

## Souza II: Restoration Opportunities on a Tributary to Brushy Creek

A project of the East Contra Costa County Habitat Conservancy



*Tributary in summer season*



*In channel wetland vegetation*

**LOCATION:** Between Armstrong Road and Vasco Road, adjacent to Byron Airport Habitat Lands

**WATERSHED:** 2072 acres (upstream of Vasco Road) in Brushy Creek Watershed

**TOTAL PARCEL(S) & SIZE (ACRES):** 1 parcel; 191 acres

The Souza II property is a 191-acre parcel on the Eastern edge of the Diablo Range near the San Joaquin and Contra Costa counties border. A tributary of Brushy Creek bisects the property, flowing from west to east for approximately 2,700 linear feet. The creek contains seasonal and alkali wetland habitats, with additional seasonal wetlands outside of the main channel and a pond at the property's eastern edge.

The Souza II property has been optioned by East Bay Regional Park District (EBRPD). The East Contra Costa County Habitat Conservancy will be a significant partner in the acquisition. EBRPD expects to take title on or before June 30, 2009. Approximately 1000 feet of channel east of Vasco Road and west of Souza 2 is in separate private ownership.

Grassland and wetland habitats on the property are capable of supporting San Joaquin kit fox, Swainson's hawk, western burrowing owl, California red-legged frog, California tiger salamander, and rare shrimp and plant species. The property is situated between Los Vaqueros Watershed Lands and the Byron Airport Habitat Management Lands (HML), and thus provides an opportunity to enhance connectivity among preserved lands and provide protection for a potentially important dispersal and migration corridor. The HML support significant restored wetlands. The Souza II parcel also provides opportunities for meeting biological goals and objectives in the HCP/NCCP, including restoration of streams, seasonal and alkali wetlands to contribute to species recovery and compensate for permanent loss of those habitat types in other parts of East Contra Costa County.

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*Thistle infestation on northwest portion of parcel*

**EXISTING WETLAND TYPE(S), DESCRIPTION, AND ACRES:** The tributary to Brushy Creek is a linear and incised channel throughout the parcel. The banks are mostly unvegetated or vegetated with non-native plant species, with some patches of salt grass (*Distichlis spicata*). Bank instability is likely due to over-grazing and high velocity runoff from artificial channels draining Vasco road, both of which exacerbate erosion. The creek supports some in-channel wetland vegetation on sediment wedges along the channel bottom. Wetland areas adjacent to the tributary are heavily grazed and are of low to moderate quality. Other wetlands are formed behind man-made berms with no fencing to exclude grazing animals.

