

LAKE CACHUMA OAK TREE RESTORATION PROGRAM

2015 ANNUAL REPORT *with* *Fiscal Year 2015-2016 Financials and Water Usage*



Prepared for: Cachuma Operation and Maintenance Board

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This Annual Report presents the results of the 2015 oak tree inventory and Fiscal Year 2015/2016 (FY15/16) maintenance with water use and financials for the Lake Cachuma Oak Tree Restoration Program (Program). For Program details and objectives, see the 2-Year Plan for Fiscal Years 2013/14 and 2014/15 (COMB, 2014). This annual report contains oak tree survival rates, maintenance with water usage, financials, and suggested program improvements.

Just over 800 (824) oak trees were planted in FY15/16. These trees are referred to as the Year 8 trees and were planted in Long Pool Flat and Terrace near Bradbury Dam and Lake Cachuma County. The inventory and results of that planting effort in regards to meeting the mitigation requirement will be presented in next year's annual report although the financials and maintenance effort are included in this report.

Results

The 2015 inventory (or survey) of the oak trees planted through the Lake Cachuma Oak Tree Restoration Program was completed in February 2016. The objective of the annual survey is to determine the status and success rate of the trees planted since the beginning of the program with 7 years of plantings; Year 1 (2005-2006), Year 2 (2006-2007), Year 3 (2007-2008), Year 4 (2008-2009), Year 5 (2009-2010), Year 6 (2010-2011), and Year 7 (2014-2015) in four different locations around Lake Cachuma (Figure 1). Year 8 (2015-2016) trees are newly planted (Figure 2) and will be included in the 2016 inventory. Annual surveys are conducted in the late fall and early winter to best document the survival after the dry season and growth since the last survey.

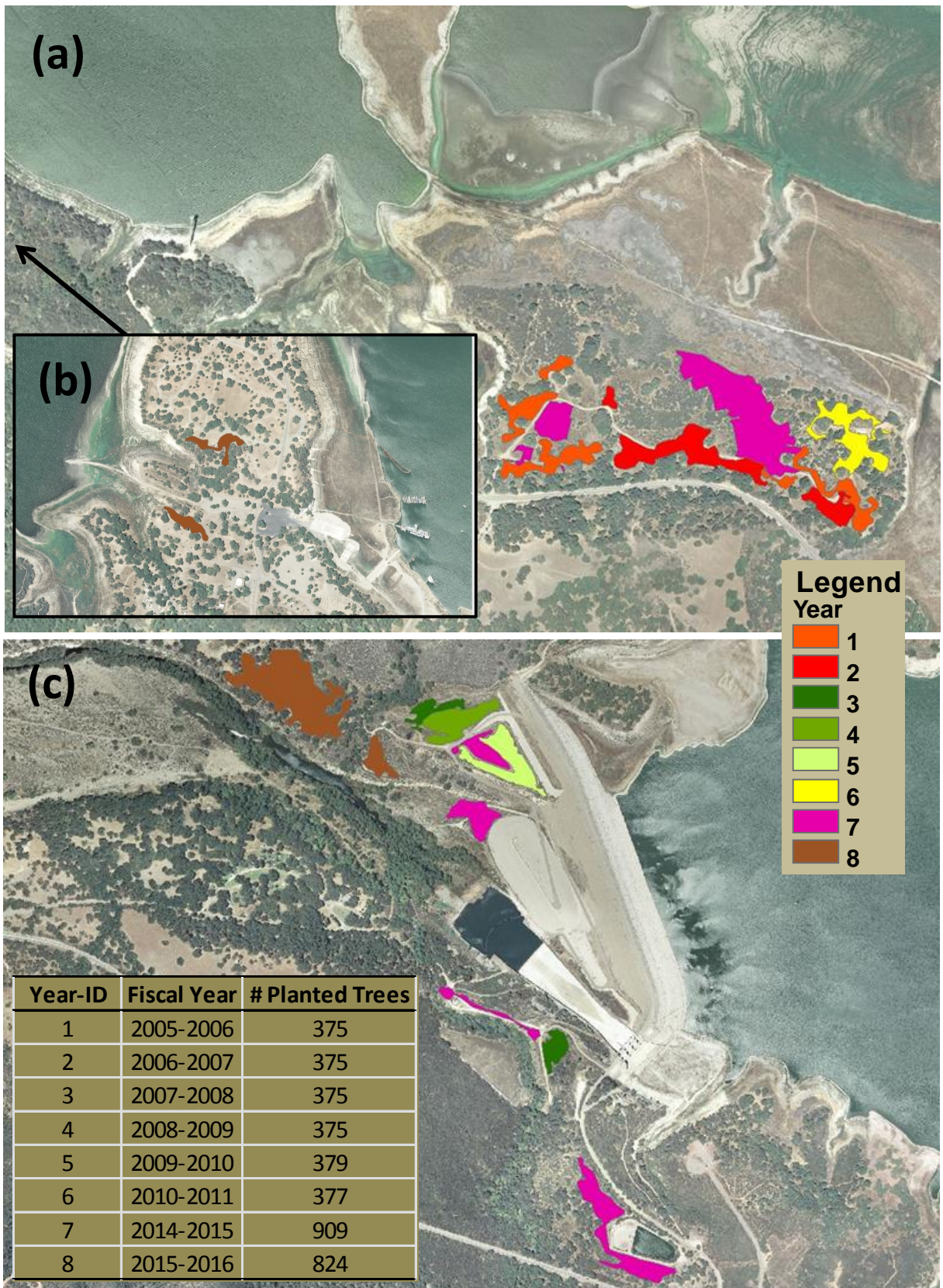


Figure 1: Oak tree planting locations by year planted; (a) Storke Flats, (b) Cachuma Lake Recreation Area (County Park), and (c) Bradbury Dam area.

