Grazing Management and Watershed Protection Plan

for the

Lake Del Valle Property

Alameda County, California

Prepared for:

Alameda County Flood Control and Conservation District, Zone 7

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Livermore, CA 94551-9486

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1 Introduction and Background

1.1 Zone 7 Objectives

Zone 7 of the Alameda County Flood Control and Water Conservation District (Zone 7) has acquired approximately 5,000 acres of rangeland historically known as the Patterson Ranch, a significant portion of which lies within the Del Valle Reservoir watershed (see Appendix 1). Zone 7 acquired this land—the "Lake Del Valle Property"—to preserve and protect, using integrated management methods, one of the key components of its regional flood control system and one of the sources of its drinking water supply.

Zone 7 provides drinking water to approximately 220,000 users in Livermore, Dublin, Pleasanton and the Dougherty Valley section of San Ramon, as well as providing untreated import water to irrigation customers. Zone 7 also provides flood protection services to Eastern Alameda County.

Eastern Alameda County encompasses 271,485 acres (approximately 425 square miles, see Appendix 1) and represents 52% of Alameda County, which has a land area of 525,540 acres (approximately 821 square miles). Alameda County is located north of Santa Clara County, west of San Joaquin County, and south of Contra Costa County.

The Lake Del Valle Property has an Agricultural and Rangeland land use planning category in the Eastern Alameda County Conservation Strategy (EACCS), adopted by Zone 7 and other local agencies. The property is currently under the Williamson Act, but not currently subject to any other conservation easements or any permit conditions. The rangeland of mid-coastal foothills, consists of Oak Woodlands, grasslands, shrub canyons and cliff faces. At its highest and southern-most point, the rangeland is approximately 1400 feet above sea level.

The Del Valle Reservoir is owned by the California Department of Water Resources (DWR), and is one of the State Water Project storage facilities. It also serves to collect and store local runoff consistent with water rights held by Zone 7 and the Alameda County Water District.

The protection and management of the Del Valle Reservoir watershed, including the rangeland discussed herein, is of primary importance to Zone 7. Zone 7 manages the watershed to achieve the goals of flood protection, water supply, and protection of water quality, and to do so in a fiscally responsible manner.

The purpose of this Grazing Management Plan is to identify how grazing practices impact rangeland management and how grazing can help implement Zone 7's watershed management objectives. This document provides a historical overview of livestock grazing in the Del Valle area, describes current conditions and issues connected with livestock grazing on the 5,000 acre property, discusses items that should be covered by a grazing agreement, and discusses monitoring the implementation and effectiveness of this plan.

1.2 Historical Overview of Grazing on the Property

California's grasslands were historically grazed, browsed, and trampled by now-extinct animals, which included medium to large herbivores, such as ground sloth, bison, camel, horse, mammoth, mastodon, and ox. When the megafauna became extinct some 10,000 years ago,

antelope, deer, tule elk, grizzly bear, and small mammals continued to utilize California's grasslands. Many of these animals were hunted, some to extinction, greatly impacting populations and distribution of these species (EBRPD 2003; EBMUD 2001; CCWD 2005).

Captain Fernando Rivera first introduced "some 200 livestock onto California's grasslands" in 1769 (EBMUD 2001, p. 1-3; also CCWD 2005). The start of the cattle industry in California can be traced to the Spanish missions. Although the missions' primary purpose was to serve as a religious network, cattle raising was fostered at all 21missions as a means of subsistence (EBMUD 2001; also CCWD 2005 6-.9). At the height of the mission period, mission-dominated land accounted for nearly one-sixth of the total area of California (EBMUD 2001; also CCWD 2005). "From the late 1820's to the early 1830's, the mission owned cattle herds grew and eventually they controlled large numbers of livestock. Jedediah Smith reported that in 1827, the herds of cattle had built up until they were nearly as numerous as the buffalo on the plains of Missouri (Burcham 1957). The San Gabriel Mission is estimated to have had between 80,000-100,000 head of cattle, besides horse, mules, and sheep" (EBMUD 2001, p. 1-5; also CCWD 2005).

As the Spanish period ended in 1822, Mexican laws required secularization of the missions, which was completed in 1836. Soon after, the Mexican Government began granting land to private individuals. This was known as the "Rancho Period." "Nearly anyone could obtain a grant for a square league of land (4,439 acres) with the understanding that a house would be built on it along with 100 head of cattle. By 1846, more than 500 Ranchos existed in California with most of them occupying former mission controlled lands" (EBMUD 2001, p. 1-5; also CCWD 2005).

Given the size of the Ranchos and California's highly productive grasslands, cattle ranching prospered and became the dominant occupation during the time. Cattle grazed free-range, and except for periodic roundups and branding, the cattle received little attention (EBMUD 2001; also CCWD 2005). "By the 1840's, the cattle ranching trade in California was well established throughout the coastal areas" (EBMUD 2001, p. 1-6; also CCWD 2005).

In 1848, gold was discovered in the American River, just east of Sacramento. This started the infamous "California Gold Rush." During this time, a "huge influx of Europeans and Americans from the Eastern United States came west to find their fortune" (EBMUD 2001, p. 1-6; also CCWD 2005).

Thus, started the history of the Patterson Ranch, a landholding created through parcel purchases by the George Washington Patterson family during the late 1800's. Patterson initially tried his hand at gold mining during the gold rush, but soon reached the conclusion far more money was to be made selling provisions to those flocking to the gold fields. The family's first land purchases of farming acreage were in the western Fremont area. That area has now been developed, although a park there still bears the original farm name, Ardenwood. The family grew grains, and row and tree crops, and built the first landing in the area to ship their produce to market in San Francisco (Simpson 1982).

In 1893, as part of the expansion of the operations, G.W. Patterson purchased a large ranch for a cattle operation (Simpson 1982). This commenced the family's acquisition of acreage in the South Livermore area. They called their landholding the Mountain Ranch (sometimes in later

years referred to as the Sky Ranch). The stone foundations of the very first, small structures are still visible near the main ranch house. They built the main ranch house in the mid-1900's, which was occupied by their ranch managers until the 1960's. Their last manager was "Doc" Root, a veterinarian of some local renown.

In 1965, the Patterson family still maintained ownership of the land, but sold the cattle business to longtime local ranchers E.J. MulQueeney and Peter Banke , who operated the business as the WP Cattle Co. (standing for William Patterson, the Patterson son who ran the cattle operation after G.W. Patterson died). . Both MulQueeney and Banke had a long history of helping Doc Root with the Patterson cattle operation. In the late 1960's, Peter Banke bought out the MulQueeney interest. He lived on and operated the ranch until 1979, when Paul Banke (Banke) bought into the business and moved onto the ranch.

When the Patterson Family purchased and operated the ranch, the acreage was contiguous and the Arroyo del Valle flowed through the middle of it. The operation was strictly cow-calf, (a permanent herd of mother cows, which calves annually). On weaning, the heifer calves were retained for replacements, and the steer calves (the castrated bull calves) were taken to the Pattersons' feedlot in Fremont, finished (fed for weight gain), and thereafter sold to a packing company in San Francisco. There were a limited number of internal cross-fences, and the range fields were vast. The Pattersons also farmed dry land hay in the field adjacent to the ranch house. Most of the ranching infrastructure, including the corrals and shipping facilities, were in the Arroyo del Valle alluvial area. In addition to the ranch house, there was a horse and hay barn up in the hills on the west side, as well as a "pole" barn for hay storage on the far west side of the hills. All materials for these structures were hauled up by horse wagon on a narrow dirt road winding up from the corral facilities in the creek bed.

In 1964, the Department of Water Resources condemned the middle of the ranch and built the Del Valle Reservoir, causing the ranching operation to change dramatically. The fields had to be realigned and re-fenced, new access roads and fire breaks had to be cut, and new corral and shipping facilities had to be built, two on the west side of the reservoir and one on the east side. This work was overseen and principally done by the Bankes. The cattle operation continued to be cow-calf, running Herefords and Hereford-Black Angus crosses. Hay farming, which had always been a marginal undertaking, ceased. Peter Banke retired from the ranching business in the late 1980's and passed away in 1989.

1.3 Current Grazing Operation

In the last several decades, there has been a significant shift in the nature of the cattle operation in light of advances in animal and environmental sciences, several drought periods, changes in the character of the Livermore Valley area, and changes in the cattle market and consumer demand and preferences. The operation has changed from a cow-calf one, to one that is a balance between cow-calf and seasonal pasture cattle that generally arrive in fall when the rains start and are shipped out in spring when the grasses dry. The cow herd is now primarily Angus and Angus-cross. The operation is also now run in conjunction with other rangelands, allowing for flexibility in distributing and moving livestock to accommodate rangeland conditions and managing cattle health and fitness.

In addition to the changes in the breed and class of cattle on range, there has also been a focus in the last two decades on updating infrastructure and enhancing the rangeland. Water source and distribution systems have been rebuilt and expanded, and cross-fences have been built or realigned, to improve distribution management and control of rangeland conditions, as discussed in Section 2.2. The Pattersons and Banke also worked with the Natural Resources Conservation Service (NRCS) and Alameda County Resource Conservation District (ACRCD) on livestock pond restoration projects, discussed in Section 3.3 and Appendices 2 and 3. As discussed in Section 2.4 and 3.3, there are flourishing populations of California tiger salamanders (CTS) (*Ambytstoma californiense*), California red-legged frogs (CRLF) (*Rana draytonii*), California newts (*Taricha torosa*) and Western pond turtles (*Actinemys marmorata*) in a number of the 23 livestock ponds on the property. Banke has also worked over the last decade with the University of California Santa Cruz Golden Eagle Population Project to facilitate the study of these raptors, of which there are two nesting pairs on or immediately adjacent to the property. Thus, the cattle operation in recent times has been operated with a balanced objective of moderate financial viability and rangeland and biodiversity preservation and enhancement.

1.4 Livestock Grazing as an Important Management Tool

In the last two decades, multiple studies have been conducted evaluating the impacts and benefits of well managed grazing on California grass and woodlands (Olberding 2013; Bush 2008; CCWD 2005; EBRPD 2003; EDAW 1997). These studies have shown grazing can have beneficial effects on these ecosystems, and grazing is being used on numerous preserves throughout the San Francisco Bay Area and other parts of California to protect rangelands and also enhance native plant and animal biodiversity. Grazing is often the preferred management tool to obtain multiple goals, including vegetation management to reduce wildfire fuel loads, control of invasive weeds and maintain grassland habitat for sensitive species (Olberding 2013; CCWD 2013; EBRPD 2003).

Grasslands across California have been altered from their native condition, as is true of the Lake Del Valle Property, through the introduction and establishment of many non-native grasses and other plant species which are dominant throughout the state (Bush 2008; CCWD 2005; EBRPD 2003). The relationship between the arrival of the first non-native annual grasses and cattle grazing remains unclear. The remains of three non-native grass species have been found in the adobe bricks of the earliest missions, suggesting the introduction of non-native annual grasses into California could have occurred by way of 16th century explorers prior to any established grazing operations (EBMUD 2001).

The introduction of non-native grass species has resulted in a permanent change in grassland species composition and has altered their ecological functions. These non-native grass species are highly competitive and produce large volumes of biomass that require ongoing management to keep these mostly annual, competitive species in check. In addition to the annual grass species, the presence of other non-native, invasive plant species, such as thistles and mustards found on grasslands as well, require additional management practices to constrain their growth for the benefit of grassland species for which grazing can be a useful tool (Bush 2008; EBRPD 2003). Despite this ecological change, these now dominant annual grasses are well adapted to California's terrain and climate, protect against soil erosion, and support an abundance of plant and wildlife diversity (CCWD 2005).

Grazing supports healthy grassland systems by providing openings in vegetation that expose mineral soil and allow light penetration so other small-statured plants can germinate and grow providing for a wide variety of plant species. In contrast, ungrazed grasslands result in accumulated thatch—dead plant material from previous growing seasons—that hampers germination, growth of other plant species and hinders grassland species biodiversity (Bush 2008; EBRPD 2003).

While in some situations fire can be an appropriate tool to manage grasslands, it cannot be employed on any significant scale or frequency in areas not readily accessible by fire equipment and crews. It is therefore of little or no utility in remote and hilly range areas like the Lake Del Valle Property. On an ongoing basis, livestock grazing is the only practical tool in such areas that provides consistent grassland preservation and biomass management (Olberding 2013; EBRPD; EDAW 1997).

As well as benefitting grasslands, livestock grazing has also been shown to enhance and support habitat conditions for animal species, including federally threatened native amphibians found in this region: the California tiger salamander (CTS) (*Ambytstoma californiense*) and California red-legged frog (CRLF) (*Rana draytonii*). As discussed in Section 3.3, management of grasslands by livestock grazing can, in fact, benefit these species (Ford et al. 2013; Bush 2008; CCWD 2005; EBRPD 2003).

2 Existing Conditions

2.1 Soils

The Natural Resources Conservation Service (NCRS) has mapped soil types and described the properties associated with each soil. The principal soil types of the Lake Del Valle Property are: Altamont clay, Millsholm silt loam, Positas gravelly loam, and Gaviota rocky sandy loam (see Appendix 4, NRCS Soils Map and Soils Inventory Report).

Generally, precipitation enters the soil at appropriate rates, and the soils do not exhibit erosion or impacts related to abnormal compaction, except in the immediate vicinity of the corrals and immediately adjacent to water troughs. However, during particularly heavy rainy seasons, the soils reach saturation and the hills, particularly on the property west of Del Valle Reservoir, are then prone to slippage. Old slippage/landslide activity is readily observable as bulges in hill contours, and in some fields, increases fence and road maintenance. In 1983, during a particularly wet year, a landslide destroyed a portion of the main horse barn and corrals just below the main ranch house (they were rebuilt the following summer).

The Diablo Range of the Coast Ranges geomorphic province is identified as one of the more seismically active regions in California. No recent seismic activity has been epicentered at the Lake Del Valle Property. Seismic activity originating at other points in the Bay Area, however, has often been felt on the property, depending on the strength and nature of the seismic activity. To date, no structures have been lost or seriously damaged due to seismic activity.

2.2 Water

2.2.1 East side of Del Valle Reservoir

Current livestock water sources on the property east of Del Valle Reservoir consist of two wells, several springs, and four ponds (see Appendix 5). Historically, there were relatively few water resources on this side of the ranch, which limited the widespread distribution of livestock. Over the last 15 years, there has been a significant expansion of the storage and distribution system. This expansion began when the East Bay Regional Park District (EBRPD), with grant funds, undertook to fence off the lakeshore located on the Department of Water Resources' (DWR) property to create a grassland buffer. At that time, in addition to installing two solar systems for EBRPD that pump lake water into troughs below the boundary fence line, Banke also built a larger solar array and storage tank system that pumps and stores water from a well on the Lake Del Valle Property near the boundary fence. In 2011, the pump and tank system on the Lake Del Valle Property was further expanded to include 5,000 gallons of additional storage, additional distribution lines and additional water troughs to distribute this water up onto the top of the ridge and flats area. In 2012, an additional water trough was installed on the boundary of the DWR property and the Lake Del Valle Property, which is fed from a tank filled from water pumped from EBRPD's water treatment system.

