

CONSERVING WORKING LANDSCAPES AND OPEN SPACE: A SOCIO-
SPATIAL ANALYSIS OF PRIVATE PARCELS SUITABLE FOR CONSERVATION
EASEMENTS IN CALAVERAS COUNTY, CALIFORNIA

By

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ABSTRACT

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Grace M. Sparks

Privately held resource lands provide ecosystem services including water quality and wildlife habitat across the United States. These lands hold significant conservation values, but their contiguity is threatened by the pressure of subdivision from residential and commercial development. Conservation easements are one land conservation tool available to landowners to keep their holdings intact. This thesis explored existing and potential use of conservation easements for the case of Calaveras County, California. The research questions addressed were: Why did landowners in Calaveras County, California enter into conservation easement contracts and where were suitable parcels (Conservation Priority Areas) for conservation easements? Methods included qualitative, open-ended interviews with landowners who have recorded conservation easements and a *GIS* socio-spatial analysis that used interview results and the literature to develop a framework for identifying Conservation Priority Areas that would be suitable for conservation easements. Conservation Priority Areas based on their zoning classification, relationship to roads, development, rivers, lakes, existing easements and public lands were mapped.

Results from interviews revealed that the decision to enter easement contracts is primarily based on landowners place attachment, whether their family homesteaded the property and lived there for generations, and their desire to prevent the property from being developed. Results of the *GIS* analysis revealed that Conservation Priority Areas are 31.05% of the county's land. The results also showed that a majority of the Conservation Priority Areas have a high risk of being developed based on their proximity to roads, commercial and residential development.

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DEDICATION

This thesis is dedicated to the landowners with conservation easements in Calaveras County, California who did or did not participate in this study and the public of Calaveras County, California who benefit from these landowners' decisions to protect their property for future generations. It is also dedicated to my son, Owen Henry, and my future children whose quality of life is influenced by these wild lands.

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INTRODUCTION

Significant conservation values are retained by preserving the contiguity of private lands, including the retention of ecosystem services. Ecosystem services are the benefits derived from ecosystems (Reid et al., 2005). The United Nation's Millenium Ecosystem Assessment identified several key services: "supporting services" such as nutrient cycling, soil formation and primary production; "regulating services" including flood control and water purification; "provisioning ecosystem services" including food, water, fuel and fiber; "cultural ecosystem services" such as educational, recreational, aesthetic, and spiritual values (Reid et al., 2005, p.vi). The retention of these lands as open space is threatened by the pressures landowners' face to subdivide for financial support. Conservation easements are one mechanism available to landowners to keep their holdings intact. It is important to know what factors encourage landowners to enter into conservation easement contracts so that these drivers can be included in analyses to identify conservation priorities at the local level. Therefore, as people identify key criteria for conservation, such as lands with critical habitat, they should also identify land most at risk of being sold from the perspective of landowners.

Research has shown that private working landscapes are threatened by urban and exurban sprawling development and by fragmentation of land use (Press, 2002; Theobald, 2005; Pejchar et al., 2007; Standiford, 2012; Oviedo et al., 2012). Land that aids in the production of provisioning ecosystem services such as timber, livestock, crops and/or hunting is considered a working landscape (Oviedo, Huntsinger, Campos and

Caparros, 2012). Fragmentation occurs when large tracts of working landscapes, especially agricultural lands, are broken into smaller parcels and agricultural land uses become intermixed with non-agricultural uses (Morehead, 2005). The conversion of agricultural and timberlands to other land uses, including residential parcels, is considered conversion (Walker and Fortmann, 2003).

As parcels become smaller it becomes increasingly difficult to make an economic return from the “provisioning services” of the land (Reid et al., 2005, p.vi). As land is demanded for other uses, property values shift to favor development over agriculture. This creates a cycle – the more the number of landowners selling increases, the more connectivity of the landscape diminishes, and the more difficult it is for the remaining community of farmers to continue farming. As a result, the agricultural livelihood base loses its economic and social viability.

I am the fourth generation to grow up on a ranch in rural Calaveras County homesteaded by my great-grandfather for the production of dryland walnuts. Growing up, I watched as local family farms, and ranches were sold off and replaced with ranchette developments (agricultural lands turned into low-density housing), major subdivisions, vineyards, and golf courses. Now that my childhood ranch is for sale, I have a personal understanding of the family conflicts that may occur when the existence of the ranch is threatened. As I watched this conflict unfold in my own family, I wondered what options were open to landowners and how county planning efforts might promote conservation of working lands.

The main lands affected by these changes in California, are oak woodlands. Eighty percent of oak woodlands in California are privately owned and two-thirds are classified as hardwood rangelands and are essential to California's livestock industry (Wacker & Kelly, 2004; U.S Fish & Wildlife Service, 2011). Oak woodlands sustain diverse wildlife and native plants, watershed and economic benefits to the public. Conversion of rangeland to residential uses is considered the most serious threat to hardwood rangelands and the ecosystem services they provide (Wacker & Kelly, 2004).

In the rural Sierra Nevada foothills of California the primary contributors to the conversion and fragmentation of hardwood rangelands are: population growth, a pro-growth political and planning culture, and value conflicts between newcomers and longtime residents (Walker & Fortmann, 2003). Since World War II, California's population has grown by 30 million new residents each year, which means more infrastructure and undeveloped land are continuously needed. Meeting the needs of the increasing population has meant new houses, highways, and infrastructure consumes habitat and farmland (Fulton & Shigley, 2005).

People move to exurbia, areas on the outskirts of metropolitan regions with low-density development, for open space, cultural history and scenic beauty. Research from rural California indicates that newcomers to rural areas often have perceptions and expectations of the landscape that are based on consumptive and aesthetic values. Longtime residents have views of the landscape based on production values and believe newcomer's expectations are politically threatening (Walker & Fortmann, 2003; Beebe &

Wheeler, 2012). The physical and cultural landscape of rural areas changes when values clash (Walker & Formann, 2003).

When ranchers make the decision to sell their land, fragmentation and conversion of working landscapes is more likely to occur. Ranchers sell their whole ranch when properties that border them are sold, and subdivided, and no longer used for agriculture (Huntsinger & Hopkinson 1996; Rowe et al., 2001; Standiford & Barry, 2005). They are also more likely to sell their land when they are not the original homesteaders of the property, and when the economic returns from the land decrease (The Sierra Nevada Ecosystem Project, 1997; Rowe et al., 2001). Ranchers are more likely to sell when they are close to retirement and they have no heirs to take over the ranching operation. Issues with federal grazing regulations on public lands were also reasons landowners decided to sell their land (Rowe et al., 2001).

Local governments are tasked with land use planning and might influence these processes. However, rural counties have limited tools to conserve privately owned working lands. Zoning, the most common tool used for conserving resource lands is problematic because it can be changed and parcels that seem safe now may be subdivided and converted to non-agricultural uses in the future. The most commonly used land conservation tools are the California Conservation Act, or Williamson Act of 1965, and the California Forest Taxation Reform Act of 1976. Under these laws, 10-year conservation agreements grant participating landowner's tax relief for parcels zoned Agriculture Preserve (AP) or Timberland Production (TP) Zone. However, these are

comparatively short term conservation tools because landowners may file for non-renewal after 10 years and sell their land for development (California Farm Bureau Federation, 2012; State of California Department of Conservation, 2011).

Conservation easements (CE) in contrast, are a long term approach to land protection available to private landowners on a voluntary basis. A conservation easement is a legal contract between a private landowner and a government agency or land trust that protects the property in perpetuity against conversion and fragmentation by limiting uses of the property, while also allowing particular land uses (Gustanski & Squires, 2000; Byers and Ponte, 2005). Landowners usually sell or donate their right to develop the property, thus reducing the land value and the owners' tax liability, especially in the case of inheritance taxes (Gustanski & Squires, 2000; Byers & Ponte, 2005).

The use of conservation easements is increasingly popular, but little is known about what motivates private landowners to enter into a contract. Further, when land is classified according to conservation value, local landowner perspectives are not typically included. It may be possible to identify lands suitable for conservation easements based on both their conservation value and likely incentives for landowners to choose conservation easement contracts. This research addressed the gap in the literature on landowners' perspective for the case of Calaveras County, California. Seventy-eight percent of the 663,478 acres of land in Calaveras County is in private ownership, thus this research is important for private land conservation. Calaveras County's population grew from 10,289 in 1960 to 47, 578 in 2010 (Forstall, 1995; United States Census

Bureau, 2012). Until my research, a project identifying suitable parcels for conservation easements based on research and criteria derived from landowners who hold conservation easement contracts had not been produced on Calaveras County, CA.

For this thesis, I asked the questions; why did landowners in Calaveras County choose to enter into conservation easement contracts, and considering this information, and the location of existing conservation easements, where were additional suitable parcels or Conservation Priority Areas (CPAs) for conservation easements in Calaveras County? I interviewed landowners in Calaveras County to better understand their decisions to enter into conservation easements. I then used the interview results, and findings from the literature, in a *GIS* based classification that identified parcels that were suitable for conservation easements. In the future, incorporating primary data about landowners and landowners' insights in landscape classification may be useful for this or other counties, land trusts, and communities in prioritizing land for conservation.

LITERATURE REVIEW

Background on the Use of Conservation

Easements for Landscape Conservation

The landscape across the United States has been transformed by advances in transportation, population growth, housing trends, and cultural changes in urban and rural areas (Daniels, 2002; Walker & Fortmann, 2003; Fulton & Shigley, 2005). Fragmentation and loss of working landscapes and habitat are results of urban and exurban sprawl, population growth, and value shifts (Daniels, 2002; Walker & Fortmann, 2003; Fulton & Shigley, 2005). These processes are driven by local planning decisions, social networks, and politics. They are often based on counties' and cities' need for revenue, which can be generated from development (Daniels, 2002; Walker & Fortmann, 2003). The result is the loss of critical habitat, farmland, ecosystem services, traditional resource based economies, and rural lifestyle (Daniels, 2002; Walker & Fortmann, 2003; Fulton & Shigley, 2005). Political ecology is an interdisciplinary approach to analyzing political, economic, and social factors as they manifest in environmental issues and changes (Robbins, 2004). In my thesis political ecology provides an analytical basis for exploring the dynamic relationships among land use changes in rural areas, exurban growth, conflicts between exurban migrants and long-time residents, and landowners' decisions to enter conservation easements.

A political ecology approach allows one to develop an understanding of local politics that affect individual landowners' decisions to conserve their property through explaining environmental interactions on multiple scales from larger to smaller including: regions, states, communities, households and individuals (Walker & Fortmann, 2003). It also brings insight into the cultural clashes in rural areas between longtime residents and newcomers who have different expectations of the landscape. This creates value shifts and changes in the physical landscape.

Walker & Fortmann (2003) state that this theory

“...provides powerful insights into the ways that the politics of landscape—revolving around the question of who ‘owns’ the landscape or decides how it ‘should’ look—become a pivotal node in the shifting human—environment dialectic” (p. 469-470).

Urban sprawl is defined as the expansion of metropolitan areas into a complex pattern of land use, transportation, social and economic development (Frumpinkin, 2002). Lewis (1996), O’Sullivan (1996), Gordon & Richardson (1997), Pendall (1999) and Rusk (1999) state that root causes, spatial patterns and consequences are three aspects of sprawl (as cited in Cornell University, 2010). These authors argue that poor planning, competition among local governments for tax revenue, fragmented governance concerning land use issues, and inappropriate land use regulation are root causes of sprawl. Market failures and market forces such as low land values are also caused by inefficient development patterns. The house owners’ preference for large lots for their homes in rural areas is also a cause of sprawl (Cornell University, 2010).

Sprawl causes inefficient spatial patterns of land use on the landscape. This is attributed to low density and leapfrog development, commercial strip land uses, unlimited outward development, and segregated land uses (Yin & Sun, 2007). Low density development patterns cause negative consequences in communities such as: overdependence on cars, excess energy use, environmental contamination, traffic congestion, and mismatch between jobs and housing (Yin & Sun, 2007). Consequences of these inefficient development patterns include the degradation of ecosystem services, loss of connectivity of wildlife habitat, and deterioration of watersheds (Heaton & Merenlender, 2000; Press, 2002; Pejchar et al., 2007). They also fragment and cause conversion of farmland (Press, 2002; Yin & Sun, 2007; Pejchar et al., 2007).

Thirty-four million acres of undeveloped crop land, pasture land, range land, and forest land in the United States were converted to sprawling development between 1982 and 2001(as cited in Cornell University, 2010). Keys, Wentz and Redman (2007) stated that agricultural lands are often the first to be developed because infrastructure for water distribution is in place. Between 2006 and 2008 more than 28% of urban conversions in California were derived from irrigated farmland, and an additional 35% from dry land farming and grazing land (Pejchar et al., 2007; California Department of Conservation, 2011).

When cities become crowded, many people crave the rural lifestyle of the past when they lived on farms and populations migrate to the country (Frumpkin, 2002; Fairfax, 2005). Cities built in rural areas, known as exurbia, have leapfrog development

patterns that are low density and expand across more acreage in comparison to the urban city (Frumpkin, 2002; Beebe & Wheeler, 2012). Exurbia's physical characteristics include: narrow roads, large lot sizes, few sidewalks, homes with large setbacks from the street, rural buildings such as barns, and outbuildings. Exurbia is absent features associated with the urban environment such as gutter drainage and curbs (Beebe & Wheeler, 2012). Rural sprawl subdivides resource lands into non-agricultural lots between 1 and 10 acres, known as ranchettes and increases the number of access roads and facilities (Beebe & Wheeler, 2011). Ranchettes satisfy their owners' desire to live in the rural landscape, but this development pattern eats up farmland, grazing land, and habitat (Frumpkin, 2002; Yin & Sun, 2007; White, Morzillo & Alig, 2008).

There are approximately 8.5 million acres of oak woodland habitat¹ remaining (Gaman & Firman, 2006; Meadows, 2007; Sacramento Valley Conservancy, n.d.). This is the most biologically diverse habitat in the state and provides a range of critical ecosystem services such as: wildlife habitat, pollination, carbon sequestration, water storage and filtration, and recreational opportunities (DeLassaux et al., 2011; Oviedo, et al., 2012). The most common commercial land use in oak woodlands is livestock grazing; two-thirds of oak woodlands are used for grazing, which is why this habitat was **coined** hardwood rangelands (Standiford & Barry, 2005; Gaman & Firman, 2006).

¹ Oak woodlands are defined as having 10% or more canopy closure with oaks as the dominant tree species.

The primary threat to oak woodlands is conversion to residential, commercial, industrial development, and intensive agriculture such as orchards and vineyards, as well as woodcutting (Garrison et al. 2000 as cited in Tehama County Voluntary Oak Woodland Management Plan, 2005; Oviedo et al., 2012). From the mid-1980s to mid-1990s 60,000 acres of woodlands were lost in total. The rate of conversion increased in 2001 to over 30,000 acres of oak woodlands being converted annually (Meadows, 2007). The oak woodlands of the Central Valley and Sierra Foothills including Amador, Madera, and Calaveras Counties face the most immediate threat of development (Gaman & Firman, 2006). In these counties one-third of all oak woodland may be developed before 2040 (Gaman & Firman, 2006).

Landowners' decisions and changes in landownership in California will determine the retention of rangeland ecosystems and the future of the ranching culture (DeLassaux et al., 2011). This is due to the fact that 42% of California's forests and rangeland are privately owned. Landowners' decisions are affected by the amenities they can derive from their private oak woodlands and the income that can be produced from these amenities (Oviedo et al., 2012).

Oviedo et al. (2012) stated:

“Continued ecosystem services from oak woodlands depend largely on the commercial profitability of ranches, their amenity value to their owners and the opportunity costs of competing land uses—in other words, on the cost of maintaining oak woodland ownership measured as the foregone benefits from using the land for something else or selling it” (p. 1).

Although oak woodlands provide valuable ecosystem services and economic benefits to the public, these public goods are unable to compete with the economic benefits private

landowners can reap from selling their land for development (Standiford, 2005).

Standiford and Barry (2005) state that the value of grazing land in California is 20% less than the value of what the land would bring on the open market

One factor that contributes to the conversion of open-spaces and agricultural lands in the United States is conflicts between exurbanites and longtime residents in rural areas (Standiford & Barry, 2005; Keys et al., 2007). Value shifts occur because of different concepts of landscape held by newcomers and longtime residents (Beebe & Wheeler, 2012). Exurbanites move to rural areas to escape suburbia and urban landscapes. They idealize the rural landscape and see it as a place of comfort, meaning, and history where people are accepted as a part of community (Daniels 1999 as cited in Beebe & Wheeler, 2012). Exurbanites want rural places to be different than the sterile suburban and dense urban neighborhoods they came from (Beebe & Wheeler, 2007). Longtime residents value the rural landscape for production values and depend on the landscape for their livelihoods. Newcomers treasure the landscape for consumptive and aesthetic reasons that may be affected by production values (Walker & Fortmann, 2003).

Exurbanites concepts of rural rely upon their ideal image of rural areas (Daniels 1999 as cited in Beebe & Wheeler, 2012). This ideal image of rural areas is a lifestyle lived by in-migrants, but creates large inequities in rural places because not all demographic groups can participate in this concept of the rural landscape (Beebe & Wheeler, 2007). These inequities include high land and housing prices, the absence of transportation systems, and affordable housing, which are aspects of the suburban and

urban areas exurbanites are rejecting (Beebe & Wheeler, 2007). Existing residents, who are participating in a service oriented economy, and who do not share the newcomer's concept of 'ruralness,' are excluded from this ideal image. In-migrants view these long-time residents as the "other" when longtime working and commuting residents challenge the exurbanites' concept of the rural landscape. Conflicts occur over who has the 'right' to occupy, access, and manage the exurban landscape (Beebe & Wheeler, 2012, p. 3). Tensions occur on the border of residential neighborhoods and farmland in the Sierra Nevada foothills over how the landscape should look and be used (Beebe & Wheeler, 2012).