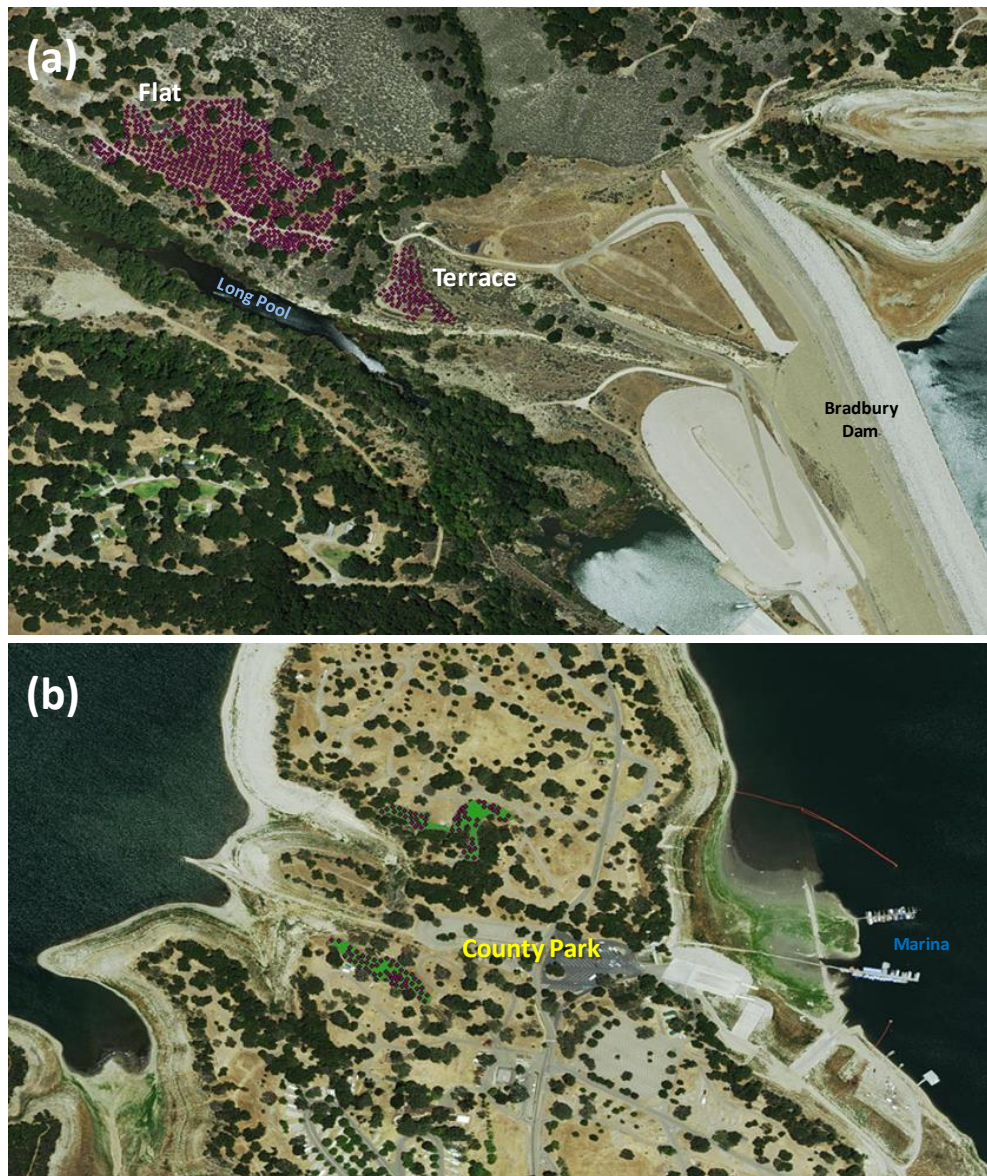


Figure 2: Oak trees planted during Year 8 specifically at (a) the Long Pool Flat and Terrace, and (b) within Lake Cachuma County Park.

The following figures and tables are the results of the survey in 2015 with 2014 results included for comparison; overall success rates in 2014 and 2015 (Figures 3 and 4) and success by planting year in 2014 and 2015 (Figures 5-10). The overall success rate went from 82.5% in 2014 to 85.7% in 2015; the increase is due to adding in the Year 7 trees (906) with a very high first year success rate. Without Year 7 trees, the success rate for Years 1-6 trees is 80.2% which is a drop from last year (2014) and is attributed to five consecutive years of drought and root damage by gophers getting through failing gopher wire baskets. The number of required mitigated trees from the Lake Cachuma Surcharge Project was set in 2015 and reported in the 2015 Lakeshore Survey Report (COMB, 2016). The required mitigation ratio is two to one (2:1) survival rate (self-sustaining) in 2025. The results of the 2015 Lakeshore Survey found there were 879 dead and 1,122 at-risk oak trees. With a 2:1 mitigation ratio and an estimated 18% mortality rate, it was estimated that 4,722 trees would need to be planted to meet our mitigation requirements in 2025. To date, there are 3,583 planted alive trees suggesting that 1,139 trees still need to be planted.

