

INTRODUCTION

The Chico 2030 General Plan is a statement of community priorities to guide public decision-making. The General Plan established the City's Urban Forestry program as essential to the services provided to Chico's citizens by establishing the Goal (OS-6) to, "Provide for a healthy and robust urban forest". The Bidwell Park and Playground Commission (BPPC) directed staff in their 2011-2012 Work Plan to begin development of an UFMP by establishing goals that are consistent with the General Plan and the Bidwell Park Master Management Plan (BPMMP).

The purpose of the Urban Forest Management Plan (UFMP) is to provide guidance to the Urban Forestry Program. It will help to focus efforts by establishing and prioritizing specific goals and actions in regard to the maintenance and expansion of the urban forest. The ultimate time frame for implementation of these goals and actions will depend upon resources.

The 2030 General Plan supports preservation of natural resources, local production of goods and services, the use of renewable versus nonrenewable resources, and new strategies to minimize waste and dispose of it locally. The City strives to improve and protect its air quality, climate, and human health by reducing harmful emissions, such as greenhouse gases. Chico leads the way to a healthy environment by providing local government support, partnership, and innovation for sustainability. Many of the goals outlined in the General Plan can be realized only with the maintenance of a healthy urban forest. These goals embrace the continued building of "complete streets", including the use of street trees to provide shade, beauty and other functional benefits.

This Urban Forest Management Plan was developed by staff under the direction of the Bidwell Park and Playground Commission (BPPC) and in consultation with the public at large as well as specific stakeholders. The Tree Committee of the BPPC met on a monthly basis during 2012 to develop and review goals and objectives to guide future Urban Forest Management. These goals are divided into 4 general categories:

- Tree Resources
- Landscape Resources
- Management
- Community

This document is limited by the fact that the City of Chico has authority only over its own operations and to a limited extent, those of citizens and businesses in regard to street trees and trees on commercial properties. Therefore, while it is called the Urban Forest Management Plan, it should be noted that goals related to the overall urban forest can only be encouraged through General Plan Elements and an Urban Forestry Program that educates the public regarding trees and their management. This document does not intend or recommend that the authority of the City be extended to trees on private property although it does encourage staff to provide as much information as possible to those seeking assistance in regard to tree care.

The UFMP will guide the Urban Forestry Division's activities over the next 20 years; although the main focus is the next 5 years. It establishes a mission and a vision for the Urban Forest, and then sets goals and actions to attain this vision. The plan is designed to focus decision-making and policy development regarding trees that are managed by the City of Chico. It specifically pertains to lands managed by the Urban Forestry Division of the Public Works Department. These include trees within the Right-of-Ways, parks, subdivisions and landscapes on commercial property.

CHICO'S URBAN FOREST

“Chico’s Urban Forest is made up of trees, landscapes and other vegetation within the City’s parks, along the streets and creeks, and within private property. The urban forest provides an essential character to the City that includes aesthetic values, functional benefits and ecosystem services to its citizens both individually and as a whole. The elements of the urban forest exist throughout the community, although their care is under several jurisdictions, including both private and governmental entities.”

An urban forest is similar to a natural forest, with all the accompanying creatures and amenities, but with the basic elements having a distinctly urban character. Instead of the forest containing only native plants, wild creatures, soils and stones, this urban forest contains man made components. The forest’s paths include sidewalks and roads; the creatures include birds and squirrels, but also pets and people as the wildlife. The amenities include beauty, but the forest functions to reduce energy demand, increase carbon sequestration, and reduce urban heat gain as well as increase property values. Branches and leaves still fall to the ground, but the normal nutrient cycling is interrupted by lawns and concrete. As a result, the forest requires us to tend it in a way that a natural forest does not require.. The urban forest is more like a garden than a natural forest, demanding more attention and care to keep it robust and thriving.

VISION STATEMENT

Chico’s Forest is healthy and robust. It provides coverage and shade over a large area of the City, creating a continuous forest canopy. This canopy contains trees of all sizes at maturity, is multi-aged and diverse. The forest is healthy and safe, with appropriate tree species planted in appropriate locations and in ideal cultural conditions. Citizens are active partners in the City’s program – they want their trees and forest to be thriving and understand their role in accomplishing this. The Standard of Care for the forest is based on accepted Industry Standards and the concept of enhancing the longevity of the trees within the forest. All City staff and officials are knowledgeable about the Urban Forest Management Plan Goals and use it as a guideline in deliberations regarding project planning and design.

MISSION STATEMENT

To Preserve and Enhance the City’s Urban Forest for this and future generations

The Mission of the Urban Forest Management Plan mimics that of the Bidwell Park and Playground Commission itself, but emphasizes the care of trees and landscapes outside Bidwell Park.

As representatives of the citizens of Chico, the Bidwell Park and Playground Commission (BPPC) endeavors to preserve and enhance the natural and recreational resources of Bidwell Park, community and neighborhood parks, greenways and open space throughout the community. Through careful consideration of the needs and desires of citizens, coupled with an awareness of available city resources, the BPPC strives to ensure that the city’s parks and greenways are preserved and enhanced for this and future generations.

The Mission of the Urban Forestry Division within Chico is to maintain the “City of Trees”, and to enhance the standing and significance of trees throughout the City. The UFMP emphasizes management to attain well cared for trees and landscapes. This mission is consistent with the General Plan Goal to provide a healthy and robust urban forest with a complete canopy and attractive landscapes.

The secondary goal is to provide, a well managed forest whose benefits far outweigh the costs and inconveniences. The Bidwell Park and Urban Forest Management Plans together ensure the continued protection and management of the urban forest that for the needs of its citizens.

DEFINED ACTIONS WITHIN THE GENERAL PLAN

The City of Chico was founded in 1860 by General John Bidwell and incorporated in 1872. General Bidwell's vision and foresight led to the development of a thriving community that incorporated street trees and landscapes throughout the downtown area, in parks and along residential streets. As the town developed, some of the orchards planted by the Bidwell's became street trees, especially in the Avenues. These trees provide an important source of shade and beauty to the City. Together, the street trees and landscapes provide the unique environment of a forest bestowed by nature, yet supplemented and shaped by man. The elements of the urban forest exist throughout the community, although their care is under several jurisdictions. The urban forest is made up of trees, landscapes and related vegetation within the City's parks, along the streets and creeks, and within private property. Chico's Urban Forest provides an essential character to the City of Chico that includes aesthetic values and functional benefits to its citizens.

Chico is known as the "City of Trees". Coming into Chico from the east, it appears to be a forest oasis surrounded by agricultural fields. Yet, Chico has never adopted a formal Urban Forest Management Plan, despite having a program in place for more than 100 years.

The 2030 General Plan Action OS_6.1 (Urban Forest Maintenance) specifically requires the City to maintain and expand the urban forest by:

- Maintaining existing City trees through regular, scheduled service.
- Planting new trees to replace those that require removal and to enhance the street tree canopy, where needed.
- Requiring street and parking lot tree planting in new development.
- Working with commercial parking lot owners to improve the shade canopy.
- Implementing the Municipal Code's tree protection regulations.
- Using volunteer groups and property owners to plant new trees, care for newly planted trees, maintain young trees, and provide information and instructions regarding such care and maintenance.

It is well documented that routine maintenance of trees on a regular schedule is the best way to sustain tree values by removing dead branches, improving tree structure and reducing weight on heavy limbs. It has been shown that a 5 to 7 year maintenance cycle is the ideal cycle to maintain the functional and aesthetic values of trees (Miller, 1981). Chico's current maintenance program is providing this cycle for certain high use areas, but the vast majority of trees are worked on only when a request is made or a breakage is observed.

A Management Plan is needed to prioritize and focus the Division's efforts toward the identified General Plan Goals. It is especially important during difficult economic times to have an adopted plan that guides the City in its care of trees and landscapes in order to maintain a safe and healthy urban forest that the citizens can enjoy for many generations to come.

SCOPE OF THE PLAN

Planning horizon

The planning horizon for this plan is 20 years, the same as the General Plan. Therefore the goals of the plan are long term, but the objectives covered in the plan will provide guidance over the next 5 years. At the end of the 5 years, progress toward the goals should be reviewed, and the objectives modified as needed to better reach the long-term goals. This strategy will be an integral component of monitoring the plan.

Relationship to other planning documents

The UFMP takes into account all the elements of the General Plan that pertain to Open Space and Environment as well as those that discuss the urban forest. That plan identified the goal of most neighborhoods and commercial districts having "complete streets." Such complete streets include street trees, with planting strips large enough to accommodate trees. Furthermore, the General Plan points to the Urban Forest as being an integral part of the City's defining character, along with the elements of architecture and landscaping.

Aside from the General Plan, each larger subdivision has a specific plan that includes the planting and care of new street trees in front of each home. Subdivisions also include parks, entrance landscaping, medians and other landscapes that greatly contribute to the character of each neighborhood.

The Bidwell Park Master Management Plan addresses forest management in a general sense, but does not apply to the remaining trees throughout Chico. This Urban Forest Management Plan will only address those trees that the City manages. However, educational programs that come out of this plan can assist anyone who owns and cares for trees throughout Chico. In fact, these programs should encourage better planting of trees in all of Chico's landscapes.

The environmental review of this plan is contained within the General Plan.

INTRODUCTION

Overview

Historical context

Chico's tree heritage dates back to the 1850's, when trees were planted along the first dirt streets within the town. General Bidwell and his contemporaries planted trees on many of the older streets in the core areas of town, including Plaza Park.^[1] Pictures as early as 1861 show trees planted along the fronts of buildings, providing shade for the people and horses below. Many of these historical trees can be found throughout the city today, particularly in the older residential neighborhoods near downtown. At the same time, gardens and parks were established with a diversity of introduced landscape plants, many of which are foundations of our gardens today, such as camellia and roses. Trees also became the main agricultural focus of the area, as General Bidwell developed his interest in walnuts, oranges and other orchard species crops. Today, Butte County remains one of the most significant orchard crop producers in the state.

The first street tree ordinance was codified in March of 1897, delegating the responsibility for oversight to the Committee on Streets, Public Squares and Parks, and delegating the responsibility for maintenance to the abutting property owner. In April 1918, the Bidwell Park and Playground Commission (BPPC) first met in its role as the City's Tree Commission. Today the BPPC has authority over street trees and "shrubberies" provided through the Chico Municipal Code (CMC) 14.40. The Tree Committee is a working sub-group of the BPPC.

Many consider the heart of Chico's Urban Forest to be Bidwell Park, much of which was deeded to the City by Annie Bidwell in 1905. This enduring remnant of the riparian forest native to Chico has many large valley oaks, sycamores and other riparian trees dating from before European settlement. Native species from this forest, especially the Valley oak, are found throughout the neighborhoods surrounding the park.