2.2.2 West side of Del Valle Reservoir

Livestock water sources on the property west of Del Valle Reservoir consist of two wells, 18 ponds, and various springs (see Appendix 5). As with the east side, there was also, historically, relatively limited distribution of stock water on the west side, particularly in the ridge areas.

Over the last two decades, there has been substantial improvement of these water sources and expansion in distribution, including two solar pump and storage tank systems. Many of these improvements have been made with assistance from NRCS Farm Bill programs, such as the Wildlife Habitat Incentive Program (WHIP) and the Environmental Quality Incentives Program (EQIP), and are listed in Appendix 6.

2.3 Vegetation

The rangeland consists primarily of Oak Woodlands, annual grassland, and shrub canyons.

Non-native annual grassland is the primary habitat type. There are also native perennials dispersed through the property.

There is an extensive diversity of showy flowering forbs, including California poppy (*Escholzia californica*), various lupines (*Lupinus sp.*), vetch (*Vicia sp.*), yarrow (*Achillea millefolium*), blue eyed grass (*Sisyrinchium bellum*), Johnny jump up (*Viola pedunculata*), Indian paintbrush (*Castilleja sp.*), and clover (*Trifolium sp.*). Depending on the amount of rainfall and time it occurs, the wildflower displays on the Lake Del Valle Property are extensive.

While not dominant, there are some non-native, noxious plants intermixed with the annual grasses, including field bindweed (*Convolvulus arvensis*), yellow star thistle (*Centaurea solstitialis*), bull thistle (*Cirsium vulgare*), artichoke thistle (*Cynara cardunculus*), tarweed (*Hemizonia* spp.), filaree (*Erodium* spp.) and black mustard (*Brassica nigra*).

There are some steep ravine areas that are largely dense brush. In addition, a significant portion of the property on the west side of the reservoir, from the ridge line down to the reservoir (an area known as the "Pony Gulch" field), approximately 400 acres, is dense with brush.

There are significant areas of trees, particularly in the northeast facing vales. Trees include both evergreen oak (*Quercus agrifolia*) and deciduous oak species (*Quercus lobata*), as well as California buckeye trees (*Aesculus californica*) and California bay laurel (*Umbellularia californica*). In the last three decades there has been observable sprouting and growth of new oaks, particularly in ravine areas along ranch roads. In the southern-most and highest elevations of the ranch, there are a few gray pine trees (*Pinus sabiniana*). There is a planted stand (planted nearly a century ago) of several varieties of eucalyptus trees (*Eucalyptus sp.*), which has not spread into adjoining rangeland.

2.4 Wildlife

The Lake Del Valle Property supports significant wildlife habitat with several special-status wildlife species. Since ranch management has focused, during the last several decades, on a balanced objective of moderate financial viability and rangeland preservation and improvement, wildlife numbers have flourished.

2.4.1 Special status species

A number of the stock ponds host populations of California tiger salamander (CTS) (*Ambytstoma californiense*), California red-legged frog (CRLF) (*Rana draytonii*) and Western pond turtles

(WPT) (*Actinemys marmorata*). These populations and the habitat restoration and improvements undertaken during the last decade are discussed further in Section 3.3 and Appendices 2 and 3.

2.4.2 Other wildlife

Mammals include mountain lion/cougar (*Puma concolor*), black tail deer (*Odocoileus hemionus columbianus*), coyote (*Canis latrans*), bobcat (*Lynx rufus*), gray fox (*Urocyon cinereoargenteus*), raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), and numerous rodents, including California ground squirrels (*Otospermophilus beecheyi*). Tule elk (*Cervus canadensis*) occasionally cross into the western rangeland from the adjacent San Francisco Public Utility Commission property. In the 1980's and early 1990's wild boar were present, but moved off of the Lake Del Valle Property by the late 1990's.

There are numerous native bird species including golden eagles (*Aquila chrysaetos*) (two known nesting pair), red-tailed hawk (*Buteo jamaicensis*), barn owl (*Tyto alba*), California quail, (*Callipepla californica*) and many passerine species. For the last two decades, the property has been part of the University of California Santa Cruz Golden Eagle study.

Reptiles include the Northern pacific rattlesnake (*Crotalus oreganus*), California king snake (*Lampropeltis californiae)*, Pacific gopher snake (*Pituophis catenifer*), Alameda whipsnake (*Masticophis lateralis euryxanthus*), and abundant lizards.

3 Goals, Objectives and Purposes of Livestock Grazing

To ensure that a grazing program meets the needs of the Lake Del Valle Property, goals and objectives have been identified. Goals represent a desired state or condition, and are often general in nature. To measure success in achieving goals, they should be paired with specific and practical objectives (Bush 2008).

***Goal 1*. Protection of the Lake Del Valle watershed to improve flood protection and source water quality.**

Objective 1a. Manage grazing to maintain and enhance vegetation cover.

Objective 1b. Manage grazing to minimize erosion.

***Goal 2*. Reduce long- and short-term fire hazard.**

Objective 2a. Reduce fuel load, slowing fire spread and reducing fire intensity.

Objective 2b. Prevent brush invasion into grasslands.

***Goal 3*. Maintain conditions for native and special status animal species.**

Objective 3a. Manage grazing to keep grassland canopy low, allowing CTS and CRLF access to and away from ponds.

Objective 3b. Manage grazing to reduce pond evapotranspiration by herbaceous vegetation.

***Goal 4*. Maintain conditions for native grasses and wildflowers.**

Objective 4a. Manage grazing to reduce canopy height of, and competitive ability of, non-native annual grasses and weeds.

Objective 4b. Manage grazing to prevent thatch build up and create small openings, exposing soil for germination and growth of wild flowers.

3.1 Protection of Lake Del Valle Watershed to Improve Flood Protection and Source Water Quality (Goal 1)

Livestock grazing is one of the significant tools available for watershed management. Well managed use of livestock will decrease fuel loads to reduce wildfire risks, support a diverse plant community structure, increase carbon sequestration, regulate beneficial nutrient cycling, control encroaching brush species and enhance wildlife habitat (CCWD 2005; EBRPD 2003).

3.1.1 Water Quality

Two factors related to grazing, in particular, have the potential to significantly impact a watershed—condition and character of vegetation cover, and soil erosion (CCWD 2005; USDA 1983).

Non-point source contaminants that have the potential to enter water bodies within a rangeland watershed occupied by cattle include sediment and associated nutrients and microbes. These contaminants can enter water bodies as a result of plant cover reduction, soil detachment, erosion and transport of runoff from precipitation (EBMUD 2001). Management within the Lake Del Valle Property should focus on reducing inputs of non-point source pollutants.

By properly maintaining vegetative cover, herbaceous vegetation protects the soil from the erosive energy of precipitation and overland flow, and acts as a sediment trap and increases infiltration rates (CCWD 2005; EBMUD 2001). The grasslands surrounding the Del Valle Reservoir provide a natural filter for runoff. Sedimentation and movement of soil borne pathogens can be controlled or reduced by the maintenance of a healthy vegetation cover (USDA 1983). The character of the vegetation cover is directly correlated with the grazing pressure on the rangeland, which is implicated by both stocking rate and length of grazing season (discussed in more detail in Sections 4.2 and 4.3).

Grass cover is particularly important along the shoreline of the reservoir. Grass buffer strips help maintain the integrity of the shoreline, and filter and trap sediment and other pollutants (CCWD 2005; USDA 1983). On the east side of the reservoir, a grass buffer is maintained by a fence installed by EBRPD on the Department of Water Resources property, approximately 50 to 100 feet above the shoreline and well below the Lake Del Valle Property. Much of the west side shoreline is so steep and rugged; it is a physical barrier for livestock. Again, this area is below the Lake Del Valle Property.

Nutrients and pathogens can be introduced into water sources directly by livestock in the water and through runoff (CCWD 2005; EBMUD 2001). However, research has indicated that unless feces are deposited in or immediately adjacent to a streambed, there is little danger of significant bacterial contamination from overland flow (EBMUD 2001). In another study it was determined relatively short vegetated buffers appear to remove substantial amounts of waterborne pathogens such as *Cryptosporidium parvum* from overland flow, interflow, and shallow surface flow (Atwill et al. 2005).

This issue is significantly mitigated by controlling livestock access to waters, including the development of alternate water systems and management practices that encourage livestock to disperse over the range (EBRPD 2003; EBMUD 2001; EDAW 1997). Even distribution of an adequate number of resting, watering or mineral (salting) sites away from permanent water-courses has been found to substantially reduce or eliminate nutrient and pathogen contamination issues (CCWD 2005). As to *C. parvum*, in particular, the potential for contamination is significantly mitigated by maintaining a healthy herd, excluding calving cows from shoreline areas, and limiting calving to late summer and mid-Fall before significant rains (CCWD 2013; EDAW 1997). *C. parvum* is also deposited by wildlife, including coyotes and feral pigs (EDAW 1997).

These types of water quality issues related to rangeland are most effectively controlled by using sound management practices including utilizing stocking rates and grazing systems that sustain good forage yields to minimize manure accumulation and reduce surface runoff. Managed grazing allows for maintenance of good vegetative cover and minimizes soil compaction, greatly reducing runoff (USDA 1983).

3.1.1.1 Water Quality Recommendations

- Manage grazing through utilization of effective stocking rates to sustain forage, reduce runoff and minimize manure accumulation
- Control livestock access to waters through the utilization and further development of alternative water systems to encourage cattle dispersement across the range

3.1.2 Invasive Weeds

The Lake Del Valle Property, like rangelands throughout northern and central California (CCWD 2005), is negatively impacted in varying degrees by non-native noxious weeds, such as yellow star thistle (*Centaurea solstitialis*), bull thistle (*Cirsium vulgare*), artichoke thistle (*Cynara cardunculus*), tarweed (*Hemizonia* spp.), and black mustard (*Brassica nigra*). Many of these noxious plants have entered our ecosystem from Asia and Europe through coastal ports, and with prevailing winds have spread across the state (CCWD 2005). An infestation can be so severe the rangeland becomes completely choked with these noxious weeds, to the exclusion of grasses and wildflowers, rendering it unusable for grazing. These species require intensive management to control, and often require additional control measures beyond grazing (Olberding 2013). "The best pest management practice is to periodically inspect and eradicate pest plants quickly" (CCWD 2005, p. 18).

Grazing provides a means to control some invasive pest species by trampling, and some pest plants will be eaten by livestock at certain times. When either of the control methods is suitable, grazing pressure may be intensified to maximize trampling or consumption. Grazing can also be intensified by placement of supplemental attractants. In appropriate applications, the targeted grazing of sheep or goats can be effective for certain invasive weeds due to both their tolerance for the plants and the ability to easily control the animals with movable fencing.

By the 1980's, yellow star thistle, in particular, had become a major problem on the Lake Del Valle Property, to the point some fields had only minimal grazing value. Accordingly, in the last two decades, a chemical application program has been put in place that (a) targets, through localized hand and boom spraying, bull thistle (*Cirsium vulgare*), artichoke thistle (*Cynara cardunculus*) and black mustard (*Brassica nigra*), and (b) targets, through aerial spraying, yellow star thistle (*Centaurea solstitialis*) and tarweed (*Hemizonia* spp.). There has been a major improvement in the rangeland, which has allowed both significantly reduced chemical usage and increased utilization of grazing controls. It is critical that noxious vegetation controls be continued. The State of California heavily regulates the application of herbicides, and there should be compliance with all license and permit requirements.

3.1.2.1 Invasive Weed Recommendations

- Maintain vigilant control program of noxious non-native weeds to ensure health of rangelands.

3.1.3 Ranch Roads and Firebreaks

Ranch roads are necessary for livestock management and range monitoring, and also serve as important firebreaks and access for fire prevention. However, they are also a potential source of

erosion. Grading practices should be seasonally focused to minimize erosion during grading, improve drainage and leave grass-stubble cover on the roads. In addition, the roads and culverts should be monitored during the rainy season to identify any problem areas and put in place temporary repairs at the time (to the extent possible given weather conditions). Roads, culverts and fire breaks should be kept well maintained and repaired as necessary.

3.1.3.1 Roads and Firebreaks Recommendations

- Maintain ranch roads, culverts and firebreaks in ways that reduce erosion potential.

3.2 Reducing Rangeland Fire Hazard (Goal 2)

3.2.1 Control of Fuel Load

Livestock grazing is an important tool to manage vegetation to reduce fire risk (EBRPD 2003). Without grazing, average fuel loads can increase substantially in a five-year period, going from a low fire hazard condition (1 ton per acre of grass type) to a moderate fire hazard condition (4 tons per acre of a medium brush type) (EDAW 1997).

The influence of livestock on fire hazard reduction is two-fold. First, grazing at moderate levels, while not significantly reducing the risk of initial fire ignition, has been shown to affect wildfire behavior by shortening flame length and reducing fire intensity (Bush 2008). Second, grazing can prevent or minimize expansion of shrublands which have greater fuel loading, can burn more intensely and longer, resulting in a greater fire hazard than grasslands (Bush 2008).

During the last 40 years, the Lake Del Valle Property has experienced only three spot burns, one that started on what is now the EBRPD Camp Arroyo site, one that started on the west shoreline of Del Valle Reservoir, and one started by a lightning strike on a western slope. Given the grazed condition of the range, all were readily contained and impacted only a few acres. Approximately 15 years ago, there was a more significant fire just south of the property, on the EBRPD Del Valle Park property, spreading into the N3 Ranch property. Given the hilly terrain, the fire (known as the "Devil's Hole Fire") quickly generated its own wind force, and the intensity of the burn was significant.

3.2.1.1 Fuel Hazard Recommendations

- Conduct grazing to reduce herbaceous fuel loads and to hold shrub areas in check.

3.3 Improving Conditions for Native and Special Status Animal Species (Goal 3)

3.3.1 California tiger salamander (CTS) Habitat

CTS's are present in some stock pond areas on the Lake Del Valle Property, particularly those on the west side of the reservoir. These ponds were built in the 1950's to provide important water resources for the grazing livestock and have been continuously maintained. In 2012, four of the ponds were the focus of an enhanced cleaning and restoration effort by the prior owners and Banke, with the assistance of the NRCS and ACRCD using mitigation funds from the Bay Area Rapid Transit District (BART). The biological assessment prepared in connection with this restoration project and the 2013 annual report are attached as Appendices 2 and 3.