As urban development increases on the border of ranchers' property, the price of land rises and ranchers feel that development cannot be avoided. Feeling this pressure a rancher may sell their land. This results in a loss of 'critical mass' to the ranching community (Rowe et al., 2001; Standiford & Barry, 2005). As the ranching community diminishes it also loses the commercial businesses that supply services and products (Rowe et al., 2001; Standiford & Barry, 2005). As fewer ranchers exist in a community the remaining ranchers suffer, for example during seasons when there is a high demand for labor that used to be shared reciprocally or when agricultural service businesses are lost and they have to drive further to get products used for their business (Huntsinger & Hopkinson, 1996; Rowe et al., 2001; Standiford & Barry, 2005). Without support and services, and because it borders urban areas, the cost of ranching increases (Standiford & Barry, 2005). This leads ranchers to decrease their time and financial investment in the

ranch, and thus leads to a declining condition of the ranch, and a loss of the sense of belonging to the community; this is known as ‘impermanence syndrome’ (Rowe et al., 2001; Institute for Local Self Government, 2002; Standiford & Barry, 2005).

As landowners invest less in the ranch this causes the profits from the ranch to decrease (Rowe et al., 2001). Profits are also affected by low livestock prices and many ranchers seek a second income on or off the ranch (The Sierra Nevada Ecosystem Project, 1997). When livestock prices were low between 1987 and 1997 many private ranchers in the Sierra Nevada foothills supplemented their income through firewood sales (The Sierra Nevada Ecosystem Project, 1997). Land rich, but cash poor owners of large ranches, dependent on the ranch for income are more likely to sell the ranch if the business is unprofitable (Rowe et al., 2001).

Encroaching urbanization of the borders of farmland also increases the likelihood that succeeding generations will sell the property (Rowe et al., 2001). Other reasons ranchers sell their land are in response to public policy decisions such as changes in state and federal grazing regulations, or for personal reasons such as being near retirement or in poor health, and lacking heirs to take over the ranch operation (Rowe et al., 2001). Ranchers also sell their land because they did not homestead the ranch originally and do not view the ranch as an important part of their lives, but only as a business to retire from.

Ranchers’ economic and political influence weakens when the economic viability of ranching in an area declines and the farming community disintegrates. When people who are not dependent upon agriculture for their livelihood gain political influence, local

decisions no longer revolve around agriculture (Rowe et al., 2001). As ranchlands and farms become intermixed with sporadic subdivision developments and ranchettes, new residents express concern with the farm operations that border their homes. Impediments to the freedom to farm imposed on landowners by private citizens, or through ordinances by local governments, include ordinances regarding traffic from customers visiting farm stands, noises from farm machinery, livestock smells, and dust (Huntsinger & Hopkinson, 1996; Esseks, Oberholtzer, Clancy, Lapping, and Zurbrugg, 2009). Ranchers' concerns with residential neighbors includes trespassing, liability issues, increased costs to their ranching operation, safety concerns, stray dogs, vandalism, and the introduction of exotic plant species (Huntsinger & Hopkinson, 1996; Standiford & Barry, 2005). Without political clout in the community agricultural land uses lose legitimacy in the local government and ordinances pass, which make it difficult for ranchers to continue to sustain the working landscape economy (Rowe et al., 2001).

The state of California does not have direct control over development or the retention of working landscapes through instituting growth controls because land use planning is delegated to local governments. Daniel Press (2002) has argued that there is a pro-growth culture in California that is supported by local governments because growth leads to increased sales tax revenue. Land use planning in California is very complex. The best ways to develop revolve around two decisions. One is to allow home building or use the land for agriculture, while still managing to conserve the farmland and save sensitive habitats such as wetlands (Press, 2002). When local government officials run on

a pro-growth platform they are more likely to be elected than if they espouse growth control (Press, 2002; Fulton & Shigley, 2005).

Local governments use zoning, general plans, and ordinances to guide development decisions. Every California county and city has an elected legislative body; in the city it is a city council and in a county it is a board of supervisors. By law each local government is required to create a general plan devised to guide its community's future development.

Fulton & Shigley (2005) described zoning as:

“[t]he division of a city into districts and the application of different regulations in each district” and zoning ordinances are “a law dividing all land in the city into zones that specifies uses permitted and standards required in each zone” (p. 415).

Zoning allows or prohibits specific projects (Fulton & Shigley, 2005).

The conservation of private land in local areas is supported by state programs, such as the Wildlife Conservation Board (WCB), the California Conservation Act of 1965, also known as the Williamson Act, and the Forest Taxation Reform Act of 1976. The primary purpose of the WCB is to approve funding to federal, state, local, and non-profit agencies for the protection of wildlife habitat, public access projects, and restoration (State of California Wildlife Conservation Board, n.d.).

Cities and counties in California use various planning and conservation tools to curb sprawling development. Planning tools include: growth management plans, zoning, infill incentives, and utility service controls. Urban growth boundaries specifically delineate where growth may or may not occur through regulatory limitations. They are

enforced by zoning controls and urban service-area limitations (Feitshans, 2003; Fulton & Shigley, 2005). Zoning ensures that neighboring land uses are compatible and direct growth. Agricultural area zoning is a regulatory tool that is used to ensure land is conserved for agricultural land uses only. One planning mechanism for conservation of agricultural lands is to use zoning to allow increased density and diversity of housing types in the same zone district which prevents sprawl onto agricultural lands (Feitshans, 2003; Randolph, 2004). Infill incentives encourage building in urban areas that already exist, which decreases the pressure to convert farmland into subdivisions (Institute for Local Self Government, 2002).

Conservation tools used by local governments vary, but common tools are: Use Value Taxation programs, right-to-farm laws, Transfer of Development Rights Programs (TDRs), and Purchase of Development Rights Programs (PDRs) or conservation easement programs. Voluntary farmland programs, such as Use Value Taxation programs, allow farmers to pay reduced property taxes on their agricultural land. The land is then taxed based on its agricultural value versus its full market value. An example of this is the Agriculture Preserve zoning used by California counties which allow farmers to enter contracts with local governments under the Williamson Act (Institute for Local Self Government, 2002; Feitshans, 2003; Randolph, 2004).

The next type of voluntary conservation program is a local statute, such as “Right to Farm” ordinances that restrict nuisance laws against farmers (Institute for Local Self Government, 2002). Nuisance laws are defined as an unreasonable interference by one

landowner with the right of another landowner to enjoy and use their property (Feitshans, 2003). The most extreme outcome of a nuisance law is that farmers are unable to farm because of a court injunction which ceases their right to certain farm practices such as loud equipment on residential roads. Under the right-to-farm law the plaintiff cannot complain against the landowner's land use because it was "first in time," whereas the plaintiff's land use was "second in time" (Feitshans, 2003, p.36).

Transfer of Development Rights Programs (TDRs) requires land that serves as a receiving area and land that serves as a sending area. The receiving area is an urban area where the local government determines that a higher density of development is a viable option, such as incorporated areas. The sending area is an area where lower density growth is desirable, such as near agricultural lands. Limited by the zoning and a conservation easement contract, the landowner of the sending area cannot develop the property (Institute for Local Self Government, 2002; Feitshans, 2003; Randolph, 2004; Fulton & Shigley, 2005).

Operated by local governments, Purchase of Development Rights Programs, (PDRs) (conservation easement programs) receive financial and technical support from the state. Purchase of Development Rights programs focus on perpetual conservation easements because government funding is so limited. Transaction costs of limited term easements and perpetual easements are the same. Governments rarely purchase limited term easements because the price to purchase them is not significantly lower than perpetual easements (Institute for Local Self Government, 2002; Feitshans, 2003).

Purchases of Development Rights Programs acquire easements as mitigation for development (Feitshans, 2003; Randolph, 2004).

The California Land Conservation Act of 1965, also known as the Williamson Act and the Forest Taxation Reform Act of 1976 are the most common conservation tools offered to landowners by local governments to retain private working lands in California (State of California Department of Conservation , 2007). Land enrolled in the Williamson Act is zoned Agriculture Preserve (AP) and land in the Forest Taxations Reform Act are zoned Timber Production Zone (TPZ) or (TP) (Municipal Code Corporation, n.d.). The minimum size of an Agriculture Preserve is 100 acres, and the minimum parcel size for a Timberland Production (TP) Zone preserve is 160 acres (State of California Department of Conservation, n.d.; Municipal Code Corporation, n. d.).

Under these acts landowners enter into contract with local governments to restrict their parcels to open space and agricultural uses. The incentive to enter into these contracts for landowners is a property tax assessment that is much lower than the full market value (State of California Department of Conservation, 2007). Until the year 2009, the state supported the lower property tax assessment in local areas under the Open Space Subvention Act of 1971 by providing financial support to local governments annually to make up for the losses in property tax revenue (State of California Department of Conservation, 2007). Due to revenue shortages the state has suspended these payments to local areas and without that financial assistance local governments have little incentive to offer the conservation tool to landowners.

The Williamson Act and Forest Taxation Reform Act are problematic for land conservation because landowners can file for non-renewal of their contracts and the minimum land requirements prevent smaller parcels from being protected through the contracts. Counties have had legal issues with the State of California because of new landowners who use Williamson Act lands for non-agricultural purposes and still receive the state funded property tax break (California Farm Bureau Federation, 2012). In 2004, Assembly Bill 1492 added Section 51250 to the Government Code (State of California Department of Conservation, 2004). Assembly Bill 1492 gives the State of California Department of Conservation the right to impose fines on landowners who develop on agricultural preserves. These fines are 25% of the value of a property's sale price as well as 25% of the value of homes built illegally on Williamson Act lands (State of California Department of Conservation, 2004; Nichols, 2007).

In 1974 Congress advocated protection of private land only in instances where the acquisition directly affected a state or national park (Fairfax, Gwin, King, Raymond, and Watt, 2005). In the 1970's states were concerned with protecting farmland from post World War II suburban sprawl. In response to governments having a lack of funding for conservation, nonprofit organizations established a movement of land protection agencies known as land trusts. These organizations formed in reaction to the public's discontent with land management agencies under the jurisdiction of the federal government (Fairfax et al., 2005). According to the 2010 Land Trust Alliance census there were 1,699 state and local groups and 24 organizations categorized as national land trusts. California had

the most land trusts at 197 (Land Trust Alliance, 2012). States allow private organizations to hold conservation easements through the Uniform Conservation Easement Statute or state statute (Gustanski & Squires, 2000).

The concept of placing a conservation easement is based upon separating out the numerous rights a landowner has including the right to: lease, sell, develop, occupy, construct buildings, harvest timber, restrict or allow access, and farm (Gustanski & Squires, 2000; Byers & Ponte, 2005). These rights have potential market or taxable value. In a conservation easement contract, a landowner may give up some of this “bundle of rights” to protect particular conservation values on the property while maintaining ownership of the property and the remaining rights (Gustanski & Squires, 2000; Byers & Ponte, 2005).

Land trusts protect land by paying for conservation easements which restrict or remove the landowner's right to develop open land and allow landowners to continue to use their property for sustenance and the creation of products (Fairfax et al., 2005). Landscapes that are preserved through conservation easements are described in general terms, such as: open spaces, habitat for wildlife, and water resources (wetlands) (Land Trust Alliance, 2006). Areas protected across the country through the use of conservation easements are: local parks, coastal shores, urban gardens, prairies, deserts, and farms (Land Trust Alliance, 2006). Land trust priorities for conservation are working landscapes such as timberlands, farms, and ranches (Christensen, Rempel & Burr, 2011).

Land trusts receive funds for conservation easements from federal programs such as the Land and Water Conservation Fund, United States Forest Service (USFS) Forest Legacy Program, North American Wetlands Conservation Act (NAWCA), and Farm and Ranchland Protection Program under the United States Department of Agriculture (Land Trust Alliance, 2012). In California, easements are funded by the Wildlife Conservation Board (WCB), Sierra Nevada Conservancy, California Department of Conservation (DOC), California Farmland Conservancy Program (CFCP), and bond measures passed by the public (The Northern California Regional Land Trust, n.d.). The 2011 estimate of total acres protected by land trusts nationwide was 47 million acres (Christensen et al., 2011). California, Colorado and Montana's local land trusts conserved 2.6 million acres between 2005 and 2010. This was 30% more than 2000 to 2005 and puts them at the top nationwide in total private land conserved (Christensen et al., 2011).

A conservation easement is a legal and voluntary agreement between a land trust or government organization (the easement grantee) and the owner of the property (the grantor of the easement).

The conservation easement contract is: "a collection of restrictions and obligations, at a minimum, restricting the activities that may occur on the property and thus limiting a landowner's use of the property" (Mayo, 2000, p. 31).

The terms and limitations of the conservation easement contract depend on the characteristics of the property and the goals of the landowner and land trust or government organization, but commonly absent is the right to develop the property (Society of American Foresters, 2002; Byers & Ponte, 2005). A third party, or the

grantee (government organization or land trust), monitors the easement to ensure the contract's terms are followed (Byers & Ponte, 2005).

Conservation easements may be perpetual or term easements. To receive income and estate tax benefits the easement must be perpetual (Byers & Ponte, 2005). Term easements are not commonly used, but are contracted for a certain number of years (Byers & Ponte, 2005). The contract is created when the fee title to a piece of land is separated between the fee holder, or landowner, and the easement holder (Gustanski & Squires, 2000). Part or all of the property can be in the easement contract. Landowners' exclude parts of their property that is developed and land for future development, known as envelopes, from the easement contract (Society of American Foresters, 2002). The easement is recorded with deed of the property in the county or city and remains on the tax roll. Easements remain intact with the property and the deed when the property changes ownership or is passed to heirs; new owners of the property are required to abide by the restrictions in the contract (Society of American Foresters, 2002; The Nature Conservancy, 2011).

To determine the value of development rights, the easement property is appraised to determine the fair market value of the property. The value of a conservation easement is based on the difference between the value of the land with the easement, known as the encumbered value, and the value of the property without the easement, which is the full market value. The full market value includes rights encumbered by the easement. The

value of the development rights sold varies because of the difference in the full market value of property.

The proceeds from the sales of development rights allow landowners to reduce their overall debt and permit them to change, modernize or diversify their ranching operations (Byers & Ponte, 2005). Reducing the overall debt on the property helps landowners settle their estates and invest in their retirement and future (Byers & Ponte, 2005). Conservation easements are a conservation tool that allows landowners to continue to sustainably manage their land for timber harvesting and farming and resist the pressure to sell their land to developers (Society of American Foresters, 2002; Byers & Ponte, 2005). If timber harvesting or farming is no longer economically viable on the property conservation easements provide protection of open space values the land provides.

Conservation easements are governed by federal and state property law and are recognized under federal tax laws and Internal Revenue Service regulations (Squires, 2000; Byers & Ponte, 2005). The Uniform Conservation Easement Act defines what an easement can protect as: the surface of land from any drastic changes that would alter its natural state and the rights of the landowner to keep the land in private ownership (Squires, 2000). The California Conservation Easement Act and UCEA describe the obligation and responsibilities of present landowners, easement holders and all parties in the contract (Hutton et al., 2000). The California statute is more restrictive than the UCEA. It explicitly states that conservation easements are binding on “successive

owners” and requires that they are in perpetuity (Hutton et al., 2000, p. 365). California’s conservation easement statute considers easements for the following purposes: ‘to retain land predominantly in its natural, scenic, historical, agricultural, forested, or open-space condition’ (Hutton et al., 2000, p. 365).

Conservation easements gained popularity as a conservation tool when the federal tax codes and Internal Revenue Service regulations were reformed in 1977 and 1997 and offered landowners monetary incentives for entering easement contracts through the tax code (Small, 2000). Landowners can potentially receive estate, income or property tax benefits. Tax deductions on easements are based on the value of the easement, absent the development or improvement rights, versus the real value of the property.

The decision to enter a conservation easement contract is primarily based on variables that affect landowners’ decisions to keep their property versus selling their property. Ranchers stay on the ranch if they have an attachment to place and a general ‘love of their land’ (Rowe et al., 2001; Standiford & Barry, 2005, p.104). Place attachment is described as loving the area where they live, the ranching lifestyle and the beautiful setting the ranch is in (Rowe et al., 2001). Attachment to place means that the ranch was worked by the family for numerous generations and the owner has a desire to pass the ranching business on to their children (Rowe et al., 2001). Working the ranch and the lifestyle that is a part of the history of the West are also part of place attachment (Rowe et al., 2001). Continuing the tradition of ranching (a traditional rancher draws the majority of their income from the ranch because they raise livestock full time) in the

West and whether or not the family was the first to establish ranching in that area, known as homesteading, also motivated ranchers to keep their properties (Rowe et al., 2001; Gosnell, Haggerty and Travis, 2006).

Landowners enter easement contracts to protect their land and water from numerous variables that affect working landscapes. Ranchers want to protect their land from development and the subdivision of their property into ranchettes when they pass their property to heirs (Gustanski & Squires, 2000; Byers & Ponte, 2005; The Nature Conservancy, 2011). Landowners also seek to protect historic buildings and to preserve their land for farming and open space (Byers & Ponte, 2005). Protecting their land with the conservation tool is also seen as a contribution to the community (Byers & Ponte, 2005). Easements also provide landowners financial benefits, but financial gain from the conservation easement is not the primary reason landowners with agricultural easements enter the contract (Marshall et al., 2003).

Many landowners are interested in easements because there are political issues and large financial burdens associated with public land management and acquisition (Merenlender et al., 2004). They also view centralized regulatory authorities as insensitive toward locals in rural communities (Merenlender et al., 2004). Landowners use easements to protect their land against government interference concerning land use decisions. The bureaucratic problems, high costs, and lack of funding associated with putting land into public ownership also leads landowners to choose conservation

easements (Merenlender et al., 2004). Overall, easements allow protection of their land without government interference.

