

**Appendix 4: Vollmar Consulting, LLC Memo on Upland Habitats
in Concord Naval Weapons Station**



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MEMORANDUM

To: John Cain, Rich Walkling; Natural Heritage Institute

Date: 06/22/06

From: John Vollmar, Vollmar Consulting

No. Pages: 6

Subject: Biological resource values of the annual grasslands, oak savannas, and associated seasonal wetlands and man-made ponds on the Concord Naval Weapons Station Property (South of Highway 4)

This memo discusses the biological resource values of the annual grasslands, oak savannas, and associated seasonal wetlands and man-made ponds on the approximately 5,000-acre Concord Naval Weapons Station Property (site) located south of Highway 4 (Figure 1-3). The site is in the process of being de-commissioned and the planning authority has been transferred to the City of Concord. This memo was prepared for the Natural Heritage Institute on behalf of the Contra Costa Resource Conservation District (RCD) and the USDA, Natural Resources Conservation Service, who are interested in the resource values of the site and potential long-term and regional land use and resource conservation options. Vollmar Consulting was hired to prepare this assessment based on our expertise with large-scale regional planning projects involving grassland, oak savanna, and seasonal wetland habitats, and our experience with the habitats and special-status species of northern Contra Costa County.

Methods

Vollmar Consulting conducted the assessment through a review of existing information and a one-day reconnaissance-level survey of the site conducted on May 24, 2006.

Existing information that was obtained and reviewed included:

- A natural resources management plan and environmental assessment previously prepared in 2002 by Tetra Tech for the entire CNWS property (north and south of Highway 4)
- Special-status species occurrence records from the California Natural Diversity Data Base on and within a 5-10 mile radius of the site (CNDDDB 2006)
- Soil Survey of Contra Costa County
- Aerial photography of the site and surrounding areas within a 5-10 mile radius

The reconnaissance-level site survey focused on evaluating the condition of existing natural habitats on the site and identifying any regionally unique or rare habitats or species that may occur based on site conditions. The survey was restricted to the northern two-thirds of the site

incorporating the relatively flat terrain of the historic floodplain and adjacent older terraces of Mt. Diablo Creek (also known as Seal Creek on the CNWS) and the adjacent hillsides to the east.

Results

General Environmental Setting

The approximately 5,000-acre site is located in northern Contra Costa County, just south of Highway 4 and about three miles south of the edge of Suisun Bay (Figure 1). It is bordered by the City of Concord to the south and west and undeveloped hills to the north and east. These hills represent the lower flanks of Mt. Diablo and are part of a continuous corridor of undeveloped land extending from the top of the mountain down to the shore of Suisun Bay. The property straddles Mt. Diablo Creek which flows from the upper reaches of Mt. Diablo, through the eastern edge of the cities of Clayton and Concord, across the site, and down to Suisun Bay. The site itself incorporates a roughly 3.5-mile section of Mt. Diablo Creek, its bordering historic floodplain and older terraces, and the adjacent low hills described above (Figure 2).

Geomorphology, Geology and Soils

The site incorporates three distinct geomorphic regions: 1) low-lying floodplain areas of the historic Mt. Diablo Creek floodplain, 2) low hills formed from older alluvial terraces bordering the creek, and 3) moderate to steep hills to the east of the creek representing the lower flanks of Mt. Diablo. The geology, soils, and some associated habitats differ markedly within these three regions. Table 1 summarizes the characteristics of these three regions including their associated soils, distribution on the site, and unique habitat characteristics.

Habitat Types

The habitat types identified on the site include:

- Riparian woodlands
- Introduced annual grasslands
- Valley oak savanna
- Vernal pools
- Other seasonal wetlands
- Man-made seasonal and perennial stock ponds

The riparian woodlands are concentrated along Mt. Diablo Creek and in a few scattered locations along smaller creeks in the hills to the east. These woodlands and their habitat values have been discussed in other documents prepared by the Natural Heritage Institute and are not discussed further in this memo. The other habitat types listed above are discussed individually below.

Introduced Annual Grasslands

A large majority of the site supports introduced annual grasslands (Figure 2). This habitat type is dominated by annual grass species introduced from southern Europe and other regions of the world with similar 'Mediterranean' climates. Italian ryegrass (*Lolium multiflorum*) is the

predominant species throughout most of the floodplain areas and low alluvial terraces. This species prefers seasonally moist soils such as the clay and clay loam soils that occur in these areas. The moderate to steep hills to the east support a higher diversity and cover of annual grass species due to the more well-drained, drier conditions.