CTS's are listed as "Threatened" by the United States Fish and Wildlife Service (USFWS) and the California Department of Fish and Wildlife (CDFW). CTS spend most of their lives in rodent burrows, emerging during the rainy season to breed in livestock ponds and other mostly seasonal waterbodies (Bush 2008).

"Numerous references in the Fish and Wildlife Service Determination of Threatened Status for the CTS (U.S. Fish and Wildlife Service 2004) indicate possible positive effects of sustainable grazing on the species, stating: '. . . sustainable grazing may benefit the [CTS] in several ways. Ground squirrel colonization produces burrows that are vitally important in the life cycle of the [CTS], serving as shelters and aestivation sites for the terrestrial adults and juvenile salamanders (Seymour and Westphal 1994). The presence of ground squirrel burrows may be an important factor in determining whether ponds can become successful salamander breeding sites. Sustainable grazing around natural pools may also benefit the CTS by extending the inundation period (Barry, UC Davis, 2003 *in litt.*)'" (Bush 2008, p.10; also EBRPD 2003).

"[T]hey are vulnerable to trampling during migration periods, but are also sensitive to excess herbaceous vegetation height (Ford and Huntsinger 2004) which can hinder their movement from November to March (adults) and March to August (juveniles). According to Ford and Huntsinger, the salamander requires access across open grasslands, thus insufficient grazing and associated grass height and shrub encroachment would reduce habitat quality. Conditions that could lead to premature drawdown of pools, such as excessive spring evapotranspiration from annual grasses could also degrade breeding habitat" (Bush 2008, p. 10).

3.3.1.1 CTS Habitat Recommendations

- Utilize sustainable grazing practices in CTS aquatic and upland areas, particularly in spring, to maintain open grassland areas, help moderate evapotranspiration and pond drawdown, and lessen impact on rodent burrows.
- Repair and reinforce aging livestock ponds as necessary, including removing sediment buildup to maintain water habitat.
- Maintain and continue development of trough water delivery systems to reduce grazing pressure around ponds and reduce pond drawdown.

3.3.2 California red-legged frog (CRLF) Habitat

CRLFs are present in some of the Lake Del Valle Property stock ponds, particularly those on the west side of Del Valle Reservoir, and are also a federally listed "Threatened" species. As stated above, these ponds were built in the 1950's to provide important stock water sources and have been continuously maintained. In 2012, several of the ponds were the focus of an enhanced cleaning and restoration effort by the prior owners and Banke, with the assistance of the NRCS and ACRCD using, in part, mitigation funds from BART. The biological assessment prepared in connection with this restoration project and the 2013 annual report are attached as Appendices 2 and 3.

CRLFs "preferred habitat consists of pools or slow moving water with dense overhanging vegetation. CRLFs attach their eggs to emergent vegetation and use upland grassland habitats and rodent burrows or woody litter refuges up to one mile from breeding areas during November

to March (movements prior to breeding) and July to October (post metamorphic juvenile dispersal). During periods of movement, the frogs are vulnerable to trampling. But excess upland grass can hinder movement during these times" (Bush 2008, pp. 10-11).

The USFWS Determination of Critical Habitat for the CRLF (USFWS 2006) cites several reasons for conducting grazing in areas with CRLF ponds: Ponds often silt-in after being fenced off from moderate grazing. Grazing at moderate to low levels helps to maintain a mix of open water habitat and emergent vegetation, the type of vegetation where frogs are usually found (Bush 2008; EBRPD 2003). Similarly, the USFWS Recovery Plan for the CRLF (USFWS 2002) states: "In such ponded habitat, grazing may help maintain habitat suitability by keeping ponds clear where they might otherwise fill in with cattails, bulrushes, and other emergent vegetation."

3.3.2.1 CRLF Habitat Recommendations

- Utilize sustainable grazing practices throughout CRLF aquatic and upland habitat.
- Repair and reinforce aging livestock ponds as necessary, including removing sediment buildup to maintain water habitat.
- Maintain and continue development of trough water delivery systems to reduce grazing pressure around ponds and reduce pond drawdown.

3.3.3 Western Pond Turtle (WPT) Habitat

There are also robust populations of Western pond turtle in several of the stock ponds on the Lake Del Valle Property on the west side of Del Valle Reservoir. As stated above, these ponds were built in the 1950's to provide important stock water sources and have been continuously maintained. In 2012, several of the ponds were the focus of an enhanced cleaning and restoration effort by the prior owners and Banke, with the assistance of the NRCS and ACRCD using, in part, mitigation funds from BART. The biologic assessment prepared in connection with this restoration project and the 2013 annual report are attached as Appendices 2 and 3.

The WPT is listed as a "Species of Concern" by CDFW. WPTs are known to use permanent or nearly permanent water. On the Lake Del Valle Property, this consists mostly of existing stock ponds. They use submerged logs, rocks or mats of floating vegetation for basking. WPT use upland habitat for egg laying and overwintering.

3.3.3.1 WPT Recommendations

- Utilize sustainable grazing practices throughout grasslands and in vicinity of ponds where WPT are known to occur, or could possibly occur.
- Repair and reinforce aging livestock ponds as necessary, including removing sediment buildup to maintain water habitat.
- Continue development of and maintain trough delivery systems to reduce grazing pressure around ponds and wetlands areas.
- Install turtle ramps (providing area for turtles to bask) in ponds where WPT populations are thriving

3.3.4 Bird Habitat

As discussed above in Section 2.4, there is an extensive bird population on the Lake Del Valle Property. Bird species utilize the many habitats on the property, including grassland, oak woodland, scrub, riparian and aquatic habitat. Maintaining these habitats is crucial to continued presence of these species on the property.

A brief list of native bird species observed includes: golden eagle (*Aquila chrysaetos*) (two known nesting pair), red-tailed hawk (*Buteo jamaicensis*), barn owl (*Tyto alba*), California quail, (*Callipepla californica*), Great blue heron (*Ardea herodias*), Horned lark (*Eremophila alpestris*), Western bluebird (*Sialia mexicana*) and many passerine species. Multiple other species including passerines, migratory duck species and shorebirds, such as the greater yellowlegs (*Tringa melanoleuca*), utilize the stock ponds on the property.

For the last two decades, the property has been part of the University of California Santa Cruz Golden Eagle Population Project. The Predatory Bird Research Group, as part of the Golden Eagle Population Project, conducted an intensive field investigation of the ecology of golden eagles in the Diablo Range and discovered that the area of this mountain range that includes the property has the highest density of golden eagle breeding pairs in North America. This, they concluded, was a result of the habitat conditions maintained by livestock grazing (EBRPD 2003).

3.3.4.1 Bird Habitat Recommendations

- Utilize sustainable grazing practices throughout grasslands and in vicinity of ponds.
- Repair and reinforce aging livestock ponds as necessary, including removing sediment buildup to maintain water habitat.
- Continue development of and maintain trough delivery systems to reduce grazing pressure around ponds and wetlands areas.

3.3.5 Other Wildlife Habitat

As discussed in Section 2.4, there is an extensive array of wildlife on the Lake Del Valle Property. The many diverse habitats on the property support the ongoing presence of many common species, in addition to the listed species referenced above. Oak woodlands, one of the primary habitats on the property, can support over 330 species of birds, mammals, reptiles and amphibians (CalPif 2002). Oak woodlands are able to support such abundant wildlife primarily due to the production of acorns but also due to the important shelter they can provide in the form of cavities for nesting.

Additional wildlife includes mountain lion/cougar (*Puma concolor*), black tail deer (*Odocoileus hemionus columbianus*), coyote (*Canis* latrans), bobcat (*Lynx rufus*), gray fox (*Urocyon cinereoargenteus*), raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), and numerous rodents, including California ground squirrels (*Otospermophilus beecheyi*). Tule elk (*Cervus canadensis*) occasionally cross into the western rangeland from the adjacent San Francisco Public Utilities Commission property.

In the 1980's and early 1990's wild boar were present and caused significant destruction to the grazing lands and stock ponds. They moved off of the property by the late 1990's.

Since focusing, during the last several decades, on a balanced objective of moderate financial viability and rangeland preservation and improvement, wildlife numbers and diversity have flourished. Two factors have been particularly significant—moderate to light grazing intensity and the development of water sources and distribution systems.

3.3.5.1 Wildlife Habitat Recommendations

- Utilize sustainable grazing practices throughout grasslands and in vicinity of ponds to sustain diversity of other wildlife.
- Maintain multiple water sources and distribution systems.

3.4 Improving Conditions for Native Grasses and Wildflowers (Goal 4)

3.4.1 Enhancing Plant Biodiversity

"Long term studies on western and eastern grazing lands indicate that appropriate grazing management supports a relatively high level of plant species diversity (Milchunas, Lauenroth and Burke 1998; Tracy and Sanderson 2000; Sanderson et al 2001; Hart 2001)" (CCWD 2005, p. 20).

Perennial grasses vary in their response to grazing. "Low-growing species and those that spread by rhizomes or stolons tend to be more resistant to heavy grazing than bunch grasses. Limited research seriously restricts the ability to generalize about grazing practices for enhancing or restoring native species (C.D.'Antonio 2002)" (Bush 2008, p. 8). Accordingly, it is difficult to identify and outline a grazing program to enhance a particular native grass species (Bush 2008).

"Generally, perennial grasses benefit from seasonal or periodic grazing, rather than continuous, year-round grazing. Unlike annuals, which rely on copious seed production and germination of many new plants each season, perennials can live for many years. They normally produce less seed than annuals and are slower to germinate and grow as young plants, so the health and longevity of individual plants is more important. When their leaf area is temporarily decreased through grazing, the plant's ability to photosynthesize and make carbohydrates is reduced, which results in root dieback. Severe, repeated grazing can weaken or kill some perennial grasses. But complete absence of grazing can also diminish their overall health because grazing stimulates vigorous new growth that actively photosynthesizes" (Bush 2008, p. 8).

What can be generally stated, however, is that grazing creates open areas in the grassland canopy, exposing small areas of soil within which small-statured forbs can germinate and grow. Moreover, disturbance and removal of thatch is essential to germination and growth of some native forb species (Bush 2008).

3.4.1.1 Plant Diversity Recommendations

- Manage and monitor grazing pressure to enhance conditions for native grasses and forbs by reducing thatch and competition by non-native annual grasses.
- Continue control of invasive non-native weed species as discussed in Section 3.1.2.

4 Grazing Guidelines

The success of a grazing program is largely dependent on defining grazing requirements and selecting an appropriate lessee to implement those requirements. It is important that there be a good working relationship between owner and lessee. "A trusting and cooperative relationship where each party understands and respects the other's goals and objectives is apt to result in a positive outcome, while lack of these qualities by either party will lessen the chances for a successful grazing program" (Bush 2008, p. 13; also Olberding 2013). Grazing agreements should clearly spell out the obligations of both parties (Bush 2008; also Olberding 2013).

"Longer-term grazing agreements (five years minimum) are more desirable" to lessees and encourage care and maintenance of properties (Bush 2008, p. 13; also Olberding 2013).

Rent/grazing fees, if charged, should be balanced with the lessee's on-site obligations. If rent/fees are charged, they should be discounted in exchange for infrastructure maintenance and custom grazing (Bush 2008; also Olberding 2013).

A grazing lessee with the appropriate type of livestock, additional nearby land and additional animals—thus with the flexibility to adjust the grazing load based on rangeland conditions and rangeland management objectives—is preferred (Bush 2008; CCWD 2005). Flexibility to adjust stocking rates in response to ongoing rangeland conditions to meet agency rangeland management goals and objectives is critical (CCWD 2005).

4.1 Grazing Infrastructure

4.1.1 Fencing

"Boundary fencing" is essential for keeping livestock on site. "Cross fencing" is important for distributing and managing livestock. "Enclosure" or "exclosure fencing" is used to shield areas from grazing, for example, to accomplish a specific rangeland objective or to establish a control area.

Fencing should be appropriate for the species and age of livestock and site conditions. Given the terrain of the Lake Del Valle Property, in almost all locations five-six strand barbed wire should be used.

Boundary fencing must be designed to meet California Food and Agricultural Code "lawful" fence requirements (Olberding 2013; Bush 2008). California law requires that livestock be kept from public roads by the person who owns or controls them: "A person that owns or controls the possession of any livestock shall not willfully or negligently permit any of the livestock to stray upon, or remain unaccompanied by a person in charge or control of the livestock upon, a public highway, if both sides of the highway are adjoined by property which is separated from the highway by a fence, wall, hedge, sidewalk, curb, lawn, or building" (Cal. Food & Ag. Code § 16902).

A livestock fence is considered "lawful" according to Chapter 7 of the Food and Agricultural Code as follows: "A lawful fence is any fence which is good, strong, substantial, and sufficient

to prevent the ingress and egress of livestock. No wire fence is a good and substantial fence within the meaning of this article unless it has three tightly stretched barbed wires securely fastened to posts of reasonable strength, firmly set in the ground not more than one rod apart, one of which wires shall be at least four feet above the surface of the ground. Any kind of wire or other fence of height, strength and capacity equal to or greater than the wire fence described is a good and substantial fence within the meaning of this article. The term 'lawful fence' includes cattle guards of such width, depth, rail spacing, and construction as will effectively turn livestock" (Cal. Food & Ag. Code § 17121).

4.1.1.1 Fencing Recommendations

- Much of the boundary fencing of the property is over 75 years old and has deteriorated to the point where "maintenance" is difficult or impossible. There should be a careful review of the condition of the fences, and a paced replacement program should be commenced to insure that all boundary fencing is strong and secure and complies with state law requirements.
- Repair and/or replace any other fencing not in serviceable condition.
- Review current cross fencing and exclusion fencing to ensure it is consistent with rangeland management and grazing objectives.

4.1.2 Water Resources.

Properly located, adequate, clean and dependable water supplies are crucial for good grazing management. A livestock watering system includes a water source, distribution mechanism, and watering location. Good quality water is important to animal health. While livestock will drink stagnant water if forced to, poor quality water can lead to reduced intake and health problems. "Water sources should ideally be located throughout a rangeland, as water is a livestock attractant, and well-distributed watering locations, particularly when in concert with strategic placement of salt blocks, are highly effective tools to manage grazing patterns and rangeland utilization" (Bush 2008, p. 15). The "key management practice" for balanced distribution over rangeland "is the careful location and distribution of watering facilities" (CCWD 2005, p. 24).

Generally, livestock water needs vary with species, class, size of animal, air temperature, humidity, and water content of forage (Olberding 2013). Generally, ten to twelve gallons per day should be available for each animal unit (AU) (Olberding 2013; Bush 2008). "Insufficient water can cause herd panic, where all livestock run to a water source at the same time for fear of not having any water left to drink. Their fears are proven out if the water source and delivery mechanism cannot refill the trough quickly enough. With troughs that stay full all the time, animals learn to drink a few at a time, avoiding panic and resulting draw down" (Bush 2008, p. 15). In riparian areas, off-stream watering sites should be provided to reduce pressure of stream banks (Bush 2008). Portable water systems can be used if permanent water sources are not available, although they require much more time and attention to set up and monitor to insure consistent supply (Bush 2008).