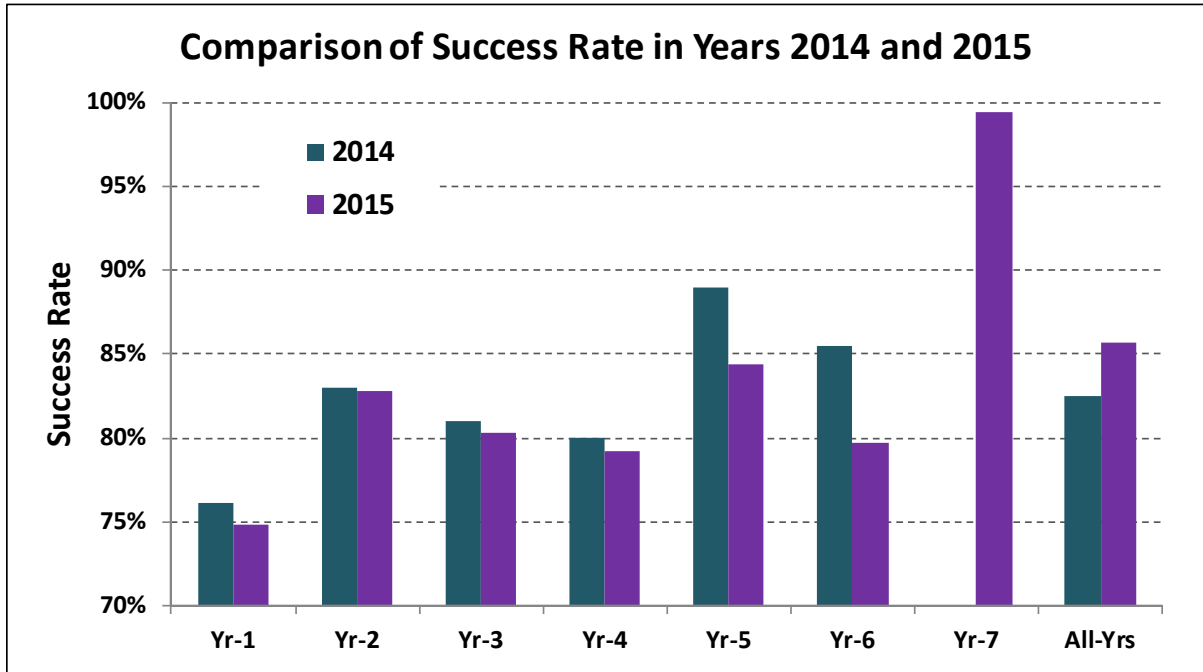
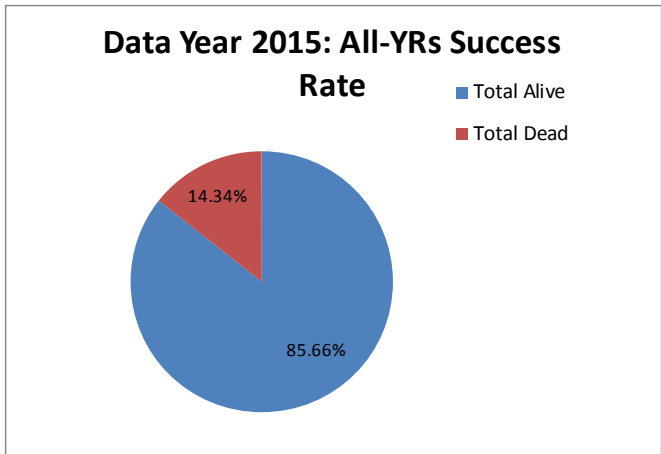
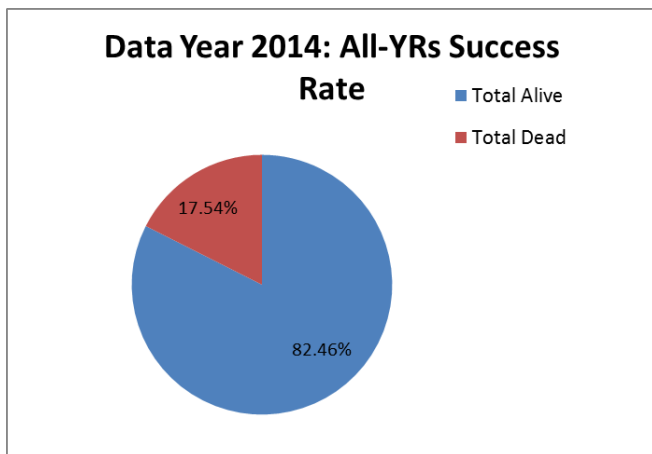