Overall, the site was found to support a relatively low diversity and cover of native wildflower species. Common species include California poppy (*Eschscholtzia californica*), miniature lupine (*Lupinus bicolor*), and fiddleneck (*Amsinckia menziesii*). It should be noted that the diversity and cover of native wildflowers can vary greatly from year to year depending on seasonal rainfall patterns and there may be showy wildflower displays in other years.

The grasslands of the hills to the east were generally found to be tall and dense, with scattered patches of weeds such as milk thistle (*Silybum marianum*), Italian thistle (*Carduus pycnocephalus*), and yellow star-thistle (*Centaurea solstitialis*). The poor condition of these grasslands is likely due to undergrazing by livestock. Weeds were much less prevalent in the grasslands on the floodplains and low alluvial terraces, at least at the time of the reconnaissance field survey.

As described below, the grasslands provide important sheltering habitat for California tiger salamander (*Ambystoma californiense*) and California red-legged frog (*Rana aurora draytonii*), both of which are federally-listed threatened species. The occurrence of these species on the site and their use of grasslands are discussed below.

Much of the grassland within the floodplain areas of the site are highly disturbed due to grading and past construction of numerous weapons bunkers. Nonetheless, these grasslands and the associated seasonal wetlands and Mt. Diablo Creek represented the last remaining large contiguous stand of this habitat mosaic in the region. All areas with similar topography in the region have been developed due to the ease of building on such flat ground. While development potential of the site is an important consideration, it is also important to consider the conservation and restoration potential of these lowland grasslands and their associated species.

Valley Oak Savanna

Valley oak savanna is characterized by widely spaced valley oaks (*Quercus lobata*) with a grassland understory. The valley oak savanna on the site is largely restricted to areas mapped as Diablo clay soils in the southern portion of the site (Table 1 and Figure 2). This soil type has scattered associated sedimentary rock outcrops and underlying bedrock that is relatively close to the surface. These geologic conditions appear to provide conditions favorable to the growth of valley oaks.

Valley oaks typically occur in deep, valley bottom alluvial soils. Their occurrence on more rocky hillslopes on the site is unusual for the species. However, Vollmar Consulting has recently observed a similar distribution on the Fernandez Ranch property just east of Hercules 8-10 miles west of the site. On that site, it appears that the valley oaks are hybridizing with Oregon oaks (*Quercus garryana*), perhaps contributing to their capacity to grow such an unexpected landscape position. We are currently having some specimens analyzed by Dr. John Tucker, an

oak expert associated with the U.C. Davis herbarium. Though much work remains to be done, we are speculating that these trees may represent a regionally unique form of valley oak partially influenced by hybridization with Oregon oak.

Valley oak savanna is considered a sensitive community by the California Department of Fish and Game. The stand on the site should be considered regionally unique since much of the surrounding area has been developed and no longer supports native oak communities and the nearby undeveloped hills to the east of the site do not support Diablo clay soils and generally lack valley oaks (Figure 2).

Vernal Pools

There are some scattered vernal pools in the low-lying floodplain area just south of Highway 4 and east of Mt. Diablo Creek (Figure 2). This area is mapped as Clear Lake clay, a poorly drained soil, which explains the presence of vernal pools and other associated seasonal wetlands in this area.

During the site visit, the annual grasslands surrounding the pools were found to be very high, dense, and apparently undergrazed. Recent studies conducted by Dr. Jamie Martee of The Nature Conservancy and others has shown that grazing (or other forms of vegetation control such as mowing) is essential for maintaining the ecological health of vernal pools. Without grazing, vernal pools (especially smaller pools such as those that occur on the site) tend to become intruded with non-native grasses, have a significantly reduced period of inundation, and have a substantial decline in native, vernal pool-associated wildflowers and large branchiopods (vernal pool fairy and tadpole shrimp).

The pools on the site were found to have a fairly low cover of vernal pool indicator plants. The most common species were stipitate popcornflower (*Plagiobothrys stipitatus* var. *micranthus*) and hyssop-leaved loosestrife (*Lythrum hyssopifolium*). The low cover of vernal pool indicator species is probably influenced by the lack of sufficient grazing, perhaps over a period of years, which has significantly contributed to the ecological decline of these habitats. Instituting a managed grazing regime would likely improve the habitat quality of these pools.

There is an historic occurrence (possibly the type locality) of Contra Costa goldfields (*Lasthenia conjugens*) less than three miles southwest of the vernal pools on the site (Figure 3). Contra Costa goldfields is vernal pool associated federally-listed endangered species. The potential for this species to occur on the site is discussed below.

The vernal pools on the site should be considered regionally unique since surrounding lowland areas have been developed, eliminating any vernal pools that may have occurred. The site also offers good potential for restoration or enhancement of vernal pools and associated special-status species such as Contra Costa goldfields and California tiger salamander.

