

# AGRICULTURAL AND RANCH LANDS



Keeping large unfragmented agricultural and ranch lands in operation supports economic vitality as well as wildlife habitat and tourism in Santa Barbara County.





## A BRIEF HISTORY OF AGRICULTURAL AND RANCH LANDS OF SANTA BARBARA COUNTY

Santa Barbara County's agricultural heritage is a foundational part of the local history and economy. The County's loamy soils, varied topography and microclimates can and have produced an incredible array of fruits, vegetables, and animal crops as the ever-dynamic agricultural economy adapts to changes in technology, consumer tastes, and market demands.<sup>1,2,3,4</sup>

From the lens of the top agricultural products produced in the County, there are several distinct production 'eras' where one or a few commodities were predominant on the landscape:

- At the turn of the 20th century, livestock (cattle, dairy cows, pigs, and sheep) dominated as the County continued to build on its Vaquero history.
- In the depression and war years, beans became a top commodity crop in the 1930s along with carrots, lettuce, lemons, cauliflower, beef, and dairy.
- The post-war years saw dairy and sugar beets as important commodities, and the County began in earnest a transition to producing vegetable and orchard crops (citrus, walnut, avocado), which soon would surpass most animals and field crops.
- The 1960 and 70s saw the growth of cut flowers, alfalfa, grain, and broccoli. Strawberries, which had begun to be important in the post-war years, continued to grow in acreage.



An old Santa Barbara County hog farm (Credit: 2013 Santa Barbara County Crop Report PLUS)

- In the 1980s, the shift from citrus production to strawberries and wine grapes took hold.
- By 1990, Santa Barbara County had 39 crops with over a million dollar gross value.
- In the 2000s, wine grapes joined the top ranked crops.
- By 2010 agriculture had been a billion-dollar industry in the County for five years. The 2016 County Crop Report showed strawberries as the top commodity crop in the County.

**As of 2016, the County ranks 13th in total crop value among California agricultural counties.<sup>5</sup>**

Agriculture has been and will continue to be a 'restless' part of our landscape as it continually adapts to changing conditions. New 'eras' of production are likely to continue in 10-20 year intervals. Current entrepreneurial trends in local farming include explorations into new crops such as coffee, dragon fruit, passion fruit, and cherimoyas. Today's core challenge is in protecting local agriculture's economic viability in an era of globalization, high land prices, and a changing workforce.

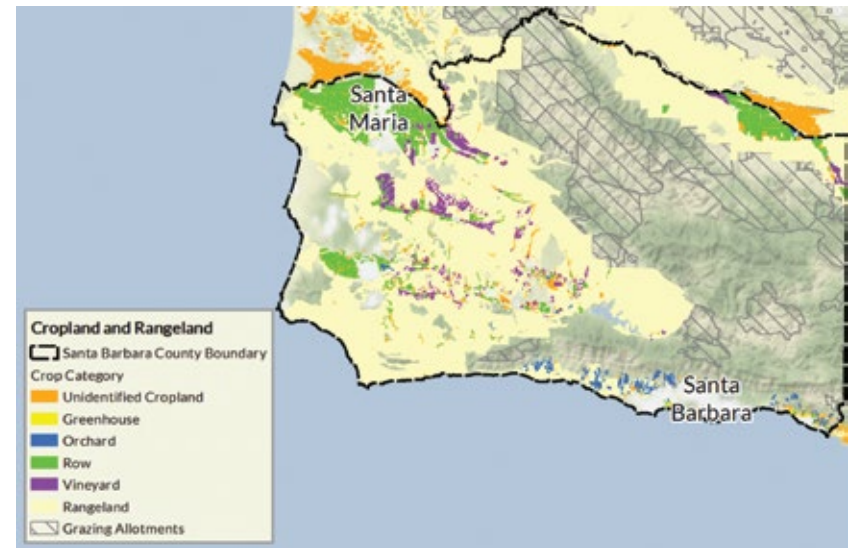
These trends have been discussed at a county-wide level for brevity. But microclimates, soils, and historical conditions also impact the local geography of farming trends. For example, cut flower operations and strawberries are centralized near Carpinteria and Santa Maria, respectively. Ranching is more prevalent in the inland hills, and orchards are found primarily along the South Coast or in Cuyama Valley, with wine grown on the slopes and upland land areas throughout the central and northern portions of the County.

## RECENT TRENDS AND THREATS TO SANTA BARBARA FARM AND RANCH LANDS

This brief history highlights the diversity of crops that can thrive in the County, the significant contribution of local agriculture operations to the global food system, and the adaptability of local farmers to changing external conditions. The recent installation of large food-safety coolers in Lompoc, for example, opened new markets for large-scale berry sales. The number of organic farms in the County nearly tripled in the last decade with increasing consumer demand, from 58 in 2006 to 159 in 2016 (with strawberries, spinach, and cauliflower as the top organic crops). Hoop houses are on the rise for berry production, and marijuana greenhouse production is another trend to watch in the coming decades.

Agricultural land use is highly sensitive to changes in market demand and production costs – particularly land, water, labor, and production inputs such as fertilizer, fuel, and seed. In Santa Barbara County and across California, there has been a steady shift to higher value crops.