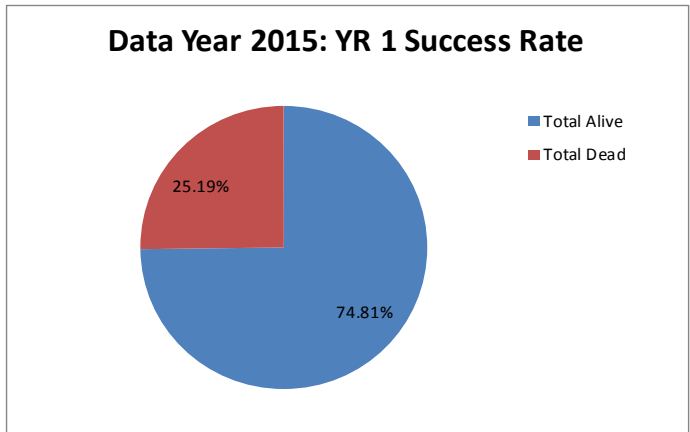
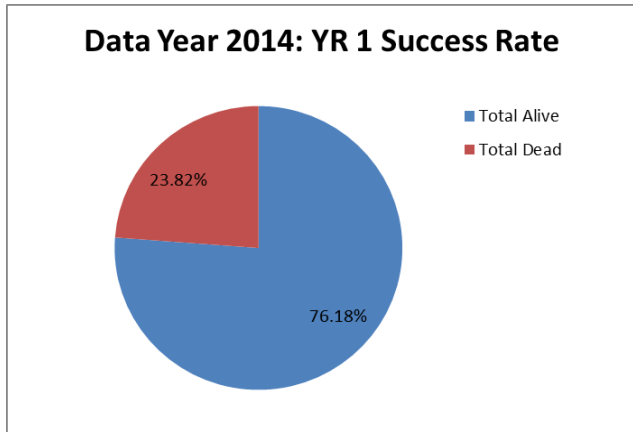
Figure 3: Success rate comparison from 2014 to 2015 for each and all tree years (Yr); not including Year 8 trees.



All Years - Total Observed in 2014		Percent of Total	
Total Coast Live Oak (alive)	1684	Total Alive	1894 82.46%
Total Valley Oak (alive)	210	Total Dead	403 17.54%
Ratio Coast/Valley	8.0	Total	2297 100.00%

All Years - Total Observed in 2015		Percent of Total	
Total Coast Live Oak (alive)	2396	Total Alive	2759 85.66%
Total Valley Oak (alive)	363	Total Dead	462 14.34%
Ratio Coast/Valley	6.6	Total	3221 100.00%

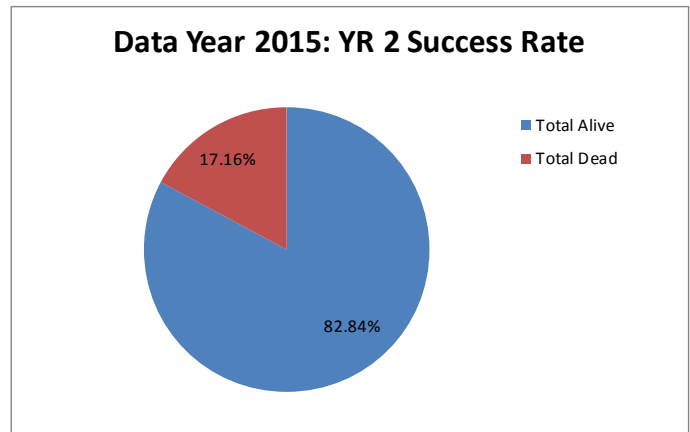
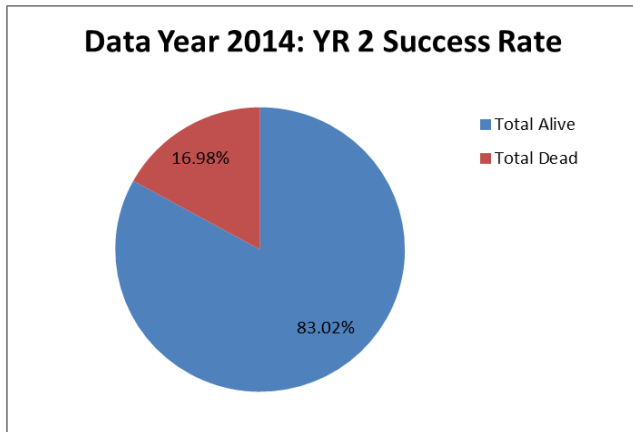
Figure 4: 2014 and 2015 status of oak trees from all years (Years 1 through 7) planted; not including Year 8 trees.