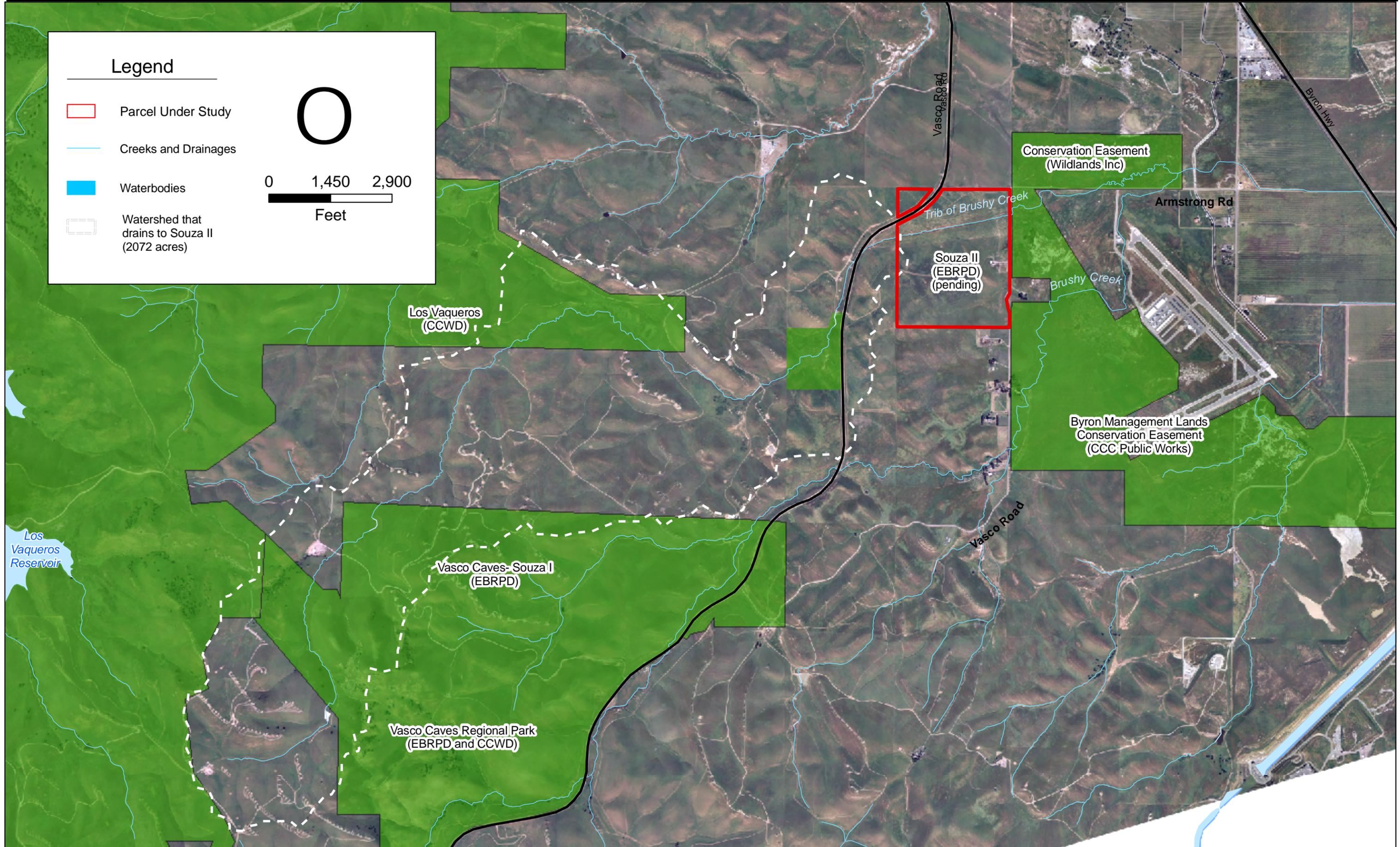
### **INITIAL THOUGHTS ON POTENTIAL RESTORATION PROJECT**

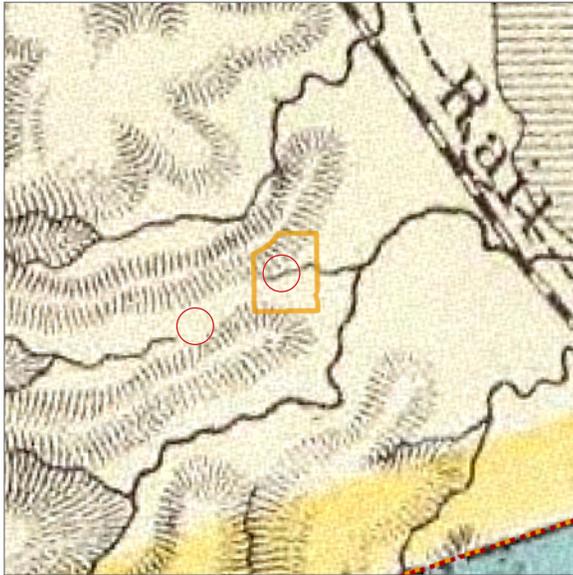
- The intent is to construct a restoration project during 2009 to stay ahead of restoration requirements.
- Phasing could be considered for financial/logistical reasons.
- Constraints include a power line near channel and a severe milk thistle infestation on neighboring hills.
- Important for restoration not to significantly harm covered terrestrial species such as SJKF.

### **INITIAL THOUGHTS ON POTENTIAL RESTORATION GOALS**

- Benefit covered species
- Address HCP's most challenging restoration requirements, such as those for streams, seasonal/alkali wetlands and fairy shrimp to greatest extent possible (e.g. maximize restored acreages.)
- Be cost effective
- Restore hydrologic functions
- Provide significant aesthetic improvement. Property is very visible from Vasco Road and will be public parkland. A dramatic beautification would be wonderful.