How landowners use their land determines the reasons they enter conservation easement contracts. Landowners who use their land for agricultural purposes are more interested in agricultural conservation easements or special-purpose conservation easements because of non-market values, personal place attachments to their property, and “a sense of altruism and commitment to stewardship” (Marshall, et al., 2003, p. 92; Byers & Ponte, 2005). Special purpose easements are held by entities that specialize in protecting certain types of resources such as agricultural land, historic sites, and forests (Byers & Ponte, 2005). Landowners with agricultural conservation easements want the property to be maintained for agricultural uses and relieve family from the burden of estate taxes (Marshall et al., 2003).

Landowners espouse the benefits from the contracts for numerous reasons. They allow landowners to retain ownership of their property while protecting the conservation values they choose. The contract ensures particular forest practices will be used and others prohibited. They like that the easement allows the family to retain some development rights for future use and that they can manage the property for income generation. Recreational uses are also reasons landowners protect their property (Society of American Foresters, 2002; Feitshans, 2003). Landowners appreciate that the rights disabled in the contract work in conjunction with the goals of the land trust or government organization and landowners (Society of American Foresters, 2002; Byers &

Ponte, 2005). They like that they remain the private owners of the property, which allows them to preserve their autonomy and that contracts are constructed to suit a diversity of their needs and interests (Gustanski & Squires, 2000; The Society of American Foresters, 2002; Sullivan, 2003; Merenlender et al., 2004; Byers & Ponte, 2005).

The main reason landowners consider a conservation easement, but ultimately decide not to use the conservation tool is because a limited amount of funds are available for the completion of the easement purchase. Many landowners state that they would complete the contract if funding became available (Marshall et al., 2003). The next reason contracts were not finished was the limited availability of estate and income tax deductions (Marshall et al., 2003). Although transaction costs such as land appraisals can be costly, landowners are likely to enter conservation easement contracts despite transaction costs (Marshall et al., 2003). Landowners decide not to enter conservation easement contracts when their primary goals were tax deductions and these financial gains could not be met (Marshall et al., 2003).

Whether a parcel is suitable for a conservation easement depends on 1) landowners' desire to enter into an agreement, 2) whether or not the property meets the conservation goals of a government or non-profit agency who can hold and guarantee the easement in perpetuity; and 3) whether there is funding available for the contract. Geographical Information Systems (*GIS*) has been used by governments and agencies for land use planning to identify and prioritize suitable parcels for various conservation purposes (Raymond et al., 2008; Greenwald et al., 2009; Rao & Yang, 2010; Brown et al.,

2010; Li & Nigh, 2011). *GIS* is a computer modeling system that facilitates collection, storage, and retrieval of information used to carry out spatial analysis (Randolph, 2004).

Social and biophysical data have been linked using *GIS* to create suitability analyses and prioritize land for various conservation purposes.

The Nature Conservancy uses a conservation framework called, “Conservation by Design”. The steps within this framework use a foundation of science and analytical parameters to define the land’s biodiversity. Next, priorities and goals are set to conserve a variety of places. The last step consists of the agency developing strategies, taking action to conserve the identified land and monitoring results (The Nature Conservancy, 2012). The Northern California Regional Land Trust (n.d) has a projects committee evaluate the property based on ecological, cultural, aesthetic and agricultural conservation values. The committee evaluates the property based on the following criteria: the ability to work with the landowner, manageability, surrounding land use, available funding, project size and contiguity. After evaluation the land trust ranks the property for conservation to prioritize the expenditure of their resources (The Northern California Regional Land Trust, n.d). The North Coast Farmland Conservation Study analyzed the conservation opportunities on agricultural parcels that bordered the coast in Humboldt County, California (Morehead, 2005). Agricultural parcels were identified called “agricultural conservation opportunity areas” or “Strategic Conservation Areas (SCA) (Morehead, 2005, p.2)”. In this analysis parcels were considered suitable if they had agricultural zoning, agricultural land uses, and the soils were productive. These areas

were mapped using *GIS* and the acres were prioritized into six “Agricultural Production Zones” (APZ) for future conservation projects and to develop county policies and programs for conservation (Morehead, 2005, p.2). Raymond et al. (2009) described conservation areas as “hotspots (areas of abundant phenomena)” which have “provided a way to integrate multiple environmental and economic values as a priority for management” (p.1302). Raymond et al. (2009) expanded the definition of “hotspots” to include local knowledge and values concerning the identification of ecosystem services and natural capital assets for conservation purposes (p.1302). They used a “community values mapping method” to incorporate biophysical data and social data from interviews with locals to map community values and threats to ecosystem services and natural capital assets in the South-Australian Murray-Darling Basin Region. The authors wanted to incorporate locals’ perceptions in environmental decisions to identify and target “high priority hotspots” for management and conservation (Raymond et al., 2009, p. 1301).

“Conservation Opportunity Areas (COAs)” are defined by Li and Nigh (2010) as regions that are important because they protect biodiversity and “maintain and restore the rich and diverse natural heritage of the state” of Missouri (p. 98). “Conservation Opportunity Areas” included private land parcels (p.98). Although landowners’ perspectives were considered important there were limited resources to reach out to landowners and government and nongovernmental stakeholder’s perspectives were easier to consider in prioritization. Thus, “COAs” were prioritized by using a score-based ranking system (Li & Nigh, 2011). Parcels (COA’s) were ranked for biodiversity

conservation based on the following criteria: parcel size, whether parcels contained a riparian corridor or stream buffer, forest coverage, proximity to public lands and endangered species habitat (Li & Nigh, 2011).

Conservation areas in Texas County, Oklahoma were parcels owned by landowners who entered their land into the Conservation Reserve Program (CRP) under the U.S. Department of Agriculture (USDA). These parcels had “resource-conserving vegetative covers to address soil, water and related resource issues...” (Rao & Yang, 2010, p.317). The relationship was investigated between the increased acreage in the Conservation Reserve Program (CRP) and groundwater levels; the assumption was that the increase in landowners entering CRP contracts created the positive impacts on the physical changes in the groundwater recharge (Rao & Yang, 2010). In this case, *GIS* mapping showed how the decisions landowners made to enter the program may have made a positive impact on particular conservation values in the physical environment (Rao & Yang, 2010). Thus, a variety of approaches to combining social and ecological data to identify conservation priorities have been documented.

GIS has also been used to identify land that faced the greatest risk of development (Morehead, 2005; Weber, Sloan & Wolf, 2006). Morehead (2005) identified agricultural lands facing conversion in Humboldt County, California based on their proximity to roads and existing development. They used a one-half mile buffer along Highway 101 and City Spheres of Influence jurisdictions as conversion “threat factors” that could result in agricultural lands being converted to non-agricultural uses (Morehead, 2005, p.15).

Agricultural lands were also identified that were within water service district boundaries and outside of the county's one-hundred year floodplain. The assumption was made that "Strategic Conservation Areas" next to parcels with non-agricultural uses were more threatened in comparison to agricultural lands that were further away from urban centers (p.15). The Green Infrastructure Assessment, developed by the Maryland Department of Natural Resources (DNR), used GIS to identify and rank ecological areas that faced the greatest development risk (Weber et al., 2004). Then they were prioritized for the state's land conservation efforts.

This literature is crucial to the case study of Calaveras County, California because it indicates approaches to GIS based modeling integrating social, economic and bio-physical values that can be adapted to identify land for various conservation purposes and approaches to assessing relative risks of development. In the research discussed here, I use results from interviewing landowners with conservation easement contracts and insights from the literature combined with bio-physical spatial data in a GIS to develop an approach to identifying priority areas for conservation in Calaveras County.

Calaveras County faces many of the challenges of development already discussed for California: sprawl, conversion, fragmentation, unplanned growth and local powers that make decisions about development based on tax revenue and short term economic growth. Local governments have the power to make institutional changes in their planning processes and the conservation methods they employ to protect agricultural lands and habitat. Sprawl has higher long term economic costs to communities and

developers because it costs more to build and maintain than compact development that uses fewer acres of land (Gies, 2009). The protection of land used for agriculture, timber and open space through numerous planning tools and conservation methods brings high economic returns to local communities (Gies, 2009). Resource lands provide economic benefits that are directly derived from them (Gies, 2009). As population grows in Calaveras County the local government may have to make decisions that are not popular to change values so that private landowners have more support in the retention of their working lands.

The research questions addressed by this thesis are: What opportunities for rangeland and timberland conservation exist in Calaveras County? Are landowners protecting their property in perpetuity through conservation easement contracts? Why do landowners enter conservation easement contracts in Calaveras County, California? How can insights drawn from understanding what engaged these landowners be applied to identifying lands likely to be candidates for additional conservation easements? Can these ideas be combined with available spatial data layers on additional conservation criteria to identify conservation priority areas?

STUDY AREA

Calaveras County is located in the central foothills of the Sierra Nevada mountain range in California and was created in 1850 when California became a state. This area is known as the “Gold Country” or “Motherload” because of the Gold Rush. The Spanish explorer, Gabriel Moraga, named the river Calaveras, which means “skull” in Spanish because of the Native American skulls he discovered along the river. The county was then named Calaveras.

Calaveras County has a high potential for growth because 78% of the county is in private ownership and because it is in close proximity to urban areas (Sierra Business Council, 2000). With this predominantly private ownership also comes a political culture that is predominantly conservative, as most voters are registered Republicans (Calaveras County Economic Development Co., 2012).

Calaveras County’s economy has been dependent on the oak woodland habitat as a working landscape for centuries (hardwood rangelands). The Gold rush began in California, and the Sierra Nevada foothills, in 1949 and the predominantly oak woodland landscape was greatly changed by dredging, hydraulic mining, hardrock or quartz mining (The Gold Rush Chronicle, 2011). Calaveras County historically produced copper and cement from the many limestone deposits in the area.

Agriculture and timber production are also historic land uses that currently help sustain the local economy. These land uses facilitate the retention of working landscapes. Mark Twain wrote about Calaveras County in his famous book “The Celebrated Jumping

Frog of Calaveras County” and the county’s annual fair, was named after his book. Every year in the third week of May school districts in the county take a two day vacation to support the fair before the weekend; the fair is geared around raising livestock and fowl (Calaveras Unified School District, n.d.). Cattle and calves, poultry and wine grapes were the top agricultural commodities in 2010. The total value of agricultural production was \$21,695,800 in 2010 (Moss & Mutz, 2010). Agriculture still plays a critical role in the local culture and economy.

Calaveras County is bordered to the northeast by Alpine County, the least populated county in California with little potential for growth because 96% of the county is in public ownership (Alpine County Chamber of Commerce, 2012). Tuolumne County is to the south, Amador County to the north, Stanislaus County to the southwest and San Joaquin County to the west. Calaveras County is unique in its close proximity to the most unpopulated areas in the state and to the dense populations of Stockton in San Joaquin County, Sacramento and the Bay Area.

Limestone caverns, mining towns, wine trails and Big Trees State Park make Calaveras County an attractive tourist destination which entices newcomers and retirees who build new homes or second homes. This in-migration contributes to exurban population growth, value shifts, as well as inefficient development patterns and the conversion of habitat and land used for agricultural and timber production (Walker & Fortmann, 2003; DeLasaux, 2011). The population of the county grew from 13,716 in

the 1970 census to an estimated 45, 578 in 2010. This does not include the absentee owners with second homes in the county who visit seasonally.

The Sierra Nevada Wealth Index (2000) reported that habitat types from grasslands, blue oak woodlands, and croplands in Calaveras County face the greatest risk of conversion because they are unprotected. Conversion to ranchettes and vineyards not only affects natural habitats and ranchlands, but also Calaveras County's community and agricultural economy that depend on the retention of oak woodlands (Meadows, 2007).

Tools to limit conversion and fragmentation of private working lands are limited to zoning, California Conservation Contracts, also known as the Williamson Act and the California Forest Taxation Reform Act of 1976. Conservation easements are becoming increasingly popular for landowners in this rural area because the decision to enter the easement is entirely up to the landowner and may be done with or without governments.

METHODS

The first step in this research effort was to find Calaveras County landowners who had conservation easements on their land and who were willing to talk about their decision to use this conservation measure with me. I used county records and received help from the assessor's office, and the Motherload Land Trust, to identify the seventeen landowners with recorded easement contracts in the county and their addresses. The assumption was that married couples counted as one landowner. I also contacted one landowner who was in the process of creating the contract. I mailed the landowners' a letter requesting an interview (Appendix B). A total of five landowners out of the 18 landowners contacted were willing to be interviewed. Some of the landowners I interviewed suggested additional landowners with recorded conservation easements. I contacted these landowners to request interviews as well. However, no additional interviews resulted. The sample size was small, and thus, this research must be seen as preliminary. However, given the small number of easement holders in the county, I did interview 27.77%. This percentage included the landowner whose easement was not yet recorded. The data gathered from interviews with landowners provided insights into these landowners' decisions to enter conservation easement contracts and their concerns about the retention of resource lands in Calaveras County that were consistent with research in the literature (Rowe et al., 2001; Press 2002; Morehead, 2005; Standiford, 2005; Keys et al., 2007).

Interviews were done in person, by phone, and through email because each landowner chose how they were comfortable being interviewed. One landowner out of the five participants was in the process of creating the conservation easement contract, while the other four had recorded easements. One landowner was the second owner of the easement property. Two landowners had agricultural easements. In one instance, at the landowner's request, a family member participated in the interview in place of the landowner on the deed because the whole family was involved in the decision to enter the contract.

Conservation easement contracts in Calaveras County are held by: The Sierra Nevada Conservancy, The Pacific Forest Trust, The Trust for Public Land, The Motherload Land Trust, East Bay Municipal Utility District (EBMUD), and the California Department of Fish and Game. They are monitored by these organizations, as well as The California Rangeland Trust. Landowners with easements held by the California Department of Fish and Game and The Sierra Nevada Conservancy did not respond to requests for interviews, or responded that they did not want to be interviewed. The information about these landowners' decisions to enter into conservation easement contracts could have elicited valuable information.

Landowners were interviewed using open-ended questions in a semi-structured framework that allowed landowners to speak freely. This conversational framework was important because questions pertained to landowner's private lives, and finances, and allowed landowners to reveal information they were comfortable sharing. Open-ended

questions elicited a lot of information about threats to private working lands and gave an important window into the landowners' decision making processes. Landowners can be a difficult population to gain access to. The interview questions can be seen in Appendix C.

Questions focused on who easement holding landowners were, how they saw the land, what landowners perceived as threats to the landscape (sprawl) and whether or not they had previously participated in the land conservation programs available in Calaveras County—the Williamson Act and Timberland Production Zones (TP). The main focus of the interview questions was why landowners chose to enter conservation easement contracts and what they liked or disliked about the contracts.

In order to learn more about land conservation efforts by local government and land trusts, county staff and one member of the Motherload Land Trust staff were contacted through email for an interview. A total of seven county staff, county supervisors, planning commissioners and land trust representatives were interviewed in-person, by phone and through email. Again, in view of the small sample size, this research can be seen as exploratory. Interviews by phone and through email did not elicit as much information as interviews that were in-person and allowed time for follow-up questions to interviewees' responses. They were interviewed to gain their perspectives about the threats to private resource lands in the county, what Calaveras County is doing to retain agricultural and open space land, whether or not the most commonly used conservation program, the Williamson Act, was working in the county, and what else Calaveras County should do to retain working lands.

These interviews provided information on professionals' knowledge and perceptions of conservation easements and provided a general perspective on the land conservation climate within the local government. Interviewing county and land trust staff also revealed information on landowner decisions to enter into conservation easement contracts. Interviewees provided information on benefits and costs they saw with conservation easement contracts as a tool for protecting private land in Calaveras County.

Information from interviews was interpreted based on themes derived from landowner's answers to the interview questions. These themes and information supported the development of a *GIS* suitability model to identify parcels under threat from development and suitable for conservation easements.

The primary purpose of the *GIS* spatial analysis was to develop a model of key characteristics that made land suitable for conservation easements. This was done by combining a land suitability model, which consisted of criteria derived from interviews with landowners, county and land trust staff, and data layers from Calaveras County specific to land uses and conserved areas.

Randolph (2004) describes a land suitability analysis as a combination of inventory information, which helps steer development. Randolph (2004) states that "the objective of land suitability analysis is to determine the appropriate locations for certain uses based on those intrinsic characteristics" (p. 600). A suitability analysis determines the land's particular "*vulnerability*" to damage or

impact, which results from development or the “*attractiveness*” of the property for development (p. 600). Vulnerable areas include aesthetically pleasing areas, resources, and habitats. Attractive areas include particular features that make land suitable for development such as: good soils, septic systems, and access roads (Randolph, 2004). This can be used to generate maps that display suitability based on the lands’ “specific use (in siting studies)...” (Randolph, 2004, p. 591). Taking an inventory of information includes collecting and mapping a number of socioeconomic and natural factors that influence land use (Randolph, 2004). In this study the social inventory was gathered from interviews. Natural factors included data in *GIS* layers, such as the rivers and lakes layers. This land suitability model differed from Randolph (2004) in that the inventory and “specific use” was used to guide the identification of parcels for conservation purposes, specifically conservation easements. These suitable parcels, hereafter referred to as Conservation Priority Areas, were demonstrated on maps that will aid the community and local government in future conservation planning efforts.

The land suitability model was primarily driven by the research reviewed on identifying land for conservation purposes (Randolph, 2004; Morehead, 2005; Keys et al., 2007; Weber et al., 2006; Raymond et al., 2009) and partially driven by the information derived from interviews with landowners, county, and land trust staff.

As the purpose here is to conserve hardwood range working lands, the definition of Conservation Priority Areas used in this thesis mimicked that of Morehead (2005) and

Randolph (2004). Morehead (2005) defined “Strategic Conservation Areas” as parcels used for agriculture and zoned for agricultural uses. Landowners who were interviewed used their property for agriculture and timber production. Thus, the zoning designations that were considered suitable for Conservation Priority Areas were General Agriculture (A1) and Agriculture Preserve (AP). This study differs from Morehead (2005) because it includes land used for timber production that are zoned General Forestry (GF). This study also differed from Morehead (2005) because Conservation Priority Areas were identified as suitable for conservation easements that matched the zoning designations of the conservation easement properties owned by interviewees. All landowners (excluding the second owner of the easement property) sold other properties in an effort to keep up with debt and mortgages and to keep their homestead properties. They described feeling pressure of encroaching development around them, and how neighboring ranches were sold and subdivided by family members who inherited the property. Therefore, this study also mimicked the definition of ‘environmentally sensitive’ areas by Randolph (2004), and defines Conservation Priority Areas as those that not only meet certain zoning designations, but also face the risk of being developed.

