plant Species Populations with Low Population Numbers.

POPULATION NUMBER	SPECIES NAME/ COMMON NAME	PROPERTY	PREVIOUS CNDDDB CENSUS DATA (# OF INDIVIDUALS)	NUMBER OF INDIVIDUALS (2011)
Atjo1	<i>Atriplex joaquinana</i> San Joaquin spearscale	Souza III	1,000	80
Atjo3	<i>Atriplex joaquinana</i> San Joaquin spearscale	Souza III	No Data	121
Atjo5	<i>Atriplex joaquinana</i> San Joaquin spearscale	Vaquero Farms North	50 to 100	11
Blpl2	<i>Blepharizonia plumosa</i> big tarplant	Barron	No Data	120
Cama1	<i>California macrophylla</i> round-leaved filaree	Vaquero Farms North	No Data ^f	38

5.2.2 WEED CONTROL

Non-native exotic weeds were observed growing sympatrically with the big tarplant population (Blpl1) on the Thomas Kreigor property. These weed species were prickly lettuce* and yellow starthistle* and they have the potential to outcompete this big tarplant population. An attempt should be made at removing these species, especially yellow star thistle, from within occupied and nearby unoccupied habitat. Removal of these weed species should be attempted by hand, as feasible, at a time when this plants are visible but have not yet flowered. During weed removal activities care should be taken to not to impact any young big tarplant individuals.

5.2.3 DESERT OLIVE SCRUB

Desert olive scrub is considered a sensitive natural community (rare) throughout its entire range in California. In Contra Costa County this vegetation community is especially rare only being recorded from five small populations (CCH 2001; Lake 2010). In 2011 a sixth population was observed on the Barron property. Because of the rarity of this community and that it has the potential to be present on other current or future Conservancy acquisitions it should be inventoried, mapped, protected, and monitored to ensure long-term viability.

5.2.4 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 2012. These surveys should be directed at unsurveyed Conservancy parcels, or the remaining portions of unsurveyed 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 needs of the current needs of the HCP and directive of Conservancy personnel.

5.2.5 BIG TARPLANT BIOLOGICAL GOALS

There is a discrepancy of the number of big tarplant populations the Conservancy is required to protect based on biological goals presented in the HCP. Objective 17.3 in Table 5-1 requires that “three” occurrences (populations) be protected outside currently (as of October 2007) held public lands. However, table on page 5-126 of the HCP the goal for big tarplant states “five” occurrences need to be protected to meet the biological goal. Because the inventory area of the HCP represents the extreme northern end of the range for big tarplant we recommend this discrepancy be corrected to five populations are required to meet this goal. The remaining big tarplant populations that lie outside Conservancy property represent peripheral populations that may contain important genetic diversity for this taxon, therefore the maximum amount should be protected. Due to the number of additional unprotected populations in the county attaining protection for five populations is feasible. .

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APPENDIX A

CNDDDB FIELD FORMS

DRAFT