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FIRST DRAFT
Vegetative Fuels Management Plan

for
Parks, Greenways, and Open Spaces

City of Chico, California

July, 2020

Plan development funded by
California Department of Forestry and Fire Protection (CAL FIRE)
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Compiled with assistance from Deer Creek Resources, Dempsey Vegetation Management, Butte County Resource Conservation District, and the CSU, Chico Ecological Reserves

City of Chico
Public Works Department – Parks Division
411 Main Street
Chico, CA 95927
parkinfo@chicoca.gov
Phone: 530-896-7800
Fax: 530-895-4731
www.chico.ca.us

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1 Introduction

1.1 Purpose

This Vegetative Fuels Management Plan ("VFMP" or "Plan") describes actions that the City will take over many years to minimize fire risk and improve other values relating to vegetation on the City's 6,847 acres of parks, greenways, and open space. Although the primary driver of this plan is the need to improve wildfire safety, the Plan should and does address other values that are meaningful to Chico's residents and visitors. These include recreation values, community safety, Chico heritage and historic values, and ecosystem values such as water supply, conveyance and quality, and habitat for wildlife (including agricultural pollinators) and wildflowers.

Because cities rarely have all the funding they would need to complete all the work they would like, this Plan identifies priority projects to make the most of limited funding, time and capacity. Because conditions will change, this Plan also provides a means for evaluating future priorities to enable adaptive management. Also, to help community members understand the art and science of vegetation management, this Plan defines and explains a wide range of vegetation management tools, techniques, actions and methods. It also specifies best management practices to ensure resources remain protected.

Development and environmental review of this Plan is funded through a CAL FIRE Community Wildfire Protection Grant, grant agreement 5GA18210. The purpose of the Community Wildfire Protection Grant Program is to build local capacity to complete community-based fire prevention projects.

Why should vegetation be managed? Fire ecology, climate change, and invasive species are all reasons why parks managers can't simply "let Nature take care of herself" while still fulfilling their public trust. While managing vegetation may sometimes seem contrary to the spirit of keeping parks wild and natural, the truth is that the land we now cherish as parks has always been managed by humans. If we decide not to intervene in natural processes humans have long helped shape, we are still making a management decision, one that can have bad consequences for our parks.

The land on which Chico is built evolved with human management, including millennia of regular and deliberate human-led fire managed by the Mechoopda people, who still live here. For this reason, all Chico parkland and open spaces are fire-dependent ecological communities. However, after a century of being deprived of the fire they depend on, many Chico parklands and greenways are overstocked with vegetative fuels. This increases the risk that any future wildfire could be catastrophically intense. Human tending is again required to restore these parklands to health.

Furthermore, as climate change advances, Sierra foothill forests are expected to experience rapid change that results in profound ecological stress. Park management changes may be needed to help the land adapt to a new climate. At the same time, invasive species can displace and disrupt natural systems that provide services we all value. For example, invasive species can create or contribute to fire risk, obstruct flood conveyance, displace habitat diversity and resilience, and cause other problems. In short, "leaving nature alone" is likely to exacerbate, not fix, the problems of catastrophic wildfire risk, climate change vulnerability, and invasive species.

The intent of this document is to guide vegetation management. It would not be practical to attempt to remove every conceivable fire *hazard* nor *exotic* plant in Bidwell Park. It is sensible to reduce both fire *risk* and *invasive* plants (priority exotic weeds with negative impacts) - and these two goals are related in purpose and

implementation. Therefore, this Plan includes both a wildfire risk assessment delineating the highest-priority areas for treatment (**where** to reduce vegetation first), and a plant prioritization scheme delineating the highest-priority species for removal (**what** vegetation to reduce first).

When we prioritize certain plants for removal, it's another way of saying we prioritize certain plants for keeping. Creating guidelines for removal and retention of plants helps ensure that fuels reduction projects won't have excessive or avoidable negative impacts on our plant biodiversity, pollinators, nesting birds, streams and salmon, and the rest of the ecosystems we cherish.

This Plan does not attempt to specify specific timeline goals as would a Project, but rather provides a *programmatic* approach for setting priorities and practices for Projects as funding becomes available. This document guides ministerial (i.e., legally obligated) or maintenance actions on vegetation, as well as actions that would constitute a Project (i.e., discretionary actions). A major objective of this Plan is to make it easier for the City to efficiently complete future vegetation management projects as time and budgets allow. A big part of that efficiency will come from streamlining the City's process for CEQA compliance.

CEQA, or the California Environmental Quality Act, requires all agencies and cities to carefully consider the effects of their proposed actions on the environment, to determine whether those effects are significant, and to reduce or mitigate significant effects whenever possible, all while informing the public. Because this is an arduous process to complete on a project-by-project basis, CEQA allows cities to bundle proposed actions together and consider them all at once, saving time and taxpayer money. This Plan is, among other things, an effort to develop a "bundled" ("programmatic," in CEQA language) CEQA document to guide vegetation management in the city for many years to come. For more about how this Plan relates to CEQA, see 6.5.

How to use this Plan.

This VFMP is structured to describe *where* the City of Chico manages lands, *what* objectives and standards the City manages them for, *how* they are managed (i.e., using which vegetation management tools and techniques, and standards for vegetation management) and, finally, *what* specific projects are top priorities for meeting those standards. It can be read in sections, or even beginning to end.

First, in sections 1.2-1.4, we cover the basics: who drafted this Plan, why we did it, and what existing plans we relied on to do it.

Next, in sections 2 and 3, you'll learn about *where* the City manages lands. You'll find descriptions of each park, greenway, and open space parcel inside the Plan area. (Not every parcel is described in great detail, because some parks already have existing management plans and it would be wasteful to reduplicate that work.) In each park, greenway, or open space, we describe the objectives the City needs to uphold when considering its vegetative fuels management activities.

In Section 4, we explain in more detail *how* vegetation management gets done. For instance, here you will find more detailed technical specifications about vegetation management activities and how they should be applied, including standards for desired conditions, mitigations to limit resource damage, and seasonal restrictions. The vegetation zones presented in Section 4.1 describe ***where*** work will get done. The specifications in Section 4.2 explain ***what*** our parklands will look like when they're fire safe. Here, you'll find the measurable metrics crews will aim to achieve in order to reduce fuel loading to acceptable ranges. These techniques and standards will be further fleshed out, with even more technical specifications, during the EIR process which begins with the release of this Plan. Finally, the vegetation treatment tools, or techniques, presented in Section 4.3 are the practices used to modify vegetation. They describe ***how*** work will get done. Again, the mitigations and best management practices the City will use to protect natural and cultural resources will be fully fleshed out in the EIR process.