As trees were planted along city streets and landscapes planted in people's yards, new species were introduced, as street trees, garden and orchard trees. Today, remnants of that original urban forest are found in the older neighborhoods. Few native trees were planted as street trees, although many species from the east coast and Midwestern United States can be found in Chico's urban forest population.

The City of Chico has grown to over 33 square miles with a population of 86,900 in the incorporated area and a greater urbanized area population of approximately 100,000. In contrast, Chico was only 28 square miles in 1990, with a population of 59,954. The current street tree population is just over 30,000 trees with more than 3500 planting sites identified as unfilled. Public landscapes cover over 200 acres of land, encompassing a rich diversity of soils and plants, and providing the understory of our urban forest.

Environmental context

Located in the Northern Sacramento Valley of California, Chico is 90 miles north of Sacramento on Highway 99, in Butte County, east of Interstate 5 and the Sacramento River.

Chico is in the Sunset Zone 8, with a few areas in Zone 9. This means that the climate is within the cold air basins of the Central Valley, so low temperatures will range from 13 to 29 degrees in a normal winter. Rainfall averages 20 to 25 inches annually. Days are hot in the summer, often reaching over 100 degrees, but then cooling with some coastal influence from the Sacramento River and delta. In the winter, fog often develops after periods of rain, due to an inversion layer and river influence.

The soils in Chico are highly diversified, with deep rich "vina loam" soils along the flood plains of the creeks, to consolidated cobble in the south industrial and commercial areas to lava cap in the eastern foothills. While some of these soil types require extensive preparation for successful tree growth, most of Chico is blessed with highly fertile soil that grows large trees fairly quickly. These same environmental characteristics have resulted in lush gardens that provide an abundance of food and huge diversity of attractive ornamentals. Canopy growth is helped by the shallow water table that can be as close as 5' to 6' in the winter near the creeks, and stays within 10' of the surface in most areas of town.

Benefits provided by trees and landscapes

Cities compose less than 2% of the earth's land surface area but contribute 50% of anthropogenic carbon emissions (Satterthwaite, 2008), consume 76% of the wood produced for building and other industry, and consume 60% of residential water use (Brown, 2001). Urban trees, particularly those along city streets, offset many negative impacts of urbanization by shading buildings, blacktop and other pavement to reduce urban heat island effects (Shashua-Bar et al. 2010), and by buffering street noise, creating a sense of well-being and charm, and adding to the economic value of a city (Soares et al., 2011). Homes with healthy, well-established trees on or near the property have been shown to decrease selling time and increase selling price compared to similar homes without trees (Carreiro et al., 2008). Well maintained landscapes, including trees, can add 14% to 20% the value of homes.

Well selected and properly planted trees, particularly along the streets, can improve the aesthetics and atmosphere of a neighborhood, at lower cost, more than any other form of municipal infrastructure (McPherson, 2000). As a result, trees are increasingly being utilized in urban planning and the design of "green" infrastructure (McPherson and Peper, 1996) to provide urban residents with improved shade and aesthetic character (Crow et al., 2006). Landscapes add a significant portion of these benefits. The City of Chico's street tree and public plantings program is no exception to these "greening" goals.

Urban trees improve air quality by capturing large amounts of air pollution (Nowak et al., 2006), including sulphur dioxide (SO₂), nitrogen dioxide (NO₂), volatile organic carbons (VOCs), and particulate matter less than 10 microns in size (PM₁₀). Trees sequester and store atmospheric carbon dioxide. They decrease adjacent building energy requirements and consequent emissions from power plants through summer shading, reducing wind infiltration and if deciduous, allow winter sun exposure. Landscapes reduce dust and buffer stormwater runoff to aid in the prevention of localized flooding. By creating

shaded, pleasant urban landscapes, trees and other landscape elements bolster business revenues by retaining shoppers for greater periods of time in retail and commercial areas (Smardon, 1987).

Trees have been shown to provide both functional and aesthetic benefits to communities like Chico. They also provide ecosystem services such as recycling of minerals into the soil and wildlife habitat. Functional benefits include shade, pollution absorption and carbon sequestration. Aesthetic values include beauty, changing scenery and increasing property values.

Carbon sequestration is the tree's ability to pull carbon from the air and use it to create wood fiber, thereby keeping the carbon locked up for future use until it decomposes. Since increasing levels of carbon in the atmosphere are seen as a major cause of climate change, the ability of trees to sequester carbon is a valuable function. This benefit is seen in the increasing girth and height of trees, in other words, tree growth is carbon sequestration in action. It can be and has been measured. (See "Environmental Benefits of Street Trees")

STATUS OF THE URBAN FOREST

Historical context

The City of Chico has had an active Urban Forestry program for many years. The program has focused on street trees, although trees within the park system are also included in the responsibilities of the Division.

Section 1006 of the City's Charter provides the Bidwell Park and Playground Commission with the power and duty to provide for the planting and maintenance of all trees and shrubberies along the streets and sidewalks of the City and to adopt such rules and regulations as to govern and control these plantings. The general policies of the program are contained in Chapter 14.40 of the Chico Municipal Code.

Street tree maintenance has been a function of the Park Department over the years. Currently, the Street Tree and Public Planting's Division is under the General Services Department alongside the Parks Division.

Urban forest resource assessment

Tree canopy cover

The Urban Forest developed as citizens moved into a oak woodland, with a large riparian compliment of tree species. Some areas were more forested than others, especially near the creeks. In other areas, citizens wanted and needed more shade and other benefits so trees were planted throughout the town. Trees continue to be planted in areas lacking canopy cover, such as in new developments in the eastern and northern parts of Chico that did not have originally have trees. As trees and gardens are planted, plant diversity increases. Some of the newly introduced species have become invasive, especially within Bidwell Park.

There has been no specific scientific measurement of canopy cover or canopy development over time for the City of Chico. Aerial photographs, though, show the older regions of Chico have a canopy cover much greater than newer developing areas, especially where grasslands existed there previously.

A view of the City from Google Earth shows 100% canopy over Bidwell Park, with a much smaller canopy over the rest of the City. Some of the older neighborhoods may approach 50-60% canopy cover, but many areas are closer to 10-20% cover. This cover includes both street trees and private and commercial trees.

The citywide street tree inventory database consists of over 30,000 records, which represent 224 species of street trees. The database was updated in 2008 to 2010, as well as mapped on the city's GIS system. The street trees provide a canopy cover that shades 21.03% of total street and sidewalk area, or 2.20% of the City's total land area.^[3] Park trees, and trees on private and commercial lots, add to this canopy although it has not been quantified.

Street trees

Chico's street trees were planted by citizens who wanted the benefits of shade, food and beauty. As a result, there is a huge variety of street trees, and although there has been some effort made to create streets with single species, most streets contain a mixture of species. Trees continue to be planted in all new subdivisions, and new species are always being sought to enhance the diversity and to provide the benefits that citizens desire while reducing the inconveniences of trees to a modern society living within a forest.

As of the most recent inventory completed in 2010, there are a total of 30,631 street trees, plus 3,546 open planting sites. Tree health is generally fair to good, with 55 percent of the trees being in fair condition and 22 percent ranked as good. Ten percent (10%) of the trees are ranked as in poor or dying condition and another 10% are rated as having excellent vigor.

Within the street tree population, a great deal of diversity of species exists. However, managers need to be diligent in making certain that favored species are not over-planted. The population contains:

- 78 Genera
- 214 Species and cultivars
- Top 6 Genera make up 43% of Population
- Top 5 Species make up 21% of population

Street tree diversity adds to the complexity of habitat for birds and other wildlife. Since trees are a food source for this wildlife, a consequence has been an invasion of young non-native trees into Bidwell Park and along the other riparian corridors where soils are fertile and sites available.

Twenty Most Common Species

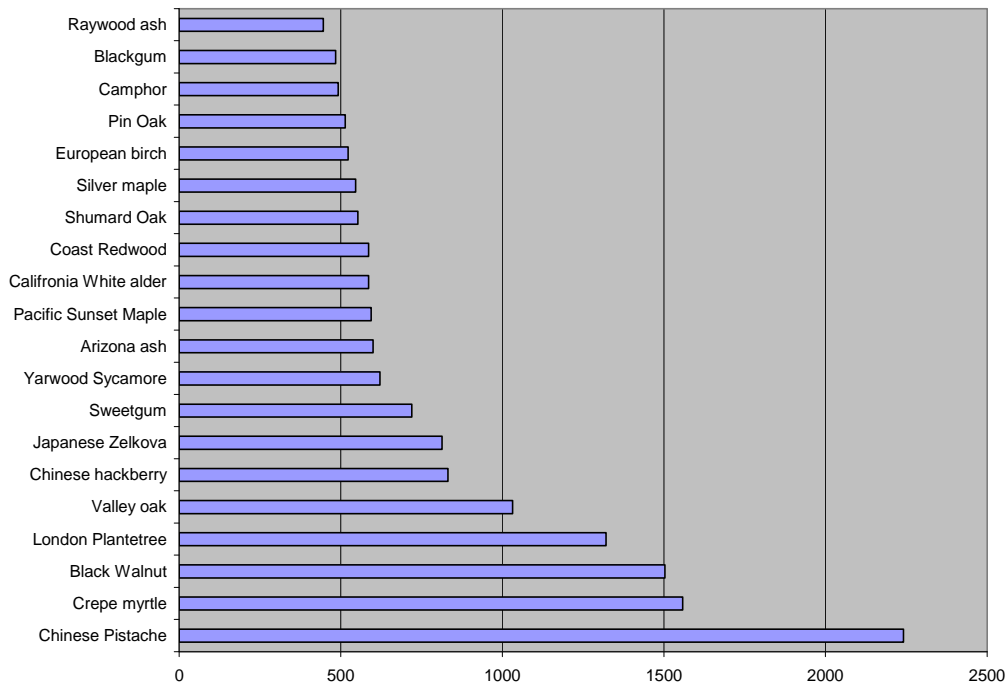


Table 1. The Most Common Tree Species and cultivars within the City of Chico

There are a total of 3546 planting sites available for new trees. These resulted from older trees being removed and not replaced, from newly planted trees in developments not thriving, or from other undocumented events. Open planting sites present an opportunity to plant new species to change the population to more favorable and desirable species. For instance, there is a desire to reduce the population of Chinese pistache and non-

native sycamore, which are impacting the native tree population in Bidwell Park. This goal can at least be partially realized by eliminating London plane and pistache trees from the tree planting list.

Sustainability of the street tree population may be improved by the use of native species. Native species are those that were present at the time of European settlement. Many California tree species are not endemic to Chico. Most developed areas in Chico are located in the Valley Oak Mixed Riparian vegetation type that includes several tree species unsuitable for street trees, such as Fremont Cottonwood and white alder. However, valley oak, California sycamore, big leaf maple, Oregon ash, blue oak, interior live oak, canyon live oak, black oak, Douglas fir and ponderosa pine should be included in the Street tree list for planting and encouraged for planting to the greatest extent possible.