The information from interviews that was used to drive the land suitability model was landowners’ concerns over agricultural and timberlands being developed, the loss of contiguity between parcels used for agriculture and timber production, the fact that they were all in the Williamson Act at some point in time, their concerns over water rights issues and the conservation of watersheds. In addition, to interview data, factors drawn

from the literature, such as impacts of encroaching urbanization on agricultural land (Standiford et al, 2005) were used to inform the *GIS*. *GIS* layers from Calaveras County's public ftp site were used to populate the *GIS*: 2009 parcels, zoning, main county roads, state highways, rivers, lakes, the California Department of Fish and Game easement layer, and the Big Trees State Park layer. The roads layer used in the analysis was created by merging the main county roads and state highways and exporting them into a shapefile (layer). The commercial and residential layers were created by selecting those zonings from the zoning layer and exporting them to a shapefile (layer). The conservation easement layer was created for the analysis by selecting those Assessor Parcel Numbers (APNs) from the 2009 parcel layer. The public lands layer was created by selecting all the public land "names" from the 2009 parcel layer, such as "Bureau of Land Management" and exporting them into one shapefile (layer) to be shown on the maps. The spatial analysis was produced using ArcInfo software version 9.3.1 (ESRI) and vector data models.

The zoning designations General Agriculture (A1), Agriculture Preserve (AP) and General Forestry (GF) were selected as the first criterion used to identify parcels suitable for conservation easements because they matched the designations of interviewees' easement properties. Interviewees' easement properties are zoned designations that fall under Article 2 of the county zoning code titled "Resource Zones" (Municipal Code Corporation, n. d.). For explanations of these zoning codes see Appendix G. Split zoning designations for General Agriculture (A1) were included in the prioritization analysis

because landowners who were interviewed have easement contracts with that zoning designation. Suitable zoning designations were selected from a spatial join of the zoning and parcel layers. The zoning layer did not have the Assessor Parcel Numbers (APNs). These were needed so that the APNs of existing conservation easements could be identified, so that they would not be included in the Conservation Priority Areas' layers. Then each zoning of the Conservation Priority Areas (GF, AP, and A1) were made into a shapefile (layer). Conservation Priority Areas zoning designations matched the properties owned by landowners who were interviewed and chose to enter contracts. Thus, it was assumed that these properties are owned by landowners who may be interested in conservation easement contracts.

Landowners who were interviewed had their property in the Williamson Act in the past or before the easement contract was completed. This supported including parcels zoned Agriculture Preserve (AP) in the suitable zoning designations. Agriculture Preserve (AP) Conservation Priority Areas demonstrate areas owned by landowners who may be interested in conservation easement contracts based on the fact that landowners interviewed in this study were in the contract at one point in time and sought a long-term conservation method. Showing parcels that are zoned AP, and simultaneously in the Williamson Act, is also important because these are landowners whose 10-year contracts may end soon. Landowners interviewed stated that the process for entering the land into the Williamson Act program was time consuming, but all were in the act at one point in time.

Parcels were considered unsuitable in this analysis that did not match the zoning designations of the conservation easements owned by landowners who were interviewed since the protection of private lands through conservation easements is ultimately their decision. Commercial Agriculture (AC), split zoning designations of General Forestry (GF) and Agriculture Preserve (AP), and Timber Production (TP) Zones were included in other layers on the maps because they were unsuitable for conservation easements. Agricultural lands were included in the layer that was created for the analysis called “agricultural lands.” Parcels with split zoning designations for General Forestry (GF) and Timber Production (TP) Zones were included in the layer that was created called “timberlands.” These layers were created so that all land within the county would be represented on the maps. The timberlands and public land layers overlap in some areas because timber production occurs on private and public lands. There are likely parcels that were considered unsuitable that hold significant conservation values and may be owned by landowners who are interested in conservation easements.

Although residential or commercial zonings are within recorded easement contracts, these designations were not included in this analysis, because it is unclear which residential or commercial parcels landowners would include in an easement contract. It is unlikely that land trusts or government agencies would consider these a high priority because smaller more developed parcels are likely to have less conservation value.

Connectivity of working landscapes may be lost due to parcels being fragmented from their proximity to roads and development (Morehead, 2005; Keys et al., 2007). Working landscapes that border urban and exurban development have an increased risk of being subdivided and developed because landowners feel that selling their land has become inevitable, the ranching community disintegrates, and the size of agricultural parcels decreases (Standiford & Barry, 2005). The price of land increases as development extends onto agricultural lands and this makes it less expensive to extend infrastructure. Ultimately, agricultural profits decrease in the region and landowners are more likely to sell (Rowe et al., 2001; Standiford & Barry, 2005). Landowners, county and Motherload Land Trust staff were concerned about the loss of contiguous agricultural and timberlands.

Based on this research, and information from interviews with landowners, county and land trust staff, the second, third, and fourth criteria for suitability was identifying Conservation Priority Areas that were in close proximity to development “threat factors” (i.e. roads, rivers, lakes, residential and commercial development) (Morehead, 2005, p. 15). They were identified from the Conservation Priority Areas (A1, AP, GF) that were considered suitable based on zoning. Proximity was defined as whether or not the Conservation Priority Areas (parcel) fell within a one-half mile buffer. The one-half mile buffer was used to define proximity because it was assumed that Conservation Priority Areas within that buffer face a greater risk of being developed because they are adjacent to lands with non-agricultural uses in comparison to lands further away from “threat

factors” (Morehead, 2005, p.15). Morehead (2005) felt that a one-half buffer was realistic, yet conservative, to determine if the parcel faced an immediate threat of conversion. All three Conservation Priority Areas’ layers were intersected with the buffered roads layer to discover how many acres fell within one-half mile of roads (merged layer of main county roads and state highways).

Then all three Conservation Priority Areas (A1, AP and GF) were intersected with the buffered rivers and lakes layers to determine Conservation Priority Areas that were in close proximity to rivers and lakes. The Conservation Priority Areas proximity to rivers and lakes was considered a “threat factor” because the existence of water infrastructure on agricultural land makes a parcel more suitable for development (Keys et al., 2007). This criterion was also supported by the study done by Morehead (2005) in Humboldt County, California who selected parcels for conservation that were more susceptible to development because they were within water districts or outside of the 100-year floodplain. Conservation Priority Areas’ proximity to rivers and lakes was also a criterion that showed conservation value. Landowners discussed how their easements protected water quality because their land existed within a watershed that supplied water to an urban area. Landowners described waterways on their properties and were concerned with water supplies and water rights issues. The conservation of parcels near rivers and lakes supports the protection of watersheds and access to water (Press 2002; Randolph, 2004).

The fourth criterion was whether or not Conservation Priority Areas bordered residential and commercial development. The “select by location” tool was used to determine which Conservation Priority Areas that bordered the residential and commercial development layers. It was assumed that Conservation Priority Areas that bordered these layers faced a higher risk of conversion to non-agricultural land uses.

Connectivity between resource lands may be gained by protecting Conservation Priority Areas (A1, AP, and GF) that border conserved areas in the county. The fifth suitability criterion was whether or not Conservation Priority Areas bordered the conservation easement layers and public land layer. This showed the Conservation Priority Areas’ that could be protected through the use of conservation easements to make larger contiguous holdings of protected private land. This was based on landowners concerns about development on the border of their property and neighbors’ ranches breaking apart. Data used to develop this layer included the public lands, Big Trees State Park and conservation easement layers. The “select by location” tool was used to determine which Conservation Priority Areas bordered those layers.

The *GIS* analysis served the purpose of showing suitable land for conservation easements, but it also served the purpose of showing where existing conservation easements are in the county. To do this a shapefile (layer) was created for the local government and community showing where conservation easements are. The grantees of these properties are: The Sierra Nevada Conservancy, The Pacific Forest Trust, The Trust for Public Land, The Motherload Land Trust and East Bay Municipal Utility District

(EBMUD). The easements were included in the layer “conservation easements” which also includes parcels held by the interviewee whose family was in the process of entering a conservation easement. These easements were not added to the Department of Fish and Game conservation easement layer because the decision was left up to the county to decide whether they want one layer, or separate layers, consisting of easements held by particular organizations.

The acreage of Conservation Priority Areas was not used as a suitability criterion in this analysis because existing conservation easement contracts consist of multiple parcels, as do the contracts of landowners who were interviewed. Thus, smaller parcels were considered suitable because they could be a part of a larger easement contract. As the interviews showed landowners knew neighbors with ranchlands that sold or had themselves sold other properties to keep up with debt and mortgages and to bypass future family disputes over the property. Smaller parcels zoned for agriculture and timber could be owned by a landowner who has already subdivided their property to sell in an effort to relieve their family of future conflicts, and they may be interested in this conservation method. Considering smaller parcels suitable for conservation easements was also based on the interview results from county staff who stated that the county should do more to conserve small agricultural parcels that were not eligible for the Williamson Act program.

In the future, land trusts and government organizations may want to select particular Conservation Priority Areas (A1, AP and GF) for conservation easements

based on the five criteria derived from the research and interviews with landowners, county employees, and land trust staff. It should be noted that recorded conservation easement contracts were created based on particular conservation values found on those properties. Thus, the conservation values on land with existing easements in the county varies from critical habitat to historical ranchlands, and is not necessarily the best land to protect ecosystem services. Land selected in this study as Conservation Priority Areas could be prioritized further for particular suitability criteria and conservation values that are important to a land trust or government agency.

RESULTS

Interviews with Landowners and County Staff and Land Trust Representatives in Calaveras County

Landowners interviewed were between the ages of 40 and 80 with the majority in the age group of 55 to 65. Four out of five landowners interviewed had owned their properties from 50 to over 100 years. All conservation easements were between 200 and 2,500 acres. The amount of time it took for conservation easements to be completed varied from six months to two years. One landowner was in the process of completing the easement contract, while another landowner was the second owner of the easement property. Landowners learned about conservation easements at workshops through the Cattleman's Association, the University of California Extension or the California Oak Foundation. One landowner learned about easements through an estate planning workshop over a decade before he decided to enter into a contract.

All landowners interviewed had family income that was not associated with the easement property and their spouses had full time jobs. Two out of five landowners interviewed (excluding one owner who purchased the property with an existing easement) generated income from the property previous to the conservation easement and continued to do so. Three out of five landowners (excluding the second owner of easement property interviewed) were in the income bracket of \$50,000 - \$75,000/year with one over \$75,000 per year, depending on annual timber sales.

Landowners described their properties as the most beautiful places in the county with foothill chamise vegetation and oak woodland habitat that they had cleared over the years. They described their properties as having ridge tops, gulches and numerous springs, and overall looking like typical foothill grazing land. Ranchers also described the climate and elevation of their land. One rancher, for example, stated that his property was in a transition zone between valley and mountain, open rolling hills and grasslands and that it did not experience extremely hot or cold weather.

There were barriers to entering conservation easement contracts that landowners had to overcome. A key issue for landowners before entering into a conservation easement contract was understanding that the easements are voluntary and no one was going to tell them what to do with or on their land. If the easement was written to include traditional uses, then they would be able to continue use to these practices. One landowner stated:

“First off; [is] the whole issue of overcoming inertia. You have to learn about something new and that creates a risk of uncertainty. The grand American tradition has been ‘leave me alone, don’t bother me with anything else’. I think it’s that libertarian thing that goes with private landowners. Going into an easement means we are sharing our property with someone else and that cooperative thing doesn’t sit well with us”.

They also worried about which organization would monitor the easement and about experiencing a loss of control over their property rights. Reading negative stories about conservation easements in the popular press also led landowners to have doubts.

Some landowners were critical of the many stipulations in conservation easement contracts about what they could or could not do with their property and of contract

language that seemed exaggerated. Landowners were also concerned with the value of the rights included in their property ownership and felt that there should be more value placed on other rights such as the value of wood cutting, not solely on the development rights. Landowners' misconceptions about the conservation easement contracts also included the fear that building envelopes included in their individual contract would not exist if the property sold. They were hesitant because future roads or building projects potentially needed by the landowner would be limited by the conservation easement.

Currently, conservation easements serve as the only alternative land conservation method to the Williamson Act or TP contract in the county. Overall, the Williamson Act tax deductions did not serve as a strong incentive for landowners interviewed to keep renewing their 10 year contracts. The two landowners with agricultural easements did not have their properties in the Williamson Act contract when entering the easement contract, but had in the past. One landowner who used his property for timber production, and wanted to return his land to agricultural use, had his property in a Williamson Act contract.

Professionals who worked in county government believed the Williamson Act worked only in the short term, and that it could work better to ensure the retention of agricultural lands.

“I think the problem in Calaveras is a total lack of leadership. There is a potential to use the Williamson Act to preserve land but they've shot themselves in the foot and it may be difficult to keep the program going in the county. There have been issues with the Williamson Act in this county and the state of California has requested county reimbursements for misuse of funds”.

They were concerned that the state may not continue the program and replace the taxes lost to Calaveras County, because the program had not been properly monitored and enforced in the past. County employees also believed that it was problematic that smaller parcels used for agriculture did not qualify for the tax incentive. They stated that the Williamson Act's minimum parcel size and income requirements discriminated against farmers practicing intensive agriculture on smaller parcels.

County employees indicated that despite the flaws, the Williamson Act is valuable and that the county could be working harder to ensure that properties stayed under contract and are renewed when they changed ownership. County employees stated that the process to enter the Williamson Act contract was overwhelming for landowners and that the county did not generally encourage landowners to go through the process. They believed that without the tax reimbursements from the state it would be too costly for the county to promote this land conservation program. They saw the Williamson Act as a tax tool and not a conservation tool because landowners can file for nonrenewal after 10 years—ending the conservation of the property.

During a discussion about how land is valued higher for development and lower for agricultural uses, one landowner had suggestions about alternative conservation methods.

“I think in this county we need developers to pay X dollars into a fund if they are developing 100 acres. The X dollars would go to buy a conservation easement on another 100 acres. The Sierra Conservancy has funds going through that. We need to get the bull by the horn and develop funding mechanisms. If you could preserve two acres for every acre

developed, I think you would be surprised how many people would be interested”.

Another rancher suggested conservation methods that were shorter than the conservation easement, but longer than the Williamson Act (10 years), such as term easements of 25 to 30 years. This rancher believed the public would be more willing to conserve private lands if short term easements were used and conservation was done through the development process.

Conservation easements are one method that can be used to support landowners so that perceived threats to the retention of resource lands may be curbed. Threats to the retention of private open space described by landowners, land trust, and county staff were: sprawl, the subdivision of large parcels into smaller ranchettes, the higher economic value of land for development compared to agricultural production, availability of water and water rights issues. Landowners were concerned about the future decisions their family would make about the property that were out of their control, whether the family would hold together and weather conflicts that could occur over decisions about the land once inherited, and whether or not the family would remain committed to the traditional land uses. Future tax law changes and the sustainability of using land as income within the foothill region were also concerns. All of these threats pushed landowners to seek a conservation method.

Feeling pressured by encroaching development around them, witnessing neighboring ranches being sold and subdivided and having to sell some of their land to

relieve debts drove landowners to use conservation easements on their properties.

Landowners described how neighboring ranches of hundreds to thousands of acres were broken into five acre parcels. Landowners also believed ranches sold because those who inherited the property did not grow up there and did not have a connection to the land.

As one landowner stated:

“You’ve got to love to live in the country. It’s a way of life. [Neighbors name omitted] passed away and had five girls . . . I suggested to one daughter that she sell development rights and pay off other family members. It’s important to have continuous deal... [referring to continuous landscape]”.

Landowners believed inheritors of neighboring ranches sold the property for the same reasons they believed their children or grandchildren might sell their land without the easement contract-- because they were uninterested in ranching and lived out of town.

Three out of five landowners sold family ranches to maintain ownership of the ranch their family homesteaded and/or owned for generations.

One landowner stated:

“My Grandfather thought when you have a hard time just carve off a piece and get what you need. This is a past of reasons that led us to what we need now...”

One landowner sold a smaller parcel to buy a larger parcel contiguous to his home ranch.

“We did sell several ranches that were a part of the edge of the [area name omitted] ranches that Dad put together . . . then, we bought another one along the [omitted name] River. [We were] able to turn around [the] money, and sell it because of too much debt. There is no way today that someone can buy any ranchland or farmland in California and pay it off. Uncle Sam takes big shot when it appreciates. It’s tough business”.

One landowner did consider selling the easement property in the 1990's.

“People believe in giving up the value of the land and the right future generations might have . . . There are people that think that selling is okay. We actually had our land for sale in the early 1990's and then this came along” [referring to conservation easements]. “We discovered we could maintain value and get use of it. People are scared of easements and I think its lack of knowledge about them...”

This landowner's decision to have the easement property on the market in the 1990's may have been related to the fact that the easement property was not the rancher's primary residence. However, the easement property was used by the family as grazing land for generations. The rancher was also considering an easement for the property where he resided. Four out of five landowners used the conservation easement as a way to keep their homestead ranches and/or properties that were in the family for generations.

Landowners' decisions to enter contracts were also based on feeling pressure from the outside world. Developers from southern California called one landowner numerous times with invitations to sell the ranch. The government also contacted a landowner with interest in building a county dump at one time, and at another time a state park. Government regulations and fears about the government taking their land through eminent domain also drove landowners to use conservation easements.