As discussed in Section 2.2.1, livestock water sources on the property on the east side of Del Valle Reservoir consist of two wells, several springs, and four ponds. While, historically, there was a relatively limited distribution system, which did not encourage widespread distribution of

the livestock, significant additional pumping, storage, and distribution systems have been installed over the last 15 years (see Appendix 5).

As also discussed in Section 2.2.2, livestock water sources on the property on the west side of Del Valle Reservoir consist of two wells, springs, and 18 ponds. As on the east side, there was also, historically, relative limited distribution systems on the west side, and over the last decade, there has been substantial improvement of these water sources, and expansion of storage and distribution (see Appendix 5). A summary of many of these improvements that have been made with assistance from NRCS Farm Bill programs, such as the Wildlife Habitat Incentive Program (WHIP) and Environmental Quality Incentives Program (EQIP), is in Appendix 6.

However, much of the rangeland on the west side of Del Valle Reservoir, particularly the southern stretches, is so deficient in stock water the area can only be stocked for extended periods in wetter seasons. Accordingly, this area of the property has historically been of only limited grazing utility and grazed only seasonally. Grazing for brush and vegetation control thus has not been optimal in this area, and cannot be enhanced unless additional stock water sources are developed. Fields with serious stock water constraints include the "Hospital Field" (just south of the Veteran's Administration Hospital and adjacent to what was formerly the site of a county tuberculosis sanitarium and is now EBRPD's Camp Arroyo facility), the "Canfield" (on the far western border of the property), and "Pony Gulch" (stretching along the mid-section of the property adjacent to the Department of Water Resources' property). The only developed sources of stock water in these fields are two ponds and two springs which, during extended drought periods, such as the current one (2014), dry up. Wells, if feasible, could provide a more stable and dependable supply.

4.1.2.1 Water Resources Recommendations

- Maintain current livestock water source and distribution systems.
- Develop additional livestock watering sources on the west side of the ranch in fields with inadequate sources for optimal management of rangeland.
- Study the feasibility of wells in fields particularly prone to lack of adequate stock water.

4.1.3 Access, Corrals and Barns.

Road access for cattle trucks and trailers and corral facilities are required for ongoing management of a herd. Working cattle in a corral is periodically necessary, including to brand cattle, perform health-related tasks such as vaccination and vector and parasite control, and to move cattle on and off rangeland.

There are two sets of maintained corrals on the property, one set on the east side of Del Valle Reservoir accessible off of Del Valle Road, and the other set on the west side of Del Valle Reservoir accessible from the access road and south of the main ranch house. There is a second, much smaller set of corrals on the far western side of the property. There is only limited accessibility to these corrals and they have been rarely used and only minimally maintained in the last several decades. Corrals in use should be maintained in sound condition to avoid injury to the cattle and those working the cattle. Before lengthy corral operations, corrals should be

watered to significantly reduce dust and attendant risk of disease and injury to animals and those working them.

There are two functioning barns on the property, one just north of the main ranch house, used for hay storage and sheltering horses, and one south of it, used for hay storage. These barns should be maintained in sound condition to avoid injury to livestock and horses required for working the cattle.

Ranch roads are necessary for livestock management and range monitoring, and also serve as important firebreaks and access for fire prevention. But they are also a potential source of erosion. Grading practices on the property should be seasonally focused to minimize erosion during grading, improve drainage and leave grass-stubble cover on the roads. In addition, dust control applications should be made to access roads to residences and main working corrals to significantly improve air quality and mitigate health issues in and around these areas.

4.1.3.1 Access, Corral and Barn Recommendations

- Maintain corrals in use, shipping facilities and barns, in sound condition.
- Whenever possible use dust controls when working livestock in the facilities.
- Maintain ranch roads in manner that minimizes erosion and controls health hazards associated with dust.

4.2 Grazing Capacity and Stocking Rate

The grazing capacity of a rangeland site, and thus the appropriate stocking rate, "depends on the site's capacity to produce grassland biomass, as well as the landowner's goals for the property, which help determine how intensive grazing should be" (Bush 2008, p. 16; also Olberding 2013).

When grazing is initially introduced to a site or reintroduced after an extended period of non-use, initial stocking rates need to be estimated. This should be followed by monitoring over a several year period to determine whether or not the stocking rates are achieving the goals and objectives for the grazing program or need to be adjusted (Bush 2008).

Because grassland biomass production in California rangelands can fluctuate tremendously between years due to climatic conditions, average stocking rates likely will need to be adjusted upward or downward in years with particularly high or low grassland biomass production (Olberding 2013; Bush 2008).

"Generally, a moderate level of grazing should be maintained unless specific resource management objectives call for more or less intensive use" (Bush 2008, p. 16).

Moderate grazing has been defined and quantified by rangeland researchers. "Clawson, McDougald and Duncan (1982) found that too much residual dry matter (RDM) results in thatch which inhibits early response of new forage growth and that maintaining the abundance of some annual forbs requires adequate but lower amounts of RDM than grasses. They linked the idea of using broad categories to describe grazing impact on landscape appearance and stubble height: light grazing leaves three or more inches; moderate grazing leaves two inches; and heavy grazing leaves less than two inches with areas of bare soil visible from 20 feet away" (Bush 2008, p. 16).

Alternatively, and more commonly, RDM is measured by poundage per acre (Olberding 2013; CCWD 2005).

Several different methods are used to estimate grazing capacity and stocking rates: "use of forage production estimation for range sites identified in the USDA Soil Surveys or on-line Soil Data Mart; direct measurement methods that involve clipping and weighing of vegetation; and knowledge of present and historical stocking rates on the site or on a similar nearby site" (Bush 2008, p. 17; also CCWD 2013, ACRCD 2011).

Because soil surveys "may not be completely precise or accurate regarding soil type and productivity, the resulting grazing capacity estimate is approximate, and is not intended to be used as a rigid guideline. Instead, it provides a good estimate for the initial stocking rate. Actual use must be monitored to determine the suitability of this AUM [animal unit month] estimate for the site" (ACRCD 2011, p. 11). The accuracy of the soil survey method "will vary, as the Soil survey does not accurately map all sites at a small scale, its forage estimates are approximate, and the approach may not take into account the degree to which livestock use some areas more than others due to terrain, water distribution, and other site conditions" (CCWD 2013, p. 8-7).

Often rangeland capacity is appraised by measuring RDM per acre and expressing capacity in AUs (animal units) (ACRCD 2011; CCWD 2005). One AUM is generally defined as the forage requirements of a 1000-pound cow, cow/calf pair, or equivalent for a month (ACRCD 2011). A typical RDM target for watershed, expected from moderate grazing, is in the 800 lbs/acre to 1200 lbs/acre range, increasing with the severity of the slope (CCWD 2005; also Olberding 2013; Bush 2008). "This range of RDM was designed to minimize erosion and ensure protection of water quality, to reduce light flashy fuels to protect important resource values and to enhance wildlife habitat for protected species (Stechman et al 1996). This range of RDM at the end of October correlates closely with a total plant (live/dead biomass) cover density greater than 70% and an average plant height of 2 to 4 inches" (CCWD 2005, p. 12; also Olberding 2013).

Review of United States Department of Agriculture (USDA) Soil Survey information (Appendix 4) and assessment of RDM for a "normal" rainfall year (see Appendix 7, NRCS Range Productivity Map) provides the following average annual capacity estimate for the entire property, assuming moderate grazing (RDM of at least 800 lbs/acre): 14.6 acres per AU (see Appendix 8, 2014 Ranch Capacity and Value Analysis). As indicated, this is merely an average estimate. It does not account for the wide fluctuation in annual climatic conditions, including rainfall and temperature, in this region. Nor does it account for field specific constraints, such as the extensive brush areas in the field historically referred to as "Pony Gulch" extending along the southerly west side on the reservoir. Nor does it account for economic considerations impacting the economic sustainability of the ranching enterprise (see Appendix 8).

"An alternative or complimentary method for estimating carrying capacity is to use recent historical stocking rates, provided the site has not suffered soil loss or other long-term damage" (CCWD 2013, p. 8-7). Given the length of time of the grazing operations by the individuals associated with the Lake Del Valle Property (over 50 years), the objectives to limit utilization to moderate grazing to enhance overall rangeland strength and health of plant and animal resources, and the observable rangeland conditions during the last decade which indicate these objectives have been met, grazing capacity and stocking rates have been estimated here based on historical use.

The historic average annual stocking rate for the entire Lake Del Valle Property in a "normal" rainfall year is 14.9 acres per AU. The historic rate on the property west of Del Valle Reservoir is 13 acres per AU; it is 17 acres per AU on the property to the east of the reservoir. Again, these are average rates. Due to the size of the property, the grazing capacity of the various fields varies significantly. Additionally, the appropriate stocking rate in any given year will depend on the climatic conditions, and also the carryover conditions of the prior year.

4.2.1 Grazing Capacity and Stocking Rate Recommendations

- Stock grazing areas at rate that results in "moderate" grazing as described above, except in any areas that may be identified for specific rangeland management objectives requiring lighter or heavier stocking.
- Achieve RDM in the range of 800 (on flat ground) to 1,200 (on steep slopes) pounds per acre.
- Monitor stocking rates to determine their suitability for rangeland management objectives.
- Adjust stocking rates at the beginning of each grazing season, based on weather conditions and expected forage crop.
- Make additional adjustments during the grazing season in drought or high production years.
- Identify a process for adjusting stocking rates within the grazing agreement.

4.3 Seasonal Adjustments to Grazing

Given California's variable climatic conditions, stocking rates must be evaluated throughout the year. For example, what may start as a "normal" rainy season, may actually end up as a dry season, and vice versa. Or, to achieve specific rangeland management objectives with respect to vegetation or animal species, grazing pressure in a particular area may need to be intensified or decreased. Accordingly, the number of animals grazing in any particular field may well require adjustment over the course a grazing season in order to maintain animal health and wellbeing and optimal range condition. "Stocking rate will always need to be adjusted with annual weather conditions, by reducing the stocking rate or removing livestock early in dry years, and increasing the rate or extending the period in favorable years" (ACRCD 2011, p. 11).

Adjustments can be made in various ways, including concentrating livestock in particular fields or more widely distributing livestock among fields, increasing or decreasing the length of grazing in fields typically grazed seasonally, and removing animals from range altogether if, and as, needed. The timing that pasture cattle are brought onto rangeland can also be adjusted, within a month in a "rainy" year when new forage is early and vigorous, on a paced basis in a moderately wet year, and not at all in prolonged dry years.

Feeding of hay and other food and mineral supplements also affects grazing pressure and is a helpful tool in making seasonal adjustments to promote forage growth. However, feeding of hay should be seasonal only and limited to months necessary to bridge between the end of the

grazing season and commencement of grass growth, as hay feeding concentrates cattle. This can have impacts both for the rangeland and the health of the cattle. Hay should be inspected and as free of weed material as possible.

These are some of the strategies used in what is referred to as "adaptive management" (ACRCD 2011, p.13), and it is important that a lessee have the resources and will to use them as climatic changes and evolving rangeland conditions require.

4.3.1 Seasonal Adjustment Recommendations

- Stocking rates should be monitored throughout the year.
- Adaptive management practices should be employed as appropriate to insure animal health and well-being, and well managed rangeland conditions.

4.4 Livestock Species and Classes

There are a variety of factors that determine which livestock species and class[1] are appropriate to grazing on a particular site, including performance in terrain, availability, infrastructure needs, and rangeland management goals and objectives (Bush 2008). Cattle are generally more appropriate for grazing on hilly rangeland than sheep, for example, because they are less vulnerable to predators like mountain lions and coyotes (although these predators can and do predate calves) (Bush 2008). Performance in the terrain is important because different cattle breeds have significantly different performance in different terrains, both in terms of meat production and calving success. Availability and market for product are related factors essential to the economic viability of a grazing operation. Rangeland management goals and objectives are important because different grazing animals prefer, and select, different types of vegetation.

4.4.1 Livestock Species and Class Recommendations

- Graze classes of cattle that are appropriate given livestock water resources and rangeland conditions.

4.5 Animal Distribution

Animal distribution is influenced by numerous factors, including instinctive animal behavior, forage quality, watering locations, livestock attractants such as mineral licks, fencing and ranch roads (Bush 2008). Generally, fairly even distribution is desirable so some areas are not overgrazed, with some areas minimally or not grazed to provide rest for those areas (Bush 2008).

Water supply, although limited by source location and production, "should be the primary tool used to distribute livestock" (Bush 2008, p. 18).

Animal distribution can also be managed through the use of supplements, such as protein and mineral supplements. The placement of liquid or other supplement feeds can encourage cattle to graze areas they may otherwise ignore.

[1] "Class" refers to age and reproductive status, i.e., bulls, cows, heifers (young females that have not yet calved), steers (young males that have been castrated), calves (very young cattle of either sex).

4.5.1 Animal Distribution Recommendations

- Maintain livestock water sources and distributions systems. Develop additional livestock watering sources on the west side of the ranch in fields with inadequate sources for optimal utilization of rangeland.
- Use, as appropriate, animal nutrient supplements to manage distribution.
- Maintain ranch roads to manage distribution and facilitate monitoring of livestock.
- Employ flexible approach to distribution to achieve moderate grazing levels and insure vigor and health of rangeland.

4.6 Monitoring and Evaluation

Grazing monitoring is important for two reasons: To discover if grazing is being carried out according to the grazing agreement (Compliance Monitoring); and to determine if grazing is achieving the goals and objectives of this Grazing Management Plan (Effectiveness Monitoring) (Olberding 2013; Bush 2008; EDAW 1997).

Compliance Monitoring. Compliance monitoring should be done to insure that the grazing operation is being conducted consistent with the terms and conditions of the grazing agreement. Monitoring actual grazing use insures compliance with stocking rate, RDM levels and other provisions of the agreement. Records of actual stocking rates and grazing periods should be kept so resource responses to grazing levels can be effectively tracked, and to create a historical data base (Olberding 2013; Bush 2008).

Effectiveness Monitoring. Effectiveness monitoring should be done to insure that the grazing operation is achieving the goals and objectives of this Grazing Management Plan (Olberding 2013; Bush 2008).

Monitoring Methodology. If staff and financial resources allow, a monitoring plan should be developed that details methodology for monitoring compliance and effectiveness (Bush 2008). Otherwise, a third party experienced in range management, such as the ACRCD or California Rangeland Trust (CRT), or a Certified Range Manager (CRM) can perform both compliance and effectiveness monitoring, work with the grazing lessee, and report to Zone 7.