Street Tree Population by Size

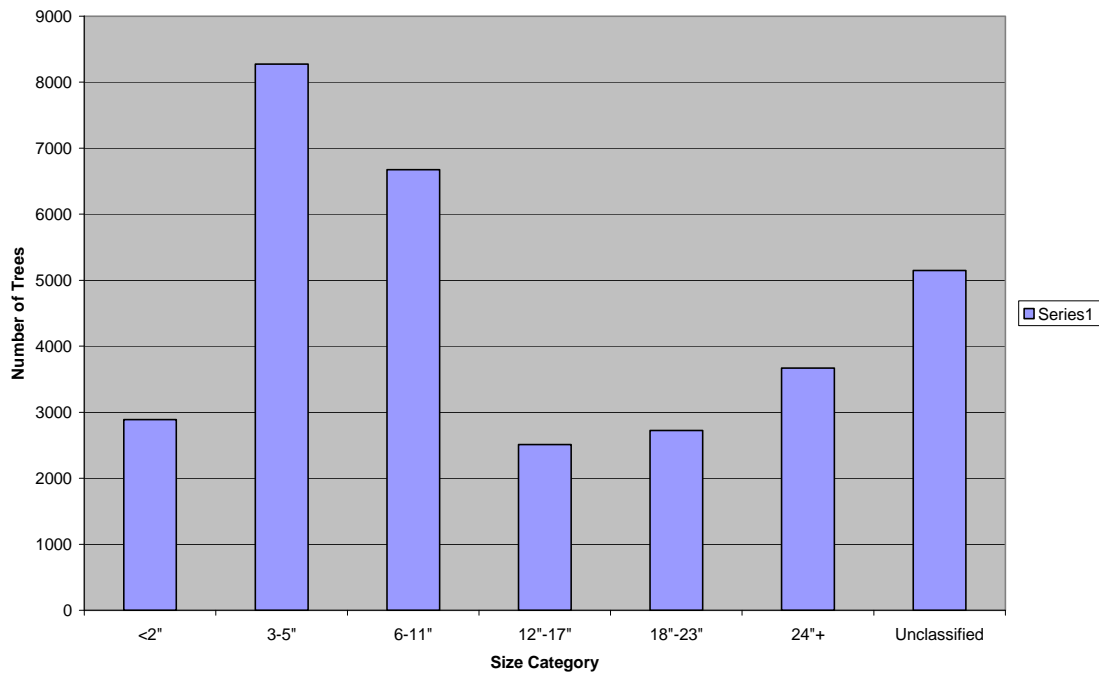
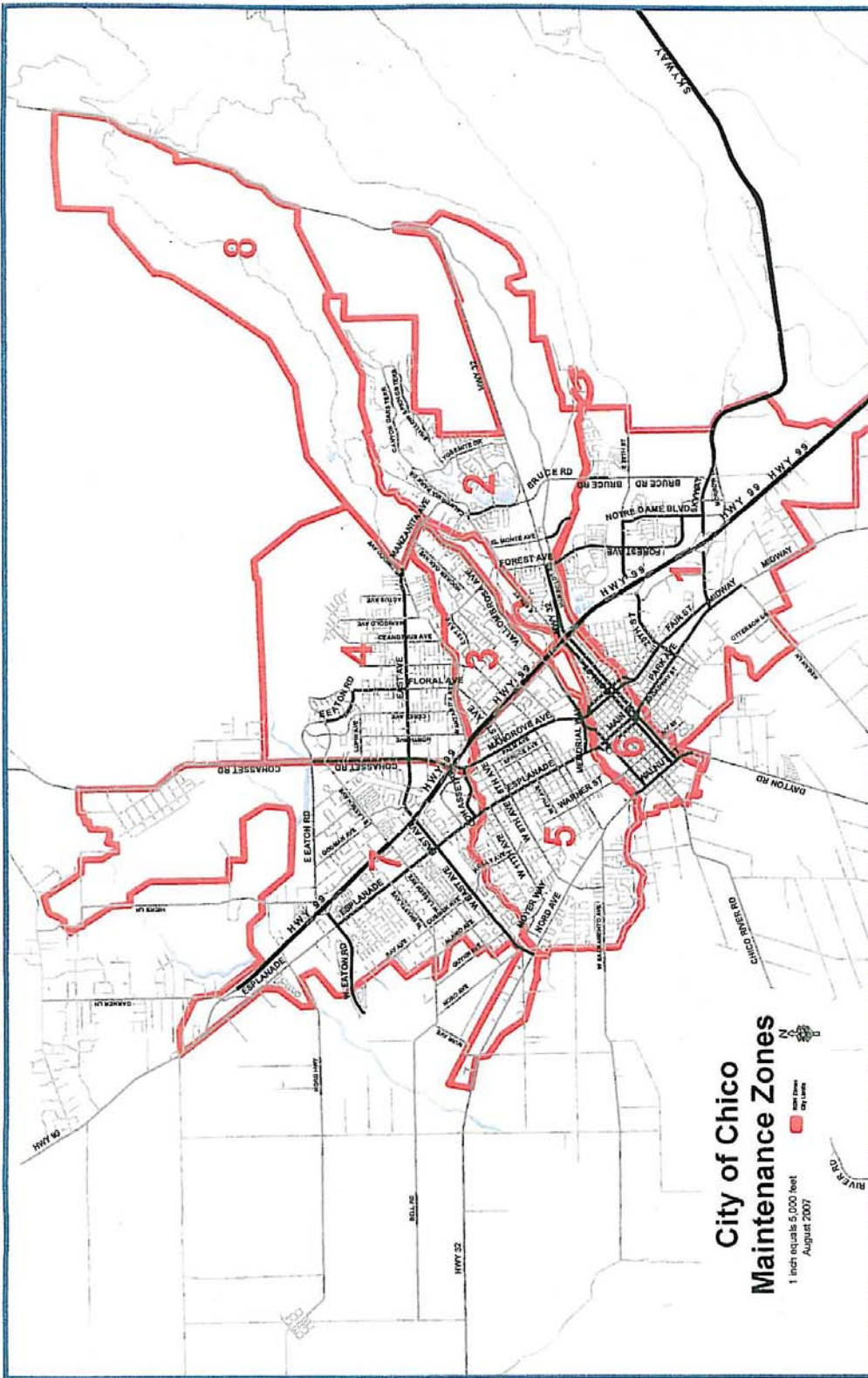


Table 2. Street trees that are currently within specific size groups.

In looking at the entire street tree population, there appears to be a relatively large number of young trees compared to older trees. At the same time, there is a gap in the middle, with the trees 12" to 23" in diameter being a relatively small number. The reason for this may be a period of time where trees were not being planted in large enough numbers. This appears to also be reflected in the number of open planting sites.

The City of Chico is divided into work zones for assignment of tree maintenance, road work and Capital Projects. These work zones boundaries are natural features, such as the main creeks east to west, and roadways north to south. To a certain extent, they correspond to specific neighborhoods.

By dividing the population of trees into these work zones, information can be ascertained as to how trees are distributed throughout the City. For instance, Work Zone 3, which is called North Bidwell, has the smallest number of trees and the largest number of empty planting sites. One reason for this is that the neighborhood contains streets that have sidewalks next to the street, and most of the trees that were planted in these neighborhoods were actually planted outside the public Right of Way. As a result, there are a large number of vacant planting sites and an opportunity to plant more street trees in this neighborhood. Northwest Chico has a relatively large number of trees and a fairly small number of open planting sites because many of homes are in fairly new subdivisions that have been successfully planted by the developers.



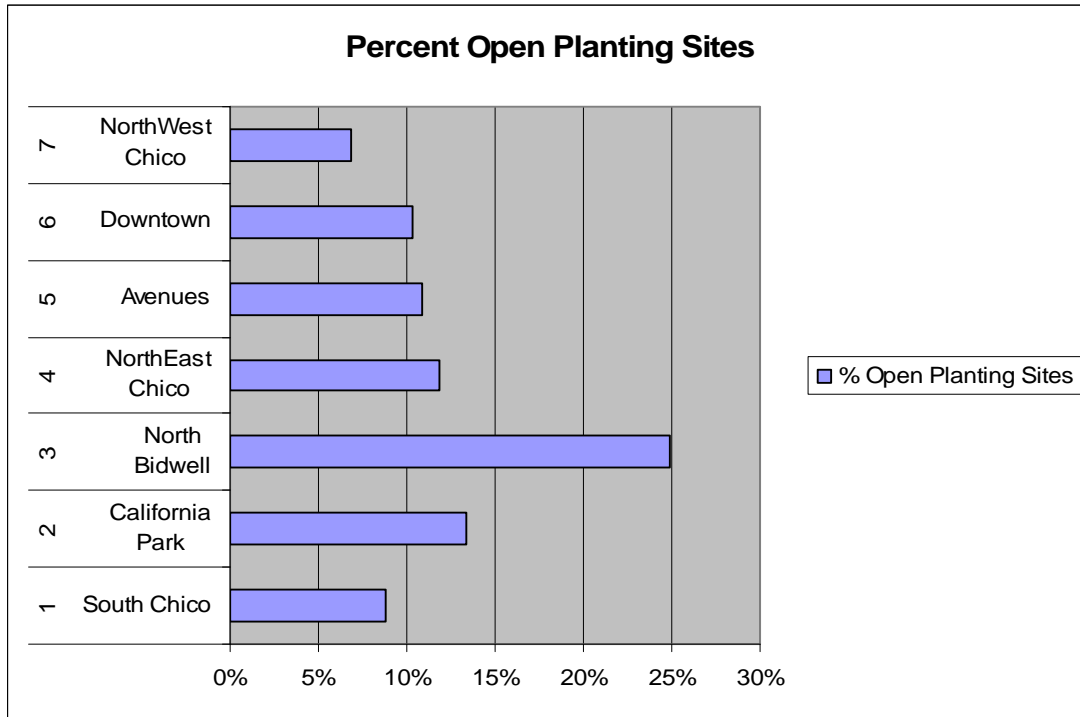


Table 3. Available planting sites within the various work zones.

Looking at the number of trees per mile of street, it becomes obvious that the older downtown zone (6) has the highest density of trees. This is followed by South Chico, Northeast Chico and the Avenues.