Other Seasonal Wetlands

There are other seasonal wetlands on the site, both in the vicinity of the vernal pools discussed above and within smaller seasonal drainages on the site. As observed during the site visit, these wetlands support a mix of non-native and native seasonal wetland plant species. They do not appear to be especially unique or provide special habitat for any specific special-status species. Nonetheless, they are wetlands and provide important functions and values to associated plant and wildlife species.

Man-made Seasonal and Perennial Stock Ponds

There are several man-made stock ponds in the moderate to steep hills in the eastern portion of the site. Most of these ponds appear to be seasonal though a few support herbaceous and/or woody marsh species and thus appear to be perennial. Though man-made, many of these stock ponds provide suitable breeding habitat for both California tiger salamander and/or California red-legged frog. The known and potential use of these ponds and surrounding grasslands by these species are discussed below.

Known and Potential Special-Status Species

Figures 1 and 3 shows documented occurrences of special-status species on and in the vicinity of the site. These occurrence records come from the California Natural Diversity Data Base (CNDDDB 2006) maintained by the California Department of Fish and Game.

Special-Status Plants

There are numerous special-status plant species documented in the northern Contra Costa County region (Figure 3). The large majority of these species are associated with the estuarine marsh bordering Suisun Bay or with unusual volcanic or metasedimentary rock outcrops and associated soils on Mount Diablo. Since none of these specialized habitats occur on the site, none of the special-status plants species associated with these habitats are expected to occur.

A few grassland and vernal pool associated special-status plant species do have potential to occur on the site including Contra Costa goldfields, round-leaved filaree (*Erodium macrophyllum*), large-flowered fiddleneck (*Amsinckia grandiflora*), caper-fruited tropidocarpum (*Tropidocarpum capparideum*), and Congdon's tarplant (*Hemizonia parryi* ssp. *congdonii*).

As discussed above, Contra Costa goldfields is a federally-listed endangered species associated with vernal pools. There is an historic occurrence of this species less than three miles southwest of the site in a currently developed region within the City of Concord (Figure 1). Given the proximity of the historic occurrence, the vernal pools on the site should be regarded as providing potential habitat for this species. Contra Costa goldfields have not been observed in vernal pools on the site. However, Contra Costa goldfields populations often significantly decline or become extirpated in the absence of active grazing or other vegetation management (Vollmar pers. obs.). During the site reconnaissance visit, it was observed that the grasslands surrounding the vernal pools were significantly undergrazed. The pools appear to have suffered from this lack of grazing with a high level of intrusion by annual grasses, a heavy build-up of thatch, and a low cover of native vernal pool species. Given the current condition of the pools, a lack of

observance of Contra Costa goldfields should not necessarily be taken to mean that the species did not historically occur on the site or does not continue to occur in the seed bank.

Round-leaved filaree, large-flowered fiddleneck, and caper-fruited tropidocarpum are all grassland associated species with documented occurrence in the site vicinity (Figure 1) and low to moderate potential to occur on the site. Round-leaved filaree, the species most likely to occur on the site, is associated with friable clay soils and is documented in the hills less than two miles southeast of the site. This species has no federal or state listing status and is considered a species that is rare in California and more common elsewhere (List 2) by the California Native Plant Society (CNPS). Large-flowered fiddleneck is an extremely rare species considered endangered by CNPS. It has no state or federal listing status. It is known from roughly five locations restricted to Contra Costa, Alameda, and San Joaquin Counties. There is one documented occurrence in the hills approximately three miles east-southeast of the site. Caper-fruited tropidocarpum is currently considered to be extinct. There is an historic documented occurrence in the hills approximately two miles southeast of the site. Given the near proximity of known or historic occurrences, the extreme rarity or presumed extinction, and apparently suitable habitat on the site for large-flowered fiddleneck and caper-fruited tropidocarpum, careful surveys covering more than a single season should be conducted for these species. If found, the occurrences and their supporting habitats should be preserved. The site should also be considered as a potential restoration site for these species as well as Contra Costa goldfields.

California Tiger Salamander and California Red-legged Frog

There are numerous documented occurrences of both California tiger salamander (CTS) and California red-legged frog (CRLF) in the hills just east of the site (Figures 1, 2 and 3). There are also a few documented occurrences of CTS and one documented occurrence of CRLF on the site. Nearly all of these occurrences are associated with man-made stock ponds which the species use for breeding.

There are several seasonal stock ponds in the hills in the eastern portion of the site. Many of these ponds were visited during the reconnaissance site visit including one pond previously documented to support CTS. Based on a visual assessment of these ponds, it appears that many are likely to support CTS and/or CRLF breeding given the quality, ponding duration, and vegetation characteristics.