In Section 5, we describe in greater detail several priority projects developed concurrently with this Plan. These fire hazard reduction projects, dependent on funding availability, will likely be the first vegetative fuels management projects implemented under this Plan.

In summary, Sections 1 through 3 provide the background information to understand the Plan activities. Section 4 provides the more specific actions and recommendations of the Plan. Section 5 provides several priority projects the City intends to implement under the Plan.

Section 6 is where you'll find the appendices. These documents are in many ways the most important parts of the plan. They describe the detailed work that was done in spring 2020 to assess fuels density and fire hazard across the City's parklands, and how City parklands managers will choose which fuels to reduce first.

1.2 Scope

This is a guiding document for management of vegetation in City of Chico parks and green spaces that are not (a) the irrigated landscapes of neighborhood parks or (b) those managed by the Chico Area Recreation District (C.A.R.D). The geographical scope as of this writing is the 6,847 acres of parks and green space owned by the City of Chico. For maps of the City-owned land covered by this Plan, see Figure 1.

This Plan distinguishes two main types of City-owned lands: lands managed first for natural values, and lands managed primarily for other values. Parks managed for "natural values" are managed first and foremost for natural ecosystem services such as clean water, clean air, and wildlife habitat, and/or for recreation in a relatively wild, natural setting. An example would be upper Bidwell Park. Parks and open spaces managed primarily for "other values" could be managed primarily for floodwater conveyance or as an airport safety buffer. An example would be Lindo Channel, which is managed primarily to keep the City of Chico safe from flooding.

For Bidwell Park, this Plan serves a special role. It serves to fulfill the "fuels management program" called for by the 2008 Bidwell Park Master Management Plan (section C-5.4.1.2). According to the Bidwell Park MMP, a fuels management program "should establish fuel load guidelines to specify acceptable fuel load levels within various Park regions" and "should ultimately prepare a detailed, programmatic level prescribed burning plan" with "a procedure [...] developed to map and prioritize prescribed burns" (section C-5.4.2.1). Due to time and capacity constraints, that fuels management program was never developed, until now.

With respect to the California Environmental Quality Act (CEQA), the practices described in this document encompass ministerial actions (i.e., those required of the City by law) and also maintenance actions to manage vegetation, as well as those actions that are discretionary and thus qualify as "projects" under CEQA. After this Plan is complete, City staff and contractors will complete an Environmental Impact Report, or EIR, on the Plan. The EIR will analyze possible environmental impacts that could be caused by implementing the Plan. The EIR will determine whether any of those effects could be significant, and if so, how they could be mitigated to below a level of significance. The public and interested groups will have multiple opportunities to comment on the EIR, as will affected agencies and governments, including the Mechoopda Tribe. After the EIR is certified, many future vegetation management actions will be easier to fund and implement, because some (or, for certain projects, virtually all) needed CEQA review on them will already have been completed. For more about how this Plan connects to CEQA, see section 6.5.

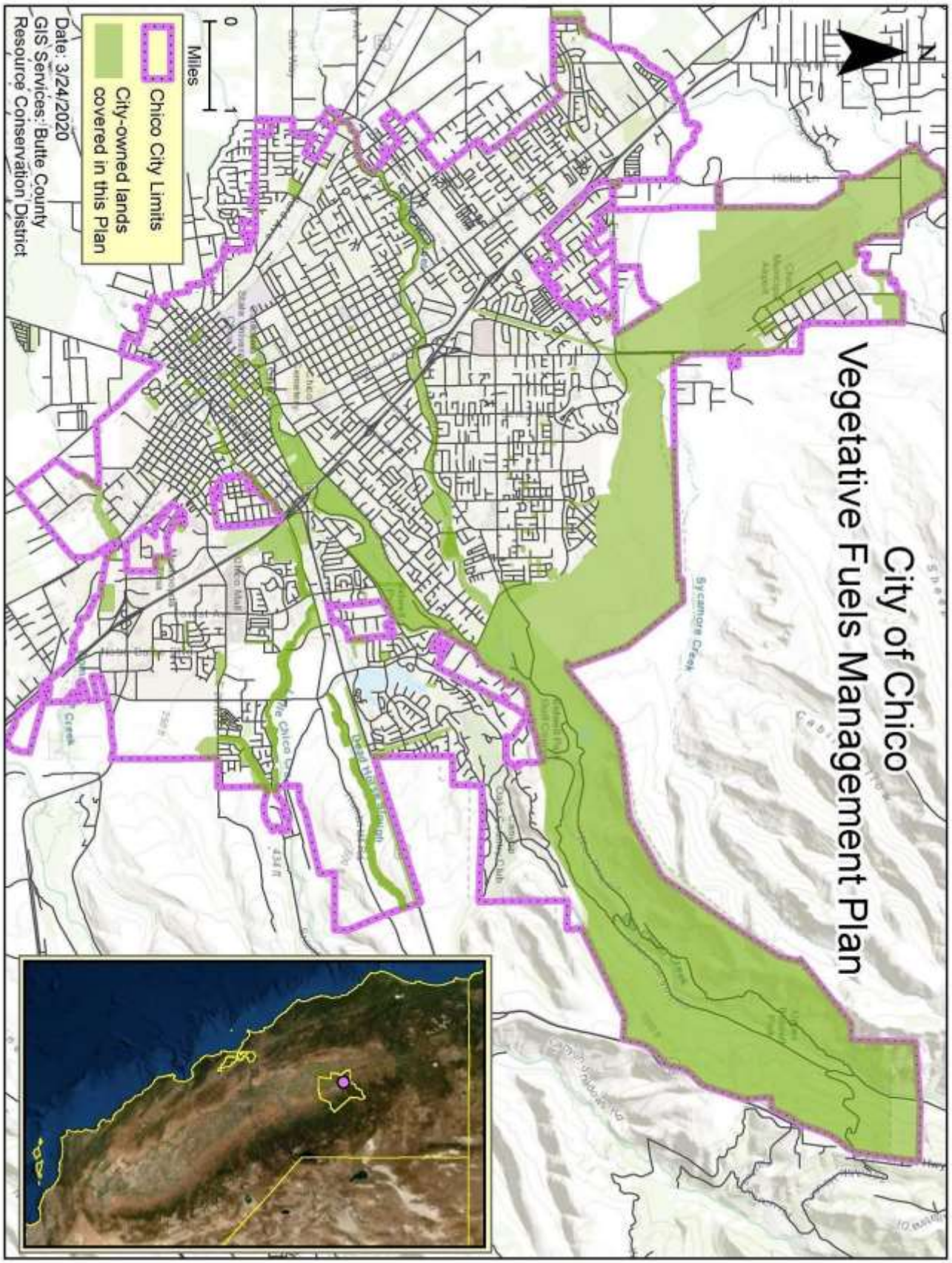


Figure 1: Lands addressed in this Plan.