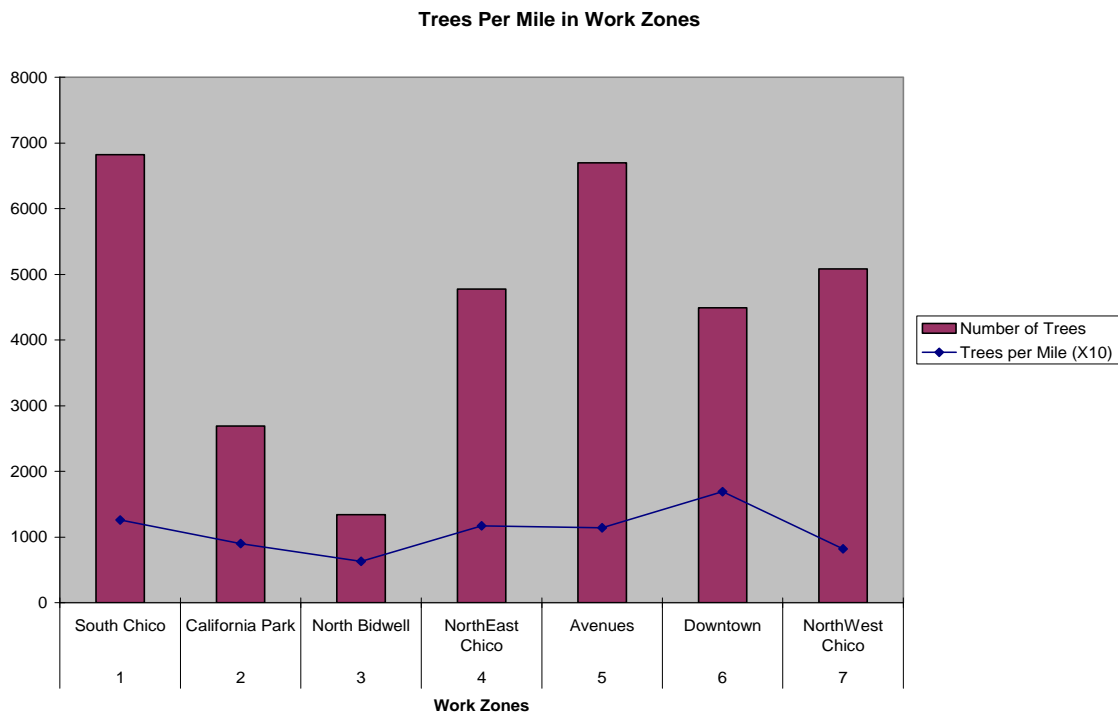


Table 4. The number of trees within each work zone, compared to the number of trees per mile of street.

If you compare the number of trees per mile of street, you find that there is also quite a range in the various

work zones, from 63 in North Bidwell to 169 trees per mile in Work Zone 6, or Downtown Chico. From the actual data, it appears that the City has an average distance between street trees of 48 feet. Most of the current trees that the City is planting are recommended to be planted about 35 feet apart. This would provide 150 trees per mile of roadway.

Municipal and Facility trees

The City of Chico is blessed with a number of trees and landscaping at their City-owned facilities. Likewise, Bidwell Park, the University and many of the commercial developments have an extensive number of trees growing and/or planted on their grounds. However, there continues to be opportunity to encourage commercial sites - whether large or small - to plant more trees, especially in the more industrial areas of Chico.

Landscapes and trees add to the essential nature of Chico's gateways: Highway 32, Highway 99, the airport, transit center and parks all provide a sense of place to those entering the City. While the term "Urban Forest" may not enter the minds of most people, as they enter the heart of Chico there is no doubt that the trees and the forested atmosphere of the community make a lasting impression. Likewise, when people see cared for landscapes and parks, they gain the impression that the community cares deeply for its environment.

Parking lots and trees in commercial developments

The City of Chico has a Parking Lot Shade Ordinance (CMC 19.70-26) that requires 50% shade over the lot within 15 years. There has been some success with this ordinance, but many of the parking lot trees struggle with soil compaction, heat, inadequate soil volume and poor maintenance. Those lots that have been well designed and diligently cared for, especially with good irrigation, do achieve the required shade.

One problem with the ordinance is that there is no mechanism for follow up to require that parking lots are in fact reaching the goal. Another recent development has been that there is no requirement to maintain landscapes when a property changes hands or is temporarily vacant due to economic downturn or bankruptcy of the business. Dead and dying landscapes are far more expensive to replace than to maintain, but that reality seems to be overshadowed by the negative economics of the moment. One suggestion has been to develop a policy or ordinance to require landscapes continue to receive water despite a temporary vacancy.

Recent advances in solar power have prompted several lots to be covered by solar panels rather than tree canopy. While this is good from a carbon production standpoint, it could be a problem were it to occur all over town. A balanced approach will need to be considered as this trend has become quite popular.

Bidwell Park trees

Bidwell Park is the largest concentration of native trees in the City of Chico, with a canopy of nearly 100% in Lower Park. Its influence on the community cannot be overlooked. The reservoir of native species within the Park has a huge influence on the surrounding neighborhoods, and many native trees can be found regenerating throughout Chico, especially the valley oak (*Quercus lobata*).

Tree management in Bidwell Park has already been addressed in the Bidwell Park Master Management Plan. Policies in regard to tree pruning and removal are also in place. As a result, management of the trees within Bidwell Park will not be covered in this Urban Forest Management Plan. The focus of this plan will center on the street tree population and how the Street Tree Division can influence the further planting and care of trees on private property.

Neighborhood Parks and Open space

Chico is blessed with a number of neighborhood parks that have a few trees planted in them as well. Most of these are under the management of CARD – the Chico Area Recreation District. Those that are the City of Chico’s responsibility are listed below.

Children’s Playground	Shasta Avenue north of 1 st and Broadway
Ringel Park	Main and 1 st Street
Deport Park	Cedar St between W 5 th and 6 th St
City Plaza	Between 4 th and 5 th Streets and Broadway and Main Streets
Junction Park	South of 9 th Street between Main and Park Avenue
Knob Hill/Husa Ranch Park	West end of Lakewest Drive
Humboldt Greenway Park	Humboldt Road across from the Police Department
Little Chico Creek Greenway Park	Humboldt Road west of the freeway, at Willow Street
Westside Gardens	Northeast of Highway 32 at Rosetti and Ruskin
Hutchinson Greens	East 20 th St at Doe Mill
Preservation Oaks Preserve	North End of Preservation Oaks Drive
Emerson Park	East end of Hartford Drive off Forest Avenue

Children’s Playground is the oldest of these parks, and therefore the most “forested”. It contains one of the City’s Heritage Trees, as well as several other significant trees. Other parks also contain significant trees, some of heritage stature. As the younger parks age, they also will develop more significant canopies.

There are additional neighborhood park open space areas that were built as detention ponds for storm drain storage and filtration. While two of these basins have successfully developed as parks, most remain as dry basins in the summer. Still others become a virtual wetland due to the drainage that comes off lawns and gardens of the neighborhood. Management has changed over the years to keep the ponds as dry as possible, with less vegetation during the summer months, in an effort to keep the prevalence of West Nile Virus to a minimum.

Public Landscapes

Public landscapes consist of lands planted for community benefit. Most are supported by 133 Chico Maintenance Districts (CMDs), plus 2 Landscape and Lighting Districts. These areas of town are maintained by a landscape contract, which is the largest service contract in the City. Public landscapes encompass approximately 183 acres and 18 miles of street that have some form of landscape to be maintained. These include:

- “Backup” areas along a street, where a fence or wall surrounds a subdivision
- Entrances to subdivisions
- Retention Ponds
- Formally landscaped bike paths
- Medians
- Freeway landscape areas
- Flat mow areas where the only maintenance is to keep tall weeds under control

Open space trees

There are many acres of open space within Chico, mostly as preserves that have been set aside by developers. These are for the most part kept natural, with very little management. Most of the open spaces are grasslands, but there are a large number of trees associated with the greenway system of lands along Big Chico Creek outside of Bidwell Park, Little Chico Creek, Lindo Channel, Sycamore Creek, Comanche Creek and several sloughs that flow through the City. For the most part, trees along these greenways are not actively managed, but are left in their natural state. One issue that is prevalent in Bidwell Park and elsewhere is that privets, tree of heaven, giant reed grass and other weed species have invaded the native riparian areas and require aggressive removal and management if the native vegetation is to be encouraged.

Heritage trees

The City of Chico instituted a voluntary Heritage Tree program in 2010 that is contained in the Chico Municipal Code (CMC 16.68). This program has included a total of 10 trees to date. The City nominated a number of trees located on City property, including Parks, Open Space and street trees. CARD, Chico Area Recreation District, nominated 2 trees at its 20th Street Community Park. Two private citizens have come forward so far to nominate a tree. One is in a new development, and highlights the effort to preserve a large Bastogne walnut. The other is a valley oak located in a residential yard. A third citizen nominated their street tree for inclusion. So there are a number of scenarios to get a tree designated as a Heritage Tree in Chico. The designation comes with a plaque at the base of the tree to draw people's attention to the program as well as the tree. The City encourages more citizens to nominate trees in the future.



Environmental benefits of street trees and landscapes

Analysis of the citywide 2008-2010 inventory dataset by i-Tree Streets calculated that Chico's street trees annually sequester 2,387,078 pounds of atmospheric carbon dioxide. This would amount to \$22 million in carbon credits that the City's trees are generating, considering the current value based on the CAP and Trade auction of November, 2012. Avoided CO₂ emissions resulting from energy savings through shading and wind blockage benefits were calculated by i-Tree Streets to provide an additional 3,243,898 pounds of carbon dioxide benefits that would theoretically be emitted in the absence of street trees. Conversely, 767,922 pounds of carbon dioxide were found to be emitted annually through decomposition of trimmings, removed trees, stumps, leaf litter, dead roots belowground, and all other forms of street tree biomass. Additionally, 43,546 pounds of carbon dioxide were determined to be emitted annually through maintenance releases in the form of fuel consumption by tree maintenance vehicles, chain saws, and leaf removal equipment. The resulting net balance of 4,819,509 pounds represents the net annual carbon dioxide benefits provided by Chico's street trees.

Carbon Storage

According to model analysis, 67,294,572 pounds of atmospheric carbon dioxide are **stored** by Chico's street trees. This mass of carbon dioxide was collectively sequestered by street trees throughout Chico in previous years, with the oxygen component released to the atmosphere and the carbon stored in above- and below-ground woody tissues among Chico's current street tree population. i-Tree Streets reports storage in terms of atmospheric carbon dioxide, despite the fact that woody biomass is not composed of carbon dioxide.

Energy Savings

Energy savings analysis determined that the environmental benefits provided by Chico's street trees result in annually reduced citywide consumption of 3,452 mega-watt hours (MWh) of electricity and 5,348 Therms of natural gas.

A comparison of street tree population and total energy reduction benefits (electricity plus natural gas) in each maintenance zone illustrates the energy avoidance efficiency of various sections of Chico's urban forest. Work zones 5 and 6, which have the largest number of older trees in Chico, have significantly greater proportions of energy benefits than a corresponding proportion of the total tree population.