### Cropland Types (Figure 22)

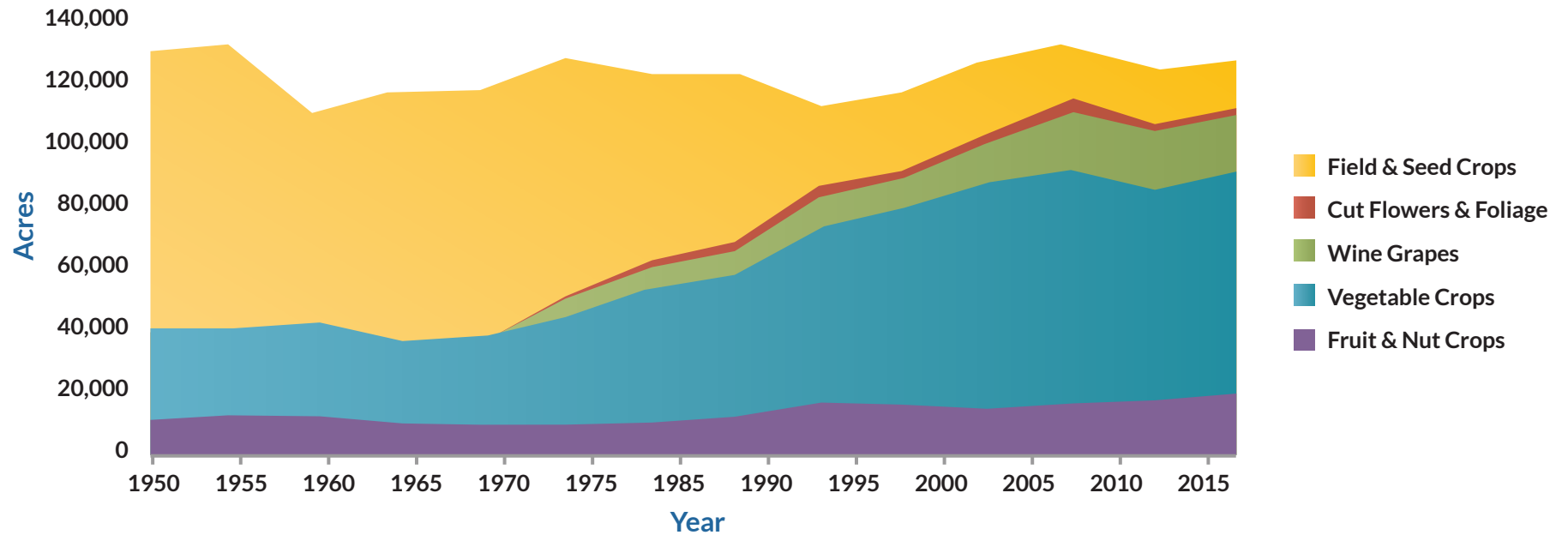


This map shows broad categories of cropland across Santa Barbara County, with trends like orchard prevalence in South County, vineyards in much of the central county, and large expanses of row crops in the Lompoc and Santa Maria Valleys. You can explore this further on the Atlas: Ag and Ranch Lands - Cropland Type Inset Map.

Partly in response to national attention on migrant labor, labor shortages, and other factors affecting profit margins, there has been a shift toward mechanization and lower-labor crops. Increasingly, producers employ a variety of high-tech growing solutions ranging from laser-guided leveling of fields to vast greenhouses for the year-round production of greens. These shifts are expensive and often out of reach for smaller, diversified producers, adding to the business pressures faced on **small farms**.

Agricultural land use and crop mix will always be dynamic, but there are no guarantees that agriculture itself will remain profitable in the County. The foremost conservation challenge around agricultural land use is ensuring farming and ranching remain profitable enterprises so that land remains in production.

Acresage Crop Trends Since 1950 in Santa Barbara County (Figure 23)



Top Three Grossing Crops in Santa Barbara County (Figure 24)

TOP GROSSING	1935	1945	1955	1965	1975	1985	1995	2005	2015
1	Beef Cattle	Beef Cattle	Cattle & Calves	Cattle & Calves	Cattle & Calves	Strawberries	Strawberries	Strawberries	Strawberries
2	Citrus	Lemons	Lemons	Lemons	Lettuce	Broccoli	Broccoli	Wine Grapes	Broccoli
3	Beans	Lettuce	Strawberries	Milk	Broccoli	Lettuce	Lettuce	Broccoli	Wine Grapes

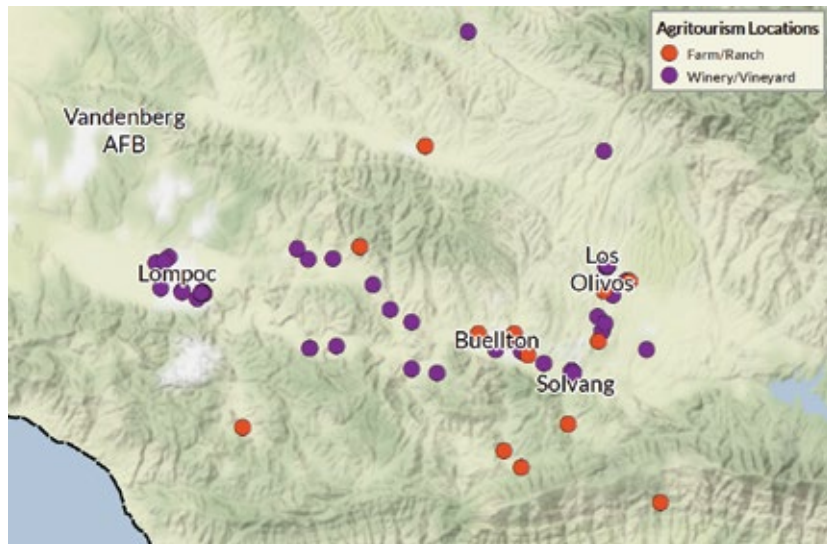
Source: County of Santa Barbara Crop Report Archive. <http://cosb.countyofsb.org/agcomm/agcomm.aspx?id=11562>