The landowner who purchased the property with an existing easement said that s/he believed the previous owners put an easement on the property because the owners loved the property, nature and wildlife. The second owner of the easement property bought the property because it was adjacent to land they owned. This particular situation

gives some insight into whether or not the conservation easement affected a landowner's ability to sell the property and the public's interest in buying the property with restricted uses. The price of the property would have been lower than the market value because of the rights encumbered by the contract. In this case, any concerns the landowner may have had about conservation easement contracts were overridden by the proximity of the easement property to land the purchaser already owned. This particular conservation easement property provided little information about what makes a parcel suitable based on landowners decisions to enter into the easement contract.

Four out of five landowners interviewed mentioned a connection to place and the desire to keep their properties undeveloped for perpetuity as primary reasons they decided to enter conservation easement contracts. One rancher discussed his place attachment first when asked why he decided to enter the contract:

“Our children love it. We love it. When it's out of our control we wanted it in the family. [The] main reason was we didn't want it to get cut up. [We] wanted to protect land especially not knowing what grandkids will do. If anyone buys it they have to buy the whole thing. Big open range land should not be built on. We saw all of the agricultural land in San Joaquin County being built on and we saw [neighboring] ranches disappearing”.

All landowners sought to preserve working landscapes and open spaces in perpetuity so that future generations would have them.

One of the fears of landowners with agricultural easements was that they did not know who would take over the ranching business when they retired and this drove their decision to enter easement contracts. Landowners with agricultural easements also feared

their property would not be a high priority for conservation because it was not prime agricultural land. Landowners who used their land for agriculture stated that financial reasons for entering the easement contract were to manage and pay off their debt and mortgages. They also hoped to benefit from the tax breaks associated with easement contracts. They also entered easements to be able to continue or start to generate income from the property from agricultural uses. Landowners who had agricultural easements also wanted to conserve the ranch to continue to provide a learning experience for the community about agriculture and its economic challenges.

Landowners also appreciated that they could choose which organization monitored the easement and that the monitoring agency would not invade their privacy beyond what was stipulated in the easement contract; this was a factor in their decision to enter the contract. Landowners stated that they chose the organization they worked with based on familiarity with and respect for the organization, the compatibility of its mission with landowner views, and the organization's knowledge of properties that were similar to theirs.

Landowners, county, and land trust staff recognized that easement contracts were developed for each individual landowner and that the contracts were flexible. Conservation easement contracts were esteemed because landowners believed the contract made it complicated to split the property into smaller parcels, thus ensuring that the land would stay in one piece. All were in agreement that easements put the property into a better financial state when they sold their development rights. This allowed them

to continue to use the property for the traditional uses, such as ranching and harvesting timber, which also allowed landowners control over the decisions about the property. They favored easements because they are a voluntary conservation method. They also supported the use of the contracts because they protected wildlife and sensitive habitat.

All landowners stated that they would suggest a conservation easement contract to other landowners. Landowners stated that neighbors' views of their going into conservation easements varied. Some neighbors gave "standing ovations," while others were "curious" and "waiting" to see how the ranch property would be appraised with the easement contract. Some neighbors looked at the situation with "guarded interest" because they did not like the organization the landowner was working with.

Various criteria about landowner's decisions to enter easement contracts were made explicit from the interviews. It was clear that landowners used the contract to support traditional land uses (agriculture and timber production) or were using the contract to get back to those traditional uses. Three out of five landowners sold other properties in an effort to keep their easement properties. Three out of five landowners interviewed knew of neighbors who sold their land and the ranches were broken into smaller parcels for residential development. Ranchers sold other parcels to keep up with debt and mortgages, but sought to keep their homestead ranches that had been in the family for generations. Landowners felt that there were more ranchers interested in conservation easements in the county, but they believed there was a lack of funds to support the contracts. Some rancher's properties bordered waterways and aided in the

protection of watersheds and water quality that supply water to the public in major cities. Conservation of large connected resource land was important to landowners. Their love for their land, and fears about the future, drove landowners to seek conservation methods. In summary, the key reasons why landowners said they entered into conservation easements were:

- 1) To protect the homesteads they loved and that had been in the family for generations
- 2) To continue to make at least some of their livelihood from the working landscape
- 3) To ensure longer term conservation (even in perpetuity) than other programs such as the Williamson Act provided due to lack of confidence that heirs would be able to (or perhaps want to) hold onto the land
- 4) To protect water supplies and habitat values

In this thesis, I worked under the assumption that operationalizing and spatially analyzing these factors that drove landowners to enter into conservation easements could help to identify additional lands with landowners in similar circumstances that could be prime for conservation.

Prioritization of Conservation Areas Using a *GIS* based Suitability Analysis

GIS layers were created using a suitability model that identified Conservation Priority Areas based on information collected during landowner interviews and

information about existing conservation easements' zoning designations. Criteria were derived from the literature and interviews with landowners and combined with data layers from the county.

The results of the suitability analysis are displayed in Map 1 Appendix A, Table 3 (page 65) and Table 4 (page 66). Conservation Priority Areas Calaveras County, California (Map 1: Appendix A) shows the county's land parcels distinguished by their zoning designation, which was the first suitability criterion used to identify Conservation Priority Areas. These designations include: General Agriculture (A1), Agriculture Preserve (AP), and General Forestry (GF). Conservation Priority Areas were selected from these three layers that meet the criterion identified in interviews (whether or not the parcel was in the Williamson Act contract, proximity to roads, rivers and lakes and whether it bordered development, public lands and conservation easements).

The layer timberlands includes the split zoning for General Forestry (GF) and the designation Timber Production Zone (TP), which were not included in the analysis because landowners who were interviewed did not have parcels in their contracts with these designations. The timberlands and public land layers overlap in some areas because timber properties are private and public. Map 1 also shows existing conservation easements which are zoned: Single-Family Residential (R1), Rural Residential (RR) RR-5 and RR-20, General Agriculture (A1), A1-20, Agriculture Preserve (AP), General Forestry (GF) and C2-PD, which stands for General Commercial Zone-Planned Development Combining Zone (Municipal Code Corporation, n. d.). Conservation

Easements in the county are held by: The Sierra Nevada Conservancy, The Pacific Forest Trust, The Trust for Public Land, The Motherload Land Trust, East Bay Municipal Utility District (EBMUD), and the California Department of Fish and Game. They are monitored by these organizations, as well as The California Rangeland Trust. Map 1 also shows conservation easements that are zoned AP and likely in Williamson Act contracts. The acreage of conservation easements held by the Department of Fish and Game is 12,476.07. The acreage of conservation easements held by East Bay Municipal Utility District, The Sierra Nevada Conservancy, The Pacific Forest Trust, The Trust for Public Land, and the Motherload Land Trust is 2,386.30 (Table 2 page 65).

Conservation Priority Areas defined are 205,916.5 acres, equal to 31.05% of the total acreage in the county (Table 4 page 66). Conservation Priority Areas zoned General Agriculture (A1) are 19.24%. Agriculture Preserve (AP) Conservation Priority Areas, which are also in the Williamson Act, are 11.55%. Conservation Priority Areas zoned General Forestry (GF) have the lowest percentage of the total acreage in the county at 0.26% (Table 3 page 65).

Table 1: Land Use Calaveras County, CA²

Zoning	Total Acreage	Percent of total acreage in county (662,802.94)
Residential Development	129,954.48	19.61%
Commercial Development	2,387.68	.36%
Agriculture Preserves (AP)	94,053.35	14.20%
AC and A1	174,321.21	26.30%
Public Lands	132,701.03	20.02%
Big Trees State Park	6,484.58	.97
Timber (GF, TP, TPZ)	133,559.39	20.15

² All data reported in Tables 1-12 were sourced from Calaveras County's public *GIS* (2010) and the California Department of Fish and Game layer was retrieved from the Assessor's office in 2007.

Table 2: Total Acres Conservation Easements

Organization	Total Acres conservation easement by organizations	Percent of Acres out of total easement acres	Total Easement Acres
Department of Fish and Game	12,476.07	83.94%	14,862.37
Motherload Land Trust & East Bay Municipal Utility District Easements	2,386.30	16.05%	14,862.37

Table 3: Conservation Priority Areas

Conservation Priority Areas	Acres by zoning of Conservation Priority Areas	Percent of Conservation Priority Areas of total for AP, A1	Percent of Conservation Priority Areas (205,916.5) of total acres in County (205,916.5)
AP	76,606.81	37.02%	11.55%
A1	127,528.13	61.93%	19.24%
GF	1,781.56	.87%	.26%

Table 4: Total Acres of Conservation Priority Areas

Total Acres of land in county	Conservation Priority Areas total acres	Conservation Priority Areas Percentage of land out of total in County
662,802.94	205,916.50	31.06 %

Table 5: Conservation Priority Areas Proximity to Roads

Conservation Priority Area	Total Acres Conservation Priority Areas by zoning	Acres Conservation Priority Areas that intersect ½ mile road buffer	Percent Conservation Priority Areas out of total Conservation Priority Areas within ½ mile of Roads
AP	76,606.81	66,875.24	87.29%
A1	127,528.13	111,357.92	87.32 %
GF	1,781.56	1,781.56	100%

Conservation Priority Areas include other parcels owned by landowners who have recorded easements contracts. The results show 2,057.26 acres of Conservation Priority Areas zoned AP are owned by landowners who have easements on other properties. Of the 127,528.13 acres of Conservation Priority Areas that are zoned A1, 216.32 acres are owned by landowners who have conservation easements on other properties.

A second key criterion was Conservation Priority Areas within a one-half mile buffer of roads (Map 2: Conservation Priority Areas in Proximity to Roads Calaveras County, California (Appendix A). Conservation Priority Areas zoned A1 have 87.32% within the buffer, while Conservation Priority Areas zoned AP were similar with 87.29%. All of the Conservation Priority Areas zoned GF fall within the one-half mile road buffer. This information is displayed in Table 5 (page 66). A few of the Conservation Priority Areas zoned GF intersect the one-half mile roads buffer more than once and one parcel intersects the buffer three times. Parcels were counted once toward the total acreage of Conservation Priority Areas that was within the one-half mile roads buffer.

Conservation Priority Areas that are in close proximity to residential and commercial development are identified in Map 3 (Conservation Priority Areas that Border Residential and Commercial Development Calaveras County, California (Appendix A) and Table 6 (page 69). Half of the parcels zoned AP (50.68%), 40.7% of parcels zoned A1, and almost all of the parcels zoned GF (95.88%) border residential development. Conservation Priority Areas zoned GF have the most parcels that border commercial development (22.43%), while AP is .67%, and A1 is 2.07% (Table 7 page

69). Map 3 also demonstrates Conservation Priority Areas that border both residential and commercial development. Conservation Priority Areas zoned GF have the highest percentage that border both residential and commercial development at 22.43% (Table 7 page 69). Less than a percent of parcels zoned AP (.63%) and over one percent of Conservation Priority Areas zoned A1 (1.98%) border both residential and commercial development.

Map 4: Conservation Priority Areas that Border Lakes and Rivers Calaveras County, California (Appendix A) shows Conservation Priority Areas that border river and lakes; this information is shown in Tables 8 and 9 (page 71). Almost all of the Conservation Priority Areas zoned A1 (78.82%), AP (82.79%), and GF (97.91%) are in close proximity to rivers (they are within the one-half mile buffer). Half of the parcels zoned A1 (52.34%) and GF (52.82%) border lakes and fewer parcels zoned AP (38%) border lakes Table 9 (page 71). For Conservation Priority Areas that are zoned AP and border lakes the results include one water district and private landowners. For Conservation Priority Areas that are zoned AP and border rivers, the results show private landowners.

Table 6: Conservation Priority Areas that Border Commercial or Residential

Development

Conservation Priority Area	Total Acres Conservation Priority Areas by zoning	Acres Border Residential Development	Percent Borders Residential Development	Acres Border Commercial Development	Percent Borders Commercial Development
AP	76,606.81	38,824.54	50.68%	480.11	0.67%
A1	127,528.13	51,915.54	40.7%	2,651.12	2.07%
GF	1,781.56	1,708.20	95.88%	399.68	22.43%

Table 7: Conservation Priority Areas that Border Commercial and Residential

Development

Conservation Priority Area	Total Acres Conservation Priority Areas by zoning	Acres Border Residential and Commercial Development	Percent Conservation Priority Areas Borders Residential and Commercial Development
AP	76,606.81	480.11	.63 %
A1	127,528.13	2519.60	1.98 %
GF	1,781.56	399.68	22.43%

The results reveal that there are very few acres of Conservation Priority Areas that border existing easements (Map 5: Conservation Priority Areas that Border Conservation Easements in Calaveras County, California in Appendix A, and Table 10 (page 72). Conservation Priority Areas zoned AP that border easements held by the Department of Fish & Game are (3.67%), A1 (6.0%), and GF (16.04)%. Conservation Priority Areas zoned A1 that border the conservation easement layer are 1.58%, while 1.20% are zoned AP and 11.30% are zoned GF.

Conservation Priority Areas zoned GF that border public lands are 47.86 %, AP are 24.01% and A1 are 18.74% (Map 6: Conservation Priority Areas that Border Public Lands Calaveras County, California in Appendix A and Table 11 (page 72). This demonstrates the connectivity that could be created between Conservation Priority Areas, existing easements and public lands. There are no Conservation Priority Areas that border Big Trees State Park.

Map 7 displays Conservation Priority Areas that border public lands, as well as conservation easements. This is shown in Appendix A and Table 12 (page 73). Conservation Priority Areas zoned A1 and AP border the conservation easement layer, the Department of Fish & Game easement layer and public land layer. Conservation Priority Areas zoned AP has the most acres at 380.23, while 127.43 acres zoned A1 border all three layers. There are no Conservation Priority Areas zoned GF that border the two conservation easement layers and public land layer Table 12 (page 73).

Table 8: Conservation Priority Areas that Border Rivers

Conservation Priority Area	Total Acres Conservation Priority Areas by zoning	Acres Border Rivers	Percent of total Conservation Priority Areas by zoning that border Rivers
AP	76,606.81	63,427.84	82.79%
A1	127,528.13	100,529.70	78.82%
GF	1,781.56	1,744.41	97.91%

Table 9: Conservation Priority Areas that Border Lakes

Conservation Priority Area	Total Acres Conservation Priority Areas by zoning	Acres Bordering Lakes	Percentage of total Conservation Priority Areas Bordering Lakes
AP	76,606.81	29,519.68	38.53%
A1	127,528.13	66,757.45	52.34%
GF	1,781.56	941.17	52.82%

Table 10: Conservation Priority Areas Connectivity to Existing Easements

Conservation Priority Areas	Total acres Conservation Priority Areas	Acres bordering Department of Fish and Game Easements	Percent of Total Bordering Existing Department of Fish and Game Easements	Acres bordering Motherload Land Trust and East Bay Municipal Utility District (“conservation easement” layer)	Percent of Total Conservation Priority Areas Bordering “Conservation Easement” layer
AP	76,606.81	2,816.91	3.67%	787.99	1.02%
A1	127,528.13	7,746.95	6.07%	2,020.17	1.58%
GF	1,781.56	285.86	16.04%	201.27	11.30%

Table 11: Conservation Priority Areas Connectivity to Public Land

Conservation Priority Area	Total Acres Conservation Priority Areas by zoning	Acres bordering Public Lands	Percent Conservation Priority Areas that Borders Public Lands
AP	76,606.81	18,394.33	24.01%
A1	127,528.13	23,903.18	18.74%
GF	1,781.56	852.71	47.86 %

Table 12: Conservation Priority Areas that Border Conservation Easements and Public Lands

Conservation Priority Area	Total Acres Conservation Priority Areas by zoning	Acres bordered DFG Easements and Public Lands	Percent of Total Conservation Priority Areas	Acres Border “conservation easement” and Department of Fish & Game conservation easement layers and the Public Land layer	Percent of Total Conservation Priority Areas
AP	76,606.81	1,215.75	1.59%	380.23	.5%
A1	127,528.13	696.08	0.55%	127.43	.1%
GF	1,781.56	152.32	8.55%	0	0

The land suitability analysis identified 205,916.5 acres as Conservation Priority Areas that hold conservation value and face significant pressure from development based on matching the criterion derived from interviews with landowners. Thus, 31.05% of the total acreage in the county is potentially threatened by development, and also owned by private landowners whose land shares characteristics with lands held by landowners with conservation easements. As other land conservation programs in Calaveras County are perceived as weak, more landowners may be interested in conservation easements.

However, this research also showed that landowners had to overcome barriers before they would enter into conservation easement contracts. For example, landowners

were interested in working with the county to balance conservation and growth, but they wanted the conservation goals of the government or land trust organization offering to hold the easement to match the landowners' desire to continue to use their property for agricultural and timber production.

DISCUSSION

Landowner Reasons for Entering into Conservation Easements

The views of landowners in Calaveras County seemed representative of landowners views reported for other rural landscapes in several key ways, including their concern over agricultural and timberlands being converted and fragmented for development (Gustanski & Squires, 2000; Sullivan, 2003; Byers & Ponte, 2005). Their fears of government regulations on private lands (Rowe et al., 2001; Standiford & Barry, 2005) and the uncertainty about what their families would decide to do with the property when they retired (Gustanski & Squires, 2000; Byers & Ponte, 2005) drove landowners to use the conservation easements. Much of the hardwood range ecosystem is in private hands in California and with an aging set of landowners private agricultural and timberlands face the threat of being converted to development. Landowners, county and land trust staff discussed many pressures for land conversion as this research has elucidated. Therefore, as people interested in conservation identify key criteria for selecting lands with critical habitat and other conservation values, they should also be seeking to identify land most at risk of being sold from the perspective of landowners. Using landowners' values and research as a basis for the classification of land for conservation easements made sense.

In the literature review, Rowe et al. discussed that landowners tended to sell their properties when they reached retirement age. The majority of Calaveras landowners

were between the ages of 55 to 65 years old when they entered conservation easements and were facing retirement or would retire from the ranching business if they could afford to. Questions of succession were a major concern for landowners who sought to avoid family conflicts over property. Who, if anyone, would take over the ranching operation when landowners retired and how family members would decide future management of the property were key concerns. As similarly reported in the research, landowners in Calaveras who entered conservation easement contracts hoped to keep the land intact and avoid conflicts that might arise as descendants were forced to break up the property into smaller parcels to buy each other out or sell the land to pay property taxes (Gustanski & Squires 2000; Byer & Ponte, 2005).