# Souza II - Publically Owned and Conserved Lands in the Souza II SubWatershed





DETAIL OF BRUSHY CREEK AREA FROM CALIFORNIA GEOLOGICAL SURVEY  
"TOPOGRAPHICAL MAP OF CENTRAL CALIFORNIA", WHITNEY AND HOFFMAN, 1873

**PRELIMINARY FINDINGS:  
HISTORICAL ECOLOGY OF SOUZA II PROPERTY**

**A Technical Memorandum to Contra Costa County**

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Ruth Askevold



San Francisco Estuary Institute  
August 2008



scale: 1:96,000

Figure 1. Souza II property (center of map, outlined in orange) with contemporary stream network depicted on 2005 imagery.

## INTRODUCTION

The Souza II property is approximately 190 acres recently purchased for restoration purposes by Contra Costa County. Currently a tributary of Brushy Creek runs from west to east across the property in a deeply incised and straight channel. The tributary connects with Brushy Creek about a mile beyond the east edge of the Souza II property (see Fig. 1).

This memorandum was produced to provide technical support for Contra Costa County. It presents early findings for the Souza II project area to inform the development of restoration strategies for the area. The technical memorandum describes some of the historical documents that have been collected for the Brushy Creek area, focusing on the tributary to Brushy Creek that currently bisects the property from west to east. This memorandum is for use by Contra Costa County and the county's partners, and not for general distribution. It is assumed that the audience is familiar with the contemporary geographic setting of the study area.

The preliminary evidence assembled here suggests that the project area was historically a diffuse, seasonally flooded drainage system with alkali wetlands, perhaps vernal pool/swale features, and a discontinuous channel. It appears that this system was converted to a relatively straight artificial channel in the early 20th century, presumably to improve drainage characteristics.

## PRELIMINARY STATUS

It should be recognized that this assessment is preliminary to the Eastern Contra Costa Historical Ecology Study report which is in progress. This report, which will incorporate additional data, analysis, and review, will describe the historical (i.e., prior to substantial Euro-American modification) characteristics of Eastern Contra Costa County. The scope of this document, therefore, will be limited to a description of the documents that have been found for this area. This information could provide a conceptual framework for restoration planning but should be considered preliminary.

## DATA SOURCES

The sources presented here include several historical maps showing possible stream configurations (1853 to contemporary); General Land Office survey data describing the east side of the property (1862); historical botanical specimen locations and descriptions in the area (prior to 1915); a USDA soil map (1933/39); and a mosaic of aerial photographs showing stream alignment (1939). These documents present a preliminary illustration of landscape characteristics before post-World War II development.

## REVIEW OF INDIVIDUAL DATA SOURCES

### *Historical maps indicating channel configuration*

The tributary to Brushy Creek on the Souza II property is currently a deeply incised and relatively straight channel, connecting to the main of Brushy Creek (see Fig 1). Several of the earliest historical maps show the tributary as discontinuous, with the defined channel ending approximately 1/2 mile to the southwest of the property and reappearing

mid-way across the property. Later maps show these reaches connected with a straight, presumably artificial channel. The following maps illustrate this pattern.

The maps that show the tributary not connecting include:

Fig. 2: Los Meganos confirmation survey, U.S. Surveyor's Office, 1853

Fig. 3: Topographical Map of Central California (California Geological Survey), Whitney and Hoffman, 1873

Fig. 4: Official Map of Contra Costa County, McMahon, 1908

Fig. 5: Map of Contra Costa and Alameda Counties, Weber 1913

Fig. 6: Official Map of Contra Costa County, Arnold & Glass, 1914

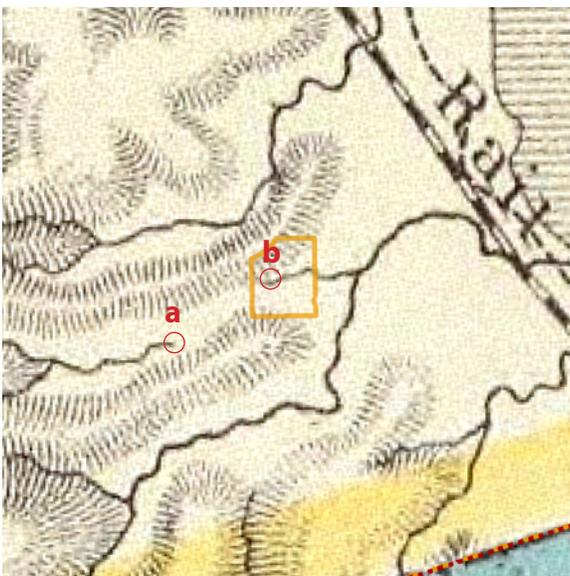
By 1916, the U.S. Geological Survey map shows the tributary connecting across the Souza II property (Fig. 7).