## A Brief Note on Local Food

A 2011 study of the Santa Barbara food system showed that over 99% of produce grown in the County is exported, and over 95% of produce consumed in the County is imported.<sup>6</sup> While this same study also showed that local consumption alone would not necessarily reduce greenhouse gas production or increase nutrition, it recognized the complexity of benefits and barriers to a more localized food system. Visiting one of Santa Barbara County's 16 farmers markets offers one way to support the local food economy. For a deeper exploration of this topic, see the 2016 Santa Barbara County Food Action Plan<sup>7</sup> – a strategy-based community driven plan for an accessible, thriving, and healthy local food system.

► visit [www.sbcfoodaction.org](http://www.sbcfoodaction.org) for details.

## Mapping the Local Food System (Figure 25)



This map shows locations of farms, ranches, and wineries where local produce or services are served direct to customers in the Santa Ynez Valley. ► You can explore this further on the Atlas: Ag and Ranch Lands - Local Food Source Inset Map.

Addressing this challenge necessitates first understanding the full range of benefits farms and ranches provide (Figure 17, Page 40), and then finding creative ways to compensate producers for these public benefits. Direct benefits include groundwater recharge, flood mitigation, and food and habitat for pollinators and other species. Indirect benefits include the value of the rural landscape to the local community and tourism industry and the value of cultural history in agriculture. Increasingly farmers and ranchers are exploring ways to deliver multi-benefit projects that demonstrate the value of the extra services land managers can provide. These new revenue streams – wind and solar installations on ranches, for example, future mitigation funding, or State Cap and Trade payments for ecosystem service provisions such as carbon farming (Page 60) point the way to a new and growing economic model for conserving working lands. **Keeping a diversity of agricultural and ranch lands in operation is one of the best ways to support conservation, tourism, and economic vitality in Santa Barbara County.** Farming and ranching will always be complex and risky businesses. Deepening public understanding of the challenges faced by farm and ranch operators and looking for ways to support the ongoing adaptability, diversity, and financial viability of 'working lands' are crucial steps toward protecting these landscapes and the livelihoods of those who steward them.

## AGRICULTURAL AND RANCH LAND STATS/TRENDS OVERVIEW

Agriculture and ranching in Santa Barbara County is continually evolving due to changes in market forces, labor, economic drivers, and competition for other land uses. Over the period of 1950 to 2016:

- The footprint of urban land grew by 54,000 acres, largely through conversion of farmland throughout the South Coast and near urban centers such as Lompoc and Santa Maria.<sup>8</sup> Acreage dedicated to vegetables, fruits, nuts, and vineyards has grown, while acreage for field and seed crops has fallen dramatically:<sup>9</sup>
  - Vegetables grew by more than 41,000 acres
  - Fruit and Nut Crops grew by more than 8,000 acres
  - Vineyards were nonexistent in 1950 and now cover more than 21,000 acres
  - Field and Seed Crops shrank more than 76,000 acres

See [Figure 23](#) for a visualization of these data highlights. From 1997 to 2012 when the last census data was published, average farm size has decreased slightly. The number of farms decreased in this same period from 1771 farms to 1597 farms, though small operations (under 50 acres) still accounted for over 60% of the farms in the County.

Ranching and cattle operations have declined significantly due to economic competition in land uses from rural residential development, cropland expansion, and drought impacts:

- Cattle numbers in the County have ranged from 62,000 in 1950 to over 100,000 between 1960 and 1970, and down to 23,000 in 2015.<sup>9</sup>
- From 1984 to 2008, ~24,000 acres of rangeland were converted to vineyards, row crops, and commercial and residential development in Santa Barbara County. This represents one of the largest losses of rangeland in any county recorded in California over this time period. An additional 2,800 acres of rangeland have been converted to other urban or intensive agricultural uses since 2008.<sup>10,11</sup>

## COMMON AGRICULTURAL AND RANCH LAND VALUES

To understand the conservation challenge and opportunity around local agricultural and ranch lands, it is essential to understand key data and objective trends (as captured above), as well as how experts and the

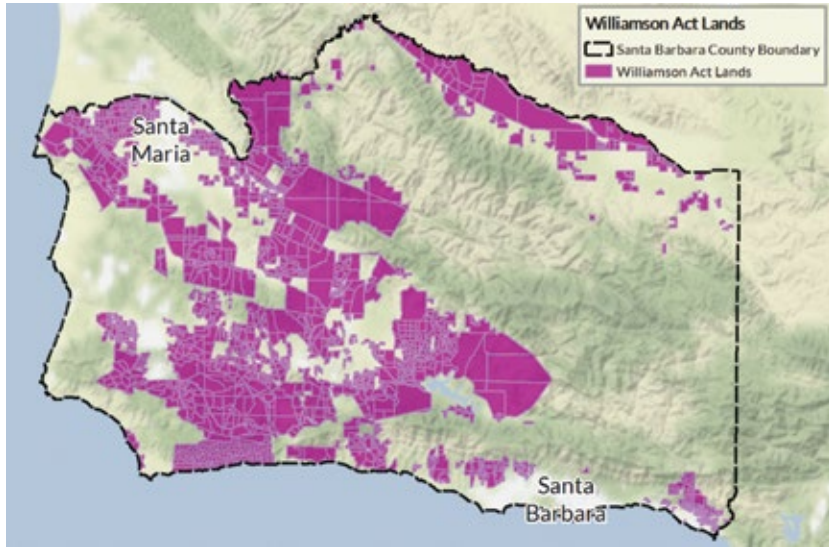
community view these resources. In the process of developing the Blueprint – through stakeholder interviews, focus groups, and surveys – community members were asked to help clarify values and attitudes for each theme area. As with the values listed for other theme areas, the following statements are intended as high-level starting points for a more nuanced ongoing dialogue on the future of these lands in the County. They also serve as reminders that though opinions can vary substantially on the means, there is also agreement on the desired ends.