Landowners were concerned that family members would not continue to use the property for traditional timber and ranching uses. The findings in the interviews coincided with other research. Rowe et al. (2001) described how ranchers with a generational legacy on their land stayed on the ranch and decided not to sell if they had heirs to take over the operation.

Numerous threats to the retention of private resource lands that were discussed by landowners, county and land trust staff mirrored findings from the research. All landowners, county and land trust staff described development and breaking apart agricultural lands into smaller parcels as risks to the retention of private resource lands. County staff mentioned that the reduction of buffer zones between agricultural lands and developed land was an issue as well as the lack of planning tools within the general plan

to curb development from sprawling onto agricultural and timberlands (Randolph, 2004; Fulton & Shigley, 2005). Low density or sprawling development patterns attract new homeowners seeking rural lifestyles, fragmenting agricultural lands and leading to conflicts with farmers, which is one force that drives farmers to sell their land (Rowe et al., 2001; Walker & Fortmann, 2003; Standiford & Barry, 2005; Yin & Sun, 2007; Beebe & Wheeler, 2012).

In the research examined, Walker and Fortmann (2003) and Beebe and Wheeler (2012) described the different concepts of landscape held by newcomers and longtime residents in rural areas and how these conflicting ideas created struggles over who has the right to access, occupy and manage exurban lands. All interviewees felt that the influx of newcomers to rural areas were a threat to the retention of private ranches. County staff were also critical of people from the city who bought ranches as home sites without knowledge about agriculture, and then complained about everyday management practices.

The uncertainty about the income produced from agriculture year to year in the foothill regions of the Sierra Nevada Mountains was a concern of landowners and professionals, and was considered a threat to the retention of working landscapes in the research reviewed. When landowners lost profits they were more likely to sell their property (The Sierra Nevada Ecosystem Project, 1997; Rowe et al., 2001). The Sierra Nevada Ecosystem Project (1997) and Rowe et al. (2001) considered the instability of the landowners' income from agriculture a risk to the conservation of private land because,

many ranching families could not depend solely on their ranching business for their livelihood and had additional sources of income.

Calaveras landowners and county staff were critical of local planning efforts and considered this a problem for the conservation of resource lands in the county. They were concerned with county planning efforts with respect to controlling development; they stated that the county lacked the visions and policies that could protect resource land within the general plan. Zoning and general plans are the primary tools to guide development by counties and cities (Fulton & Shigley, 2005). However, from an agricultural landowner's perspective, these approaches lack longevity.

The Williamson Act was the main conservation tool offered to landowners by local cities and counties in California as an incentive to keep their land in agricultural production and protect it from development (Fulton 2005; State Department of Conservation, 2007). The California Farm Bureau Federation (2012), State of California Department of Conservation (2004) and Nichols (2007) described problems with the Williamson Act in California because landowners use Williamson Act land for non-agricultural purposes while still receiving the property tax deduction funded by the state. In alignment with the research, county employees feared that the state would end the program in the county because of misuse of funds. Landowners and professionals in the study indicated that the process to enter parcels into the Williamson Act contract was overwhelming and that the public was not encouraged by the county to go through the

process. Only one landowner, who was in the process of entering the contract, had their land in the Williamson Act.

There were numerous reasons landowners entered into conservation easements. The primary reason landowners entered conservation easement contracts in Calaveras County was their attachment to place and because generations of their family had lived on or used the easement property as a part of the ranching operation. Rowe et al. (2001) illustrated how place attachment decreased the likelihood that a rancher would sell their land. Standiford and Barry (2005) discussed how ranchers decided to stay on their land because they love their land and the quality of life it provides them. New findings were that landowners feared their grandchildren had no attachment to place. Therefore, they may sell the property when they inherited it. Interviewees believed that neighboring ranches sold on the borders of their ranches because inheritors had no connection to the ranch. In contrast to the research, (Rowe et al., 2001) homesteading was a factor in ranchers' decisions to keep their land in Calaveras County. Oviedo et al. (2012) discussed how landowner's decisions were affected by many variables including which amenities they can derive from the hardwood rangelands and whether or not they can profit from those amenities. Landowner's fears of government interference, regulations on farms and ranches and the threat of eminent domain were also reasons they entered conservation easement contracts (Standiford & Barry, 2005; Rowe et al., 2001; Merenlender et al., 2004).

The desire to prevent their properties from being developed in the future and to keep the land from being subdivided drove landowners to protect their property with conservation easements. This finding was consistent with those of Gustanski and Squires (2000), Sullivan (2003) and Byers and Ponte (2005). Huntsinger and Hopkinson (1996), Rowe et al. (2001), Standiford and Barry (2005) described the declining state of ranches as a result of ranchers decreasing their financial and personal investments in the property, which resulted in ‘impermanence syndrome’. The research reviewed coincided with landowner’s fears that when neighboring ranches sold, they would be subdivided and numerous new owners would border their property.

Landowners’ decisions to enter conservation easements were affected by how they used their property and the organization they worked with to create their easement contract. The Society of American Foresters (2002) and Byers and Ponte (2005) examined how the terms of the conservation easement contract was based on the type of property the landowner had as well as the goals of the landowner and organization they worked with to create the contract (Marshall et al., 2003; Byers & Ponte, 2005). They also examined how conservation easements are a useful conservation tool because they allow landowners to continue to use their property for farming and timber harvesting, while simultaneously preventing development. Landowners stated that being able to use the property for traditional uses in the future was a primary motivation for the easement contract. The landowner’s prior relationship with the organization played an important role in their choice of what organization they would create the contract with and in some

cases they requested that a different organization monitor their easement because they felt comfortable with that organization on their property.

One reason landowners entered easement contracts in Calaveras County was to relieve debt associated with the ranching operation by selling their development rights and through the use of tax deductions. Gustanski and Squires (2000) and Byers and Ponte (2005) pointed out how the sale of development rights allowed landowners to modernize or diversify their ranching operations and diminish their debt. They examined how the sale of development rights allowed landowners to focus on their future retirement and settle their estates. In alignment with Rowe et al. (2001), landowners with agricultural easements in Calaveras County were particularly concerned with the debt associated with estate taxes. New findings were that landowners managed debt by selling other properties to relieve financial pressure and to keep their homestead properties that were in the family for generations.

Conservation easements have become increasingly popular to protect a variety of landscapes. Unfortunately, as Marshall et al. (2003) discussed, there were landowners who considered conservation easements, but decided not to enter the contracts because of limited funds available for the completion of the easement purchase. This coincided with statements by landowners in this study who believed there were more landowners interested in conservation easements than there were funds to help landowners create contracts. Overall, landowners became interested in easements when their financial

situation changed and they were closer to retirement, but their primary reason was their attachment to place.

Landowners were not only concerned about themselves and their families, but the community at large. Landowner's wanted to keep their property for future benefit of the public so they could teach their children and community about agriculture. Byers and Ponte (2005) stated that landowners entered conservation easements because they are committed to land stewardship and as a way to contribute to their local community.

New findings in this study were that landowners learned about easements from neighbors and conferences. A second new finding was that landowners entered conservation easements to set an example for other landowners who had misconceptions about the loss of property rights.

Prioritization of Conservation Areas Using a *GIS* Based Suitability Analysis

The results of the *GIS* analysis identified and demonstrated Conservation Priority Areas that could be protected using conservation easements based on suitability criteria derived from research and interviews with landowners. Using *GIS*, numerous authors identified and demonstrated parcels that had conservation values based on a link between social and natural data. The conservation criteria in this study were based on zoning because landowners interviewed with conservation easements had parcels with particular zonings (A1, AP, GF). Landowners said that they use their land for agriculture and timber production, thus it was translated to the methods that these uses were also representative of agricultural and timber zoning designations. Landowners said they were

worried about working lands breaking apart into smaller parcels, thus Conservation Priority Areas that bordered existing conserved areas (public lands and conservation easements) were shown on the maps to show Conservation Priority Areas that would aid in a contiguous landscape. Landowner's fears about agricultural lands being developed supported the demonstration of Conservation Priority Areas in the *GIS* analysis that bordered residential and commercial parcels and were in close proximity to roads, rivers and lakes. Landowners were concerned about protecting watersheds for water quality and water rights issues, and thus the conservation of these areas was incorporated into the *GIS* analysis by showing Conservation Priority Areas that were in close proximity to lakes and rivers.

The study of Calaveras County drew upon the approach of Raymond et al. (2009) who used data from interviews with locals to identify land for conservation based on local values and threats to ecosystem services so that a conservation plan could be made. It also mirrors Li and Nigh (2011) who described conservation areas as "Conservation Opportunity Areas" that included private land parcels and were ranked higher or lower for biodiversity conservation using a score-based ranking system. The criteria ranked included: parcel size, proximity to public lands and endangered species habitat. This study mimicked Li and Nigh (2011) because its definition of conservation areas is private parcels and it demonstrated private parcels that also met other criteria, such as proximity to public lands. The study of Calaveras County expanded on Li and Nigh's (2011) study by showing Conservation Priority Areas that bordered development and conservation

easements and Conservation Priority Areas proximity to roads, lakes and rivers. The study of Calaveras County differs in that these criteria were demonstrated on maps to provide information for future conservation efforts and were not ranked higher or lower for conservation easements.

The study on Calaveras County coincides with research that selected private land for conservation based on the threat of development (Weber et al., 2006; Morehead, 2005). Weber et al. (2006) used The Green Infrastructure Assessment developed by the Maryland Department of Natural Resources (DNR) to identify and rank ecological areas in the state that were facing the greatest risk of conversion for the state's conservation efforts. Morehead (2005) identified land that was more susceptible to development based on whether or not agricultural parcels fell within a one-half mile buffer of roads and urban areas. Keys et al. (2007) discovered that agricultural lands are often converted first to residential and commercial uses, partially because water infrastructure is already in place. Mirroring ideas from the North Coast Farmland Study, Conservation Priority Areas were also shown that met "threat factors (Morehead, 2005, p. 15)." This was based on whether or not they fell within the one-half mile buffer around roads, rivers and lakes or bordered residential and commercial development (Morehead, 2005). This study expanded on the North Coast Farmland Conservation Study by using the one-half mile buffer to identify Conservation Priority Areas that met conservation factors. Identifying Conservation Priority Areas that were in close proximity to lakes and rivers was based on

them falling within a one-half mile buffer. Conservation Priority Areas that bordered conservation easements and public lands was also demonstrated on the maps.

The results showed that many landowners are interested in conservation easements. Also, workshops landowners' attended helped them overcome barriers and misinformation about the contracts. The results also coincided with the research that shows private working landscapes in California are at risk of development (Standiford, 2012) and that landowners in local areas desire more mechanisms to conserve their property.

CONCLUSION

Privately owned hardwood rangelands provide critical ecological services and are under threat of conversion to other land uses in California. This thesis explored conservation opportunities for private working lands, the choices that some landowners have made to put their land into conservation easements, and how understanding these choices might enhance efforts to identify additional lands for conservation. Conservation opportunities for working lands in Calaveras County are limited to the Williamson Act program, Timber Land Protection Zone contracts or conservation easements. Among the reasons why landowners favored conservation easements was their perception that the other programs would not protect their lands in the long term.

The research showed that some landowners are interested in conserving their property through the use of conservation easements. This research identified a number of factors that drove landowners in Calaveras County to enter into conservation easement contracts. Landowners entered contracts because of a strong attachment to place and sought to protect for future generations their homestead properties that had been in the family for many years. Landowners were concerned that their family would decide to subdivide the property and sell off parcels when they retired, and were not sure if their family would continue to use the property for agricultural and timber production. They were also concerned with encroaching development, and loss of connectivity between agricultural and timberlands on their borders that made it more difficult for them to farm.

Insights from understanding what engaged these landowners to enter conservation easements can be applied to identify lands likely to be candidates for additional conservation easements. In order to do this their motivations for entering the contracts were operationalized into criteria for identifying lands prone to being sold for development. These socio economic factors, based on local values, were combined with additional conservation values to enhance identification of Conservation Priority Areas that were suitable for conservation easements. Suitability analysis showed that 31.05% of the total acreage in the county is owned by private landowners who may be interested in conservation easements.

The first criterion derived from the research (Randolph, 2004; Morehead, 2005; Keys et al., 2007) was conservation of working lands. The lands under conservation easement were zoned: General Agriculture (A1), Agriculture Preserve (AP) and General Forestry (GF). The next criteria derived from the interviews and research was the threat of development. Conservation Priority Areas that bordered the residential and commercial layers created in the analysis were identified. In the *GIS*, proximity (defined by a one-half mile buffer) to desirable real estate near pre-developed roads and agricultural water infrastructure, and aesthetically attractive rivers and lakes was considered a “threat factor” (Morehead, 2005; Keys et al., 2007). Rivers and lakes were also defined as critical conservation factors for the protection of watersheds and water quality. To show the possible contiguous landscape that could be created, lands that

bordered the conservation easement layers and the public land layer were identified as Conservation Priority Areas.

There were other land suitability factors from the research, and reasons landowners entered conservation easement contracts in Calaveras County that were not operationalized in the *GIS* suitability model, but might have elicited important spatial information about Conservation Priority Areas that are suitable for conservation easements. Landowners were very motivated to protect their family homesteads. In other words, the amount of time that a family has owned land increases the likelihood that they would enter into a conservation easement. Such lands could have been identified by researching the county's data bases on the history of land sales. Once mapped, these criteria would have narrowed the acres of Conservation Priority Areas significantly. As the key ecosystem under threat here is oak woodlands, it would have been valuable to include a vegetation layer in the *GIS* analysis and to include hardwood rangelands or oak woodlands as a category in the analysis.

I had hoped to reach a larger sample of Calaveras landowners with conservation easements. In a future analysis it would be useful to interview more landowners with conservation easements in the county and that are held by different organizations, such as the California Department of Fish and Game. This would elicit more detailed information about their decisions to enter the contracts, and might reveal important data about landowners' property types and uses. It would also be useful to conduct interviews with landowners who are not currently party to conservation easement contracts, but own

parcels included in the Conservation Priority Areas' layers. This could increase information about landowners' knowledge of conservation easements and perhaps most importantly, what their fears or misunderstandings are concerning such contracts. In general, it would be valuable to know more about ages of landowners and succession planning countywide.

Many Conservation Priority Areas identified in the *GIS* analysis are in close proximity to roads and residential development. It would also be useful to target these areas of the county for succession and conservation easement workshops, for example through the Cattleman's Association, Motherload Land Trust, the Trust for Public Land or The California Rangeland Trust. Conservation Priority Areas shown in this land suitability analysis were individual parcels that are suitable for conservation easements. A future analysis could identify Conservation Priority Areas based on the names of landowners who currently hold easements and who therefore might be open to conserving more of their land. In a future *GIS* analysis parcels that were not included in this spatial analysis (split General Forestry (GF), Timber Production (TP) Zone or Rural Residential (RR), (zoned for small farmers and their personal use) could be identified based on interviews with landowners to see if these landowners are interested in conservation easements. A *GIS* analysis could focus solely on interviews with landowners whose properties are zoned Agriculture Preserve (AP) and are currently in the Williamson Act to cross reference which landowners are interested in conservation easement contracts. Conservation Priority Areas could be identified for suitability based on the owner filing

for non-renewal of their Williamson Act contract because landowners with easements were in the Williamson Act at one time. Prioritization of parcels in the county for conservation easements could also be based on the larger scale conservation gaps that exist in California. The *GIS* analysis could prioritize based on landowner interviews as well as the parcels that fit the criteria for those particular conservation gaps.

Calaveras landowners indicated that they were interested in having more conservation opportunities in the county to retain working landscapes. They suggested that conservation in the county could work through the development process by having developers put money into a mitigation fund that could be used to fund conservation easements in the county. The county could explore a broad range of conservation mechanisms, such as “Right to Farm” laws that local governments can set in place so farmers are not pushed out of the community, especially when their land uses existed first (Institute for Local Self Government, 2002). Another option is Transfer of Development Rights Programs, which require a receiving urban area that serves as a place where higher density development is acceptable and a sending zoning area where lower density growth is desired (Fulton & Shigley, 2005; Randolph, 2004).

Another finding from this research was that none of the landowners entered into conservation easements lightly and all had to overcome significant misinformation and barriers to the contract before entering them, such as how much control over the decisions about the property they would lose and whether or not they could continue to use the property for agriculture and timber production. Landowners were aware of other

conservation tools available, such as developing fee programs which discourage developers from building low density, but none of these other conservation tools were in evidence in Calaveras County (Institute for Local Self Government, 2002; Randolph, 2004). In the future, the county and land trusts could work with landowners to utilize planning tools to help them keep their land in agricultural and open space uses.

Workshops that inform landowners about conservation easements would be beneficial to landowners.

In summary, conservation easements are one mechanism that can be used to protect private working landscapes, especially in oak woodlands that provide vital ecosystem services to the public, including water quality and agricultural products. Government organizations and land trusts interested in increasing the acreage of working landscapes held in conservation easement contracts would benefit from including the perspectives of landowners when pursuing land for conservation easements.