scale: 1:96,000

Figure 2. This detail from an 1853 map of Los Meganos appears to be a copy made by the U.S. Surveyor General's Office of the 1853 original *diseño* (land grant map), probably for the confirmation hearings for the land grant. The map depicts a channel and pond on the east side of the grant. The channel, marked "Salt water", ends about one-half a mile above a body of water, marked "Pond" on this map. The same feature is marked "Salt Pond" on the original map. Once georeferenced, this channel falls in the same location as the tributary to Brushy Creek; however further investigation is required to confirm the location.

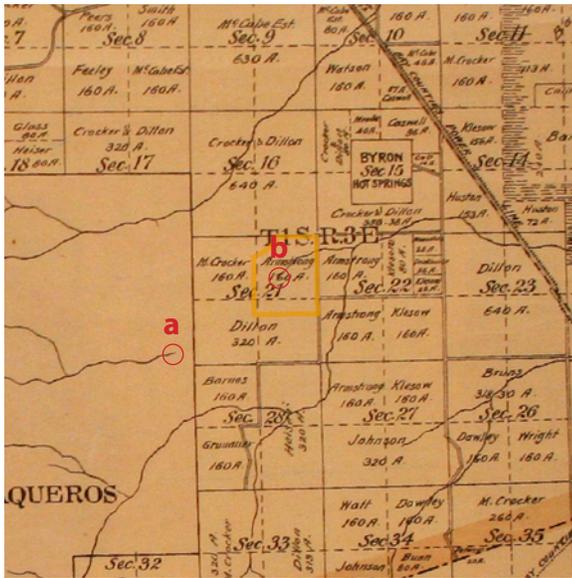
The newly established township and range lines are depicted on each map, and were used to help align the map during georeferencing in the GIS. Measurement between persistent features in the georeferenced *diseño* and the contemporary landscape varies, but overall was remarkably good for such an early map. For example, Briones, Deer, and Horse valleys correspond to the location of the same valleys on a contemporary map, and the lower portion of Marsh Creek agrees in general trend and direction. However, without further investigation, it is difficult to say with certainty the channel portrayed on the land grant map is the tributary to Brushy Creek.



scale: 1:96,000

Figure 3. However, this 1873 map by Hoffmann and Whitney of the California Geological Survey shows the tributary to Brushy Creek quite clearly, and depicts the channel as stopping west of the Souza II boundary (a) and reappearing to the east (b).

This small scale (1:380,000) yet detailed map, entitled "Topographical Map of Central California Together With a Part of Nevada" was part of a statewide surveying and mapping effort by the California Geological Survey.



scale: 1:96,000

Figure 4. The "Official Map of Contra Costa County California" from 1908 was "compiled from private surveys and official records" by surveyor T.A. McMahon. The portion shown to the left indicates the tributary of Brushy Creek is discontinuous for 1500 meters, ending close to the eastern edge of the Los Vaqueros land grant (a), and reappearing again in the NE of section 21, on the Souza II property (b).