### Based on input to date, the community values:

- Support for farmers, ranchers, and the benefits they provide the public.
- Maintaining production on prime farm and ranch lands as a vital part of the local community, economy, and ecosystem service provision.
- Access to best practices that support the continued evolution of agriculture.
- Flexible and environmentally responsible land management.
- Incentive-based on-farm conservation opportunities.
- Access to high-quality, locally-grown food.

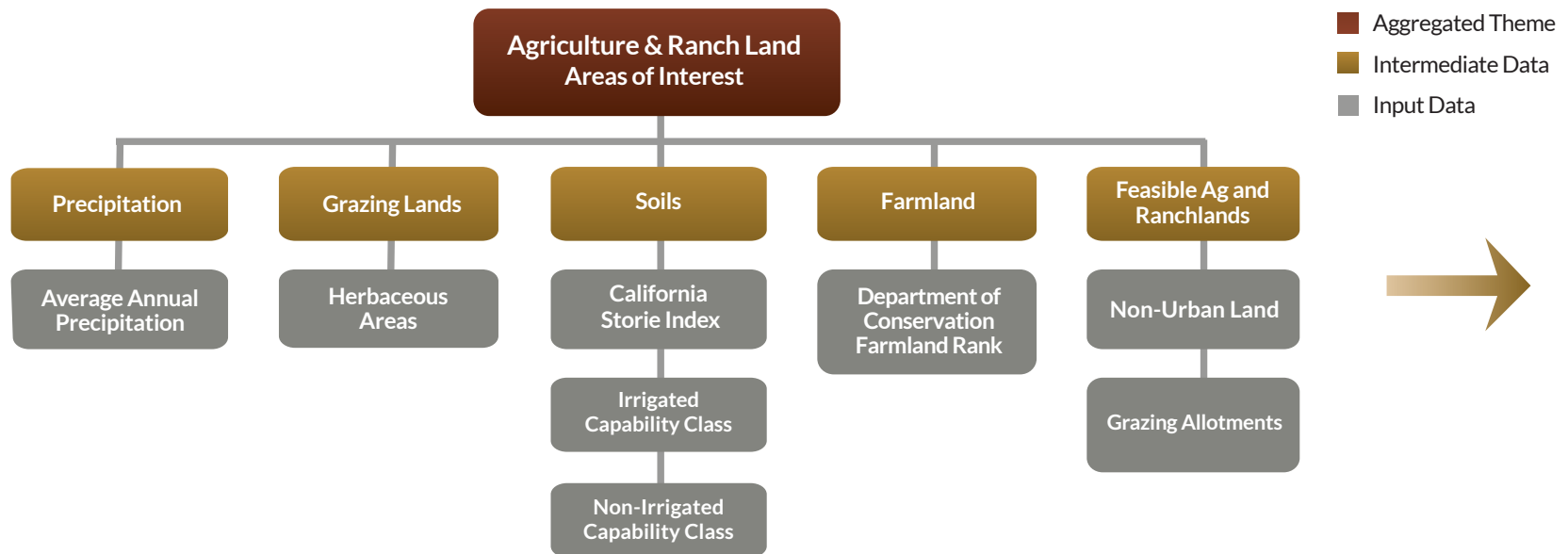


## Williamson Act Lands (Figure 26)

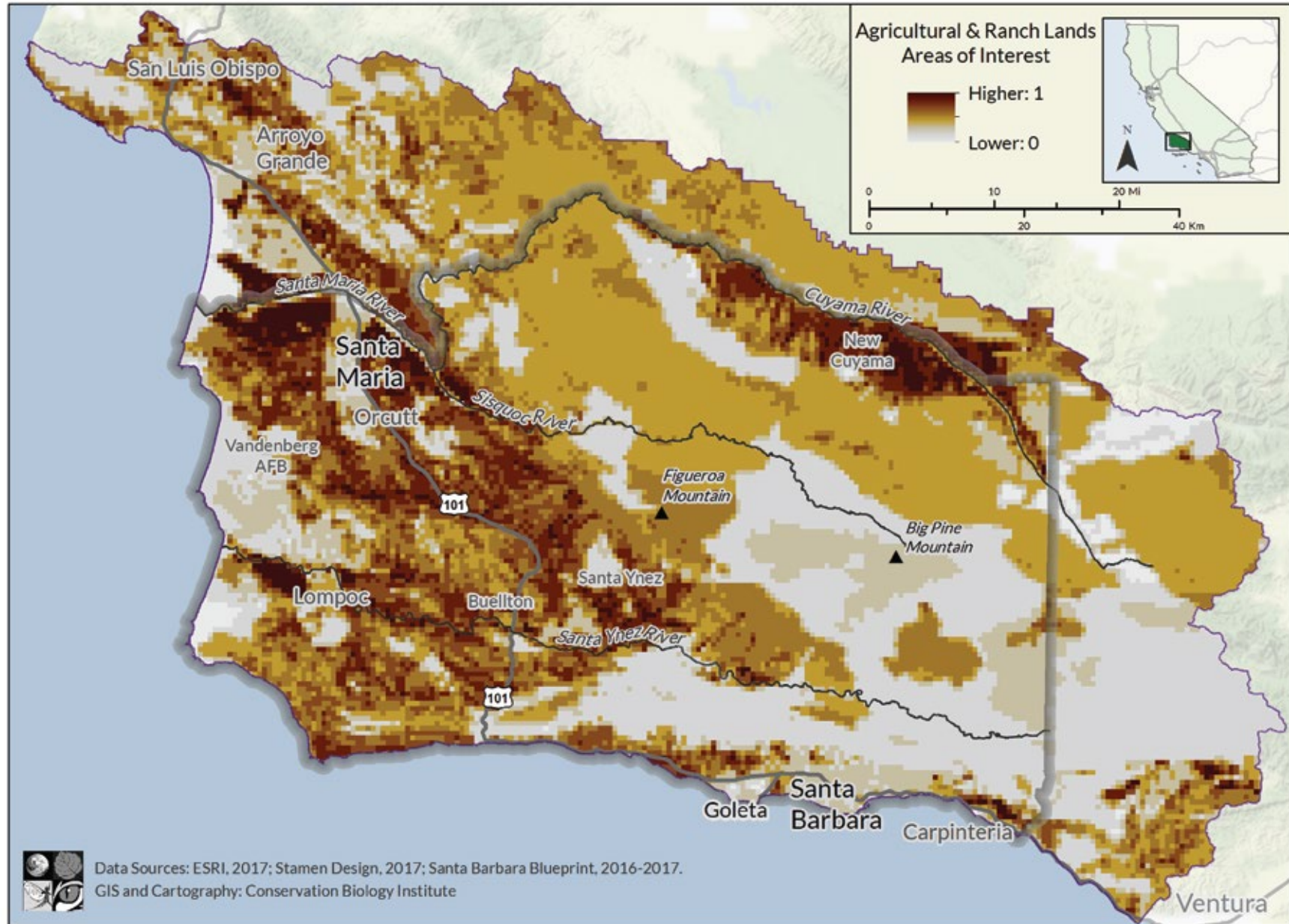


This map shows Williamson Act lands within Santa Barbara County showcasing lands protected from development throughout the County. You can explore this further on the Atlas: Ag and Ranch Lands - Williamson Act Inset Map

The Williamson Act (California Land Conservation Act of 1965) reduces landowners' property taxes in exchange for a ten-year agreement to keep lands in agricultural, open space, or recreational use. This act has been a great support to Santa Barbara County farm lands over the years. The County has approximately 1,275 agricultural preserve contracts, covering about 75% of agricultural lands in private ownership.<sup>12</sup> Without this property tax break, more crop and ranch lands already under tremendous economic pressure would be forced to sell for development or forced to convert to higher value production such as grapes & berries, further decreasing the diversity of crops grown in the County and eliminating ranching as a profitable option. However, the property tax benefits of the Act have also attracted investment in agricultural and ranch lands as wealth management strategies for many outsiders. The low taxes and strong real estate market make buying a ranch or farm in Santa Barbara County a relatively good investment. The Williamson Act comes under scrutiny whenever redistricting comes up in the County electoral process. Since it allows lands to be taxed as agricultural lands and not at their (ever increasing) potential development value, the perceived loss of revenue to the County keeps the Act on the radar of local officials. However, the law is highly supported locally, with over 80% of residents in the County in favor and only 5% clearly opposed.<sup>13</sup>