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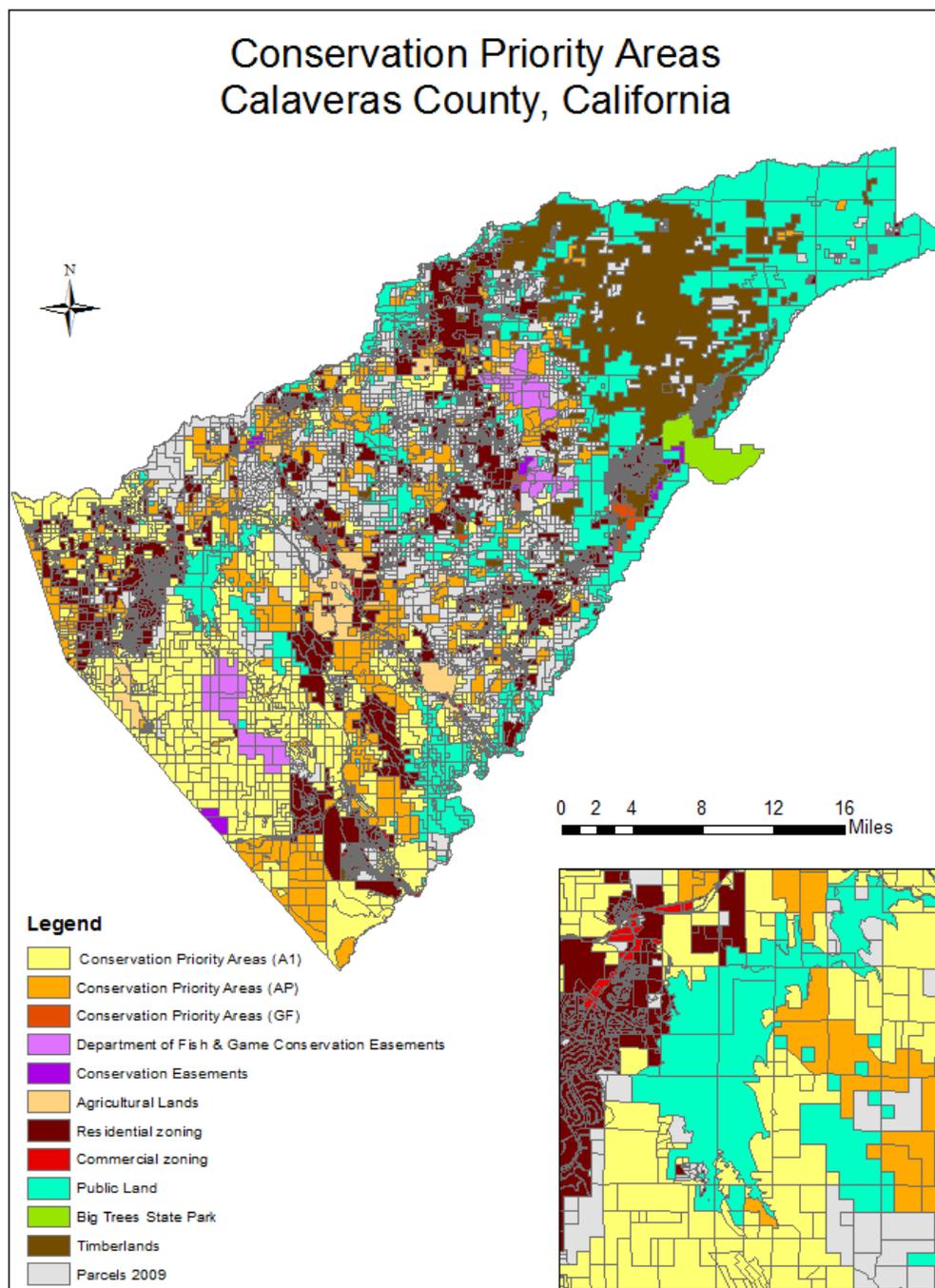
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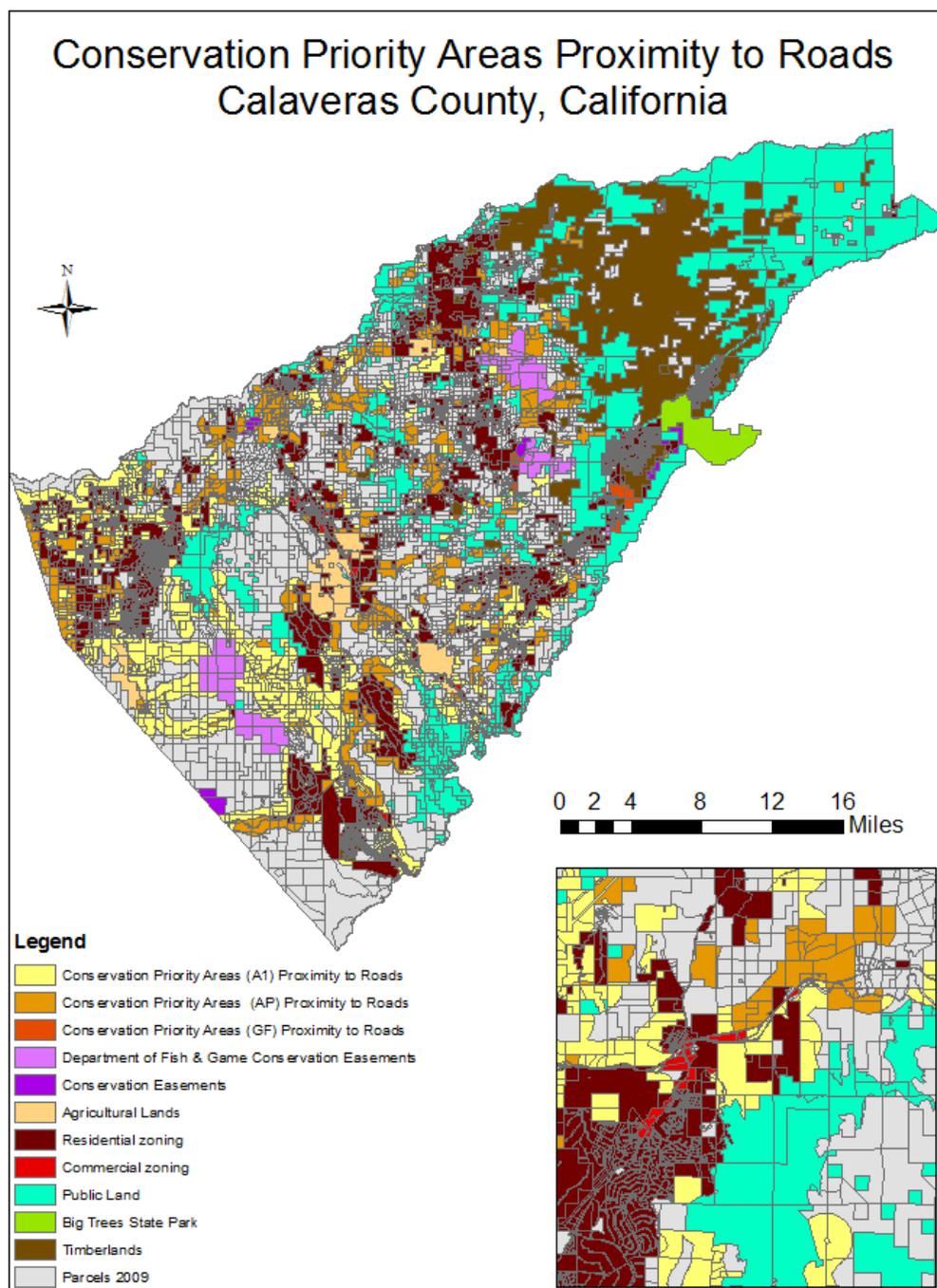
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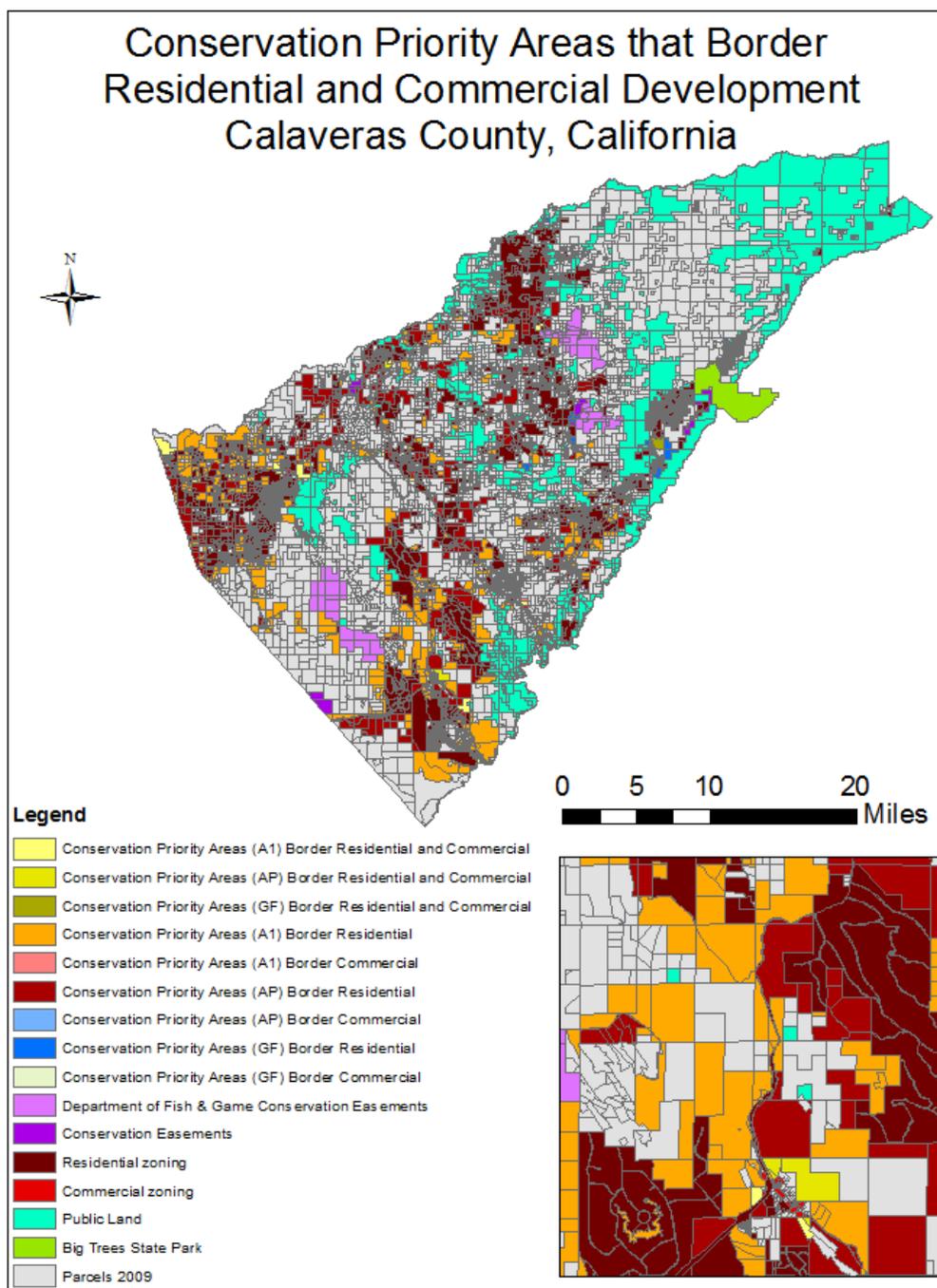
APPENDIX A
FIGURES (MAPS)



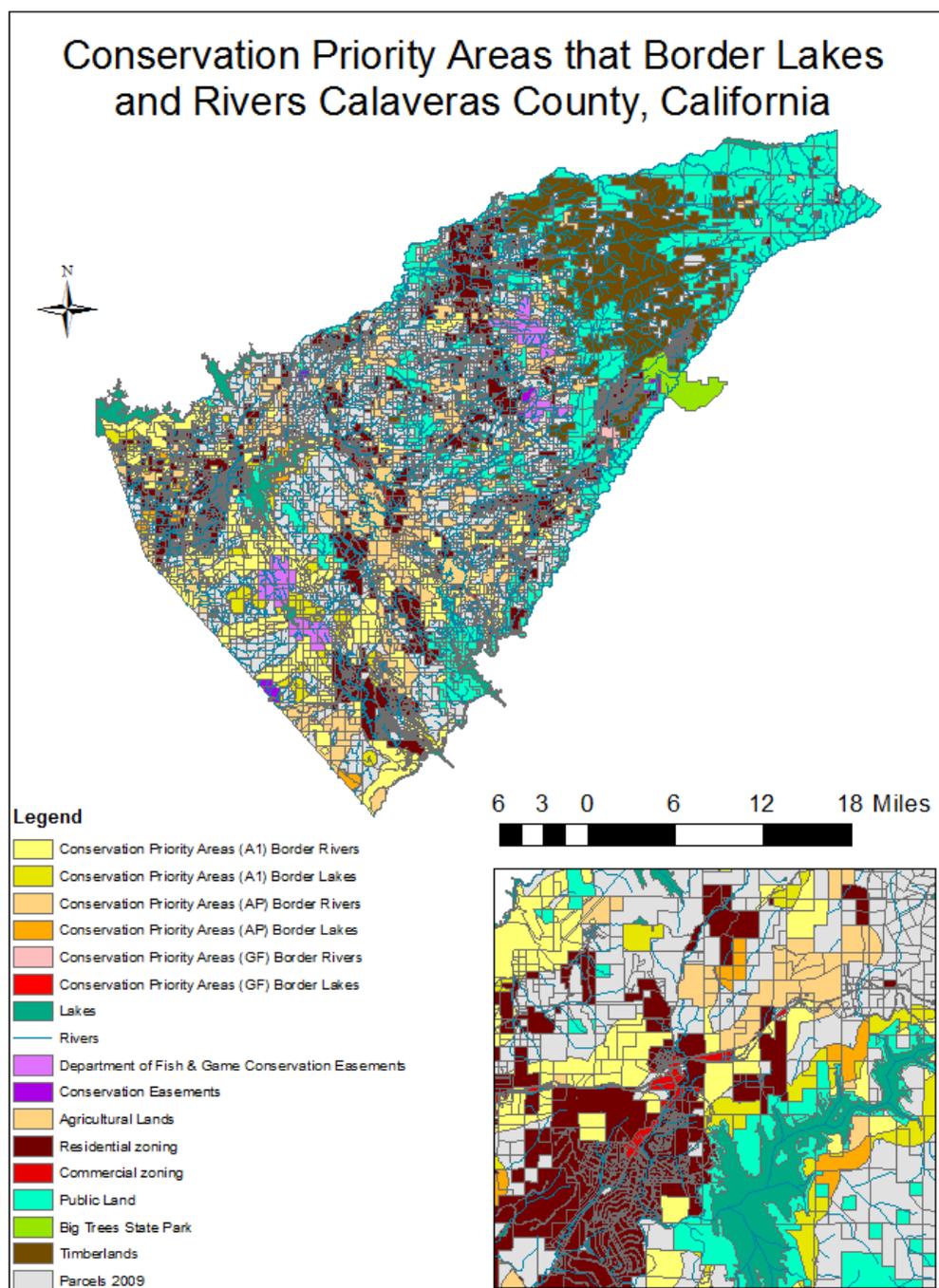
Map 1. Conservation Priority Areas Calaveras County, California



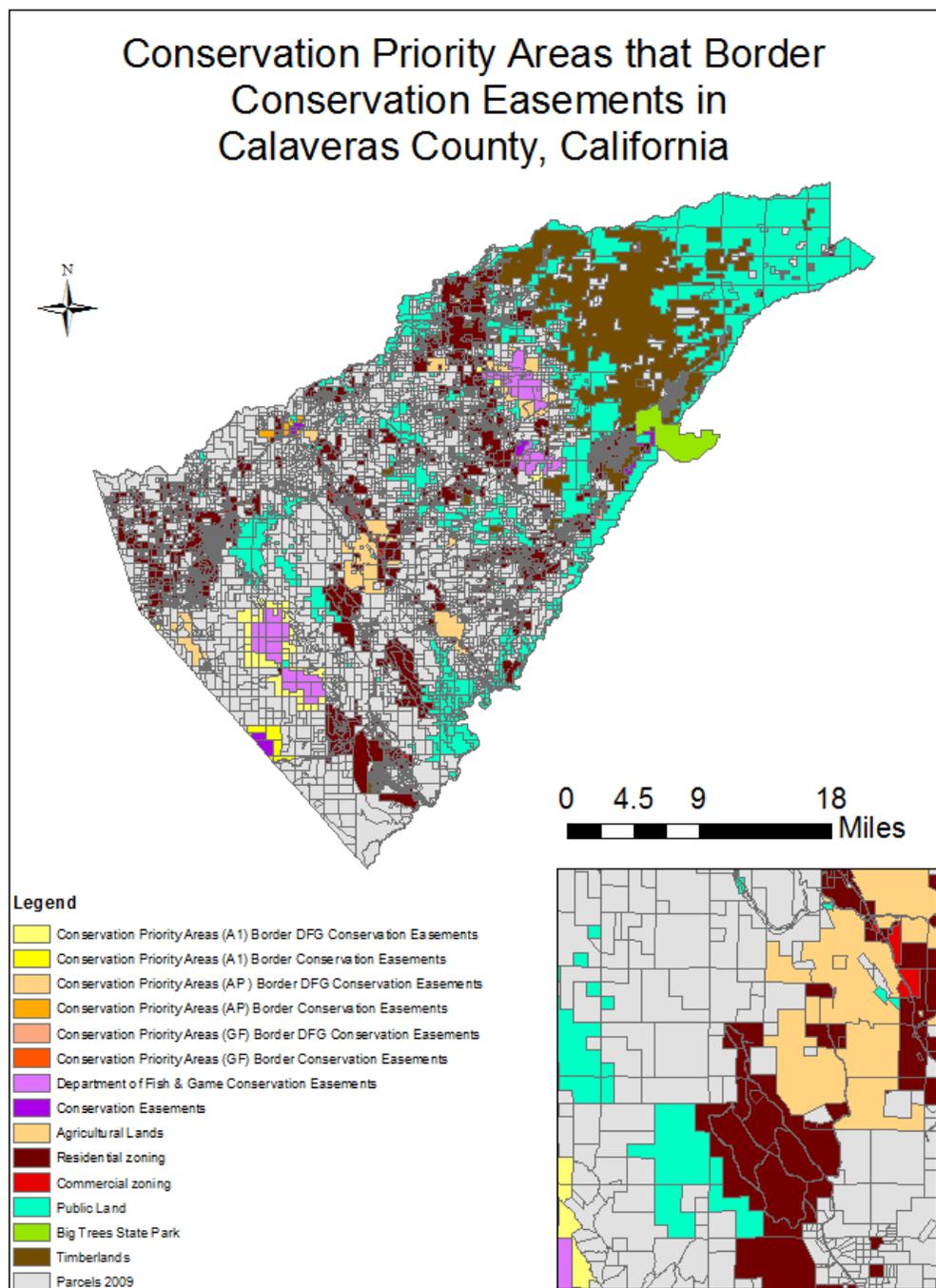
Map 2. Conservation Priority Areas Proximity to Roads Calaveras County, California