1.3 Connection to other Plans

Several parks and green space areas of Chico have existing management plans that serve various purposes or convey responsibility or legacy legal restrictions that limit how the City can act on vegetation for those parcels. For example, the Wildwood Vernal Pools Preserve has very strict and clear guidelines about what kind of vegetation management can be undertaken and under what conditions, and it has a Preserve Manager whose job is (among other things) to patrol for, assess, and resolve fire hazards there. Therefore, the Plan you are reading won't spend a lot of time addressing the Wildwood Preserve. On the other end of the spectrum, Lindo Channel (Sandy Gulch) has never had any kind of management plan (with the exception of some monitoring plans for native species and elderberry bushes), much less any framework for how to control fire risk, so Lindo Channel gets significant attention in this Plan.

Meanwhile, Bidwell Park is in between these two extremes. Bidwell Park has a detailed master management plan, but that plan has long been missing a detailed fuels management program. This Plan provides that program, but it will not provide every possible analysis of Bidwell Park's vegetation and natural resource context, since rehashing the background information already presented in the BPMMP would be wasteful.

It would be impractical to list the details of all the existing plans (or lack thereof) and the constraints and responsibilities they impose. Therefore, most existing plans are incorporated by reference into this Plan. Readers will find the planning status of the different parks, greenways and open spaces helpfully summarized in sections 2.1-3.5.

1.4 How This Plan Was Developed

In November 2018, the Camp Fire destroyed over 18,000 structures across Butte County, including most of the town of Paradise. The human toll was devastating, and Chico was profoundly impacted as residents took in newly homeless family members, friends and even strangers. The fire burned up to the city limits of Chico, and some Chico neighborhoods were evacuated. Many Chicoans became newly sensitized to how Chico's cherished parks and greenways could serve as fuses pulling wildland fire into the neighborhoods of Chico. While Chico's topographical setting and prevailing winds make a Camp Fire-like conflagration less likely here than in Paradise, our town could still do more work to reduce fire risk.

Cities cannot simply send crews into the hills to cut brush at will. Under California law (e.g., the California Environmental Quality Act, or CEQA), cities must first analyze the likely environmental impacts of their projects, and they must inform and invite comment from citizens, the wider public, and affected agencies and other governments. This process is what is known as project planning. Recognizing that capacity for planning was a critical need in further reducing the City's wildfire risk, in December 2018 the City of Chico applied for a CAL FIRE planning grant to fund this Plan.

Starting after grant award in May 2019, this Plan was developed by City staff (Parks Division) with assistance from many partners and contractors. Sections on vegetation management were written by longtime City consultant Dempsey Vegetation Management, as well as by conservation professionals from the Butte County Resource Conservation District (BCRCD) and the CSU, Chico Enterprise Foundation (CSUCEF), which also provides Registered Professional Forester review of the finished plan. The fire risk assessment was completed by Deer Creek Resources, part of Firestorm LLC. Burn planning was or will be provided by Firestorm LLC. The warm and collegial assistance of professionals from Horizon Water and Environment, who shared some lessons learned from their experience developing the Oakland Vegetation Management Plan (OVMP; Eckhart et al 2019), is gratefully acknowledged; in places, this Plan adapts parts of the now publicly available OVMP to Chico. Earlier work completed by parks volunteer Susan Mason was important in developing the arundo removal project. Resource surveys were completed by BCRCD and others.

Through a pilot partnership with the CSU, Chico Ecological Reserves, the project provided paid interdisciplinary training to a CEQA intern who contributed hundreds of hours of surveys, mapping, and data analysis to the Plan while gaining valuable professional skills. Managers of the Big Chico Creek Ecological Reserve (BCCER), which borders Bidwell Park to the north, donated their time to help review and harmonize this Plan with vegetation management plans upcanyon. The team is grateful to Horizon Water and Environment, who generously shared some of their lessons learned while developing the City of Oakland's Vegetation Management Plan and EIR.

1.5 Abbreviations and special terms

Acronyms Used

Acronym	Meaning
BCCER	Big Chico Creek Ecological Reserve
BMPs	Best management practices
BP MMP	Bidwell Park Master Management Plan
BRCP	Butte Regional Conservation Plan
CAL FIRE	California Department of Forestry and Fire Protection
C.A.R.D	Chico Area Recreation District
CCG	Comanche Creek Greenway
CCI	California Climate Investments, a funding source that uses carbon auction proceeds to fund, among other things, fuels reduction work
CDFW	California Department of Fish & Wildlife
CEQA	California Environmental Quality Act
CSUC	California State University, Chico
dbh	Diameter at breast height, a way to measure the thickness of trees.
DEIR	Draft EIR
DWR	(California) Department of Water Resources, an agency which has the responsibility to maintain floodwater conveyance in several of Chico's channels
EDRR	"Early Detection and Rapid Response," a strategy for engaging people to identify and control invasive weeds. Colloquially, "EDRR weeds" in an area are the ones that people are particularly vigilant about keeping out of their parklands.
EIR	Environmental Impact Report, a type of CEQA document
IS	Initial Study (also known as "the Appendix G checklist," a type of preliminary CEQA document that sorts out insignificant from potentially significant impacts

LCC	Little Chico Creek
MMP	Master Management Plan (or, sometimes, Mitigation and Monitoring Program!)
MND	Mitigated Negative Declaration, a type of CEQA document
ND	Negative Declaration, a type of CEQA document
NOD	Notice of Determination, a document filed by a public agency when it completes the CEQA process
NOE	Notice of Exemption, a document filed by a public agency to show that a project is exempt from further CEQA review
NOP	Notice of Preparation, a document filed by a public agency to announce it is preparing an EIR
OHWM	Ordinary High Water Mark, the level of every stream channel up to which the State of California holds an easement to perform activities found by the Legislature or the People to be in the public interest (e.g., removing obstacles to floodwater conveyance).
OLWM	Ordinary Low Water Mark, the level of every stream channel which forms the upper boundary of the land to which the State of California holds title under the Public Trust Doctrine. While the State holds title to lands below the OLWM, it usually merely holds an easement on lands between the OLWM and OHWM.
PEHL	Public and Easement Habitat Lands (a term used in the BRCP to describe lands that are in public ownership or under conservation and thus serving to conserve natural communities and covered species habitats)
PEIR	Programmatic EIR
SRCS	Spring-run Chinook salmon, a sensitive endemic species
TEK	Traditional Ecological Knowledge
USFWS	US Fish & Wildlife Service
VELB	Valley Elderberry Longhorn Beetle, a sensitive endemic species
VFMP	Vegetative Fuels Management Plan
VMP	Vegetation Management Program, a program of CAL FIRE whereby CAL FIRE assumes responsibility (including liability) for vegetation management activities (usually including prescribed fire) on lands not owned by the State, under agreement with the land manager.