## Agricultural and Ranch Lands Areas of Interest (Figure 27)



This synthesis EEMS map highlights areas of interest for farming and ranching by overlaying a variety of inputs from the Agricultural and Ranch Lands theme (see model, left). This and other maps featured throughout the report are meant to support meaningful visual insights about agricultural and ranch lands in the Santa Barbara County landscape and to stimulate conversations about key issues. (See Appendix C for a more detailed description of the EEMS methodology. [You can explore this map further and use the interactive EEMS Explorer on the Atlas: Agricultural and Ranch Lands Areas of Interest \(EEMS\) - Santa Barbara County.](#))



## AGRICULTURE AND CLIMATE CHANGE

Santa Barbara County's highly dynamic and productive agriculture is supported greatly by local climate conditions: Mild temperatures and a variety of microclimates allow for year-round production of fruit and vegetable crops. These same microclimates and coastal climates could protect many agricultural areas from drastic climate change impacts, but agriculture will still be challenged by disruptions to water supply and groundwater recharge, increases in pests and invasive species, and the potential for reduction in pollinators.<sup>14</sup>

In order to develop resilience to potential future changes in climate, early indicators of those changes need to be measured and reported. Particularly important will be tracking changes in local pest populations and production levels of staple crops, especially those most vulnerable to change in climate, and perennial crops that are least able to be quickly swapped out for other crops (e.g. avocados, grapes, citrus, berries). Adaptation strategies identified

by the California Department of Food and Agriculture include: switching to low chill varieties, providing shade structures for sensitive crops, reducing erosion caused by flood events with cover crops, maintaining riparian vegetation, developing hedgerows and habitat for native pollinators, and protecting against the conversion of agricultural lands.<sup>15</sup>