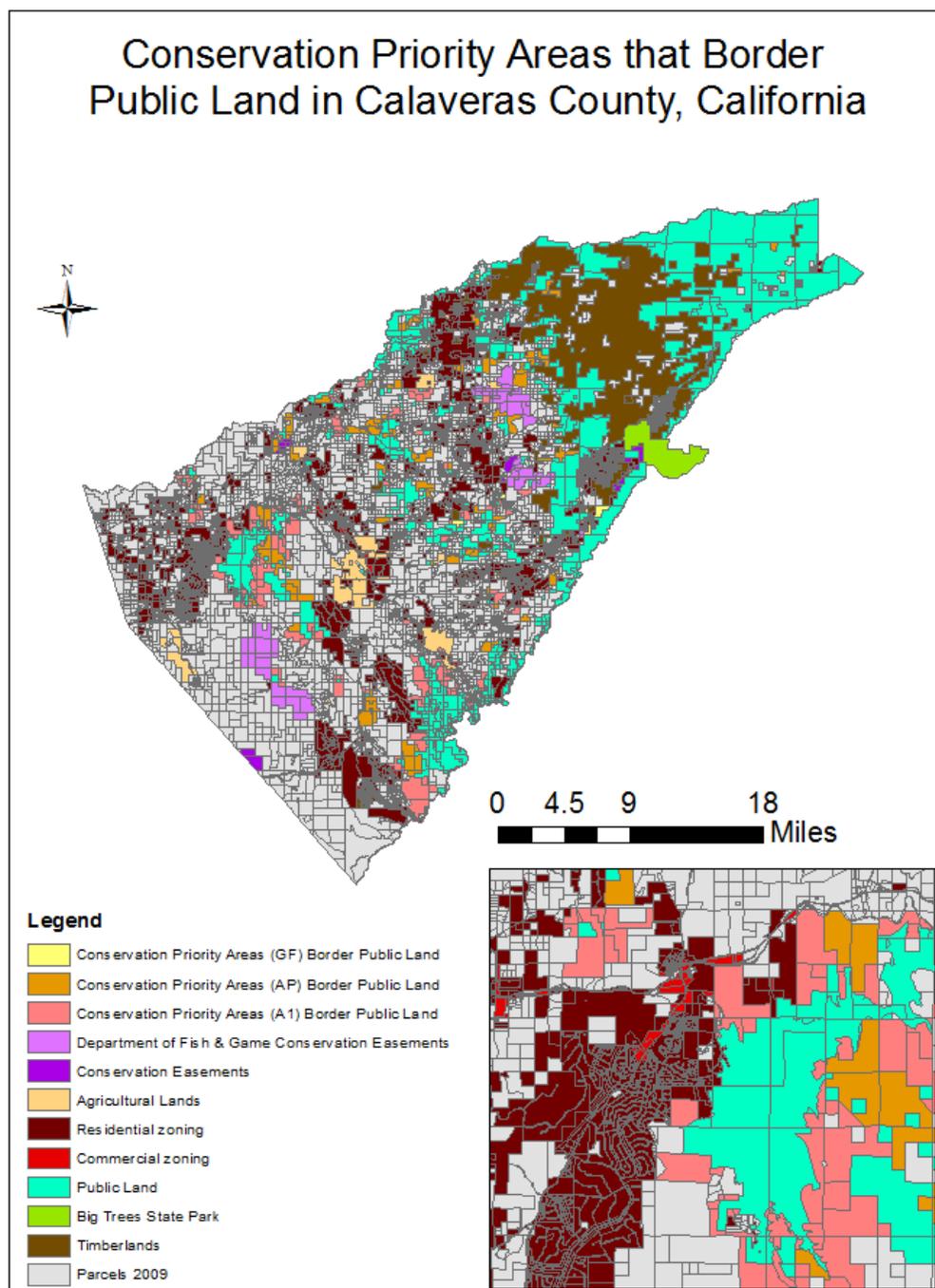
Map 3. Conservation Priority Areas that Border Residential and Commercial Development Calaveras County, California



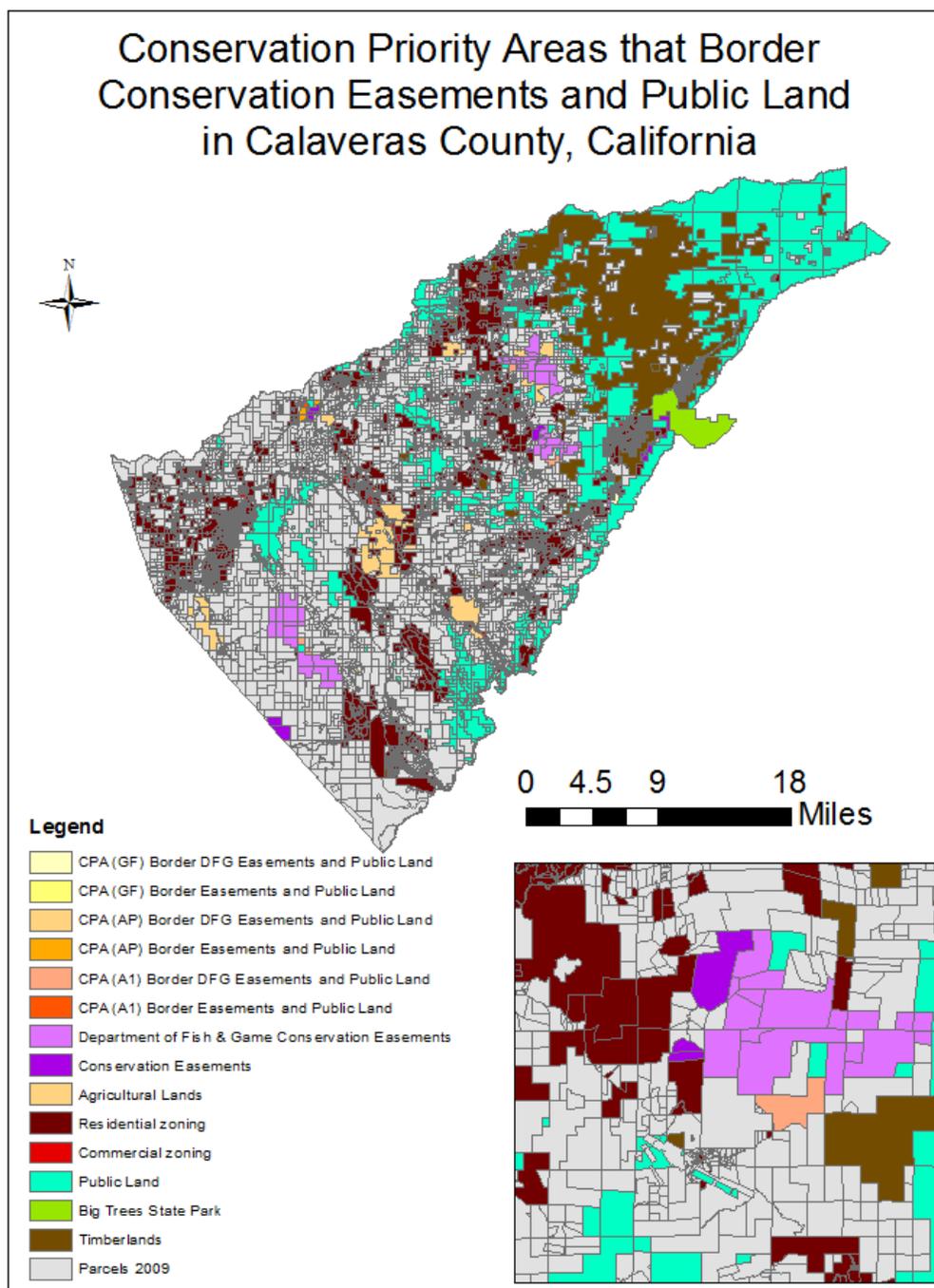
Map 4. Conservation Priority Areas that Border Lakes and Rivers Calaveras County, California



Map 5. Conservation Priority Areas that Border Conservation Easements in Calaveras County, California



Map 6. Conservation Priority Areas that Border Public Land in Calaveras County, California



Map 7. Conservation Priority Areas that Border Conservation Easements and Public Land in Calaveras County, California

APPENDIX B

RECRUITING LETTER TO LANDOWNERS

September 30, 2007
Grace Wilson
P.O. Box 652
Arcata, CA
95518

Dear "Landowner,"

I am a student in the Master's of Arts interdisciplinary program "Environment and Community" at Humboldt State University. I grew up in Calaveras County on land my Great-Grandfather homesteaded in the beginning of the 20th century in Mountain Ranch.

My thesis focuses on conservation easements and the reasons landowners' decide to enter a conservation easement contract in Calaveras County. I am writing landowners who have an easement on their property to find out information about the easements in Calaveras County.

I realize that some landowners are not the original property owner who initiated the easement contract. I believe interviewing the current landowner will also reveal important information about landowners' decisions. I would also like to interview the past landowners' who first entered into the easement contract.

I would like to interview you because county records show that you have a conservation easement on your property or records show the easement was originally recorded with you as the owner. I am hoping that you will be available for an interview during the week of November 14th-20th or 23rd-24th of 2007 (If these do not work out for you we can work out another time). If landowners live in Calaveras County I can interview them there at a place of their choosing. I will also be traveling to Stanislaus County for interviews. I can also interview you over the phone if you do not live near Calaveras or Stanislaus Counties or we cannot find a date that works to meet. This interview will take about 30-45 minutes and your name will be kept confidential in reference to your interview responses.

Please feel free to contact me with questions or concerns. I look forward to hearing from you concerning an in-person or phone interview.

Thank you,
Best Regards,
Grace Wilson
Gmw8@humboldt.edu
(707) 845-8654
Evenings: (707) 822-0953

APPENDIX C

INTERVIEW QUESTIONS LANDOWNERS

1. What do you think is the main threat/s facing private agricultural and open space land today?
2. Would you describe your land?
3. How long has your family lived on this land?
4. How long has your family owned this land?
5. How does your family use the easement property?
6. How did you find out about conservation easements?
7. Where is the conservation easement?
8. What type of conservation easement do you have on your property?
9. How many acres is your easement?
10. Why did you decide to put your land into a conservation easement contract?
11. When was the contract for the easement started?
12. When was the easement contract completed?
13. What other options did you consider using to conserve your land?
14. Was your land in the Williamson Act Contract before the completion of the easement contract?
15. What organization is your easement with (the grantee)?
16. How was your easement developed?
17. What do you like about your conservation easement contract?

18. What do you dislike about your conservation easement contract?
19. Did you have any fears or concerns about entering into a conservation easement contract?
20. Why do you think some landowners' hesitate to put their land into a conservation easement contract?
21. What was the response from your neighbors/other landowners' about you putting a conservation easement on your land?
22. Is there someone who will carry on your ranching business when you retire?
23. Have you sold any of your land not in the easement?
24. Do you know other landowners or neighbors who have sold their land?
25. Do you know why they decided to sell their land?
26. Did you consider selling your land?
27. If yes, did this play a role in whether or not you entered into a conservation easement contract?
28. What is your age bracket?
 - 20-35
 - 35-45
 - 45-55
 - 55-65
 - 65-75
 - 75 -85

- 85 +
29. What is your annual income?
- < \$25,000
 - \$25,000-\$50,000
 - \$50,000-\$75,000
 - \$75,000-100,000
30. Do you have a second income?
31. What suggestions do you have for other landowners' who are thinking about selling their land?

APPENDIX D

INTERVIEW QUESTIONS ASSESSOR

1. What do you think is the main threat or threats facing private agricultural and open space lands in Calaveras County?
2. What do you do on a daily basis in your job position?
3. Do you know landowners'/ranchers whose land was used for agriculture and was sold?
4. Do you know why they sold their land?
5. When did you hear about land trusts?
6. Do you believe conservation easements are an effective tool for retaining agricultural and open space lands in Calaveras County?
7. Why do you think landowners' enter into conservation easement contracts?
8. Why do you think some landowners' hesitate to put their land into a conservation easement contract?
9. What problem do you see with conservation easement contracts as a tool for protecting private land in Calaveras County?
10. What is Calaveras County doing to retain agricultural and open space lands?
11. What do you think is a good strategy for Calaveras County to conserve private agricultural and open space lands?
12. Do you believe the Williamson Act is working in Calaveras County concerning the retention of agricultural lands?

13. What do you like about conservation easements?
14. What do you dislike about conservation easements?
15. What issues have you ran into concerning the assessment of parcels with conservation easements?
16. How is this assessment of a parcel with a conservation easement on it ultimately decided?
17. Do you foresee any problems with conservation easements in the futu

APPENDIX E
INTERVIEW QUESTIONS SUPERVISORS, PLANNING STAFF
AND PLANNING COMMISSIONERS

1. What is your position with Calaveras County?
2. What do you do on a daily basis in your job position?
3. In your opinion, what is the main threat facing Calaveras County's private agricultural and open space lands?
4. Do you know landowners'/ranchers whose land was used for agriculture and was sold?
5. Do you know why they sold their land?
6. Have you heard of Land Trusts?
7. Have you heard of conservation easements?
8. What do you like about conservation easements?
9. What do you dislike about conservation easements?
10. Do you believe conservation easements are an effective tool for conserving agricultural and open space lands?
11. Why do you think landowners' enter into conservation easement contracts in Calaveras County?
12. Why do you think some landowners' hesitate to put their land into a conservation easement contract?

13. What problem do you see with conservation easement contracts as a tool for protecting private land in Calaveras County?
14. What is Calaveras County doing to retain agricultural and open space lands?
15. What do you think is a good strategy for Calaveras County to conserve private agricultural and open space lands?
16. Is the Williamson Act working to conserve agricultural lands in the County?
17. Any additional comments?

APPENDIX F

AMADOR LAND TRUST QUESTIONS

1. What are the main threats facing private agricultural and open space lands in Calaveras County?
2. How did you hear about land trusts and conservation easements?
3. What is your position with the land trust?
4. What is your position with the land trust?
5. What types of things do you do in your position?
6. When did the Land Trust start?
7. How long have you worked for the Amador Land Trust?
8. What type of criteria do you look at when considering a parcel for a conservation easement?
9. Where does your funding for the easements come from?
10. Is it difficult to obtain funding?
11. Is it difficult to obtain funding?
12. What do you like about conservation easement contracts?
13. What do you dislike about conservation easement contracts?
14. Have you had any issues with compliance of any easement contracts?
15. Do you have any easement projects in motion currently in Calaveras County?
16. About what size are those?

17. What are some of the reasons those landowners stated an interest in putting an easement on their property?
18. Why did they choose your organization to hold their easement contract?
19. What have landowners' disliked during the easement process that you have observed?
20. How long does it take to complete an easement contract?
21. Have any landowners' backed out of putting their land into a contract?
22. What reasons did the mention for backing out?
23. What can Calaveras County do to retain open space?
24. What problems do you foresee with easements in the future, if any?
25. Do you foresee any legal issues with easements in the future?
26. Additional comments or concerns?

APPENDIX G

TITLE 17 ZONING CALAVERAS COUNTY CODE

1. Article 2 Resource Zones

a. Chapter 17.12 General Forest (GF) Zone

17.12.010 - Purpose.

The GF zone is intended to provide a resource production zone for commercial timber production and related uses.

b. Chapter 17.16 General Agriculture (A1) Zone

17.16.010 - Purpose.

The A1 zone is intended to be the main resource production zone. It is to classify areas for general farming and ranching practices, and assign such uses the primary emphasis for the area. It is the purpose of the A1 zone that residential uses are placed in a position of secondary importance when compared to the commercial scale production of food and fiber.

c. Chapter 17.18 Agriculture Preserve (AP) Zone

17.18.010 - Purpose.

The purpose of the AP zone is to protect and preserve lands for intensive agriculture and ranching production. Agriculture preserve zoning applies to lands for which a Williamson Act contract has been executed. The AP zone may also be utilized for open space protection and preservation. All of the listed permitted and conditional uses allowed in the AP zone are determined by the board of supervisors to be compatible

with the definition of agricultural use, recreational or open space use of the land and thus a use authorized in the AP zoning and for lands under a Williamson Act Contract.

2. Article 3 Residential Zones

a. Chapter 17.22 Rural Residential (RR) Zones

17.22.010 - Purpose.

The RR zone is intended to provide lands for personal ranches in which residential use is the primary land use. The RR zone is established to permit small-scale farming primarily for personal use and not as the primary use for the property.

b. Chapter 17.4 Single-Family (R1) Residential

17.24.010 - Purpose.

The R1 zone is intended to provide land for single-family residential neighborhoods with houses on individual parcels.

3. Article 4 Commercial and Economic Zones

a. Chapter 17.36 Commercial (C2) Zone

17.36.010 - Purpose.

The purpose of the C2 zone is to provide lands for intensive and general commercial use.

(For zoning C2-PD)

4. Subtitle III Combining Districts
 - a. Chapter 17.50 Planned Development (PD) Combining Zone

17.50.010 - Purpose.

The purpose of the planned development combining zone are to:

- A. Provide flexibility for purposes of density transfer, planned unit development and condominium development;
- B. Encourage design innovation and provide more detailed county project review than would otherwise normally be allowed in the base zone, to improve the visual quality of a project and provide more efficient land use, to provide more open space, to protect fragile natural resources, and to develop public services at minimal cost;
- C. The intent of this chapter is to regulate site development and aesthetics, not the type of use. Permitted uses are as defined in the base zone.