2 Introduction to Chico's Natural Parks

City owned parks that are managed foremost for natural values include:

- Bidwell Park;
- The three vernal pool mitigation properties Bidwell Ranch, Foothill Park, and Wildwood Vernal Pool Preserve along with Hillview and South Chico preserved parcels;
- The Comanche Creek Greenway;
- Teichert Ponds; and
- Verbena Fields.

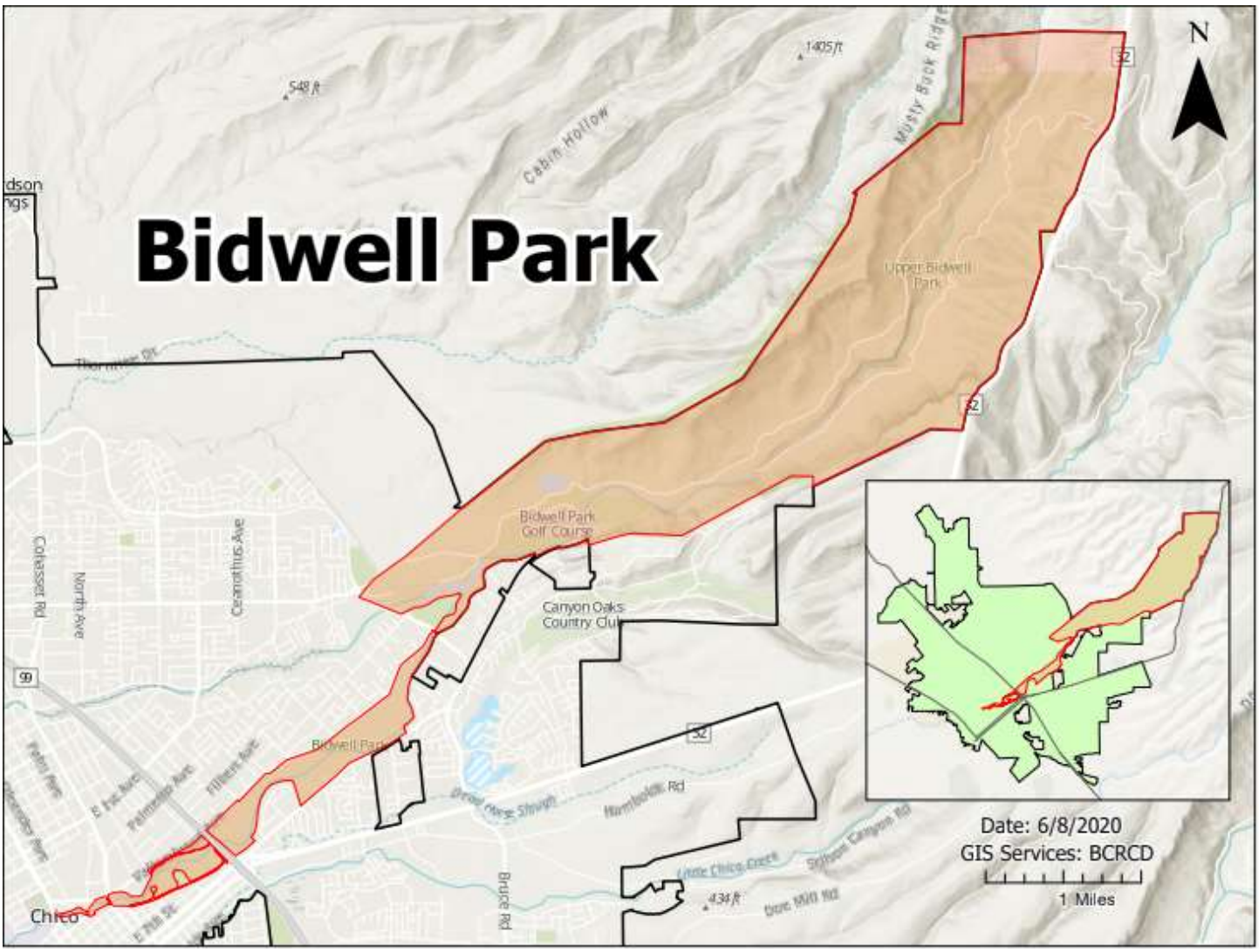
By natural values, we mean:

- Recreation in a natural setting;
- Natural and cultural heritage; and
- Natural ecosystem services such as clean water, clean air, and carbon banking for climate change.

Other natural values for which these lands are managed include wildlife habitat, native insect and agricultural pollinator habitat, wildflower beauty, and fisheries values.

Chico's rich natural heritage is inseparable from its cultural and historical heritage. The beautiful and productive landscape of what is now called Bidwell Park is the visible legacy of thousands of years of skilled management by Mechoopda people. Thus, when Annie Bidwell adjoined the City to "preserve" and "sacredly guard" "the beauty of [the] Park," she was praising the beauty of a landscape that had been cultivated, tended, and deliberately burned by Native people since time immemorial. For this reason, parks managed for natural values may also be managed for consistency with traditional ecological knowledge (TEK) held by the Mechoopda Tribe.

2.1 Bidwell Park.



2.1.1 Purpose and Scope

Often described as “the jewel of Chico,” Bidwell Park encompasses 3,621 cherished acres. It extends from Bidwell Mansion, the historic center of the town of Chico, ten creek-miles into the Big Chico Creek canyon. This canyon deeply divides the wild, volcanic foothills of the southern Cascade foothills (geographically usually considered the Sierra Nevada foothills). Bidwell Park is described in detail in its Master Management Plan Sections 1 and 2, which are incorporated here by reference. The entire Bidwell Park MMP (City of Chico 2008) is available from the City of Chico Parks website.