Ultimately, farmers and ranchers may have to adjust crop varieties and cropping strategies, and continue to safeguard resources with practices like erosion control and nutrient and water management. New management practices may come into play as well. The carbon sequestration value of agricultural and rangelands will increase in the years ahead, and partnerships to support these practices offer a significant climate mitigation opportunity for the County. Greenhouse gas emissions are 58 times lower on agricultural croplands than urban areas (per acre per year). Rangeland carbon sequestration projects (such as the one featured on page 60) can help the County sequester more carbon, store more water, bring additional income sources to farmers and ranchers.<sup>16</sup>



## CARBON FARMING COMES TO THE COUNTY

The Cachuma Resource Conservation District and the Community Environmental Council (in partnership with the Ted Chamberlain Ranch, LegacyWorks, Natural Resources Conservation Service, The Santa Barbara Foundation, Santa Barbara County Air Pollution Control District, Carbon Cycle Institute, UCSB Schimel Climate Lab, and UC Cooperative Extension) have been working to explore the benefits of carbon farming for soil quality on Santa Barbara ranches. Researchers from UC Davis, UC Berkeley, and Cal Poly are also involved in the project. This project is a great example of collaboration for agricultural and environmental benefit and also asks a bold and possibly game-changing question for Santa Barbara: **Can the agricultural sector emissions in the County be offset through carbon farming within five years?** The group has scientific proof of concept; early results from other test sites around the state show promising multi-benefit results.<sup>17,18</sup> Carbon farming has been shown to support ranchers through improved forage production, soil health, and water retention (an essential benefit in times of drought). It also supports climate resilience with a new way to mitigate carbon emissions and benefit the local working lands economy.<sup>19</sup>

The Chamberlin Ranch is hosting a Santa Barbara County pilot study, with strong initial results. The project research team estimates 270,000 acres in the County – much of which is active rangeland – could support at least one carbon farming practice; compost application on grazed grassland (eligible land was estimated to require less than a 25% slope and be at least 100 feet from wetlands or streams, though spray methods have since proven viable for steeper slope applications).<sup>20</sup> This same study estimates that only 15% of that land would need a one-time quarter inch compost application to meet the 5-year ag sector emissions offset goal for the County. Scaling the



**Ranch grass after compost application (Figure 28)**

pilot project will require funding for training and outreach, as well as for enhancement of local compost supply and distribution systems. Modifications to local permitting may also be required for long-term success of carbon farming as a central part of the Santa Barbara County climate resilience story, but many carbon farming practices are traditional USDA-NRCS conservation practices that can be implemented without permitting requirements.<sup>21</sup>

► You can learn more about this project at: [www.sbcblueprint.net/resources](http://www.sbcblueprint.net/resources).

## ONGOING DIALOGUES

### IMPEDIMENTS TO CONSERVATION ON FARM AND RANCH LANDS

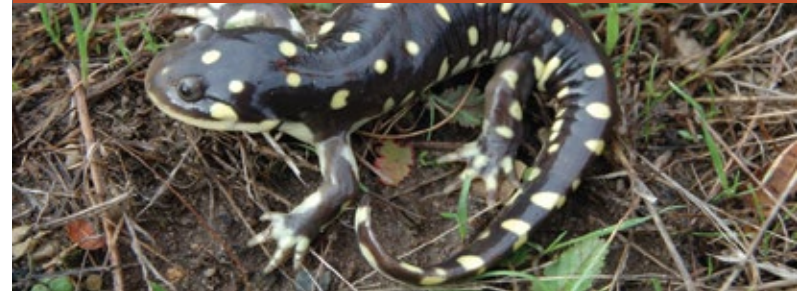
Throughout the community outreach process (which included a diversity of stakeholders from farmers and ranchers to environmental advocates and government), stories were shared of the unintended consequences of the increased interest from the public in how and where their food is grown. This interest shows up in action to support local food systems, and in demand from large commodity crop purchasers for certifications and audits that demonstrate compliance with health, safety, animal welfare, labor, and farming practice standards. It also shows up in public regulation that covers most aspects of farming and ranching. Farmers and ranchers are often interested in conservation and engage in practices that help restore habitat and ecosystems, but many current regulations and requirements unintentionally impede – rather than incentivize – best practices. Here are just a few specific examples:

#### Cattle Grazing to Restore Native Grasses



High intensity, quick-rotation grazing is common on many local ranches: Pastures are managed to maximize the amount of rest each pasture gets and to allow grasses to “go-to-seed” before they are grazed. This strategy maximizes forage, promotes soil health, and reduces weeds. It also enhances native perennial grasses, but the presence of rare natives can lead to increased restrictions on allowable management practices. As local rancher Paul Van Leer notes, this is a frustrating situation for a ranch manager: “I’ve enhanced the native grasses just in the way that I graze. I shouldn’t be penalized for then grazing those native grasses, because my grazing is what made the native grasses thrive here.”<sup>22</sup>

#### Agriculture and Sensitive Species



A similar example of where a ‘save every specimen’ approach can backfire can be seen in ponds on ag and ranch lands. Farmers and ranchers create desirable habitat in on-farm storage ponds for species like tiger salamanders and red-legged frogs, but then the storage systems become burdensome if they are discovered as endangered species habitat. This risk has led some to go so far as to choose other water management options that do not risk creating habitat (and the resulting regulatory scrutiny and paperwork).