The manner in which data should be collected for each type of monitoring is currently a matter of discussion in the range science community, and it is recommended Zone 7 consult with experts in the field (such as the NRCS, ACRCD and certified range managers, or range management specialists with the University of California) to devise monitoring systems appropriate for its approach to monitoring (i.e., in-house or through third parties) and its range management objectives. At a minimum, RDM monitoring and mapping should be done based on field surveys in spring and fall.

Adaptive management techniques, such as those discussed in Section 4.3, should be implemented based on monitoring results, if adjustments are necessary. Similarly, adjustments

to the Grazing Management Plan may be necessary to achieve overall rangeland management goals and objectives (Olberding 2013; Bush 2008).

4.7 Grazing Requirements For Special Status Species

Good watershed management is the primary focus of Zone 7's Grazing Management Plan for its Lake Del Valle Property. In the future it is anticipated that habitats for special status species may be identified, and management of these habitat areas will be subject to specific management requirements.

5 References

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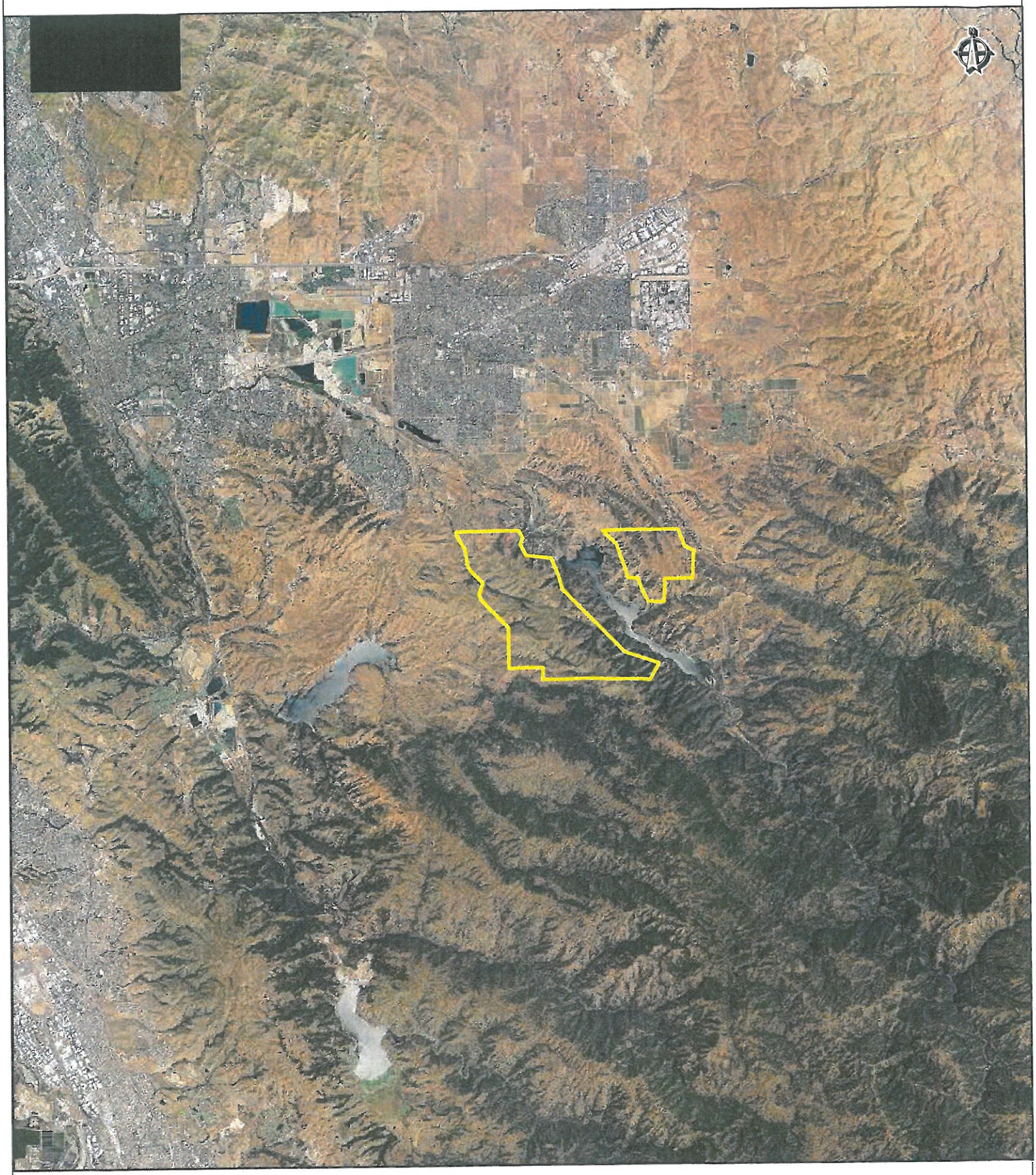
APPENDIX 1:

Location of Lake Del Valle Property

Zone 7 Lake Del Valle Property



APPENDIX 2:

Pond Restoration Biological Assessment Report

Patterson Ranch Pond Restoration Project

Final Construction Report

In Compliance with:
DFG #1600-2011-0257-R3
RWQCB Site #02-01-C1118
RWQCB Site #02-01-C1121
USFWS Safe Harbor #TE133479-0

Prepared by:
Alameda County Resource Conservation District
Natural Resource Conservation Service

Contact:
Jackie Charbonneau
jackie.charbonneau@ca.usda.gov
(925) 371-0154 ext. 114

November 23, 2011

Project Background:

The Patterson Ranch Pond Restoration Project was completed in October 2011. The project involved de-sedimentation of four existing livestock ponds on the Patterson Ranch in Livermore, CA. The primary purposes of the project were to improve habitat for native wildlife and improve availability of water for livestock. The project was a voluntary restoration project on private rangeland.

The project serves as mitigation for BART for the temporal loss of habitat functions and values associated with wetlands and open waters that will occur between the initial time of impact and post-mitigation establishment of habitat and associated functions and values on the Blankstein parcel for the Warm Springs Extension Project.

Project Implementation Details:

Pond 1 involved the removal of approximately 2000 cubic yards of sediment. The pond depth was returned to its original capacity (approximately 12 feet deep). The sediment disposal area was the existing corral area approximately 900 LF from the pond. Species that were found and/or relocated during construction included:

Species Found/Relocated	# of Adults	# of Juveniles	Relocated Area
CA red-legged frog (CRLF)	10	35	Pond nearby with existing CRLF
CA newt	10	0	Pond nearby with existing CA newts

Pond 2 involved the removal of approximately 800 cubic yards of sediment and cattails. The pond depth was returned to its original capacity (approximately 10 feet deep). A section of cattails remained intact. The sediment disposal area was located in a flat area near the pond. Species that were found and/or relocated during construction included:

Species Found/Relocated	# of Adults	# of Juveniles	Relocated Area
CA red-legged frog (CRLF)	8	11	Pond nearby with existing CRLF

Pond 3 involved the removal of approximately 900 cubic yards of sediment. The pond depth was returned to its original capacity (approximately 9 feet deep). Because of their location in the pond, we were not able to keep any of the cattails intact. The vegetation at the inlet of the pond did remain intact. The sediment disposal area was located in a flat area near the pond. Species that were found and/or relocated during construction included:

Species Found/Relocated	# of Adults	# of Juveniles	Relocated Area
CA red-legged frog (CRLF)	5	25	Pond nearby with existing CRLF

Pond 4 involved the removal of approximately 450 cubic yards of sediment. The pond depth was returned to its original capacity (approximately 7 feet deep). The sediment disposal area was located in a flat area near the pond. No species were found and/or relocated during construction.

Patterson Ranch Pond Restoration Project
Before & After Photos

DFG #1600-2011-0257-R3
RWQCB Site #02-01-C1118
RWQCB Site #02-01-C1121
USFWS Safe Harbor #TE133479-0

Pond 1- Before
4-1-11

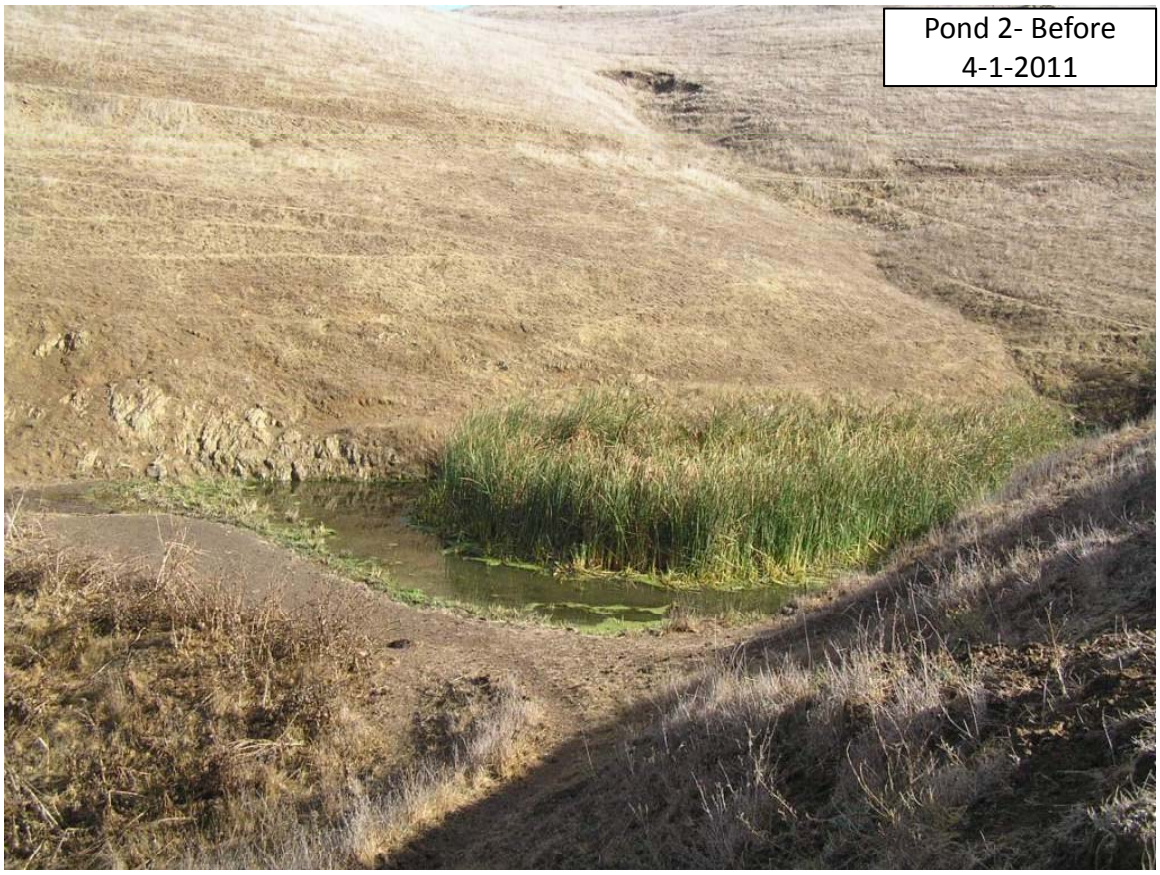
Pond 1 - After
10-3-11

Pond 1- Before
10-2010

Pond 1 - After
10-3-11

Pond 2- Before
4-1-2011

Pond 2 - After
11-22-11


Pond 2- Before
4-1-2011


Pond 2 - After
11-22-11


Pond 2 - After
10-3-11
Note –
Cattails left
intact


Pond 3 - Before
8-2-11


Pond 3 - After
10-3-11


Pond 3 - Before
8-2-11


Pond 3 - After
10-3-11

Pond 4- Before
8-2-11

Pond 4 - After
10-3-11


Pond 4- Before
8-2-11


Pond 4 - After
10-3-11

APPENDIX 3:

Pond restoration 2013 Annual Report

2013
ANNUAL MONITORING REPORT FOR THE PATTERSON RANCH POND RESTORATION PROJECT

Prepared for:
San Francisco Bay Area Rapid Transit District

Prepared by:
Alameda County Resource Conservation District and Natural Resources Conservation Service

January 2014

Mitigation for the BART Warm Springs Extension Project

CONTENTS

1 Introduction 2
2 Project Background 2
3 Project Description 2
4 Reporting Requirements 3
5 Annual Summary 3
6 Monitoring Schedule 3
7 Monitoring Methods 3
8 Monitoring Results 3
9 Proposed Management and Remedial Actions 4

1 INTRODUCTION

This report covers year 2 of the required five year annual monitoring reports for the San Francisco Bay Area Rapid Transit (BART) District's Patterson Ranch Pond Restoration Project and covers the monitoring efforts conducted in 2013. BART has contracted with the Alameda County Resource Conservation District (ACRCD) to plan, implement and monitor the pond restoration project to satisfy mitigation requirements associated with the BART Warm Springs Extension (WSX) Project in Fremont, California. ACRCD has contracted with the USDA Natural Resources Conservation Service (NRCS), to assist with the project tasks.

2 PROJECT BACKGROUND

The Patterson Ranch Pond Restoration Project is located on the Patterson Ranch, a large cattle ranch located South of Livermore. The Patterson Ranch was owned by the Patterson Family during project construction. The ranch was recently sold to Zone 7 water agency in November 2013. The existing land manager continues to lease the property for cattle grazing. The project involved de-sedimentation of four existing livestock ponds. The primary purposes of the project were to improve habitat for native wildlife, in particular the California red-legged frog and/or the California tiger salamander, and improve availability of water for livestock. The project was a voluntary restoration project on private rangeland that was funded through BART. The project serves as mitigation for BART for the temporal loss of habitat functions and values associated with wetlands and open waters that occurred between the initial time of impact and post-mitigation establishment of habitat and associated functions and values on the Blankstein parcel for the Warm Springs Extension Project.

The primary work associated with the Patterson Ranch Pond Restoration Project was completed in 2011. The ponds were successfully implemented and are performing according as planned. Five years of post-construction photo monitoring are required to meet BART's mitigation requirements.

3 PROJECT DESCRIPTION

All four ponds were designed by ACRCD/NRCS biologists. The design focused on the habitat needs of the California red-legged frog and California tiger salamander. A basic project description was given to the contractor. The specific habitat guidance/design was done in the field, with the contractor and biologists working closely to tailor the desiltation process to meet the needs for both species and to meet permit requirements. This involved creating shallow areas in the pond for larval development, and deep water for escape areas and pond longevity. Desiltation/enhancement of the ponds to meet the habitat requirements of the California red-legged frog and California tiger salamander was successfully implemented and the ponds are performing according as planned. Five years of post-construction photo monitoring are required to meet BART's mitigation requirements.

4 REPORTING REQUIREMENTS

This report will be submitted to BART to satisfy WSX Project permit conditions. Separate permits obtained by the landowner and ACRCD to implement the project do not have on-going permit requirements (CA Department of Fish and Wildlife Notification Number 1600-2011-0257-R3, SF Bay Regional Water Quality Control Board Site Numbers 02-01-C1118 and 02-01-C1121, and US Fish and Wildlife Safe Harbor Number TE133479-0).