For Bidwell Park, the Plan you are reading serves a special role. It serves to fulfill the "fuels management program" called for by the 2008 Bidwell Park Master Management Plan (section C-5.4.1.2). According to the Bidwell Park MMP, a fuels management program "should establish fuel load guidelines to specify acceptable fuel load levels within various Park regions" and "should ultimately prepare a detailed, programmatic level prescribed burning plan" with "a procedure [...] developed to map and prioritize prescribed burns" (section C-5.4.2.1).

For example, BPMMP page C.5-5 states:

> *Fuel reduction treatments should be prioritized, with highest priority given to treating those areas likely to pose significant risks to public safety, private property, or Park facilities. Fuels reduction treatments should also be considered for areas with dense infestations of nonnative invasive plants (e.g., Himalayan blackberry, tree of heaven, eucalyptus), areas with high concentrations of ladder like fuels like wild grape, areas where wildlife habitat could be improved or protected through fuels reduction, areas lacking natural oak regeneration, or areas where fuels reduction would benefit native plant communities or special status plant populations.*

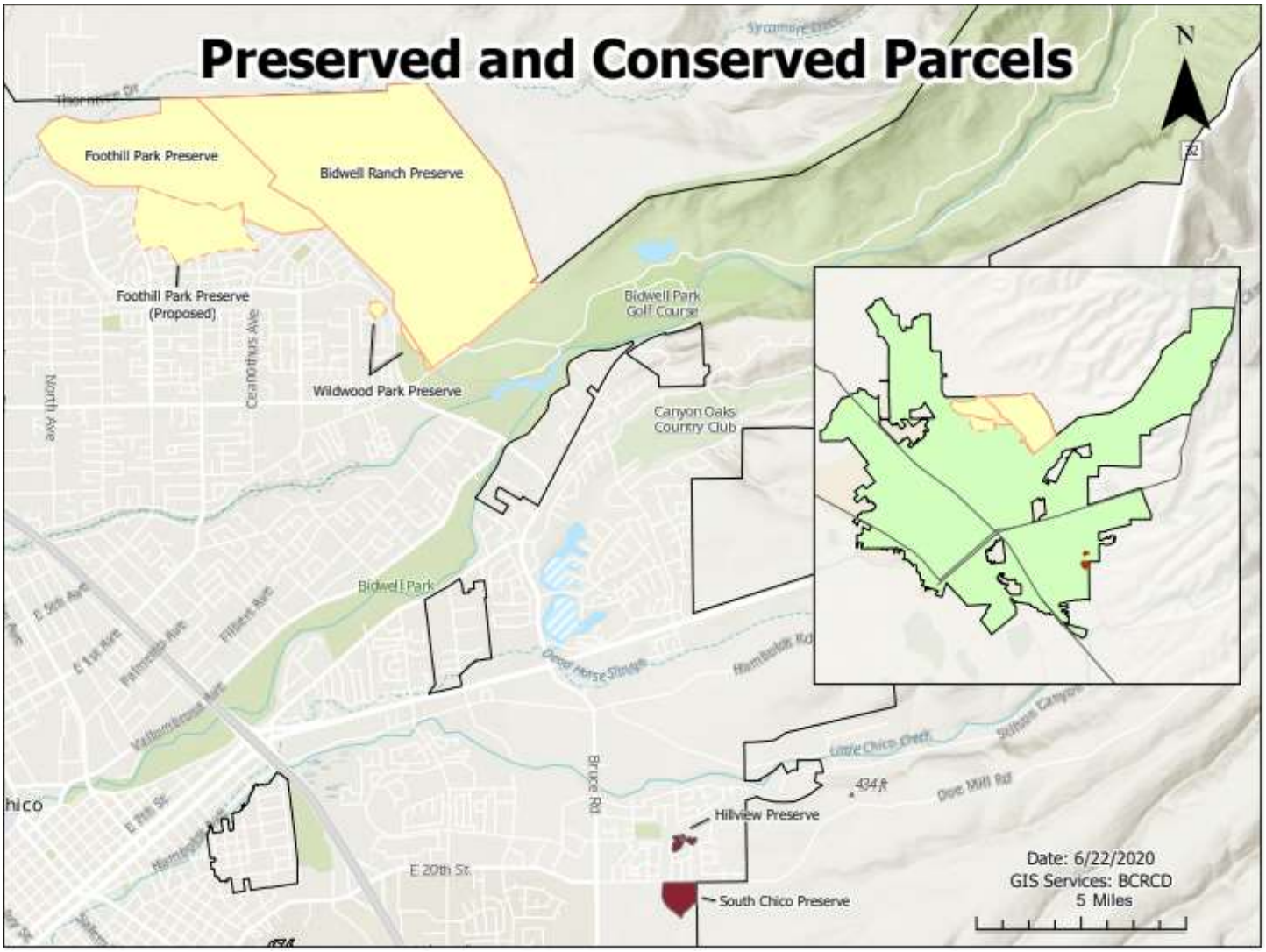
The natural fire return interval in Upper Park is 5-12 years. Because the park's natural communities have evolved with frequent fire, from a native plant's perspective the problem in Upper Park is not too much fire, but too little. Fire suppression, while often necessary to protect lives and property, eventually results in overly dense woodlands that are more drought-susceptible, less biodiverse, less able to cycle nutrients (and less nutritious as wildlife forage), and more vulnerable to eventual catastrophic wildfire, compared with woodlands that burn every few years.

Since Upper and Middle Parks are managed primarily for natural values (e.g., wildlife and rare plant habitat, a healthy wild or minimally tended landscape, rugged non-motorized recreation, and a basic level of user safety), fuels reduction work there will focus on enhancing natural values. For example, fuels work will be guided by objectives in the BPMMP (e.g., O-NC-7, "Improve age class diversity within chaparral and even-age stands of oaks and other plant communities to benefit wildlife") and will be designed to improve vegetation communities' resilience to climate change and to help mitigate the ecologically detrimental effects of long-term fire suppression. When it is necessary to remove plants to make the landscape healthier, crews will prioritize removing invasive plants, and then move on to returning native plants to within the range of healthy density, as defined by the registered professional forester (see section 4.2 for more on ranges of desired conditions).