Year 1 - Total Observed in 2014		Percent of Total	
Total Coast Live Oak (alive)	263	Total Alive	291 76.18%
Total Valley Oak (alive)	28	Total Dead	91 23.82%
Ratio Coast/Valley	9.4	Total	382 100.00%

Year 1 - Total Observed in 2015		Percent of Total	
Total Coast Live Oak (alive)	264	Total Alive	288 74.81%
Total Valley Oak (alive)	24	Total Dead	97 25.19%
Ratio Coast/Valley	11.0	Total	385 100.00%

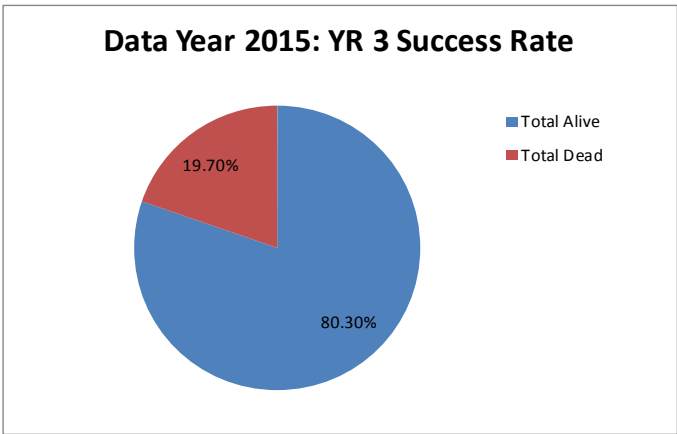
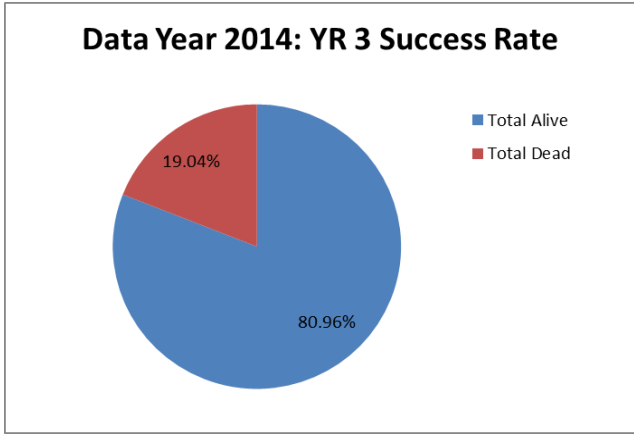
Figure 5: Status comparison of Year (YR) 1 trees from 2014 to 2015.



Year 2 - Total Observed in 2014		Percent of Total	
Total Coast Live Oak (alive)	280	Total Alive	308 83.02%
Total Valley Oak (alive)	28	Total Dead	63 16.98%
Ratio Coast/Valley	10.0	Total	371 100.00%

Year 2 - Total Observed in 2015		Percent of Total	
Total Coast Live Oak (alive)	285	Total Alive	309 82.84%
Total Valley Oak (alive)	24	Total Dead	64 17.16%
Ratio Coast/Valley	11.9	Total	373 100.00%

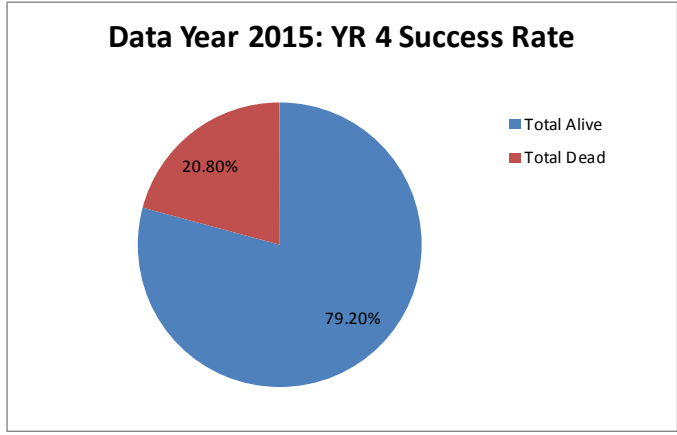
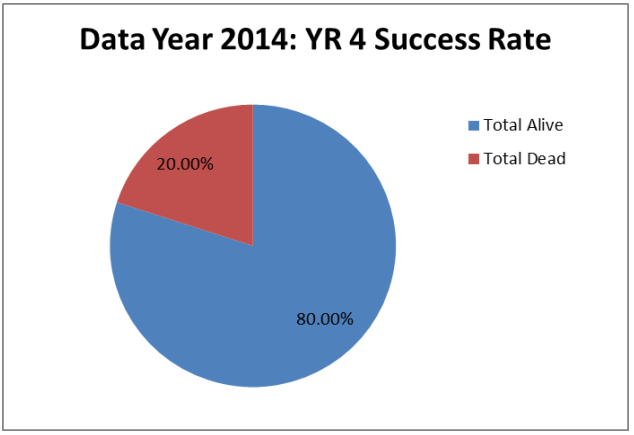
Figure 6: Status comparison of Year 2 trees from 2014 to 2015.