#### Agriculture and Pollinator Habitat



Funded by the Santa Barbara Foundation LEAF Initiative, The Santa Barbara Botanic Garden has launched a pilot research project in partnership with five local land managers to explore best practices for enhancing native pollinators on farms. Native pollinators, which can include beetles, flies, bees, and wasps, can be up to 1000 times more efficient pollinators than honey bees on specific crops, and their services are free when conditions are right for them to thrive near commercial crops. This multi-benefit research project might never have gotten off the ground

if it weren't for an agreement with the County that any habitat created from the project will not be designated as 'protected', and can be removed at any time during or at the end of the study. This allows agricultural operations to continue to change their land use over time as needed. Without this type of agreement, the risk of loss of flexible farming practices was too high for many farmers to be able to participate in the pilot.

## COMMON MISUNDERSTANDINGS ABOUT FARM AND RANCH MANAGEMENT

Many imagine a pastoral ideal when they think of a farmer's life. But the business of farming and ranching is rife with complexity and stressors. Understanding the practical realities of farming and ranching is an important step to understanding threats to farm and ranch lands and how those interested in land conservation can better ally with working landowners and managers for mutual benefit. The following statements address common misunderstandings within the community that came up often in the Blueprint development process:

- **Owning farm or ranch land is not a guarantee of being able to make ends meet.** Many assume that those who own land in Santa Barbara County are rich. But when your only income comes from the land itself, with variabilities of weather, market conditions, and operating costs, margins can be very low and the threat of having to close operations, borrow money to stay afloat, and/or sell land can be a constant stressor for land managers. For example, small-scale farms are under the most pressure to sell, consolidate, or shift to intensive high value crops, and inheritance taxes add further challenges to keeping younger generations in farming. Unpredictable groundwater costs may also affect farmland viability in the coming decades (see SGMA story on [page 19](#)).
- **Agricultural land sales are actually quite rare in the County.** Unlike in other areas of California, most farms in Santa Barbara County are still family-run operations, with a strong interest in keeping the land in farming. Large swaths of land rarely open up to outside markets, though families often have outside financing or leases. These leases can impact management practices, as crop rotation associations are common among landowners to help manage larger swaths of land more effectively

through leases and subleases. Though agricultural lands staying in production is good for conservation, these subdivisions of large agricultural and ranch lands (where zoning allows it) can have ecological impacts through increased fencing – which can impede wildlife movement – and infrastructure on the landscape.

- **Agricultural and ranch lands are dynamic, not static landscapes.** As the introduction to this chapter shows, agriculture is an incredibly dynamic industry. Though many may view farms and ranches as a bucolic part of the rural viewscape, the reality is that the ability to evolve how the land is worked and capitalized upon is crucial to farmers' and ranchers' ability to keep working lands in production. For those who would like to see working landscapes stay in production, supporting the ongoing flexibility of farmers and ranchers is key.
- **Agriculture increasingly provides full-time, year-round, skilled jobs.** Many unfamiliar with the agriculture industry assume that most farm jobs go to migrant laborers. However, about 10% of the County's total workforce is employed in agriculture-related work, 56% of which are off-farm jobs in processing, technical, and business positions that support the local agricultural economy.<sup>23</sup> Two-thirds of agricultural jobs in the County are full-time positions.<sup>24</sup>
- **Managed landscapes provide important ecological benefits.** Humans have been managing the land in Santa Barbara County since early Chumash inhabitants engaged in farming, fire, and water management. Local vegetation can benefit from grazing animals, for example, and active support of ecosystems in the wake of fire damage can help ecosystems recover more quickly (see for example the river bottom tilling story on [page 24](#)). Finding ways to compensate ranchers and farmers for the land management practices that provide measurable benefit to local ecosystems could be a helpful strategy for finding multi-benefit approaches to conservation in the County into the future.

## KEY TAKEAWAYS TO AGRICULTURAL AND RANCH LAND RESILIENCE

Potential resilience strategies for agricultural and ranch lands include actions and processes that will support the economic and ecological vitality of agricultural and ranch lands in the County, such as:

- Supporting the ability of farmers and ranchers to maintain economic viability through flexibility in cropping choices and ancillary land uses
- Supporting ways to enhance and preserve habitat and scenery on agricultural and ranch lands through incentives that provide economic benefit to the landowners
- Increasing the community's understanding of the economic and regulatory burdens on the continued viability of agriculture
- Supporting the use of agriculture to enhance ecological conditions, combat harmful invasive species and maintain ecosystem services through incentives for participating landowners
- Visit [www.sbcblueprint.net](http://www.sbcblueprint.net) for more resources, project highlights, or to share your ideas!

## ENDNOTES

- <sup>1</sup> Langholz, J. & DePaolis, F. 2014. Economic Contributions of Santa Barbara County Agriculture. Agricultural Impact Associates LLC and the Santa Barbara County Office of the Agricultural Commissioner. Accessed May 2017: <https://tinyurl.com/yctg8zaa>
- <sup>2</sup> Data was also pulled directly from archival Santa Barbara Crop Reports, accessed online May 2016. <http://cosb.countyofsb.org/agcomm/agcomm.aspx?id=11562>.
- <sup>3</sup> Special thanks to Lisa Bodrogi of Cuvée Connections for curating much of this information in a May 2016 research report for the Cachuma RCD "A Perspective on the History of Agriculture in Santa Barbara County since 1930". Data was also pulled directly from archival Santa Barbara Crop Reports (see endnote 2).
- <sup>4</sup> Santa Barbara County Agricultural Commissioner's Office. 2016. Santa Barbara County Agricultural Production Report 2016. Santa Barbara. Accessed August 2017: <https://tinyurl.com/ybb8yx53>.
- <sup>5</sup> California Department of Food and Agriculture. 2016. California Agricultural Statistics Review, 2015-2016. Accessed May 2017: <https://www.cdfa.ca.gov/statistics/PDFs/2016Report.pdf>.
- <sup>6</sup> Cleveland, D.A., Radka, C.N., Müller, N.M., Watson, T.D., Rekstein, N.J., Van M. Wright, H., & Hollingshead, S.E. 2011. Effect of localizing fruit and vegetable consumption on greenhouse gas emissions and nutrition, Santa Barbara County. *Environmental Science & Technology*, 45(10), 4555-4562.