In Lower Park, a higher maintenance level is appropriate, resulting in a more developed and manicured, more "parklike" appearance. Crews will continue to prioritize the removal of invasive plants over natives (BPMMP-NRMP, C.4-2) and to maintain a shaded riparian corridor that can provide cool water for salmon and other aquatic species (see pp 3-20 and 3-21 of the BPMMP for more on riparian habitat objectives within the Park). At the same time, in high-use areas, raising sightlines and providing a safe recreation experience where park users can see their surroundings is a valid vegetation management objective. The "Riparian" vegetation standard (see section 4.2.3) provides guidance for how to maintain a shaded and healthy creek corridor while pruning back excessive ladder fuels.

Below the 5-mile control structure, DWR does not work in the Park unless the City requests it. For example, when large trees fall into the stream, during salmon season they must be lifted out rather than dragged; currently, DWR will handle this at the City's request. Through the CSUC campus, DWR maintains the zone below the OHWM free of downed wood. Above the 5-mile structure, DWR maintains flood clearance, acting on both veg and sediment.

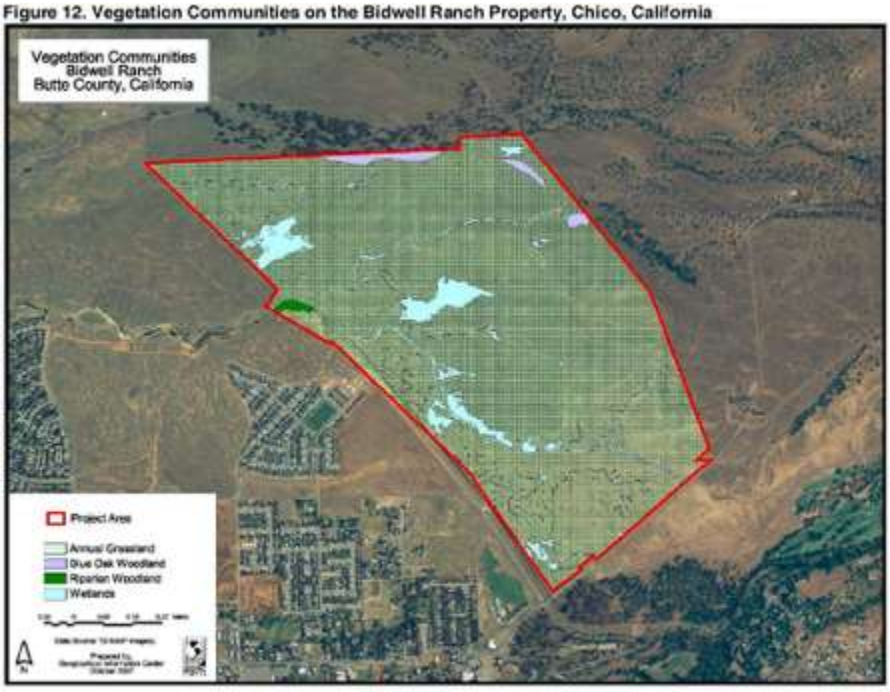
2.2 Preserves and Conserved Parcels -Bidwell Ranch, Foothill Park Preserve, Wildwood Vernal Pool Preserve, and conserved parcels of Hillview & South Chico.



The contiguous areas of Bidwell Ranch, Foothill Park Preserve, and Wildwood Vernal Pool Preserve were set aside to preserve vernal pool rare and sensitive species habitat.

Bidwell Ranch (760 acres, map at right) awaits progress on the Butte Regional Conservation Plan (BRCP) to determine future disposition and funding of the site for vernal pool mitigation banking. A draft management plan currently guides maintenance grazing on the area. Future vegetation management depends on the pending BRCP and whether a specific plan for Bidwell Ranch will be developed as a consequence, otherwise the objectives described for Bidwell Park, especially its grasslands (see sections 2.1 and 4.2.1) can serve to guide future management.

Figure 12. Vegetation Communities on the Bidwell Ranch Property, Chico, California



Bidwell Ranch – Site Inventory
River Partners

March 5, 2008
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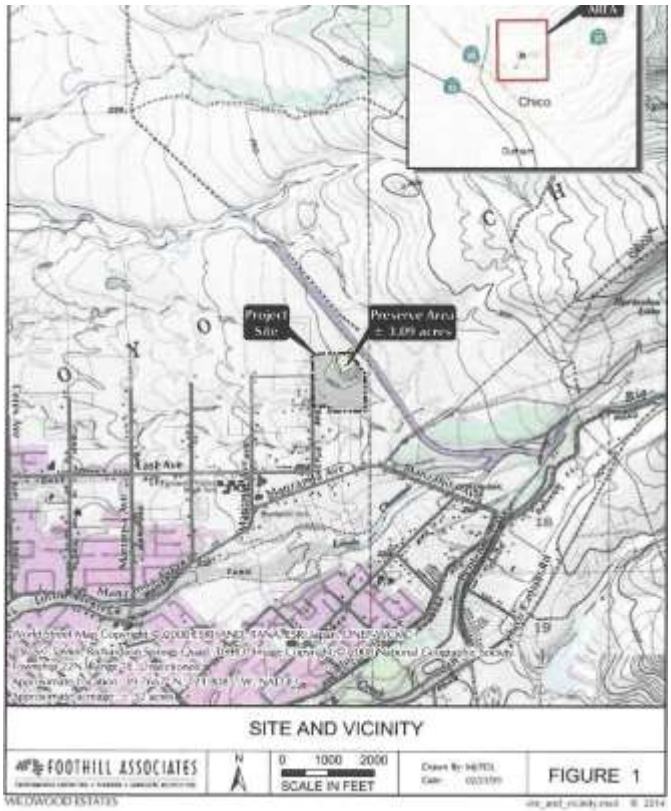
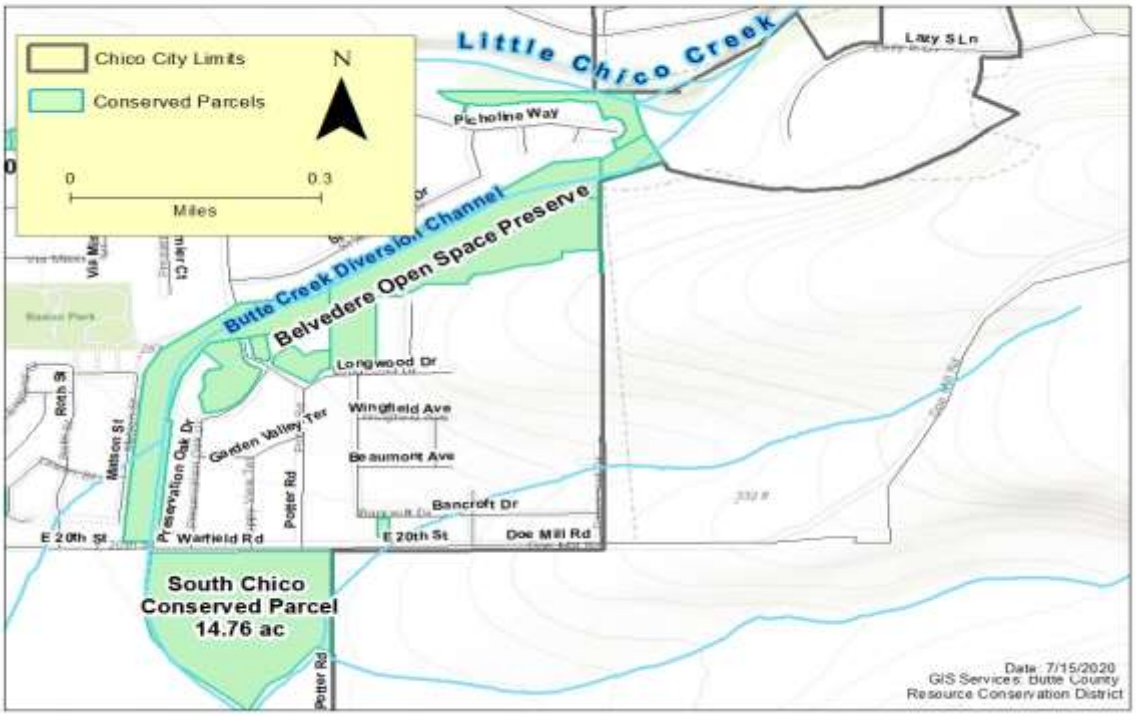
Foothill Park Preserve (292 acres, map at right) is managed by a third party according to the 1999 Foothill Park Preserve Management Plan. Its long-term maintenance and preservation are funded as mitigation for the adjacent residential development. This land is protected against any change in land use and management for ecological protection (protected land Category 1 PEHL [Public and Easement Habitat Lands]). Foothill Park is part of the Grassland vegetation zone and is already managed to the standards established for that zone in section 4.2.1.