Year 3 - Total Observed in 2014		Percent of Total	
Total Coast Live Oak (alive)	292	Total Alive	319
Total Valley Oak (alive)	27	Total Dead	75
Ratio Coast/Valley	10.8	Total	394
			100.00%

Year 3 - Total Observed in 2015		Percent of Total	
Total Coast Live Oak (alive)	295	Total Alive	322
Total Valley Oak (alive)	27	Total Dead	79
Ratio Coast/Valley	10.9	Total	401
			100.00%

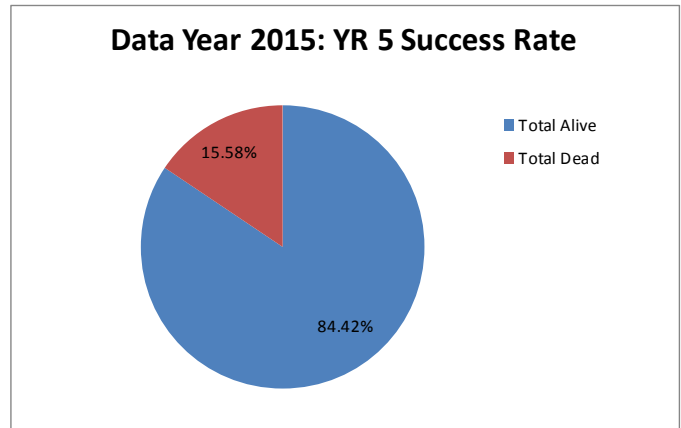
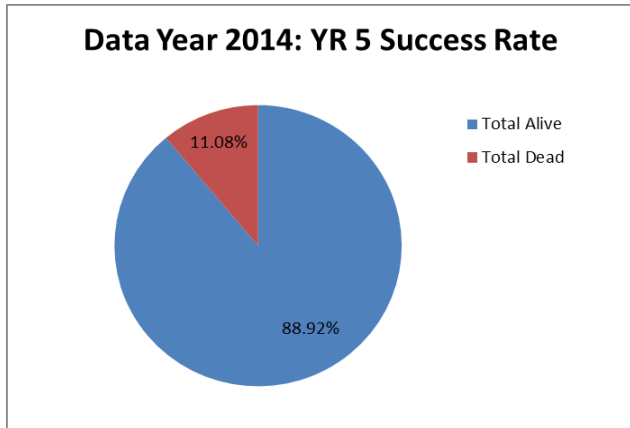
Figure 7: Status comparison of Year 3 trees from 2014 to 2015.



Year 4 - Total Observed in 2014		Percent of Total	
Total Coast Live Oak (alive)	272	Total Alive	300
Total Valley Oak (alive)	28	Total Dead	75
Ratio Coast/Valley	9.7	Total	375
			100.00%

Year 4 - Total Observed in 2015		Percent of Total	
Total Coast Live Oak (alive)	270	Total Alive	297
Total Valley Oak (alive)	27	Total Dead	78
Ratio Coast/Valley	10.0	Total	375
			100.00%

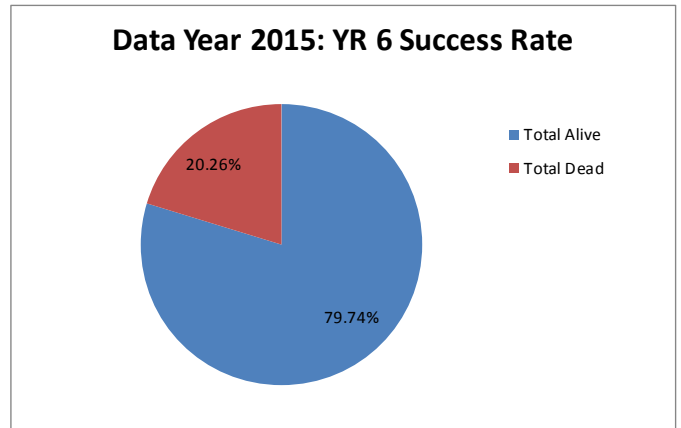
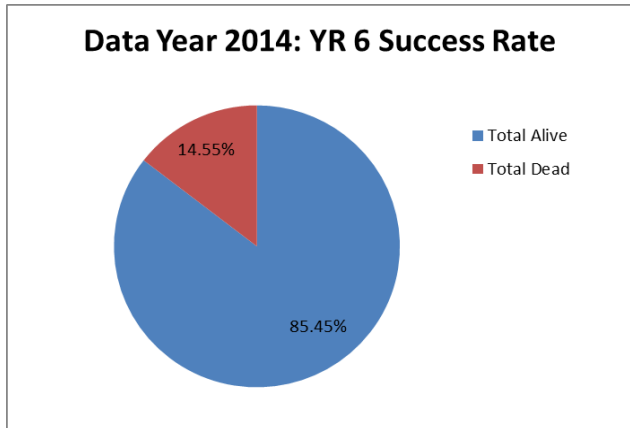
Figure 8: Status comparison of Year 4 trees from 2014 to 2015.



Year 5 - Total Observed in 2014		Percent of Total	
Total Coast Live Oak (alive)	297	Total Alive	353 88.92%
Total Valley Oak (alive)	56	Total Dead	44 11.08%
Ratio Coast/Valley	5.3	Total	397 100.00%

Year 5 - Total Observed in 2015		Percent of Total	
Total Coast Live Oak (alive)	285	Total Alive	336 84.42%
Total Valley Oak (alive)	51	Total Dead	62 15.58%
Ratio Coast/Valley	5.6	Total	398 100.00%

Figure 9: Status comparison of Year 5 trees from 2014 to 2015.