- 7** Santa Barbara County Food Action Plan. 2016. Accessed May 2017: <https://tinyurl.com/yda9rk2m>
- 8** Data compared between: Osherenko, G., Onsted, J., Clarke, K., Boucquey, N., Hart, K.N. 2007. Retaining California's Coastal Agricultural Land Through Economic Incentives, Regulation, and Purchase. Los Angeles, University of Southern California Sea Grant. Accessed May 2017: [http://ocpc.msi.ucsb.edu/pdfs/CalRep/hi-res/CalRep\\_all.pdf](http://ocpc.msi.ucsb.edu/pdfs/CalRep/hi-res/CalRep_all.pdf) and California Department of Conservation. Farmland Mapping and Monitoring Program Data 1984-2014. Accessed May 2017: <ftp://ftp.consrv.ca.gov/pub/dlrp/FMMP>.
- 9** Data compared across decades from Santa Barbara County Agricultural Commissioner - Crop Reports 1950-2015. Accessed May 2017: <https://tinyurl.com/yasg47t9>
- 10** Cameron, D.R., Marty, J., & Holland, R.F. 2014. Whither the Rangeland?: Protection and Conversion in California's Rangeland Ecosystems. *PloS ONE*, 9(8), e103468. Estimates of rangeland loss calculated in this paper were adjusted as the original researchers over-estimated rangeland loss of ~10,000 acres to oil and gas development. There was no additional development of oil and gas during the mapping period 1984-2008 and this change from rangeland to oil and gas development was simply a categorization correction made in 2008 by the California Department of Conservation. Please see page 2 under the Unusual Changes header for the correction. <https://doi.org/10.1371/journal.pone.0103468>. Accessed May 2017.
- 11** California Department of Conservation. Farmland Mapping and Monitoring Program Field Reports for 2010, 2012, and 2014. Accessed May 2017: <https://tinyurl.com/y6ucrw3p>
- 12** Langholz, J. & DePaolis, (2014) (the 2013 Crop Report PLUS) suggest 77% for 2011 farmland data. The more recent Cleveland et al. (2016) study suggest 75% of agricultural land in the County is protected by the Act. (2013 Crop Report PLUS: Langholz, J. & DePaolis, F. 2014. Economic Contributions of Santa Barbara County Agriculture. Agricultural Impact Associates LLC and the Santa Barbara County Office of the Agricultural Commissioner.)
- 13** Cleveland, D.A., Copeland, L., Glasgow, G., McGinnis M.V., & Smith, E.R. 2016. The Influence of Environmentalism on Attitudes Toward Local Agriculture and Urban Expansion, *Society & Natural Resources*, 29:1, 88-103. DOI: 10.1080/08941920.2015.1043081. The article draws its data from the 2010 Central Coast Survey.
- 14** A 2016 interview assessment of grower conditions in Goleta and Carpinteria, produced by Ag Innovations for the Cachuma RCD, notes that avocado trees are also suffering from decreases in water quality associated with drought impacts (salts, nitrates, and others minerals build up in the soil with decreased irrigation).
- 15** Cook, C., Levy, M., & Gunasekara, A. 2013. Climate Change Consortium for Specialty Crops: Impacts and Strategies for Resilience. Sacramento, California Department of Food and Agriculture. Accessed May 2017: <https://tinyurl.com/yd4rq6n4>
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- 18** Ryals, R. & Silver, W.L. 2013. Effects of organic matter amendments on net primary productivity and greenhouse gas emissions in annual grasslands. *Ecological Applications*, 23: 46–59. DOI:10.1890/12-0620.1.
- 19** To learn more about carbon farming and potential benefits, visit <http://www.marincarbonproject.org/carbon-farming>.
- 20** Smith, C. 2016. Potential Acreage in Santa Barbara County for Compost. Prepared by Legacy Works and the Cachuma Resource Conservation District for the National Resources Conservation Service. Personal communication, 2016. <https://tinyurl.com/yajp736y>
- 21** Visit NRCS's carbon and greenhouse gas evaluation tool at [www.comet-planner.com](http://www.comet-planner.com) for more. Natural Resource Conservation Service, United States Department of Agriculture, and Colorado State University.
- 22** Personal communication, 2016. For a great video exploration of Van Leer's intensive grazing practices, watch this video (starting at the 2 minute mark): <https://www.youtube.com/watch?v=WsgJVS5i3JA&t=390s>.
- 23** Calculations based on data from the 2013 Crop Report PLUS: Langholz, J. & DePaolis, F. 2014. Economic Contributions of Santa Barbara County Agriculture. Agricultural Impact Associates LLC and the Santa Barbara County Office of the Agricultural Commissioner. Accessed May 2017: <https://tinyurl.com/yctg8zaa>
- 24** The Economic Forecast Project. Data accessed online May 8, 2017, and updated regularly at <http://www.efp.ucsb.edu/data/employment>.