Air Quality Benefits

Air quality benefits provided by Chico's street trees were expressed in three categories: deposited/absorbed pollutants via leaf surfaces, avoided emissions that would have been generated in the absence of street trees, and emissions of biogenic volatile organic carbons (BVOC) naturally produced by trees.

Deposited air pollutants assessed are: ozone (O₃), nitrogen dioxide (NO₂), particulate matter less than or equal to 10 microns in size (PM₁₀), and sulfur dioxide (SO₂). These substances constitute 4 of the 6 principal air pollutants identified by the United States Environmental Protection Agency (U.S. Environmental Protection Agency, 2010).

Avoided NO₂, PM₁₀, SO₂, and VOC air pollutant emissions by maintenance zone were also calculated, as provided through summer shading and ambient air cooling, which lead to reduced air conditioner use across the City, and therefore reduced emissions at power plants. In addition, many well placed evergreen trees block winter winds while deciduous trees allow sunlight infiltration in the winter months, lessening use of electricity, natural gas, and wood fires for heating, the latter providing the greatest degree of locally avoided air quality benefits.

Pounds of annual deposited emissions, avoided emissions, BVOC emissions, and net total air quality benefits by maintenance zone and citywide total

Zone	Air Pollution Benefits and Emissions (lbs)			
	Deposited	Avoided	BVOC Emissions	Net Total
1	7,210.6	1,395.2	-3,411.8	5,193.9
2	1,639.5	314.4	-1,677.1	276.9
3	1,265.2	244.2	-1,180.0	329.5
4	2,629.8	539.2	-1,291.6	1,877.4
5	9,645.6	1,807.8	-6,650.4	4,803.2
6	7,699.0	1,473.4	-5,869.1	3,303.4
7	3,538.3	691.8	-2,255.5	1,974.7
Total	33,628.2	6,466.3	-22,335.5	17,759.0

Table 5. Air Pollution Benefits and Emissions in pounds (Gregory, 2011)

Storm Water Buffering

Temporary rainwater capture generated by tree canopies across the City of Chico accounts for a significant buffering of hydraulic input to the City’s stormwater drainage system. The analysis determined that Chico’s street trees have the potential to temporarily hold 20,461,752 gallons, or 1.62 inches of rain water annually during precipitation events on their canopy, branch, and trunk surfaces. Benefits are directly proportional to the other environmental benefits provided by street trees in the various work zones. All documented environmental benefits derived from i-Tree are supported in the Masters Thesis Quantifying street tree function and distribution: analysis of environmental services, population characteristics, and sidewalk uplift in the City of Chico, California by Gregory, 2011.

Community Values

Chico’s Urban Forest covers a large percentage of area within the City limits – creating a view from the air of a natural forest. Prior to man’s settlement of Chico, the forest consisted of a large grove of primarily oaks on the valley floor between the creeks and more diverse riparian vegetation along the creeks. Today, the Urban Forest canopy exists in every section of town, even in areas that were historically devoid of trees. It can be seen on aerial photographs as consisting of a large number of street trees, orchard trees, trees along creeks and in private yards and commercial areas.

Trees improve the environment in Chico. Citizens know that the City’s trees provide significant benefits to them, including shade, beauty, temperature amelioration, pollution reduction, noise reduction and improved property values.

The citizens of Chico, or at least those most interested in the Urban Forest, see it as a continuation of the forest within its heart: Bidwell Park. They envision the Urban Forest as a diverse and sustainable canopy of trees and related vegetation that provides many benefits to both the City as well as wildlife. While made up of trees that are both planted and native, the trees are there to create an almost continuous canopy over the City. This canopy should be multi-level, with trees of all sizes at maturity, multi-aged and diverse. It provides a plentiful habitat for birds and other wildlife, and is seen as an integral part of the community.

MANAGEMENT OF THE URBAN FOREST

The City's Street Trees and Public Plantings Division is located within the General Services Department. This Department also includes the Park Division, Public Works, Facilities, Fleet Services and the Water Pollution Control Plant.

The City has several ordinances that pertain to trees, including the Street Tree ordinance (CMC 14.40), a Heritage Tree ordinance (CMC 16.68), the Parking Lot Landscape ordinance and Tree Preservation ordinances (CMC 16.66 and 19.68).

Table 6. Summary of Tree Management Activities and Responsibilities

Activity	Activity subclass	Street Trees Division	Public Works	Parks	Planning Engineering	Other-specify
Planting	New sites				x	developer
	Replacement plantings	x				public
Pruning	Scheduled	x				
	Storm/emergency	x	x	x		
	Utility clearance					PG&E
Tree removal	Street/equipment clearance	x	x			
	Hazard trees	x		x		contract
	Clearance (for flood control, fire safety, etc)	x	x	x		
Root system work	Sidewalk/curb repair and replacement		x		x	
	Excavation for utilities	x				utility
	Construction	x			x	
Permitting	Planting	x			x	
	Pruning	x				
	Removal	x				
Outreach/ education	Property owners/public	x				
	Contractors	x	x	x	x	

Table 7. Summary of ordinance, policies, and plans already in place

Tool	Street trees	Park trees	Facility trees	Heritage trees	Parking lot trees	Other-specify
Ordinance	x			x	x	
General plan	x		x	x	x	
Specific plans		x				
Improvement standards	x		x		x	
Specifications - planting	x	x	x		x	
Specifications - pruning	x					
Hazard program	x	x	x	x	x	
Street tree master plan	x					
Approved planting list	x	x				subdivisions

Current tree management practices/programs

The Street Tree program consists of planting and establishing new trees, pruning and care of existing trees and removing dead, dying and structurally deficient trees. The work has traditionally been accomplished by the City’s in-house tree crews, under the direct supervision of a Field Supervisor. In recent years, tree planting by the crews has been eliminated, and replaced by a citizen tree planting program. Tree removals are mostly the responsibility of a contractor, so the main function of the Division is the care of the city’s 30,000 street trees, plus park needs as they arise. Assignments of priorities are made by the Urban Forest Manager.

The tree crews work primarily on routine pruning and service requests. Routine pruning consists of formative or structural work on young trees including elevating foliage over streets and in the downtown business district, as well as removing large dead limbs and reducing weight on long heavy limbs over roads, houses and parking.

Service requests result from citizens seeing a problem or having a concern about a tree’s health, structure or overall condition. Because of the backlog of trees needing pruning, service requests must be reviewed and prioritized in order to reduce hazards and improve public safety. Since many of the trees are older and quite large, service requests can take several hours to complete. The system is inefficient, but with a relatively small crew and a significant backlog of work, it is absolutely necessary to attend to the work requested.

Summer months are the most difficult, with the crews spending a considerable amount of time picking up fallen limbs. Some breakage results from summer limb drop, an unexplained sudden cracking and shedding of limbs, especially in sycamore and oak. However, most limb breakage results from heavy new growth, as well as the production of copious seeds, and defects such as co-dominant branches with included bark or decay. Numerous limb breakages over several days result in reduced work time available for individual trees and may leave potentially unsafe conditions in the tree.

<u>2004 staffing of the Urban Forestry Program:</u>	<u>2012 Staffing</u>
1 Urban Forester	1 Urban Forester
1 Field Supervisor	1 Field Supervisor
3 Tree Maintenance Workers	4 Tree Maintenance Workers
3 Maintenance Workers	
.75 Maint. Worker (Water Truck)	0.5 Maint. Worker (Water Truck)
3 Seasonal Hourly Maintenance Aides	
	1 Landscape Supervisor – Added in 2006
10 Full Time Position <u>Total Staffing</u>	7.5 Full Time positions

Table 8. Comparison of City of Chico staffing within the Street Trees Division from 2004 to 2012.

Using annexation, growth and population data from the Planning Department as a basis, the overall increase in tree population since 1991 is shown below. The main reason there is no increase in the tree population from 2003 to the current year is that during the recent tree inventory a fairly large number of trees that had been previously included were found to be outside the Right-of-Way, and therefore actually residential trees. These trees are no longer cared for by the City. Another reason is that trees along Highway 32, which are Cal-Trans responsibility, are no longer active trees within our system. There remain about 300 to 500 trees in the inventory that have not been updated and properly located on the GIS system. The Field Supervisor and Urban Forest Manager update the trees as service requests are reviewed, but a goal of the Division is to complete the inventory with the help of an intern from the University.

Tree Location	1991	1996	2003	2010
Right-of-Way Tree Sites	14,000	17,586	30,812	36,500 Projected (30,161 Actual)
Percent Increase Over Time		25%	90%	188% (Zero from 2003)

Table 9. Street Tree Population Growth Over Time, Using 1991 as Base Yearⁱ

Limb breakage from trees with poor structure is a common occurrence, so the time spent to provide formative pruning of young trees is well spent. Keeping the limbs smaller in diameter than the trunk, and elevating the foliage to the right height above the street greatly reduces future problems that can cause limb failure.

Tree removals are usually assigned to a contractor, although City crews do remove the occasional tree that has broken or is in a dangerous condition. The number of trees removed has been decreasing in recent years to less than 100 trees per year. There is an increasing backlog of tree removals, and a larger backlog of stumps that require grinding. At the same time, there is an increase in the number of dying and declining older trees, so the number of trees needing removal is actually increasing. There is a larger backlog of requested tree removals due to sidewalk damage, surface root intrusion in lawns and other perceived inconveniences caused by trees, such as leaf drop and branches growing over structures.

Tree planting is performed by several entities. Currently, developers plant their own trees when new homes are built, or if the home is built after the sub-division has been accepted, the homeowner is responsible for tree planting. In 2010, the Urban Forest Manager proposed and started a campaign to have citizens plant and care for their street tree. This serves to help educate the citizens on proper care of the trees as well as reducing the number of calls for relatively minor care issues, such as the trees coming loose from the stakes.

Public landscapes are developed as an integral part of each new subdivision, and are generally maintained through the establishment of Maintenance Districts, that are funded by specific property taxes to care for the plants, lawns shrubs and trees planted around and within the new residential areas. These landscapes are currently managed through a landscape contract. Replacement funds are also accumulated in the maintenance districts and can help pay for the renewal of landscapes. However, much of the time, the actual costs of maintenance and replacements are greater than those estimated by the developer, engineers and landscape architects when the projects are first proposed. However, the process had been a huge benefit to the Community as a source of funding for our public landscapes, medians and community parks.

Tree species are assigned to each new street subdivision, the selection being made by the Urban Forest Manager. Some of the species used over the last 20 years have been found to be undesirable and are therefore no longer being planted. As a result, these species have resulted in a fairly large number of requests for removal of trees in the 8" to 18" diameter range. Requests are most often due to rooting issues causing sidewalk lift or lawn damage.