Wildwood Vernal Pool Preserve consists of 3.1 acres between Wildwood Neighborhood Park and the Sycamore Diversion Channel (map at right). It has a detailed management plan (Foothill Associates 2014). The plan states, "If, at any time, conditions at the Preserve become a fire hazard, the Preserve Manager will work with [the Army] Corps [of Engineers], the [U.S. Fish and Wildlife] Service, and the local fire authorities to decide on the best method to reduce the fire risk at the Preserve." (p 31)

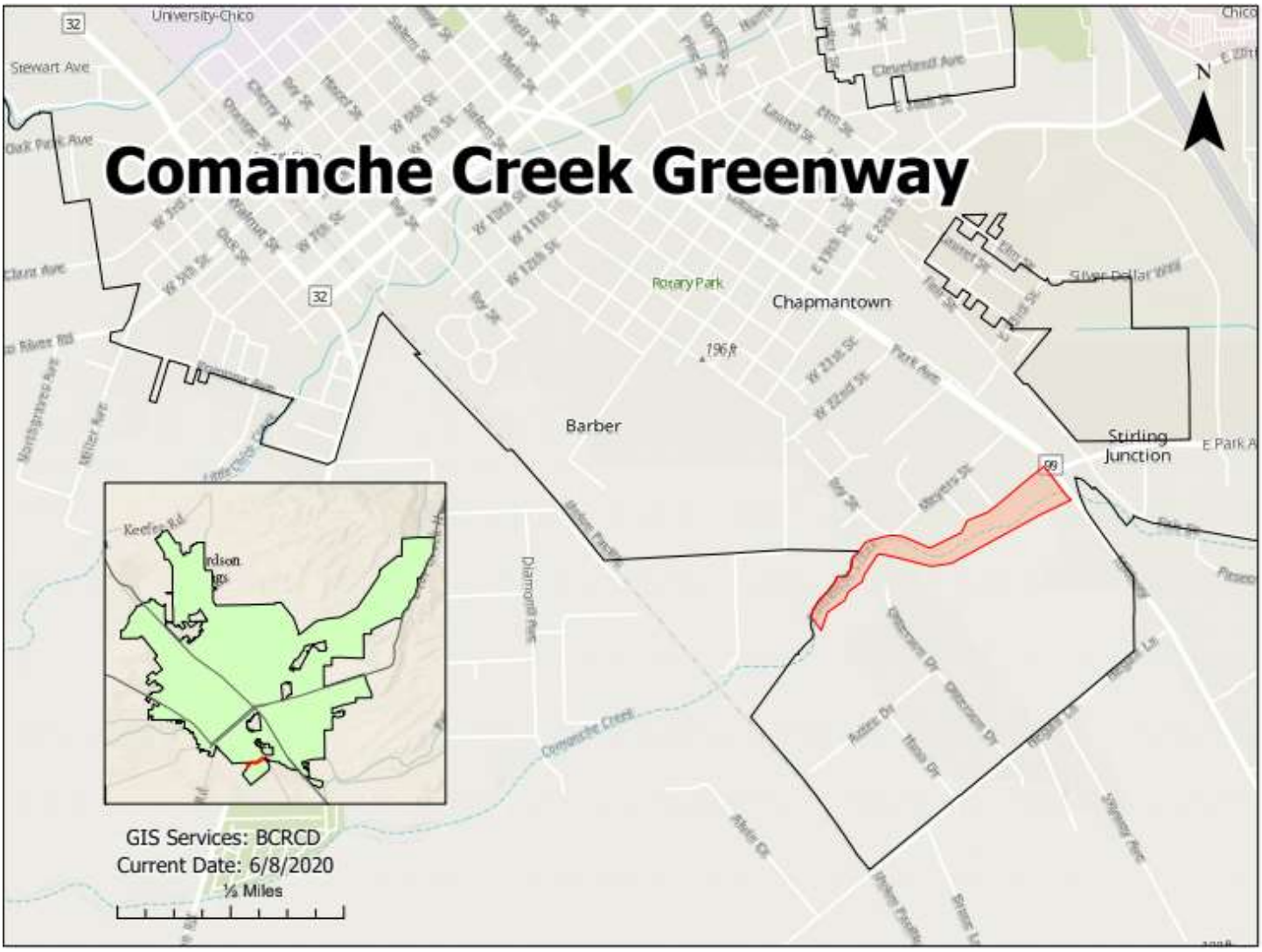
This area is managed for open space for mixed use in a way that maintains ecological value (protected land Category 2 PEHL according to BRCP Sec 5.2.3.6). Wildwood Vernal Pool Preserve is part of the Grassland vegetation zone and is already managed to the standards established for that zone in section 4.2.1.