5 ANNUAL SUMMARY

To date, the lack of rain during the 2013/2014 rainy season has impacted the amount of water in the four project ponds on the Patterson Ranch. The lack of rain and impacts are not isolated to the Patterson Ranch, with many of the ponds in the county completely drying for the first time in recent memory and in some cases, for the first time recorded. The restored ponds are still performing as planned. See Section 8, Monitoring Results, for a summary of pond conditions noted during monitoring.

6 MONITORING SCHEDULE

Photo-monitoring was conducted upon completion of construction (October 2011), and for the first year of annual monitoring (January 2013). The second year of photo monitoring was conducted on January 9, 2014.

7 MONITORING METHODS

Photo-monitoring was done using established photo points for each pond. Unfortunately some of the January 9th, 2014 photos were affected by fog. The fog rolled in as the photo-monitoring visit was taking place.

8 MONITORING RESULTS

See Appendix A. Each photo is labeled with the location point and date. Pre-Project photographs from the photo points are also included for comparison. Following is a brief summary of conditions noted during monitoring:

- *Pond 1*: Performing according to design. During construction the contractors were careful to not remove fringe emergent vegetation to the maximum extent possible. The majority of the fringe vegetation was left intact and is doing well. The water level of pond 1 has been impacted by the lack of rainfall to date during the 2013/2014 rainy season.
- *Pond 2:* Performing according to design. Before construction this pond did not have a lot of open water available for amphibian breeding. Sufficient open water habitat is now present. The lack of rainfall has not seemed to impact the water level of pond 2. The de-sedimentation

of this pond seems to have really opened up the spring in this pond, making it a reliable water source for both wildlife and livestock.

- *Pond 3*: Performing according to design. Before construction this pond did not have a lot of open water habitat for amphibian breeding. Sufficient open water habitat is now present. The de-sedimentation of this pond seems to have really opened up the spring in this pond, making it a reliable water source for both wildlife and livestock.
- *Pond 4*: Performing according to design. The lack of rainfall to date during the 2013/2014 rainy season has impacted this pond. This pond is not springfed and relies on rainfall to fill. This pond has not yet filled this season due to insufficient rainfall.

9 PROPOSED MANAGEMENT AND REMEDIAL ACTIONS

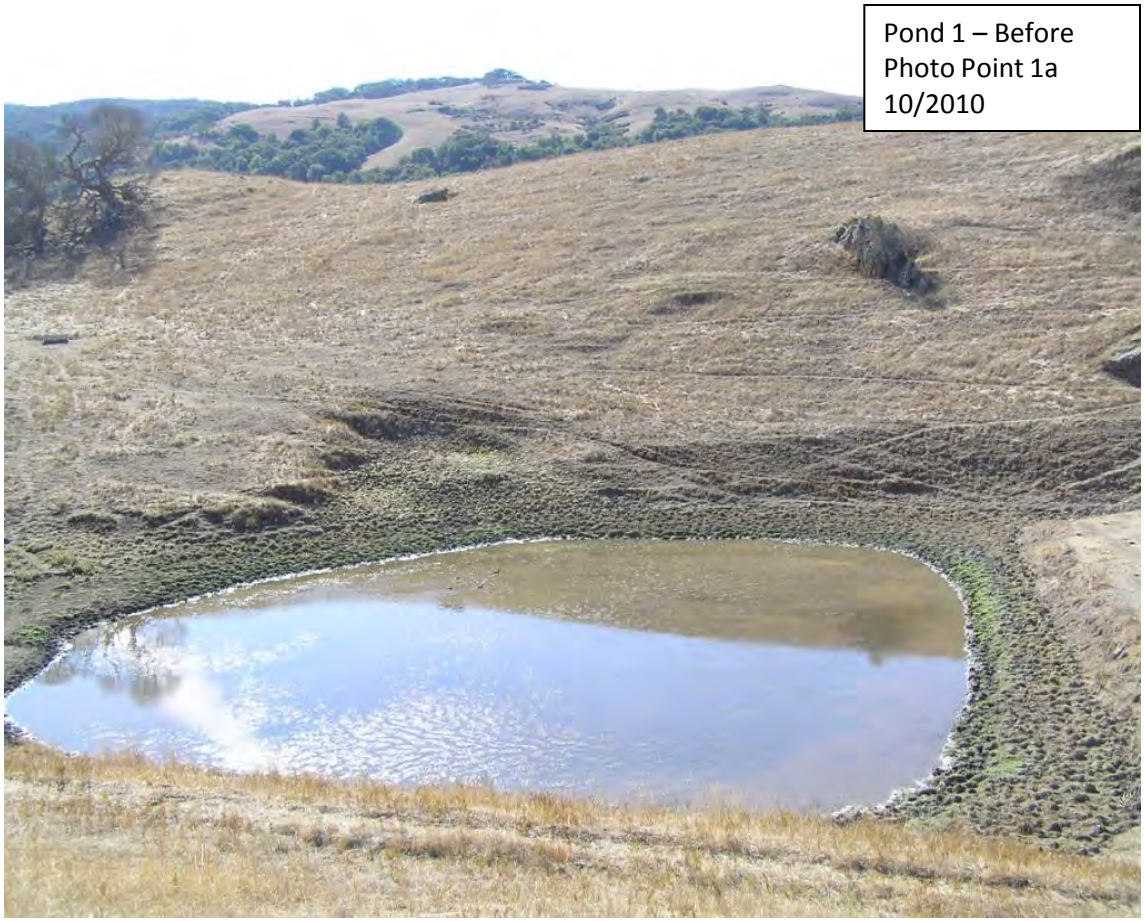
The ponds have been successfully restored and have met the required success criteria. Recommended future actions, although not necessary for the success of the project goals, include the following:

- Pond 1: Electrical lines to an existing livestock water system were damaged during construction activities. The landowner is working with the contractor to ensure that this damage is repaired. ACRCD/NRCS recommend repair of the livestock water system. The land manager is interested in possibly fencing out the inlet for pond 1 to reduce grazing pressure on inlet vegetation. The land manager is working with ACRCD/NRCS to develop a plan for this fencing.
- Pond 2: Continue to monitor upland vegetation re-growth along the western edge of the pond. Some erosion has occurred – mostly likely due to natural slumping, and/or cattle trails.
- Pond 3: None
- Pond 4: None