However, soil compaction is actually the main cause of surface rooting. It results from construction practices, when the entire lot is highly impacted, and then little attention is paid to the soil before it is landscaped. Such practices should be reviewed and more attention paid to remediating soil structure in residential subdivisions prior to landscaping. Failure to address the issue results in tree removal after 5 to 10 years for trees that should have been an asset for 50 years or more. This is discussed in greater detail under the Landscape Resources goals and objectives.

When trees die, decline or become hazardous, their ultimate use should be as beneficial to the City and the planet as possible. Chico has a rich heritage of using wood from its many “claro” walnuts to produce final products from gun stocks to fine furniture. The use of other woods, including pistache, sycamore and oak should also be encouraged. A program of actual sales of the large walnuts as they decline could provide some additional funding for the City.

STRATEGIC PLAN

The Tree Committee of the BPPC developed the following definition of Chico's Urban Forest.

Chico's Urban Forest is made up of trees and related vegetation within the City's parks, along the streets and creeks, and within private property. The urban forest provides an essential character to the City that includes aesthetic values, functional benefits and ecosystem services to its citizens both individually and as a whole. The elements of the urban forest exist throughout the community, although their care is under several jurisdictions, including both private and governmental entities.

This plan will provide for the care and management of that forest to produce the benefits and services described above. During the last 5 years, a number of issues have surfaced within the urban forest that should be addressed. These are listed below. Some policies and procedures have already been developed to address these issues, but others are less formal.

This document seeks to memorialize the policies and procedures in an actual plan that is vetted through the process of public involvement and discussion. As these policies and procedures are developed, they should be added to the Urban Forest Management Plan in the Appendices. This will create a document that becomes a working plan for the current and future Urban Forest Managers.

Issues and needs

Issues, goals and objectives were discussed in detail with the Tree Committee of the BPPC, and with members of the general public and stakeholders who attended the meetings. Each set of issues and goals were presented, reviewed and discussed at separate meetings, and then reviewed again at the following meeting. The issues and goals were then presented to the Bidwell Park and Playground Commission as reports on each meeting. Technical review and informative insights were provided by the Street Tree Division staff and the California Urban Forests Council. Citizen review has also been solicited through the City's web site. All discussions and comments were taken into consideration when developing the final plan.

Tree Resources

- **ISSUE:** Public safety is compromised by the inability to maintain regular pruning and care of the trees within the forest. A normal pruning cycle for large trees should be every 5 to 10 years. At this point Chico is only pruning or removing the most hazardous situations, rather than performing routine maintenance. This is leaving a number of precarious situations in trees.
- **ISSUE:** There is a backlog of maintenance needs. A detailed pruning cycle needs to be established so that individual trees are pruned regularly. The Standard of Care for Chico's urban forest should be high, based on the concept of enhancing the longevity of the trees within the forest. Production standards for the tree crew need to be analyzed and improved. In order to get back to a routine prune cycle, it will be imperative to fund a contract for tree pruning, as well as the current tree removal contract, to allow for greater flexibility in managing the trees with limited staff.
- **ISSUE:** There is a backlog of empty planting sites, leading to inadequate canopy coverage in some areas. Maintaining a multi-aged stand of trees requires planting throughout the City each

year where planting spaces are available. The City needs to develop a program to increase tree planting opportunities, including seeking grants for this purpose. Staff also needs to work with other departments to establish better procedures for planting new trees in developments and for insuring that trees are planted according to Professional Standards.

- ISSUE: Diversity is important to the resiliency of the tree population. The Urban Forest should be a diverse and sustainable canopy of trees and related vegetation. Wherever possible, with adequate space and appropriate growing conditions, native trees species should be planted. Habitat values of trees should be emphasized.

Landscape Resources

- ISSUE: Landscape Design Standards for all new landscapes need to be reviewed in an effort to improve long-term appearance and water conservation within the City's public landscapes. Developing specific landscape goals with lists of plants and irrigation systems will help reduce the long-term cost of maintenance. In addition, prohibiting specific species known to be invasive in Bidwell Park reduce the need for aggressive and continued invasive plant management.
- ISSUE: Landscape Standards are not modernized as new equipment, techniques and practices are developed. This is mostly due to a lack of time and expertise. Staff should encourage the hiring of a landscape professional in the Planning Department to foster better communication and constant upgrading of systems.
- ISSUE: Irrigation systems are not being upgraded in a timely manner to provide for better water conservation. As such, the costs of maintenance escalate. Instead of new irrigation systems being installed, money is wasted repairing obsolete equipment and systems. A complete review of Standards is needed on a 5 year basis, including types of controllers, preferred equipment for City projects, and new science-based water management systems. Identify and prioritize the larger, publicly funded areas of Chico's landscapes that need to be retrofitted. Explore opportunities to obtain community or grant funding for these projects.
- ISSUE: Maintenance costs must be a major component in the design review for new landscapes in Capital Projects. Currently they do not adequately address future maintenance needs and funding for new landscape materials, except in residential maintenance districts. Projects costs should be projected and budgeted over a 12 month period to provide a reasonable starting budget for the project. The practice of eliminating or reducing landscaping and tree planting in Capital Projects because of cost overruns needs to be discouraged.
- ISSUE. The Landscape contract is the largest maintenance contract in the City. It is extensive and can be cumbersome. It needs to be reviewed to make it more cost effective and efficient to administer. Specifically, better methods to gain adherence to contract requirements, reduction in the dependence on herbicides and ways to reduce the cost of unforeseen repairs should be incorporated into the analysis. Budgets also need to be assessed, especially those supplied by the General Fund.
- ISSUE: Over the last 3 to 4 years, properties that have gone into foreclosure have allowed landscapes and trees to die, at a cost to both the new owners as well as the community at large. The city needs to explore ways to require owners of property that becomes vacant to maintain the landscapes, especially the trees, on the site. This may require a new ordinance.

- ISSUE: Review the issue of Community Gardens to be certain it is being addressed in a satisfactory manner. This is more of a Planning discussion, but the Urban Forest Management Plan should at least address, and perhaps take the lead, in reviewing the City's policies around this issue.

Management

- ISSUE: Staff has not been given clear direction on what the overall character and appearance of the Urban Forest should be. The General plan alludes to the concept of having "complete streets" which includes street trees, but the space allotted for these trees is often not large enough to establish a canopy without some infrastructure damage. As a result, many new subdivisions experience sidewalk issues within 10 to 15 years of establishment and simply want the trees removed or replaced, rather than tolerate some of the inconveniences of having trees. Soil compaction resulting from building practices adds to this problem. Staff proposes that in most new subdivisions, standards be developed for reducing soil compaction prior to landscape installation. In addition, the Urban Forest needs to be clearly defined and provided for in new developments, such as:

"Provide for an urban forest that contains large trees over the main corridor streets where space allows, in large planting strips, in open space and parks. In residential subdivisions, maintain a population of young, moderate sized and vigorous trees. As a result, there will be almost continuous canopy over the City that is multi-level, with trees of all sizes at maturity, multi-aged and diverse."

- ISSUE: Street Trees and landscapes are not being routinely maintained because of budget shortfalls. Staff should examine productivity and set standards for care, requiring better accountability in operations. Staff is using maintenance district funds where possible for tree care, reducing the work load for the street tree crews. However, adequate budgets and staffing must be provided to maintain trees in the manner required by industry standards.
- ISSUE: The Street Tree Ordinance, (Chico Municipal Code 14.40) was last updated in 2000 and needs to be reviewed and upgraded to improve its functionality. For instance, the code makes reference to shrubberies - while the City may have pruned shrubs in the distant past, this is clearly a private responsibility. Shrubs that grow to tree size should be disallowed and any hedge planted within a specified distance from a street should be discouraged. Clearances over roadways need to be increased.
- ISSUE: The Street Tree Master Plan required in CMC 14.40 is out of date and except for major corridors is probably not needed. Should the BPPC want a thorough Master Plan for street trees, then a grant to develop the Master Plan should be sought.
- ISSUE: The Street Tree Inventory is not fully updated – about 3000 trees remain to be re-measured and located. This could be done by an intern or through a grant. In the meantime, trees will continue to be upgraded as they are removed, planted or pruned.
- ISSUE: Measures needed for tree preservation on new projects are not fully understood. Discussions are under way with the Planning Department on how to better coordinate tree protection when plans are submitted. Staff is also on the calendar to address the Architectural Review and Historic Preservation Board (ARHPB) regarding the existing tree protection regulations and physical requirements for tree preservation. Staff could use more guidance from the BPPC in regard to how diligent staff should be in pushing for tree protection. Staff believes an important concept that has not yet gained acceptance is to preserve young, smaller trees on some sites in lieu of larger mature trees.

- ISSUE: Current end use of trees is not achieving the highest and best value for the wood. When trees die, decline or become hazardous, their ultimate use should be as beneficial to the City and the planet as possible. The use of chips is required in all landscaped areas because they are beneficial to soil and plant health, result in water and soil conservation and improve soil fertility. The sale of commercial wood products, including logs, should be considered a good end use for trees. Black walnut in particular is a valuable asset that should be sold as an asset and not simply removed.
- ISSUE: Trees creates significant ADA sidewalk issues that need to be addressed. The City code places the responsibility for sidewalk repair on the adjacent property owner, yet the City has not used this code to aggressively pursue sidewalk repairs due to tree roots. At the present time, the sidewalk program has limited resources that allow only a few situations to be addressed each year. To reduce future sidewalk damage, trees should only be planted in adequately sized planting strips. The city should also review sidewalk design criteria in an effort to reduce sidewalk displacement by tree roots. To reduce ADA liability, specific corridors for ADA access need to be defined and publicized.

Community

- ISSUE: Trees are dying because citizens don't understand how to care for them. More education is needed to improve tree care, so that staff should develop and distribute more information regarding the selection of good trees at the nursery, the care of young trees, including planting, proper soil preparation, watering, and pruning. In this effort, it would be highly beneficial to have such information included in packets for new homeowners.
- ISSUE: Citizens don't appreciate the benefits of trees, and often focus on the perceived problems of leaf drop, etc, rather than the value of shade and other benefits. Staff should develop a more aggressive educational program to improve citizen understanding of the functional benefits of trees
- ISSUE: There are few volunteer opportunities within the Urban Forest; these need to be developed and expanded. They could include tree planting, young tree pruning and removal of stakes. Staff should also continue to encourage citizens to plant and care for their own street trees, and invite interns from CSUC and Butte college programs to participate in the program.
- ISSUE: Tree topping on private property leads to degraded landscapes and potentially hazardous conditions that can threaten the public ROW and citizens. Poor pruning practices occasionally occur in parking lots as well. Citizens who understand the potential harmful affects of poor pruning practices requested that the city address this issue, at least through an educational program.
- ISSUE: Citizens sometimes plant, prune and remove trees without permits, so the process should be included in educational programs. As such, the process should be closely reviewed to see if it can be improved. The web site should also be improved and regularly updated to improve citizen awareness of program benefits and procedures. When needed, Code Enforcement can assist with issues regarding City Code.
- ISSUE: Citizens occasionally remove trees on private property that impact neighboring properties or are viewed as community assets. Staff should explore ways to influence the management and retention of trees that are owned and managed by other entities, such as trees in private yards or commercial developments, including CARD, the County, the University and others.