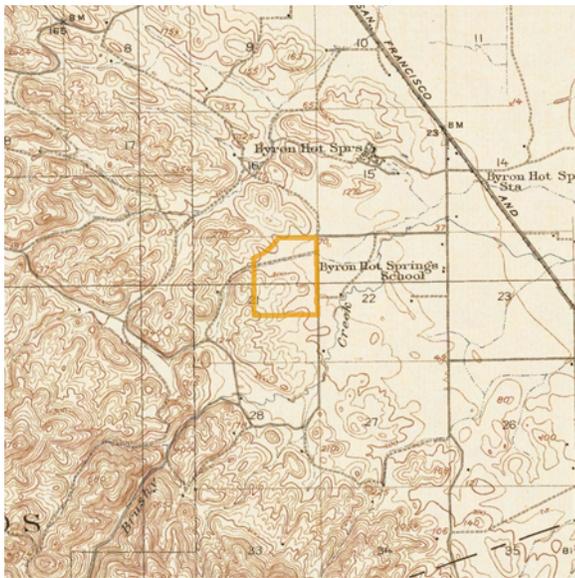
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Figure 5. In a privately published map of Contra Costa and Alameda counties by C.F. Weber and Co. in 1913, the tributary of Brushy Creek also ends close to the eastern edge of the Los Vaqueros land grant boundary (a). On this particular map, the channel does not reappear before the Brushy Creek mainstem (though it's unclear if that was omitted due to the large township and range numbers).



scale: 1:96,000

Figure 6. In 1914, a new edition of the "Official Map of Contra Costa County California" was published. In this version by Arnold and Glass, the tributary to Brushy Creek is only shown as a channel starting within the Souza II property (b), and not on the eastern side of Los Vaqueros land grant.

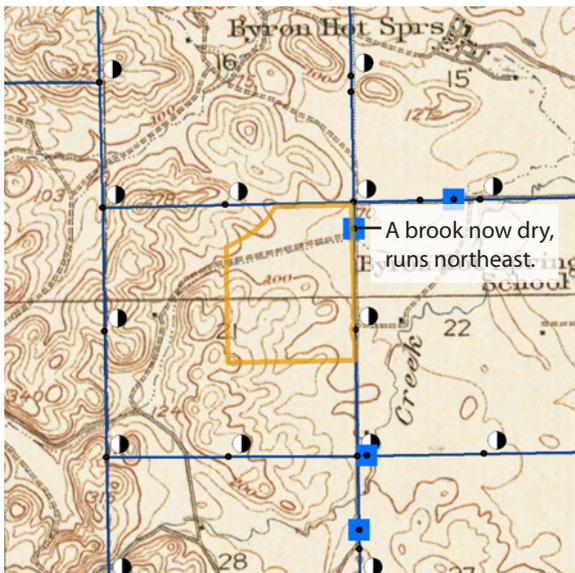


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Figure 7. The 1916 USGS quadrangle of Byron (15 minute, 1:63500 scale) shows the tributary continuous across the Souza II property. The quadrangle indicates the channel now runs closely parallel to a dirt road through the Souza II property in a straight line.

*General Land Office PLS notes*

E.H. Dyer surveyed the eastern boundary of Township 1S, Range 3E, Section 21 (the eastern edge of the Souza II boundary) for the General Land Office Survey (GLO) in June 1862. In his survey notes, he records “A brook now dry, runs northeast” as he crosses the tributary at the section line, indicating the bed of the creek appeared to have carried water at some point. The western edge of Section 21 was only surveyed to establish the eastern boundary of Los Vaqueros land grant, and does not contain notes about any fluvial features.



scale: 1:48,000

Figure 8. Dyer noted in the 1863 GLO survey as he crossed the tributary to Brushy Creek that “a brook now dry, runs northeast”. The survey notes also indicate that there were no trees in the vicinity (indicated here by black and white circles).

### Historical plant locations and descriptions (1884 to 1914)

The Consortium of California Herbaria has assembled plant data collected by a variety of institutions. When possible, these institutions have assigned geographic locations indicating where the specimens were collected, and have provided that spatial location as part of the specimen data. These locations can be very generalized (i.e. even though specific longitude and latitude coordinates are assigned to the specimen, the collector may have indicated only a very general location, for example, the location of the species may have been a vague as the “Byron quadrangle”).

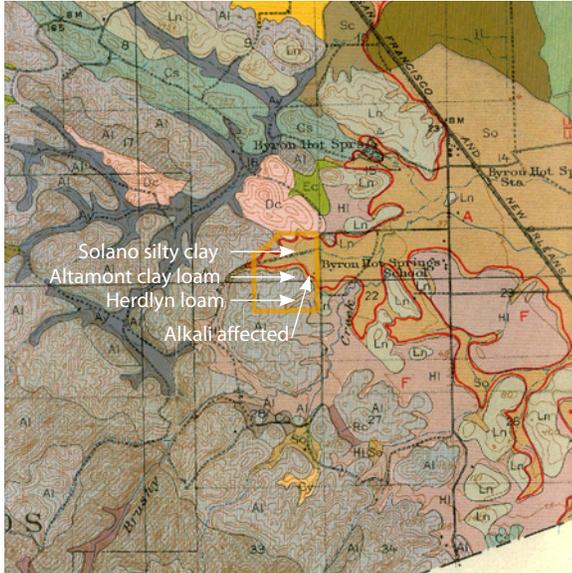
Some of the early plants within a two-mile radius of the Souza II property are noted below (Table 1).