Year 6 - Total Observed in 2014		Percent of Total	
Total Coast Live Oak (alive)	280	Total Alive	323 85.45%
Total Valley Oak (alive)	43	Total Dead	55 14.55%
Ratio Coast/Valley	6.5	Total*	378 100.00%

Year 6 - Total Observed in 2015		Percent of Total	
Total Coast Live Oak (alive)	265	Total Alive	303 79.74%
Total Valley Oak (alive)	38	Total Dead	77 20.26%
Ratio Coast/Valley	7.0	Total	380 100.00%

Figure 10: Status comparison of Year 6 trees from 2014 to 2015.

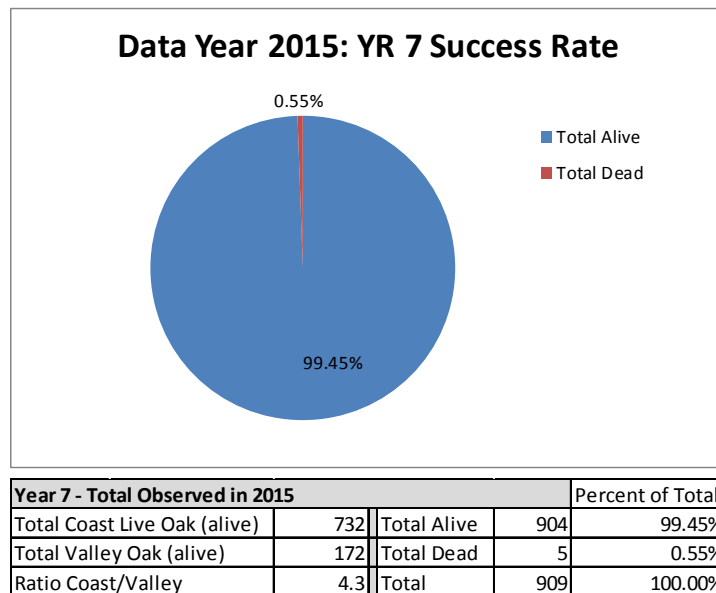


Figure 11: Status of Year 7 trees to 2015.

Maintenance

Maintenance of all planted oak trees in FY15/16 included irrigating, weeding, mulching, and deer cage maintenance is presented in Table 1. The total amount of water used from Lake Cachuma to irrigate oak trees from all years in FY15/16 is provided in Table 2. Information presented in Tables 1 and 2 does include Year 8 trees.

Table 1: Cachuma Oak Tree Restoration Program completed maintenance in FY15/16.

	July 2015	Aug 2015	Sept 2015	Oct 2015	Nov 2015*	Dec 2015*	Jan 2016	Feb 2016**	March 2016	April 2016	May 2016	June 2016	July 2016
Year 8 Oaks (2015-2016)						New Trees Gopher Baskets Fert/Comp Deer Cages Mulch/Irrigated	New Trees Gopher Baskets Fert/Comp Deer Cages Mulch/Irrigated	New Trees Gopher Baskets Fert/Comp Deer Cages Mulch/Irrigated	Irrigated Weeded	Irrigated	Irrigated Weeded	Irrigated Weeded	Irrigated Weeded
Year 7 Oaks (2014-2015)	Irrigated Weeded Cage maint.	Irrigated Weeded Cage maint.	Irrigated Weeded Cage maint.	Irrigated Weeded				Weeded Mulched	Irrigated Mulched Weeded	Irrigated Weeded		Irrigated Weeded Mulched	Irrigated Weeded Mulched
Year 6 Oaks (2010-2011)				Weeded Mulched							Irrigated Weeded		
Year 5 Oaks (2009-2010)				Irrigated Fertilized									
Year 4 Oaks (2008-2009)					Irrigated Fertilized Cage maint.				Cage maint.		Irrigated		
Year 3 Oaks (2007-2008)					Irrigated Fertilized Cage maint.				Cage maint.		Irrigated		
Year 2 Oaks (2006-2007)					Fertilized						Irrigated		
Year 1 Oaks (2005-2006)					Fertilized							Irrigated	Irrigated

*November and December work included annual oak tree inventory.
 **February work included Year 8 oak tree inventory.

Table 2: Cachuma Oak Tree Restoration Program water usage from Lake Cachuma for irrigation during FY15/16.

Month	Gallons	Acre-feet
July	33,075	0.102
August	11,700	0.036
September	17,550	0.054
October	30,600	0.094
November	3,600	0.011
December	17,100	0.052
January	2,250	0.007
February	16,200	0.050
March	7,200	0.022
April	62,550	0.192
May	41,400	0.127
June	49,500	0.152
Total	292,725	0.90

Financials

Annual expenses by Fiscal Year since the beginning of the Lake Cachuma Oak Tree Restoration Program in FY05/06 are presented in Table 3. The totals include COMB staff (plus burden) and consulting arborist hours, material, supplies and fuel expenses over the period. The breakout for those costs is presented by labor (Table 4) and the total cost (labor, materials and supplies) in Table 5.

Table 3: Total program costs by Fiscal Year including planting year (Year-ID) and number of trees planted during those years.