GOALS AND OBJECTIVES

Tree Resources

GOAL	RATIONALE	SHORT TERM OBJECTIVES	MID TERM OBJECTIVES	LONG TERM OBJECTIVES
<p>1. Implement a program for enhancing public safety and reducing risk to citizens from trees.</p>	<p>Deferred maintenance has resulted in an increased number of trees with defects such as dead limbs or stem and root decay that may lead to failure, increasing the risk and liability to the City.</p>	<p>a. Define and publish a written policy for prioritizing work. b. Base all tree care on existing ANSI Safety and Tree Care Standards per ISA BMPs. c. Reduce the backlog of maintenance. Encourage citizens to care for the trees in front of their homes, by providing permits to approved tree services.</p>	<p>d. Budget for a tree pruning contract that focuses on high priority needs of large trees, while the crews focus on routine formative pruning and emergencies. e. Adopt the new ANSI Tree Risk Assessment as the Standard for assessing risk and assigning priorities for tree work. f. Analyze and revise current tree pruning and production standards.</p>	<p>g. Establish a recommended pruning cycle, with number of staff and associated costs. h. Explore tree service discounts for City street trees.</p>
<p>2. Define the character of Chico's Urban Forest</p>	<p>An overall policy that defines the character and appearance of the forest is necessary for decision making. The General Plan calls for "Complete Streets" that include trees, but does not specifically state how the trees should relate to the street.</p>	<p>a. Establish policy and obtain agreement from the Bidwell Park and Playground Commission that the Urban Forest should provide a specified character to the City of Chico.</p>	<p>b. Create policies that provide adequate-sized planting strips in new developments so that large trees can be planted. Update the list of trees to be certain that selected species can provide large canopies without creating sidewalk damage. c. Upgrade the approved street tree species list.</p>	<p>d. Create an almost continuous canopy of trees over the City. This canopy will be multi-sized, multi-aged and of diverse species.</p>
<p>3. Enhance tree planting to reduce the backlog of empty planting sites</p>	<p>Consistent planting helps maintain a multi-aged stand of trees throughout the City. It also allows the Urban Forest to experience species change as new cultivars are developed to address issues of older species.</p>	<p>a. Explore grant opportunities to fund a larger tree planting program.</p>	<p>b. Establish a non-profit within the community to encourage neighborhood tree plantings and stress the importance of tree planting.</p>	<p>c. Transfer responsibility for tree planting in subdivisions to the Street Tree Division to insure trees are planted to the City's standards.</p>

GOAL	RATIONALE	SHORT TERM OBJECTIVES	MID TERM OBJECTIVES	LONG TERM OBJECTIVES
4. Encourage diversity in the Urban Forest	Diversity of species creates a forest that is resilient to pest and disease invasion. It also creates a more attractive and interesting forest.	a. Recognize and remove invasive species from the Urban Forest to the extent possible given budgets, etc. Seek grant funding for this project.	b. Analyze work zones and set specific objectives for each zones in terms of species diversity.	c. Study and develop a rating of habitat values for tree species used in the urban forest.
5. Improve planting standards.	Young trees die or fail to thrive due to circling roots and poor care after planting.	a. Review and revise planting standards as needed. b. Improve communication between departments regarding the reasons for provisions of tree planting standards. c. Review current specifications for nursery stock tree selection.	d. Improve the inspection process for the installation of new landscapes e. Establish inspection protocols and timeframe during the development/construction process f. Enforce standard pruning practices on private commercial parking lots so that the trees attain the required shading as quickly as possible.	g. Bring oversight of all tree planting to the Street Tree Division, rather than the building Department. h. Require trees in new Capital Projects to be fully established - to have been in the ground and thriving after one year before final acceptance. Include the requirement of a performance bond for all tree planting projects.

Landscape Resources

GOAL	RATIONALE	SHORT TERM OBJECTIVES	MID TERM OBJECTIVES	LONG TERM OBJECTIVES
1. Improve landscape designs and practices to enable sustainable and consistent quality of the City's public landscapes.	By providing for better installations, appropriate plant materials and ET ¹ based irrigation systems, the City's landscapes will look better, conserve water and reduce maintenance costs.	a. Review and modernize Landscape Design Standards to enhance water conservation, reduce maintenance costs and improve soil health issues. b. Develop criteria for trees, shrubs and ground covers that can be used in City landscapes, such as those that are drought tolerant, easy to maintain, long lived, non-invasive and tolerant of Chico soil types.	c. Develop planting schemes that reduce the necessity for regular pruning. Endorse specific, water conserving irrigation systems, based on longevity and ease of maintenance. d. Endorse specific, water conserving irrigation systems, based on longevity and ease of maintenance.	e. Approve and encourage the use of 2 wire irrigation systems for ease of upgrading and repair.

¹ ET – Evapotranspiration – The amount of water that is used by the plant and evaporated off the surface. When irrigation controllers are ET based, they apply only the amount of water that is actually used on the site, automatically adjusting the amount of water applied each week.

GOAL	RATIONALE	SHORT TERM OBJECTIVES	MID TERM OBJECTIVES	LONG TERM OBJECTIVES
<p>2. Improve landscape soil management practices to establish deep rooted trees.</p>	<p>Soils are treated as an engineering material, rather than a biological system. But for landscapes to thrive, their biological components need to be conserved. Planting sites need to be engineered, managed and inspected as a fundamental part of the overall project, so the biological integrity of the soil is enhanced rather than compromised.</p>	<p>a. Provide planting sites with the same level of "authority" as that of the hardscape in new projects.</p> <p>b. Identify, review and revise the current policy to better define the steps developers must take to have landscape plans approved.</p>	<p>c. Develop a better procedure for final approval and acceptance of projects once complete, including the requirement that as-builts are received and scanned in a timely manner.</p> <p>d. Require electronic copies of as-builts for completed landscape projects.</p> <p>e. Develop a Public Landscapes web page that includes information about AB 1881 and landscape requirements for the public portion of planting strips.</p>	<p>f. Require that soils be treated during construction and prior to planting to reduce compaction when planting landscapes in new developments (This would be compatible with AB1881)</p> <p>g. Promote having a landscape irrigation professional within the Planning or Building Department who can better review landscape designs.</p> <p>h. Review AB 1881 compliance for potential development into Chico's version of AB 1881.</p>
<p>3. Upgrade Irrigation systems in a timely manner to provide for better water conservation and reduced maintenance costs.</p>	<p>Irrigation systems that are not upgraded fail more often, requiring extra repair costs, and leaks that waste water.</p>	<p>a. Identify and prioritize the larger, publicly funded areas of Chico's landscapes that need to be retrofitted. Explore opportunities to obtain community or grant funding for these projects.</p> <p>b. Require new controllers in public landscapes to have remote ability to enhance maintenance.</p>	<p>c. Replace old galvanized systems with new pop-up systems that have water conserving nozzles.</p> <p>d. Review efficacy of netafim drip irrigation systems.</p>	<p>e. Upgrade old irrigation controllers as budgets allow to have remote ability.</p> <p>f. Include weather and ET sensing in all new controllers installed in the City.</p>
<p>4. Assure funding for maintenance and replacement costs in new landscapes in City projects.</p>	<p>Current projects do not adequately address future maintenance and funding for restoration of landscapes, except in residential maintenance districts.</p>	<p>a. Maintenance costs should be a major part of the design review for new landscapes in City projects.</p>	<p>b. New Projects should project and budget maintenance costs over a 12 month period. An annual maintenance period, rather than 90 days, would provide a reasonable starting budget for the project.</p>	<p>c. Discourage, through policy development, the practice of eliminating or reducing landscaping and tree planting in Capital Projects because of cost overruns.</p>

GOAL	RATIONALE	SHORT TERM OBJECTIVES	MID TERM OBJECTIVES	LONG TERM OBJECTIVES
<p>5. Review the landscape contract to make it more cost effective and efficient to administer.</p>	<p>The landscape contract is complex and difficult to administer. It should probably be divided into more than one contract. Having only one contractor provides no backup to the City for the failure of a company to adhere to the contract.</p>	<p>a. Review and revise methods used to gain adherence to the landscape contract.</p> <p>b. Review the landscape contract to reduce the cost of unforeseen repairs to the greatest extent possible.</p>	<p>c. Incorporate more industry standards into the landscape contract.</p>	<p>d. Provide adequate budgets for landscape maintenance, as required by the contract.</p> <p>e. Reduce the use of pesticides to the greatest extent possible, giving preference to the use of biological and cultural controls.</p>
<p>6. Require owners of property that becomes vacant due to economic or other conditions to maintain the landscapes, especially the trees, on the site.</p>	<p>Landscapes that die as a result of foreclosure are unsightly and provide a detrimental impact to the surrounding neighborhood and community. Replacing such landscapes is expensive and reduces the sale ability of the site.</p>	<p>a. Outline the process and responsibility for restoration should the landscape die.</p>	<p>b. Develop minimum requirements for irrigation when property is vacant.</p>	
<p>7. Review the issue of Community Gardens to be certain it is being addressed in a satisfactory manner.</p>	<p>Community Gardens are currently a planning issue, although it is often thought of as a landscape issue.</p>		<p>a. Review the current policy and upgrade where needed.</p>	