The grasslands surrounding the ponds provide important habitat used as summer sheltering habitat by both CTS and CRLF. Current information suggested that both species can travel a mile or more away from a breeding pond in seeking sheltering sites.

As shown on Figure 1, the undeveloped hills and floodplain lands on and to the east of the site provide significant regional habitat for both of these species. These lands are cut off to the east and west by development, to the north by Suisun Bay, and to the south by the steepening slopes of Mt. Diablo. Since these undeveloped lands are isolated from surrounding open lands that provide suitable breeding and sheltering habitat for CTS and CRLF, these lands should be considered critical for the long-term conservation of these species in the region. As such, a careful assessment should be conducted as to the extent of suitable CTS and CRLF breeding

habitat on the site and the potential for restoration and creation of additional breeding sites. Also, the grasslands should be regarded as sheltering habitat for these species and conserved areas should be specifically managed for these species.

Since most, if not all, of the currently documented CRLF and CTS breeding sites in the region are within man-made stock ponds, it begs the question as to what natural habitats these species used historically for breeding. It is very unlikely these species bred in the hills since there were unlikely to have been any natural ponds of sufficient size or ponding duration given the steep topography. It is more likely they used seasonal and/or perennial pools that may have been present within the flat terrain of the Mt. Diablo Creek floodplain. These pools may have existed in off-channel scour areas, remnant oxbow depressions, or on clay soils as vernal pools. The historic occurrence of such pools could be assessed by review of aerial photos if old enough photos are available. In any case, the low-lying floodplain terrain adjacent to Mt. Diablo Creek should be considered as a potential area for creation or restoration of breeding ponds for both CRLF and CTS.

Other Special-Status Wildlife Species

The grasslands and oak savanna habitats on the site provide potential habitat for several other special-status wildlife species, especially western burrowing owl (*Athene cunicularia*), other raptor species, western pond turtle (*Clemmys marmorata*), and American badger (*Taxidea taxus*). The vernal pools on the site have low potential to support vernal pool fairy shrimp (*Branchinecta lynchi*). Surveys and habitat assessments should be made for these species as part of the overall site assessment.

Table 1. Geomorphic units and associated soil associations and soils types on the Concord Naval Weapons Station Property (south of Highway 4), northern Contra Costa County, California.

Geomorphic Unit	Soil Association	Soil Types on the CNWS Property	Distribution, Habitat Notes on the CNWS Property
Mt. Diablo Creek Floodplain	<i>Clear Lake-Cropley Association:</i> Nearly level to gently sloping, poorly drained and moderately well drained clays on valley fill and in coastal valley basins	Capay clay Clear Lake clay Cropley clay	<ul style="list-style-type: none"> • Mapped on low-lying floodplain areas in the northern portion of the property. • Scattered vernal pools and other seasonal wetlands on poorly drained Clear Lake clay mapped just south of Hwy 4 on the east side of Mt. Diablo Creek.
	<i>Brentwood-Rincon-Zamora Association:</i> Nearly level to gently sloping, well-drained clay loams and silty clay loams on valley fill, alluvial fans, and low terraces	Rincon clay loam Zamora silty clay loam	<ul style="list-style-type: none"> • Mapped on low-lying floodplain areas in the mid and southern portion of the property. • Explosives bunkers concentrated on flat area mapped as Rincon clay loam west of Mt. Diablo Creek. • Generally lacks vernal pools or other seasonal wetlands since soils are well-drained.
Old Alluvial Terraces Bordering Mt. Diablo Creek	<i>Tierra-Antioch-Perkins Association:</i> Nearly level to moderately steep, moderately well drained and well drained loams and clay loams that formed in old alluvium on terraces	Antioch loam Kimball gravelly loam San Ysidro loam	<ul style="list-style-type: none"> • Mapped primarily on low hills in the northwest portion of the property and just east of the Mt. Diablo Creek floodplain.
Moderate Hills East of Mt. Diablo Creek	<i>Altamont-Diablo-Fontana Association:</i> Strongly sloping to very steep, well-drained clays and silty clay loams that formed in material weathered from soft, fine-grained sandstone and shale on uplands	Altamont clay Diablo clay Garretson loam	<ul style="list-style-type: none"> • Mapped on the moderate hills along the eastern portion of the property. • Valley oak savanna concentrated on areas mapped as Diablo clay with associated rock outcrops in the southern portion of the site. • Scattered man-made stock ponds that provide suitable breeding habitat for California red-legged frog and California tiger salamander.
Steep Hills East of Mt. Diablo Creek		Altamont-Fontana complex	<ul style="list-style-type: none"> • Mapped on the steep hills along the eastern edge of the property. • Scattered man-made stock ponds that provide suitable breeding habitat for California red-legged frog and California tiger salamander.