Table 1. Data provided by the participants of the Consortium of California Herbaria ([ucjeps.berkeley.edu/consortium/](http://ucjeps.berkeley.edu/consortium/)) and Calflora.

Taxon Name	notes from Calflora	Common name	Date Collected
<i>Lasthenia fremontii</i>	native; wetland-riparian; occurs almost always under natural conditions in wetlands [U.S. Fish & Wildlife Svc.]	goldfields	Apr 1 1884
<i>Centromadia pungens subsp. pungens</i>	native; annual herb; wetland-riparian; equally likely to occur in wetlands or non wetlands [U.S. Fish & Wildlife Svc.]	tarweed	May 23 1886
<i>Tropidocarpum capparideum</i>	native; rare species; valley grassland (extinct)	caper-fruited tropidocarpum	Mar 24 1888
<i>Chlorogalum pomeridianum var. pomeridianum</i>	native; perennial herb; valley grassland	amole; soap plant	May 23 1889
<i>Trifolium depauperatum var. depauperatum</i>	native; annual herb; valley grassland, mixed evergreen forest; wetland-riparian; equally likely to occur in wetlands or non wetlands [U.S. Fish & Wildlife Svc.]	clover	Mar 23 1889
<i>Lepidium dictyotum</i>	native; annual herb; valley grassland, Alkali Sink, wetland-riparian; occurs almost always under natural conditions in wetlands [U.S. Fish & Wildlife Svc.]	pepperwort; peppergras; one variant called alkali pepperweed	May 1898
<i>Allenrolfea occidentalis</i>	native; shrub; Alkali sink, wetland-riparian; usually occurs in wetlands, but occasionally found in non wetlands [U.S. Fish & Wildlife Svc.]	iodine bush	May 1898
<i>Ruppia cirrhosa</i>	native; aquatic perennial herb; coastal salt marsh, freshwater wetlands, wetland-riparian; occurs almost always under natural conditions in wetlands [U.S. Fish & Wildlife Svc.]	ditch grass	Sep 1899
<i>Polygonum aviculare subsp. aviculare</i>	not native; annual or perennial herb; also wetland-riparian; occurs almost always under natural conditions in wetlands [U.S. Fish & Wildlife Svc.]	water knotweed	Sept. 1899
<i>Suaeda moquinii</i>	native; perennial herb; Coastal Salt Marsh, Coastal Sage Scrub, Sagebrush Scrub, Creosote Bush Scrub, Alkali Sink, wetland-riparian; equally likely to occur in wetlands or non wetlands [U.S. Fish & Wildlife Svc.]	inkweed	Sep 1899
<i>Salicornia virginica</i>	native; perennial herb; coastal salt marsh, wetland-riparian; occurs almost always under natural conditions in wetlands [U.S. Fish & Wildlife Svc.]	pickleweed	Sep 1899
<i>Heterodraba unilateralis</i>	native; annual herb; valley grassland, foothill woodland; slopes	ladiestongue mustard	Mar 14 1914
<i>Phacelia tanacetifolia</i>	native; annual herb; many plant communities	unknown	Mar 14 1914
<i>Lasthenia ferrisiae</i>	native; rare and endangered; annual herb; valley grassland, wetland-riparian; occurs almost always under natural conditions in wetlands [U.S. Fish & Wildlife Svc.]	goldfields	Mar 14 1914

*USDA Soil Survey, 1933 (issued 1939)*

The historical USDA soil survey is consistent with the modern survey, showing alkali soils with low permeability. The straight and incised tributary to Brushy Creek on the Souza II property is on poorly drained Solano silty clay, in an alkali affected area. Solano silty clay is described as having a “hummocky microrelief”, suggesting vernal pool conditions.