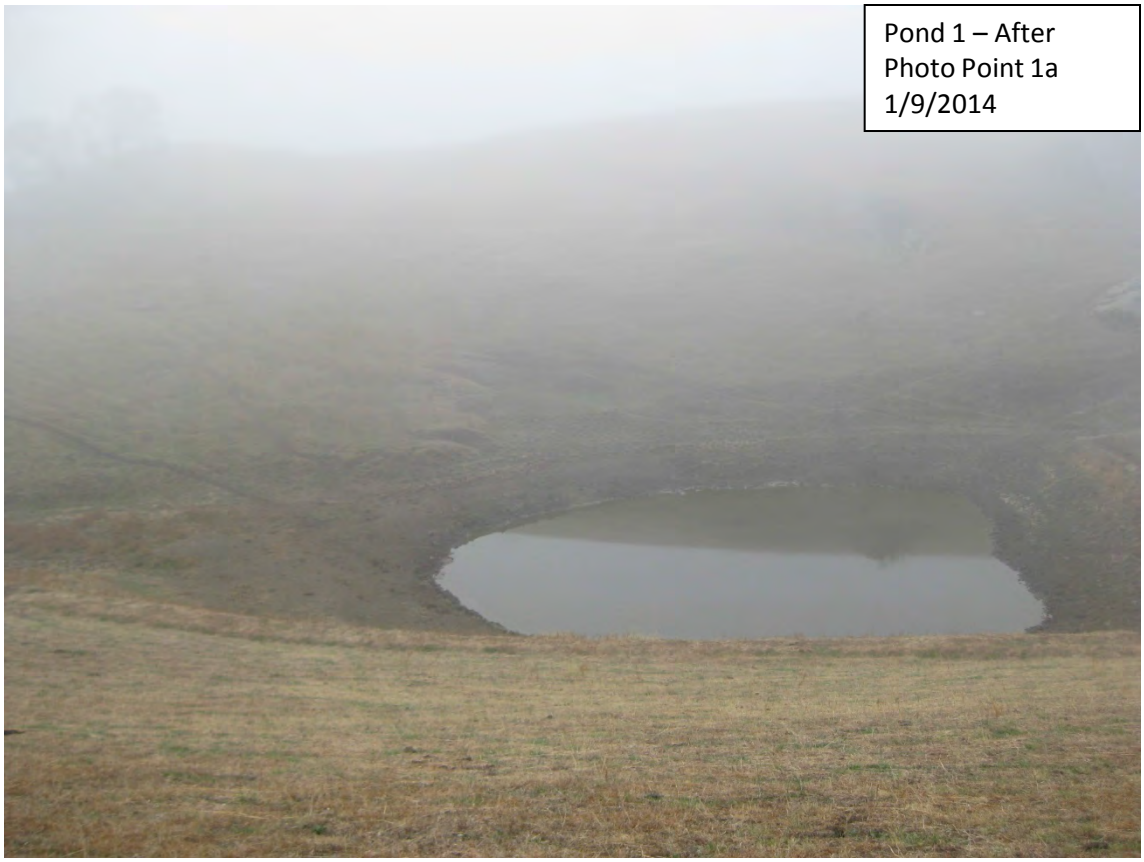
APPENDIX A - PHOTOGRAPHS

2013 MONITORING PHOTOGRAPHS (JANUARY 9, 2014):

PHOTO-MONITORING POINTS



Pond 1 – Before
Photo Point 1a
10/2010



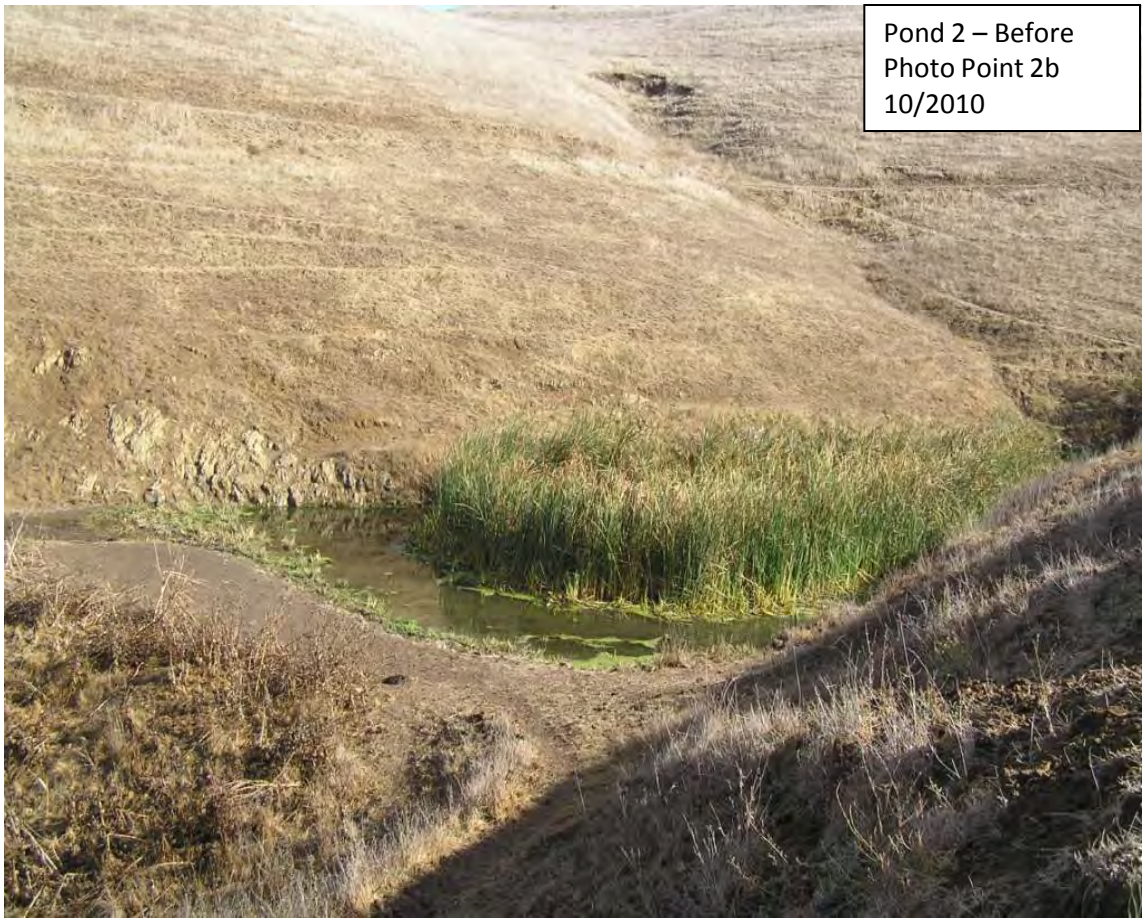
Pond 1 – After
Photo Point 1a
1/9/2014

Pond 1 – Before
Photo Point 1b
4/1/2011

Pond 1 – After
Photo Point 1b
1/9/2014

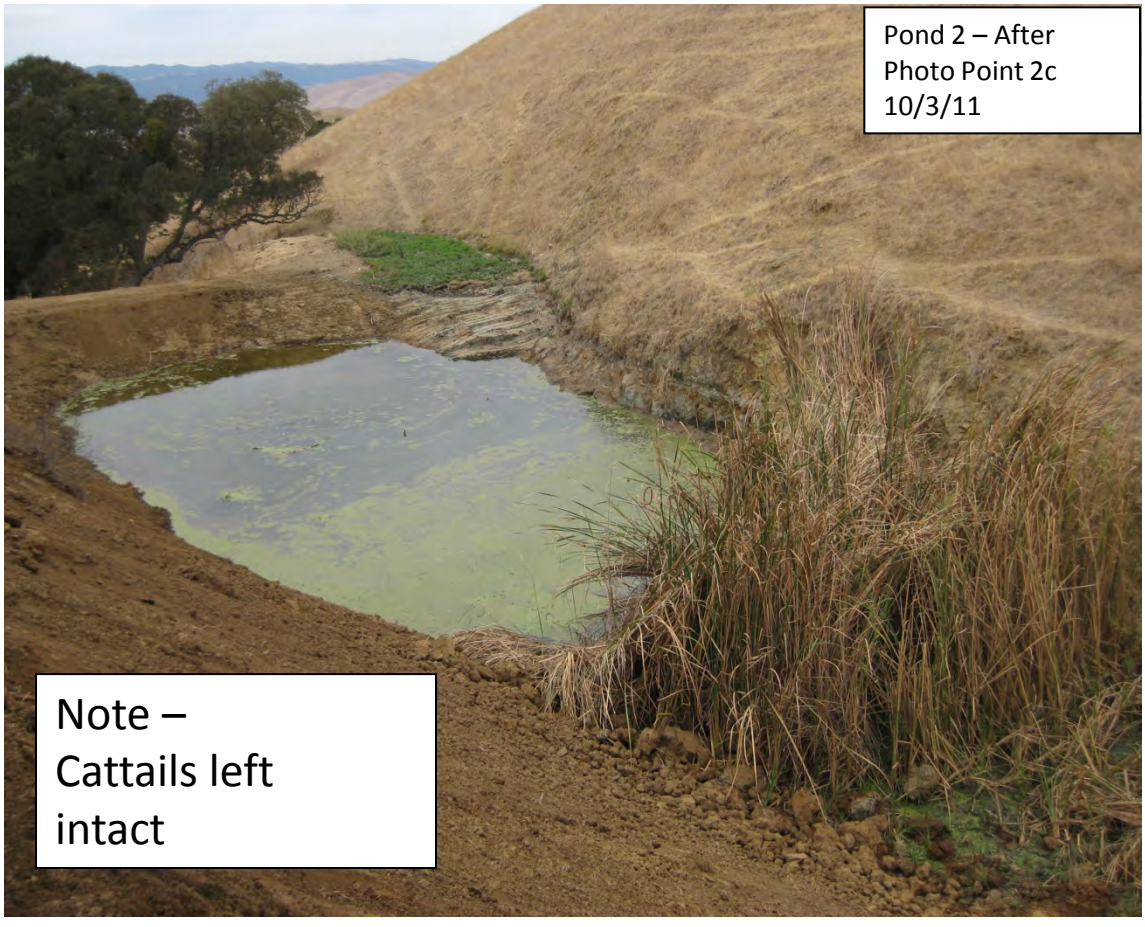
Pond 2 – Before
Photo Point 2a
4/1/2011

Pond 2 – After
Photo Point 2a
1/9/2014



Pond 2 – Before
Photo Point 2b
10/2010

Pond 2 – After
Photo Point 2b
1/9/2014


Pond 2 – After
Photo Point 2c
10/3/11
Note –
Cattails left
intact


Pond 2 – After
Photo Point 2c
1/9/2014
Note –
Cattails left
intact

Pond 3 – Before
Photo Point 3a
8/2/11

Pond 3 – After
Photo Point 3a
1/9/2014

Pond 4 – Before
Photo Point 4a
8/2/2011

Pond 4 – After
Photo Point 4a
1/9/2014

Pond 4 – Before
Photo Point 4b
8/2/2011

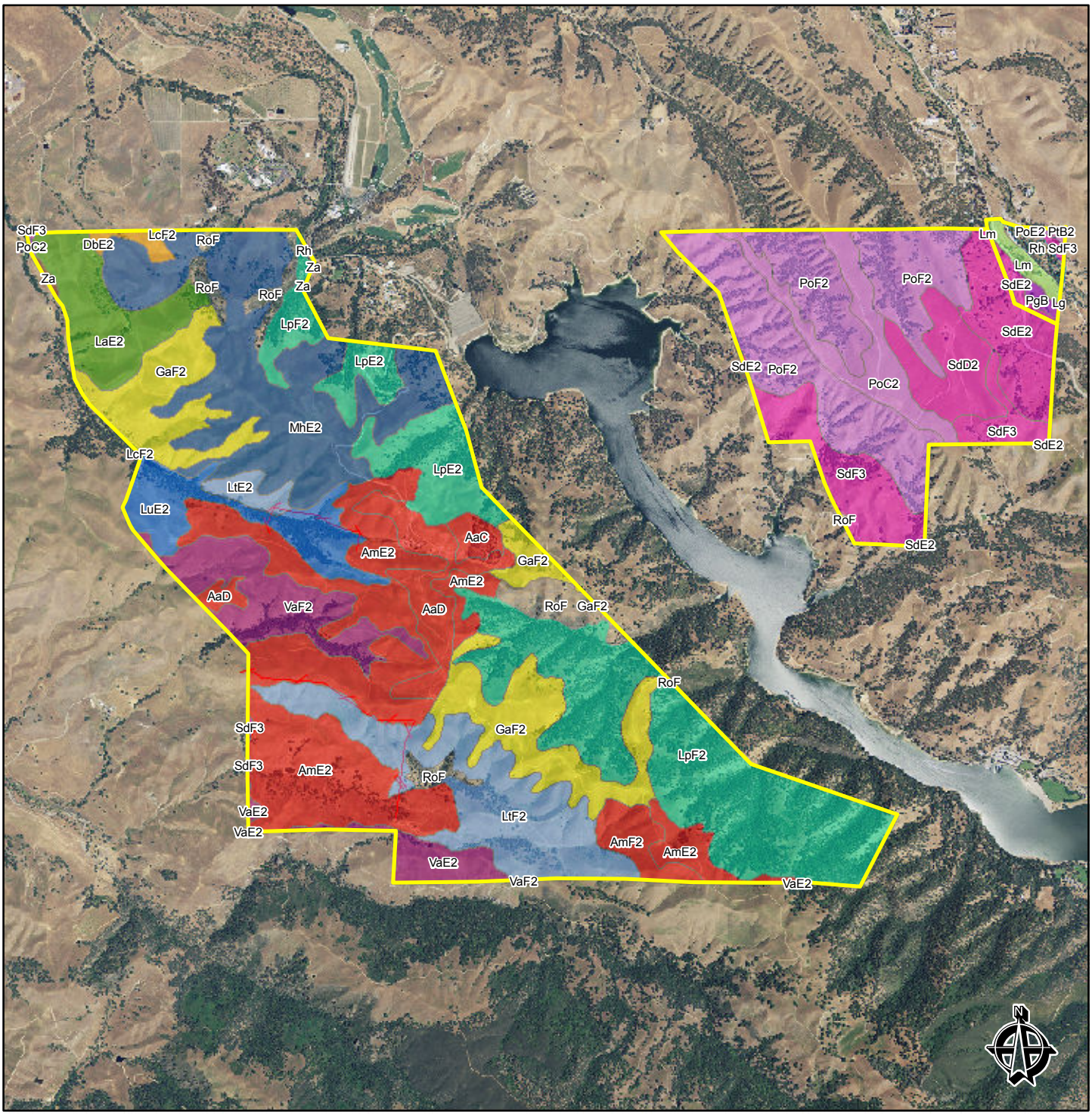
Pond 4 – After
Photo Point 4b
1/9/2014

APPENDIX 4:

NRCS Soils Map, Legend and Soils Inventory Report

Soils Map
Patterson Ranch

Date: 9/15/2014



0 0.45 0.9 1.35 1.8 Miles

1:42,000

See Attached page for map legend

Legend

Property Boundary

Soils Map

MUSYM, muname

AaC, Altamont clay, 3 to 15 percent slopes

AaD, Altamont clay, 15 to 30 percent slopes

AmE2, Altamont clay, moderately deep, 30 to 45 percent slopes, eroded

AmF2, Altamont clay, moderately deep, 45 to 75 percent slopes, eroded

DbE2, Diablo clay, 30 to 45 percent slopes, eroded

GaF2, Gaviota rocky sandy loam, 40 to 75 percent slopes, eroded

LaE2, Linne clay loam, 30 to 45 percent slopes, eroded

LcF2, Linne clay loam, shallow, 45 to 75 percent slopes, eroded

Lg, Livermore gravelly loam

Lm, Livermore very gravelly coarse sandy loam

LpE2, Los Gatos-Los Osos complex, 30 to 45 percent slopes, eroded

LpF2, Los Gatos-Los Osos complex, 45 to 75 percent slopes, eroded

LtE2, Los Osos silty clay loam, 30 to 45 percent slopes, eroded

LtF2, Los Osos silty clay loam, 45 to 75 percent slopes, eroded

LuE2, Los Osos and Millsholm soils, 30 to 45 percent slopes, eroded

MhE2, Millsholm silt loam, 30 to 45 percent slopes, eroded

PgB, Pleasanton gravelly loam, 3 to 12 percent slopes

PoC2, Positas gravelly loam, 2 to 20 percent slopes, eroded

PoE2, Positas gravelly loam, 20 to 40 percent slopes, eroded

PoF2, Positas gravelly loam, 40 to 60 percent slopes, eroded

PtB2, Positas gravelly loam, thick surface, 2 to 10 percent slopes, eroded

Rh, Riverwash

RoF, Rock land

SdD2, Shedd silt loam, 15 to 30 percent slopes, eroded

SdE2, Shedd silt loam, 30 to 45 percent slopes, eroded

SdF3, Shedd silt loam, 45 to 75 percent slopes, severely eroded

VaE2, Vallecitos rocky loam, 30 to 45 percent slopes, eroded

VaF2, Vallecitos rocky loam, 45 to 75 percent slopes, eroded

Za, Zamora silt loam, 0 to 4 percent slopes

Soils Inventory Report

PAUL BANKE

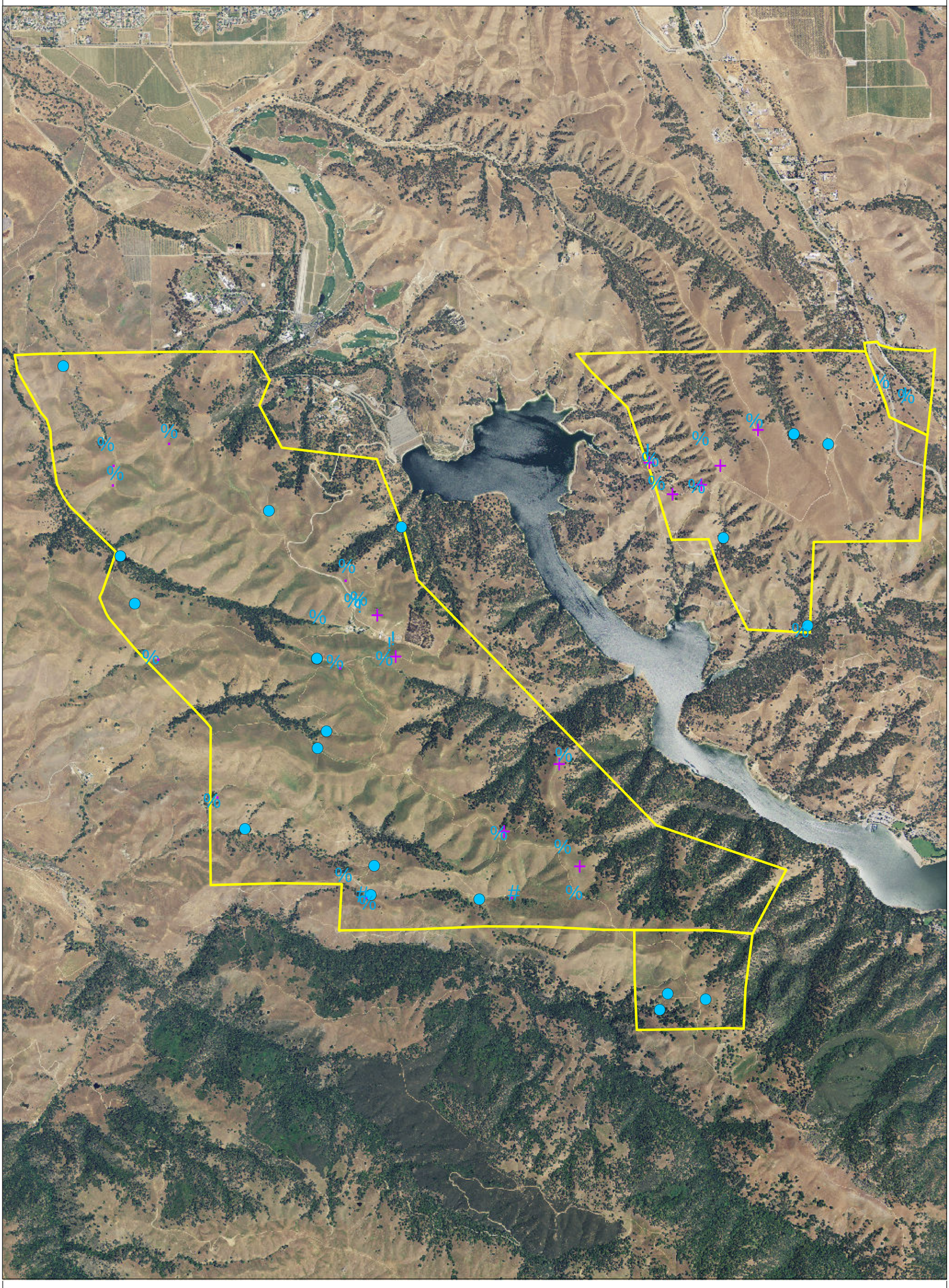
Map Unit Symbol	Map Unit Name	Acres	Percent
AaC	Altamont clay, 3 to 15 percent slopes	24.6	1%
AaD	Altamont clay, 15 to 30 percent slopes	126.7	3%
AmE2	Altamont clay, moderately deep, 30 to 45 percent slopes, eroded	604.5	13%
AmF2	Altamont clay, moderately deep, 45 to 75 percent slopes, eroded	54.1	1%
DbE2	Diablo clay, 30 to 45 percent slopes, eroded	16.2	0%
GaF2	Gaviota rocky sandy loam, 40 to 75 percent slopes, eroded	389	9%
LaE2	Linne clay loam, 30 to 45 percent slopes, eroded	158	3%
LcF2	Linne clay loam, shallow, 45 to 75 percent slopes, eroded	1.9	0%
Lg	Livermore gravelly loam	0.3	0%
Lm	Livermore very gravelly coarse sandy loam	22.1	0%
LpE2	Los Gatos-Los Osos complex, 30 to 45 percent slopes, eroded	175.5	4%
LpF2	Los Gatos-Los Osos complex, 45 to 75 percent slopes, eroded	606	13%
LtE2	Los Osos silty clay loam, 30 to 45 percent slopes, eroded	28.2	1%
LtF2	Los Osos silty clay loam, 45 to 75 percent slopes, eroded	303.6	7%
LuE2	Los Osos and Millsholm soils, 30 to 45 percent slopes, eroded	139.8	3%
MhE2	Millsholm silt loam, 30 to 45 percent slopes, eroded	483.9	11%
PgB	Pleasanton gravelly loam, 3 to 12 percent slopes	9.8	0%
PoC2	Positas gravelly loam, 2 to 20 percent slopes, eroded	120.5	3%
PoE2	Positas gravelly loam, 20 to 40 percent slopes, eroded	1.9	0%
PoF2	Positas gravelly loam, 40 to 60 percent slopes, eroded	468.4	10%
PtB2	Positas gravelly loam, thick surface, 2 to 10 percent slopes, eroded	2.3	0%
Rh	Riverwash	19.9	0%
RoF	Rock land	98.6	2%

SdD2	Shedd silt loam, 15 to 30 percent slopes, eroded	107.8	2%
SdE2	Shedd silt loam, 30 to 45 percent slopes, eroded	142	3%
SdF3	Shedd silt loam, 45 to 75 percent slopes, severely eroded	179.9	4%
VaE2	Vallecitos rocky loam, 30 to 45 percent slopes, eroded	66.8	1%
VaF2	Vallecitos rocky loam, 45 to 75 percent slopes, eroded	170.8	4%
Za	Zamora silt loam, 0 to 4 percent slopes	4.1	0%
	Total:	4527.2	

APPENDIX 5:

Livestock Water Sources and Distribution Systems

Zone 7 Lake Del Valle Property - Livestock Water



developed spring
trough
Property Boundary
solar pump
well
tank
Ponds

0 0.3 0.6 0.9 1.2 Miles

N

APPENDIX 6:

WHIP and EQUIP Projects

Paul Banke - Patterson Ranch - Farm Bill Conservation Projects 2002-2014

2014 Environmental Quality Incentives Program Pond Initiative Application
Planned Practices (Not currently in contract, pending application approval)

NRCS Application #	Practice Code	Practice Name	Units	Amount	Year	Status	NRCS Cost Share	Description
749104143DA	378	Desed (Difficult Excavation), embankment pond with pipe, >500CY	No.	1	2015	Pending	Pending	Chapman Pond - Desedimentation and Spillway repair for improving wildlife habitat and livestock water.
749104143DA	378	Desed (Difficult Excavation), embankment pond without pipe	No.	1	2015	Pending	Pending	Bullfield Pond - Desedimentation and Spillway repair for improving wildlife habitat and livestock water.
749104143DA	734	Wildlife structure (Turtle Rafts)	No.	2	2015	Pending	Pending	Turtle rafts for Turtle pond and Ridgefield pond to improve basking areas for Western pond turtle.
749104143DA	382	Fence	No.	Pending	2015	Pending	Pending	Fence around riparian inlet of Ridgefield pond to reduce sedimentation from animal trampling into the pond.