Fiscal Year	Operator	Year-ID	# Planted Trees	Cost
2005-2006	Fournier	1	375	\$116,731
2006-2007	Fournier	2	375	\$117,620
2007-2008	Fournier	3	375	\$138,786
2008-2009	Fournier	4	375	\$137,872
2009-2010	Fournier	5	379	\$136,900
2010-2011	Fournier	6	377	\$137,878
2011-2012	Fournier	-	-	\$79,439
2012-2013	COMB	-	-	\$101,431
2013-2014	COMB	-	-	\$48,097
2014-2015	COMB	7	909	\$134,054
2015-2016	COMB	8	824	\$128,241
Total:			3989	\$1,277,050

Table 4: Labor costs for the Lake Cachuma Oak Tree Program during FY15/16.

	Total
COMB Staff (hours):	
Seasonal Biologist Aide A	206
Seasonal Biologist Aide B	537
Seasonal Biologist Aide C	160
Seasonal Biologist Aide D	457
Seasonal Biologist Aide E	744
Seasonal Biologist Aide F	481
Administrative Secretary	0
Water Service Worker II	16
Water Service Worker I	0
Water Service Worker III	27
Engineer Technician I	0
Project Biologist A	110
Project Biologist B	137
Senior Resource Scientist	113
Total Staff Hours:	2988
Cost - Labor plus burden	\$71,915
Consultant Service Hours (Ken Knight):	58
Consultant Cost	\$5,775
Total Personnel /Consultant Cost	\$77,690

Table 5: Total expenses (labor, materials and supplies) for the Lake Cachuma Oak Tree Program during FY15/16.

	Total
Materials and Supplies:	
Oak trees	\$4,132
Tree stakes	\$4,854
Tree tags	\$17
Mulch	\$487
Compost	\$1,331
Fertilizer	\$777
Gopher wire baskets	\$1,779
Protective deer caging/netting	\$5,979
Hand tools	\$283
Rebar	\$37
Hoses	\$878
Cable ties	\$51
PPE	
Lake Cachuma boat rental	
Backhoe mobilization	\$1,980
California Conservation Corps	\$24,983
Water truck rental	\$1,717
Vehicle Fuel Cost	\$1,091
Equipment Fuel Cost	\$177
Total Materials and Supplies	\$50,551
TOTAL EXPENSES (labor, materials + supplies)	\$128,241

The total cost of the Lake Cachuma Oak Tree Restoration Program in FY15/16 was \$128,241, of which \$62,148 of that amount was the cost of planting the Year 8 oak trees. There were 824 oak trees planted in FY15/16, over two times the amount of trees planted any single year effort during the first 6 years of planting. Again, the total reflects personnel cost (labor plus burden), materials, supplies, expenses (vehicle and equipment fuel), and consultant fees. For comparison across recent years without new plantings, the total cost in FY11/12 (previous consultant), FY12/13 (COMB takes over and incurs repair costs), FY13/14 (COMB with some repair costs), FY14/15 (COMB with some repair costs and without planting costs for the Year 7 trees), and FY15/16 (COMB with some repair costs and without planting costs for the Year 8 trees) were \$79,439, \$101,431, \$48,097, \$53,265, and \$66,094, respectively. The increase in FY15/16 costs reflects the additional expenses for maintenance of the new trees and a slight reduction in cost for the older and more self-sustaining trees. The ability to keep costs down relative to the number of new oak trees planted between FY12/13 and FY15/16 is attributed to multiple factors, which include but not limited to:

- Relying on the COMB Fisheries Division seasonal staff to conduct the bulk of field activities; further assistance was obtained by the California Conservation Core (CCC) members.

- Scaling back on the amount of full-time staff being used.
- Reduced equipment needs as the bulk of purchases occurred during the initial start-up of the Program during the previous fiscal year when COMB took over the project.
- Reduced consultant hours.
- Reduced vehicle gas consumption as some of the seasonal staff live in the Santa Ynez Valley and use their own vehicles to travel to oak tree locations.
- Reduced equipment (generator/pumps) gas consumption from more efficient irrigation hosing and better delivery technique for extracting water from Lake Cachuma.

Summary and Program Improvements

There are 3,584 (1,856 from Years 1-6, 904 from Year 7 and 824 from Year 8) alive oak trees attributed to the mitigation effort of the Program. The survival rate to date is 85.7% (Years 1-7 trees) which would be considered very respectful in any open range oak tree planting effort in a similar climate. Challenges for the Program, specifically tree survival, are five years of an extraordinary drought, inadequate initial planting (compromised gopher wire baskets, trees planted too low, etc.), and a limited staff to take care of an extensive number of trees. Some planting areas have better soil and topography than others, for example the Year 4 planting area has shallow soils with southern exposed whereas the Year 6 planting area is just the opposite.

Lessons learned by the COMB staff from 4 years of conducting this Program have been put into practice, specifically:

- Mulch all trees once a year.
- Maintain deer cages for all trees below deer browsing level.
- Clear the dirt away from the tree base.
- Expose gopher wire baskets at the surface to prohibit gopher travel over the top of the cage.
- Plant new trees in professional gopher wire baskets using backhoe dug holes (no auger holes that limit the spread of tree roots); plant the trees slightly above grade to accommodate subsidence; and use sturdy wire deer cages instead of netting or chicken wire.
- Plant well established trees from the nursery as they seem to have a better success rate.
- Continue to experiment with using Grow-Tubes (Figure 12).



Figure 12: Planted coast live oaks with 4 foot high Grow-Tubes at Storke Flats (Year 7 trees).