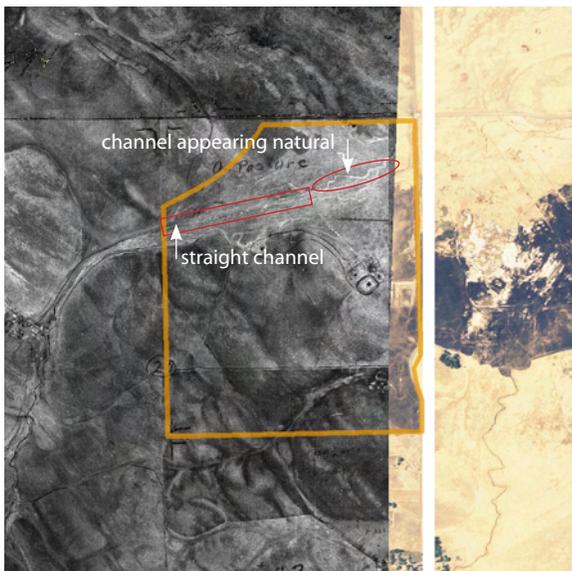
scale: 1:96,000

Figure 9: The 1933/39 USDA soil map shows three soil types on the property:

- So: Solano silty clay, coinciding with area of “alkali affected” in red (“hummocky microrelief”; poor drainage; alkaline, especially subsoil; high salt content)
- Al: Altamont clay loam (easily cultivated, retentive of moisture)
- Hi: Herdlyn loam (poor in organic material; hard and baked when dry)

*Historical aerial photography from 1939*

The historical aerial photographs show a straight channel through most of the property, but also shows multiple shallow channels, possibly indicating seasonally wet swales or sloughs. Note area of natural appearing channel on east edge of property (Fig. 10).



scale: 1:24,000

Figure 10: A mosaic of 1939 aerial photographs, shown against contemporary imagery.

## DISCUSSION

The sources presented here suggest that the Brushy Creek tributary had a distinctly different channel/wetland morphology than the current straight and deeply incised connection across the Souza II property (see Fig. 1).

Maps prior to 1916 show the channel as discontinuous. It is possible these sources are not independent, but rather are compiled and therefore may repeat information rather than be independent confirmation. For example, the second “official” map of the county (Arnold and Glass, 1914; see Fig. 6) likely built on the first (McMahon, 1908; see Fig. 4), so the gap in the creek’s channel indicated on both maps is not necessarily evidence of the creek being surveyed on two separate occasions. The privately published map in 1913 may have been compiled from the published McMahon county map as well. However, the 1873 California Geological Survey clearly depicts the creek as being discontinuous (Whitney and Hoffman, 1873; see Fig. 3). Additionally, if this depiction of the tributary to Brushy Creek as discontinuous was incorrect, it is likely it would have been corrected on the second map of the county in 1914.

The General Land Office survey notes indicate there was a natural creek channel on the east side of the property in 1862. This is consistent with the evidence found on the historical maps described above, as each map source (except for Fig. 5) shows the channel in evidence on the east side of the Souza II property. This also appears to be evident in the historical and contemporary aerial photographs.

The list of plant species collected in the area before 1915 indicates the presence of wetland-riparian plants, though it is not clear if this was simply the preference of the collector. Also, these are not necessarily plants found on the property but simply a list of plants in the vicinity. The presence of plants that occur in alkali sinks is consistent with the alkali soils found in the area.

The tributary of Brushy Creek currently crosses the property on the area of historical Solano silty clay and an alkali affected area. This could indicate the presence of an alkali meadow/wetland. The land grant map from 1853 confirms a channel with “salt water” as well as a salty pond in the area.

The 1939 aerial photographs show multiple shallow channels as well as a straight ditch through the project area. Remnants of at least one of these shallow channels are still visible.

Despite some uncertainty among individual documents, an array of historical evidence suggests that the project area was a diffuse, seasonally flooded drainage system with no well-defined channel across most of the property. Soils and botanical evidence suggest alkali wetland and vernal pool ecology. The site probably had a high degree of topographic variability with shallow channels or sloughs and perhaps larger bodies of persistent surface water (e.g. 1853 Los Meganos land grant map).