Chapman Pond Planned Restoration


Ridgefield Pond Planned Riparian Fencing Area

2010 Agriculture Water Enhancement Program
Planned Practices (Currently in contract, not yet completed)

NRCS Contract #	Practice Code	Practice Name	Units	Amount	Year	Status	NRCS Cost Share	Description
799104105NP	382	Fence (Ft.)	ft	2,800	2014	Planned	$8,955.00	Installation of cross-fencing as part of grazing management/improvement of livestock distribution.
799104105NP	468	Lined Waterway or Outlet (Ft.)	ft	375	2014	Planned	$1,536.00	Gully repair to address erosion caused from road drainage.
799104105NP	468	Lined Waterway or Outlet (Ft.)	ft	10	2014	Planned	$755.00	Gully repair to address erosion caused from road drainage.
799104105NP	468	Lined Waterway or Outlet (Ft.)	ft	60	2014	Planned	$4,525.00	Gully repair to address erosion caused from road drainage.


Planned Gully Repair


Planned Gully Repair

2010 Agriculture Water Enhancement Program
Completed Practices

NRCS Contract #	Practice Code	Practice Name	Units	Amount	Year	Status	NRCS Cost Share	Description
799104105NP	614	Watering Facility (No.)	no	1	2010	Certified	$1,134.00	Component of a livestock watering facility to support grazing management/improvement of livestock distribution.
799104105NP	614	Watering Facility (No.)	no	1	2010	Certified	$2,610.00	Component of a livestock watering facility to support grazing management/improvement of livestock distribution.
799104105NP	382	Fence (Ft.)	ft	3,500	2012	Certified	$23,732.10	Installation of cross-fencing as part of grazing management/improvement of livestock distribution.
799104105NP	382	Fence (Ft.)	ft	300	2010	Certified	$959.46	Installation of cross-fencing as part of grazing management/improvement of livestock distribution.
799104105NP	382	Fence (Ft.)	ft	4,400	2011	Certified	$14,072.08	Installation of cross-fencing as part of grazing management/improvement of livestock distribution.

Completed Watering Facility

Completed Watering Facility with escape ramp

2002 Environmental Quality Incentives Program
Completed Practices

NRCS Contract #	Practice Code	Practice Name	Units	Amount	Year	Status	NRCS Cost Share	Description
7491042A002	516	Pipeline (Ft)	ft.	1,250	2003	Certified	$2,596.06	Component of a livestock watering facility to support grazing management/improvement of livestock distribution.
7491042A002	533	Pumping plant (No)	no.	1	2003	Certified	$4,500.00	Component of a livestock watering facility to support grazing management/improvement of livestock distribution.
7491042A002	614	Watering facility (No)	no.	1	2003	Certified	$1,700.00	Component of a livestock watering facility to support grazing management/improvement of livestock distribution.
7491042A002	614	Watering facility (No)	no.	4	2003	Certified	$1,800.00	Component of a livestock watering facility to support grazing management/improvement of livestock distribution.
7491042A002	533	Pumping plant (No)	no.	1	2004	Certified	$2,500.00	Component of a livestock watering facility to support grazing management/improvement of livestock distribution.
7491042A002	574	Spring development (No)	no.	1	2004	Certified	$2,238.00	Component of a livestock watering facility to support grazing management/improvement of livestock distribution.
7491042A002	516	Pipeline (Ft)	ft.	1,500	2005	Certified	$3,750.00	Component of a livestock watering facility to support grazing management/improvement of livestock distribution.
7491042A002	614	Watering facility (No)	no.	2	2005	Certified	$900.00	Component of a livestock watering facility to support grazing management/improvement of livestock distribution.
7491042A002	614	Watering facility (No)	no.	1	2005	Certified	$1,750.00	Component of a livestock watering facility to support grazing management/improvement of livestock distribution.

Completed Solar Pump Panels

Completed Watering Facility (Tank)

APPENDIX 7:

NRCS Range Productivity Map

Range Productivity Map
Patterson Ranch

Date: 8/12/2010

Customer: PAUL BANKE

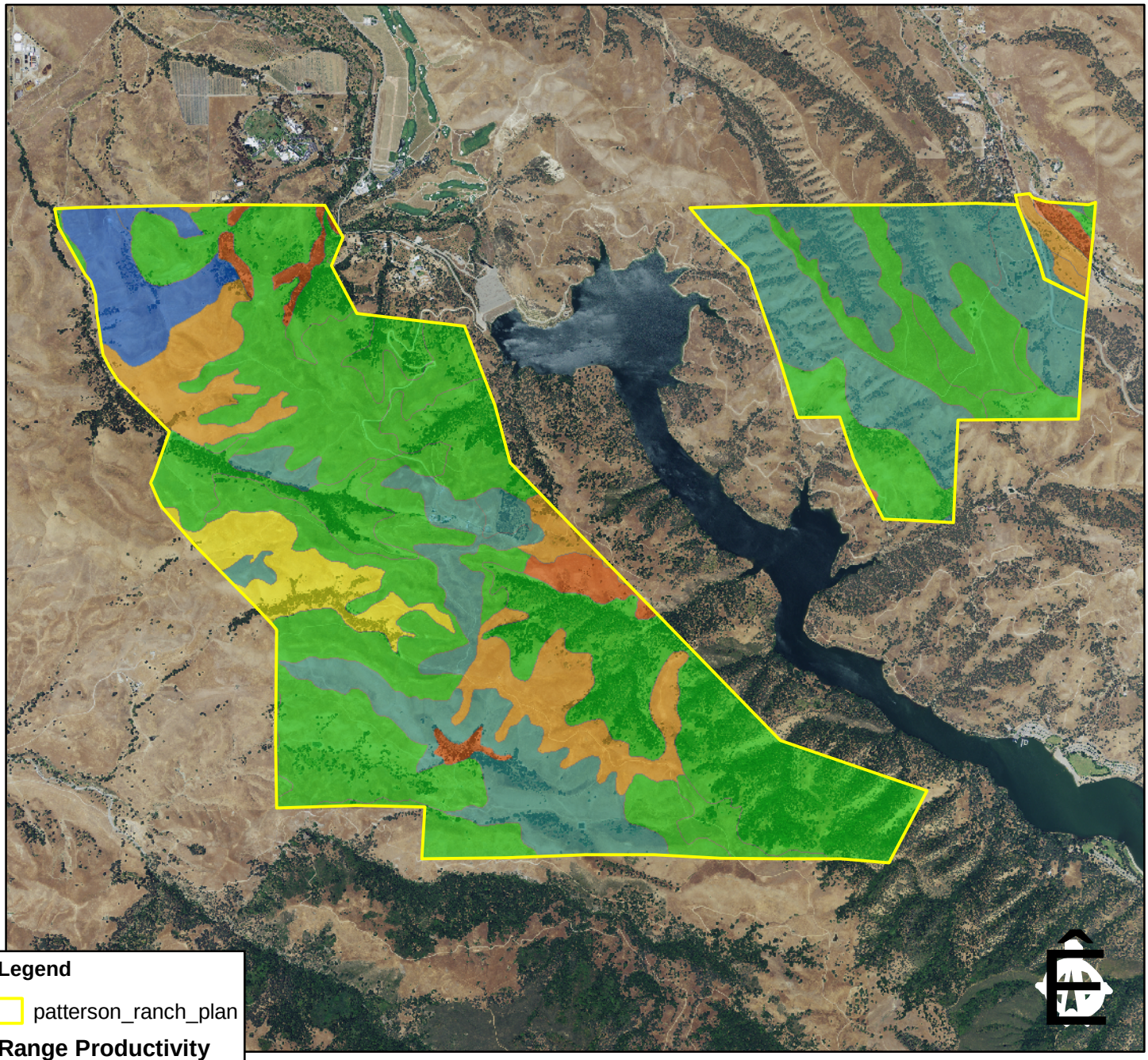
State and County: CA, ALAMEDA

Land Units: F 19 T 4770, 6115; F 839 T 6328
Grazed Rangeland

Field Office: LIVERMORE Partnership Office

Agency: USDA Natural Resources Conservation Service

Assisted By: MORPHEUS ANIMA



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APPENDIX 8:

2014 Ranch Capacity and Value Analysis

Koopmann Ranch
EST. 1918
PO Box 177
Sunol, CA.
Phone (925) 200-2123
E-mail: koopmannranch@gmail.com
Commercial Cattle / California Certified Rangeland Manager #41

Patterson Ranch Capacity and Value Analysis

General Area Information

Alameda County, in the west-central part of California, covers approximately 325,000 acres. Due to industrialization, residential development and population growth, acreage used for agriculture has diminished significantly. Due to zoning management and public land acquisition for recreation and water resources, over 200,000 acres of rangeland in Alameda County remains available for managed livestock grazing. The Mediterranean type climate, with rainfall averaging 16 to 28 inches annually, provides for good to excellent winter forage growth.

Data Accumulation

The Patterson Ranch land adjacent to the farmstead, and generally south and west, is comprised of three general soil associations. Two are upland and one is a terrace\alluvial.

Vallecitos-Parrish - Moderately steep to very steep; brown and red-brown soils on meta-sedimentary and basic igneous rock base

Millsholm-Los Gatos-Los Osos – Moderately sloping to very steep, brown soils on moderately hard sedimentary rock.

Positas-Perkins – Nearly level to steep, shallow to moderately deep soils on high terraces

Soil Series, specific to the approximate Patterson Ranch site (in declining order of occurrence) include:

PoF2	Positas gravelly loam, 40 to 60 percent slopes
PoC2	Positas gravelly loam, 2 to 20 percent slopes
SdE2	Shedd silt loam, 30 to 45 percent slopes
SdF3	Shedd silt loam, 45 to 75 percent slopes

The above soil classes represent a variety of estimated forage production capability on a dry matter basis. Annual production is impacted by many factors including total rainfall accumulation, rain fall timing occurrence, RDM protective cover, and relative soil temperature.

The potential production of unfertilized air-dry forage for the respective soil series pertinent to the particular Patterson Ranch site are as follows:

Soil Series	Favorable Years	Less Favorable Years	Average Years
PoF2	2,200 lbs.	1,200 lbs.	1,700 lbs.
PoC2	3,200 lbs.	1,800 lbs.	2,500 lbs.
SdE2	2,400 lbs.	1,200 lbs.	1,800 lbs.
SdF3	2,200 lbs.	1,200 lbs.	1,700 lbs.

As shown, and as known by range practitioners, weather conditions and other factors play a significant role in the productivity of the range resources and thusly, the economic sustainability of the ranching entity. There may be wide variability in carrying capacity from year to year, thus stocking rates must be estimated based upon economic considerations that are further complicated by the volatility in the live cattle market.

Estimating Stocking Rates

1 Animal Unit = 1,200 lbs.	Estimated dry matter consumption at 3% body weight daily
RDM = Residual Dry Matter	Necessary for water quality, habitat and soil retention

To establish an estimate of an acceptable pasture-stocking rate, the annual total pounds of forage produced per acre must be known or assessed. Historical records may be available, a non-grazed sample may be harvested, weighed and calculated, neighbors may be consulted, local UCCE personnel may provide information, and soil series analysis may be conducted.

A sample calculation for estimating a stocking rate on the Patterson Ranch, using soil series PoF2 forage production, in a **Favorable Year** as follows:

Annual forage produced per acre	2,200 pounds		
Less desired RDM	(800) pounds		
Forage available for grazing			1,400 pounds
Annual forage requirement per Animal Unit	13,140 pounds	=	9.39 acres \ AU
Divided by forage available for grazing	1,400 pounds \ acre		

A sample calculation for estimating a stocking rate on the Patterson Ranch, using soil series PoF2 forage production, in a **Less Than Favorable Year** is as follows:

Annual forage produced per acre	1,200 pounds		
Less Desired RDM	(800) pounds		
Forage available for grazing			400 pounds
Annual forage requirement per Animal Unit	13,140 pounds	=	32.85 acres\AU
Divided by forage available for grazing	400 pounds \ acre		

A sample calculation for estimating a stocking rate on the Patterson Ranch, using soil series PoF2 forage production, in an **Average Year** is as follows:

Annual forage produced per acre	1,700 pounds		
Less Desired RDM	(800) pounds		
Forage available for grazing			900 pounds
Annual forage requirement per Animal Unit	13,140 pounds	=	14.60 acres\AU
Divided by forage available for grazing	900 pounds \ acre		

Another limiting factor for all grazing operations is the availability and location of stock water. Stock water should be located so as to encourage distribution of grazing animals to all areas of the rangeland, Concentration of livestock in wetland areas, riparian corridors, and lowlands may inhibit proper utilization of upland areas and cause resources to be overly grazed. Daily water consumption per Animal Unit ranges from 10 to.22 gallons, depending on temperature, class of livestock and physiological function, as lactating females have enhanced requirements