Management

GOAL	RATIONALE	SHORT TERM OBJECTIVES	MID TERM OBJECTIVES	LONG TERM OBJECTIVES
<p>1. Review, revise and update the Chico Municipal Code (CMC), Section 14.40 that specifically pertains to Street Trees.</p>	<p>The Street Tree ordinance has several sections that are out of date, or have unclear terminology and as a result impede the function of the Division.</p>	<p>a. Clarify and define terminology within the code, as well as within tree and landscape policies, to improve the quality and consistency of work standards.</p> <p>b. Increase the required clearance over roadways to 14'.</p> <p>c. Allow the removal of problem shrubs in the ROW through code enforcement action.</p>	<p>d. Require that except for City approved street trees, no plant that reaches taller than 24" can be planted in the public ROW.</p> <p>e. Review the CMC 16.66 to allow flexibility in requiring mitigation for existing street trees in new commercial or development projects</p>	<p>f. Review the feasibility and practicality of the required Street Tree Master Plan, including funding for keeping the Plan up to date.</p>
<p>2. Review the Tree Program to look for efficiencies and ways to improve operations.</p>	<p>Street trees are not being routinely maintained because of staffing and budget shortfalls. As a result, the tree resource is not being maintained as an asset, and is becoming a liability to the City.</p>	<p>b. Specify a level of service to the citizens and establish productivity standards to meet this level.</p> <p>c. Provide additional staffing to maintain trees in the manner required by the specified level of service, while meeting industry standards.</p>	<p>d. Explore the use of contract services for routine work while staffing is limited.</p> <p>e. Continue to have staff upgrade the inventory as trees are removed, planted or pruned.</p> <p>f. Complete the street tree inventory - about 3000 to 5000 trees remain to be accurately mapped onto the GIS program. This will require a commitment of resources of about 2000 hours. Explore ways to upgrade remaining trees, such as volunteers or interns from the University.</p> <p>g. Apply for grants where possible.</p>	<p>h. Track and compare the efficiency of in house crews with contract crews, if they are provided for pruning.</p> <p>i. Review funding and productivity levels in other cities. Develop an agreed upon pruning cycle that can be sustained within reasonable funding levels.</p>
<p>3. Improve staff and commission understanding of measures needed to preserve trees on new projects and to reduce the incidence of invasive tree species.</p>	<p>Many projects that seek to preserve trees on a site being developed do not allow adequate space for that preservation, per the current standards within the code.</p>	<p>a. Enhance the knowledge of City staff and appointed officials (ARHPB, Planning Commission, etc.) about tree protection measures.</p> <p>b. Address and discuss the current Tree Preservation regulations with the ARHPB and Planning Commission regarding physical requirements for tree preservation.</p> <p>c. Lots/land that contain invasive trees such as <i>Ailanthus</i> should be required to remove all such trees as a condition of approval for discretionary projects.</p>	<p>d. Consider the preservation of well placed, healthy and young trees on developing sites, rather than only the large old tree. Young trees are often less expensive and easier to preserve and will better serve as the future generation of trees.</p> <p>e. Require desirable tree preservation as a standard condition of approval for projects, including adequate room around trees for their effective preservation.</p>	<p>f. Promote the importance of trees within the City</p>

GOAL	RATIONALE	SHORT TERM OBJECTIVES	MID TERM OBJECTIVES	LONG TERM OBJECTIVES
<p>4. Develop better design standards for tree planting that reduces sidewalk damage.</p>	<p>Trees create significant sidewalk damage if not planted correctly into soil that has not been adequately prepared and designed for tree roots. In addition, the allotted space for tree trunks and roots needs to consider the ultimate size of the tree.</p>	<p>a. Allow specific trees to be planted only where there is adequate space</p> <p>b. Develop an official list of invasive tree/shrub species</p> <p>c. In high use areas, such as the downtown business district, remove unsuitable trees and replace with more appropriate tree species.</p>	<p>d. Evaluate and improve species selection along the City defined street and sidewalk corridors for ADA access</p>	<p>e. Review sidewalk design criteria in an effort to reduce sidewalk displacement by tree roots</p>
<p>5. Strengthen the provisions of the Parking Lot Shade Ordinance.</p>	<p>Many parking lots in town have not met the current requirements of 50% shade in parking lots.</p>	<p>a. Better enforce existing parking lot building standards on newly built projects by reviewing planting sites and tree installation as it occurs.</p>	<p>b. Encourage the review and analysis of parking lot standards to see if they can be made easier to understand and enforce, i.e. require a tree for every specific number of parking spots, rather than a square footage of coverage by shade.</p>	<p>c. Enhance opportunities to upgrade existing lots to the current standards.</p>
<p>6. Research and develop ways for the City to obtain value from wood removed along city streets.</p>	<p>When trees die, decline or become hazardous, their ultimate use should be as beneficial to the City as possible. Many street trees are highly valued in the urban wood industry, yet the City has not considered this wood an asset when trees must be removed.</p>	<p>a. The use of chips shall be required in all landscaped areas because they are beneficial to soil and plant health, and result in water conservation.</p> <p>b. Encourage the establishment of a program for the sale and use of all urban wood grown in the City of Chico.</p>	<p>b. Review the tree removal contract to allow for the sale of commercial wood products from city street trees to go back into the General Fund.</p>	

Community

GOAL	RATIONALE	SHORT TERM OBJECTIVES	MID TERM OBJECTIVES	LONG TERM OBJECTIVES
1. Develop a comprehensive tree education program to enhance citizen understanding of tree care and the benefits that trees provide.	Many citizens don't appreciate the benefits of trees, and therefore focus on the negative realities of living with trees. As a result, citizens request tree removal when fairly minor remedial work can repair the problem for several years. Also, young trees die each year because citizens don't understand the basics of tree care.	<p>a. Continue to encourage citizens to plant and care for their own street trees.</p> <p>b. Develop and distribute more information regarding proper care of young trees</p> <p>c. Develop more outreach for the Arbor Day program, so that more students know of and celebrate the day each year.</p> <p>d. Retain Tree City USA Recognition.</p>	<p>e. Develop a more aggressive educational program to improve citizen understanding of the functional benefits of trees. Educate citizens about the selection of good trees to start with, and the care of trees, including planting, proper soil preparation, watering, and pruning.</p>	<p>f. Require care of young trees brochures to be included in new homeowner packets.</p> <p>g. Find ways to influence the management and retention of trees that are owned and managed by others, such as trees in private yards or commercial developments, including CARD, the County, the University and others.</p>
2. Improve citizen awareness of program benefits and procedures to prevent citizens planting and removing trees without permits.	Citizens will sometimes plant, prune and/or remove trees within the public right-of-way.	<p>a. Work with Code Enforcement when necessary to enforce City Code.</p> <p>b. Include the permit process in educational programs.</p>	<p>c. Review the process and policy regarding tree and shrub planting in the Right-of-Way.</p>	
3. Enhance volunteer opportunities to assist with the Urban Forest.	Citizens will sometimes plant, prune and/or remove trees within the public right-of-way.	<p>a. Continue to encourage interns from CSUC and Butte college programs. Develop and expand volunteer opportunities in the Urban Forest.</p>	<p>b. Develop and expand volunteer opportunities in the Urban Forest.</p>	<p>c. Reinstigate a program to teach about young tree pruning.</p>

IMPLEMENTATION PLAN

The City of Chico, like most of the rest of the state and country, is currently in a financial crisis. This means that implementing this Urban Forest Management Plan requires priorities to be set and followed. Short term goals can focus on items that can be accomplished with little direct costs to the city. At the same time, safety may require funding be increased for some items, in the interest of reducing risk to the citizens and liability to the City.

Goals are generally listed in order of priority. In addition, the objectives and action items are prioritized so that the implementation can take place over the next 5 to 10 years as the objectives can be addressed.

MONITORING PLAN

The planning horizon for this plan is 20 years, the same as for the General Plan. Therefore many of the goals of the plan are long term, but the objectives covered in the plan will provide guidance over the next 5 years. At the end of the 5 years, progress toward the goals should be reviewed, and the objectives modified as needed to better reach the long-term goals. This will be the main process of monitoring the plan.

As objectives are reviewed and policies and procedures finalized, they should be incorporated into this document, so that the plan becomes a working document. Each objective should include some form of measured outcome for monitoring progress. This can range from a time frame for implementation to more specific measurements. Monitor progress toward achieving each goal at five-year increments.

REFERENCES

- Boza, Chris. Urban Forester, City of Chico, 2004 Urban Forest Strategic Plan.
- Brown, L.R. 2001. *Eco-Economy: Building an Economy for the Earth*. W.W. Norton, New York.
- California Department of Water Resources. 1999. California Irrigation Management Information System evapotranspiration map. <http://www.cimis.water.ca.gov/cimis/pdf/etomap1.pdf>
- Carreiro, M.M., Song, Y., and Wu, J. 2008. *Ecology, Planning, and Management of Urban Forests: International Perspectives*. Springer Science, New York.
- City of Chico, California. 2009. Approved street and parking lot trees for the City of Chico: A guide to their selection, planting, and long term care. Approved by the Bidwell Park and Playground Planning Commission, July 29, 2009.
- City of Chico, California. 2009. City tree history. http://www.chico.ca.us/general_services_department/park_division/street_trees.asp
- City of Chico, California. 2010. City budget. <http://www.chico.ca.us/finance/budget.asp>
- City of Chico, California. 2010. Tree counts from street tree inventory. http://www.chico.ca.us/general_services_department/park_division/street_trees.asp
- Crow, T., Brown, T., and De Young, R. 2006. The Riverside and Berwyn experience: Contrasts in landscape structure, perceptions of the urban landscape, and their effects on people. *Landscape and Urban Planning*. 75:282-299.
- EDAW, 2007. Final Bidwell Park Master Management Plan Update, Vol. 1. Existing Conditions, Page 2-33. April 2007.
- Gregory, S.G. 2011. Quantifying street tree function and distribution: analysis of environmental services, population characteristics, and sidewalk uplift in the City of Chico, California. *Chico Digital Repository*. Masters Thesis, California State University, Chico.
- McPherson, E.G. 2000. Expenditures associated with conflicts between street tree root growth and hardscape in California, United States. *Journal of Arboriculture*. 26: 289-297
- McPherson, E.G. and Peper, P.P. 1996. Costs of street tree damage to infrastructure. *Arboricultural Journal*. 20: 143-160

McPherson, E.G., Simpson, J.R., Peper, P.P., Maco, S.E., and Xiao, Q. 2005. Municipal forest benefits and costs in five U.S. cities. *Journal of Forestry*.411-416.

Miller, Robert W. and William A. Sylvester, 1981. "An Economic Evaluation of the Pruning Cycle". *J. of Arboriculture* 7(4): 109-112.

Nowak, D.J., Crane, D.E., and Stevens, J.C. 2006. Air pollution removal by urban trees and shrubs in the United States. *Urban Forestry & Urban Greening*. 4: 115-123.

Satterthwaite, D. 2008. Cities' contribution to global warming: notes on the allocation of greenhouse gas emissions. *Environment and Urbanization*. 20: 539-549.

Shashua-Bar, L., Potchter, O., Bitan, A., Boltansky, D., and Yaakov, Y. 2010. Microclimate modeling of street tree species effects within the varied urban morphology in the Mediterranean city of Tel Aviv, Israel. *International Journal of Climatology*. 30: 44-57.

Smardon, R.C. 1987. Perception and aesthetics of the urban environment: Review of the role of urban vegetation. *Landscape and Urban Planning*. 15: 85-106.

Soares, A.L., Rego, F.C., McPherson, E.G., Simpson, J.R., Peper, P.J., and Xiao, Q. 2011. Benefits and costs of street trees in Lisbon, Portugal. *Urban Forestry and Urban Greening*.10:69-78.