Some open space preserves have no management plans. One is **Hillview, a.k.a. Belvedere open space preserve** (10+ acres) located in the Hillview Terrace subdivision along the Little Chico Creek to Butte Creek diversion canal. Maintenance is funded by a maintenance district, but there is no management plan. Also lacking a management plan is **South Chico conserved area** (14.9 acres), on the south side of East 20th Street, and east side of the Little Chico Creek to Butte Creek diversion canal. Now that this Plan is complete, vegetation in both areas (which falls into the Grassland vegetation type, see 4.1) will be able to be managed under the Plan.



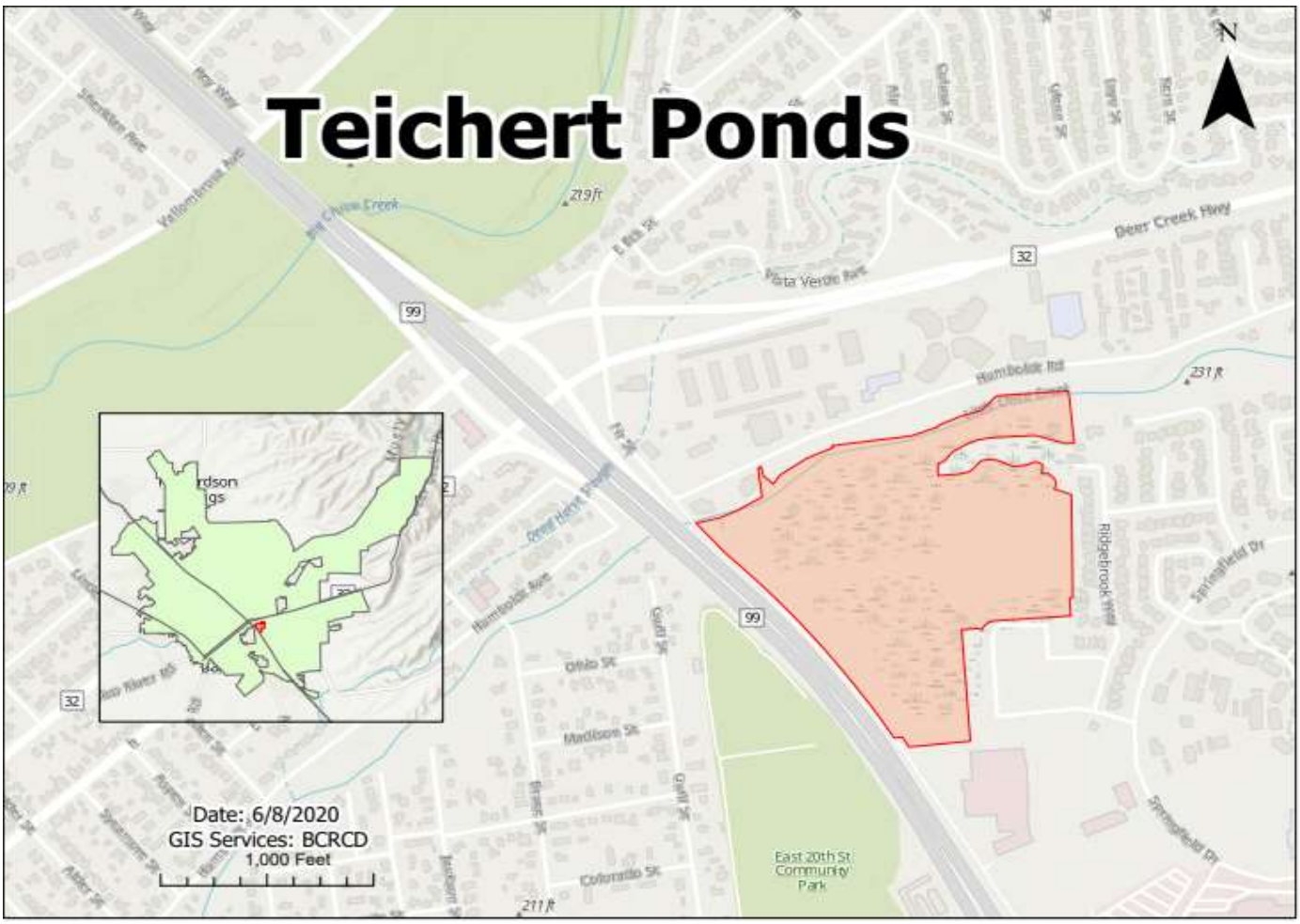
2.3 Comanche Creek Greenway



Comanche Creek (a.k.a. Edgar Slough) originated as a seasonal stream but now flows year-round, delivering irrigation water diverted from Butte Creek to M&T Ranch. Comanche Creek Greenway parcels totaling 20 acres were acquired by the City of Chico Redevelopment Agency to mitigate impacts on sensitive species (Giant Garter Snake, Valley Elderberry Longhorn Beetle, and Swainson's Hawk) in connection with Redevelopment Agency projects. Thus, habitat conservation is a very important goal for this park. Another objective is providing a safe and enjoyable corridor for non-motorized commuting and recreation. Comanche Creek is not designated as a floodwater conveyance channel of particular importance and DWR has no maintenance responsibilities or activities there.

The Comanche Creek Management Plan (City of Chico 2012) observes that increasing public use of greenway carries with it an increased risk of fire but does not provide any fire risk reduction objectives or suggestions. The Comanche Creek Vegetation Management Plan (DCE 2008) provides considerable guidance on restoring riparian vegetation, improving wildlife habitat, providing an enjoyable recreational experience, and removing invasive species. However, that plan contains minimal reference to fire beyond an acknowledgement that fire risk is one reason vegetation should occasionally be thinned out in a valley oak woodland community. Therefore, this Plan adds to the body of management literature for Comanche Creek by assigning it measurable vegetation management standards (see the relevant standards in sections 4.2.2 and 4.2.3).

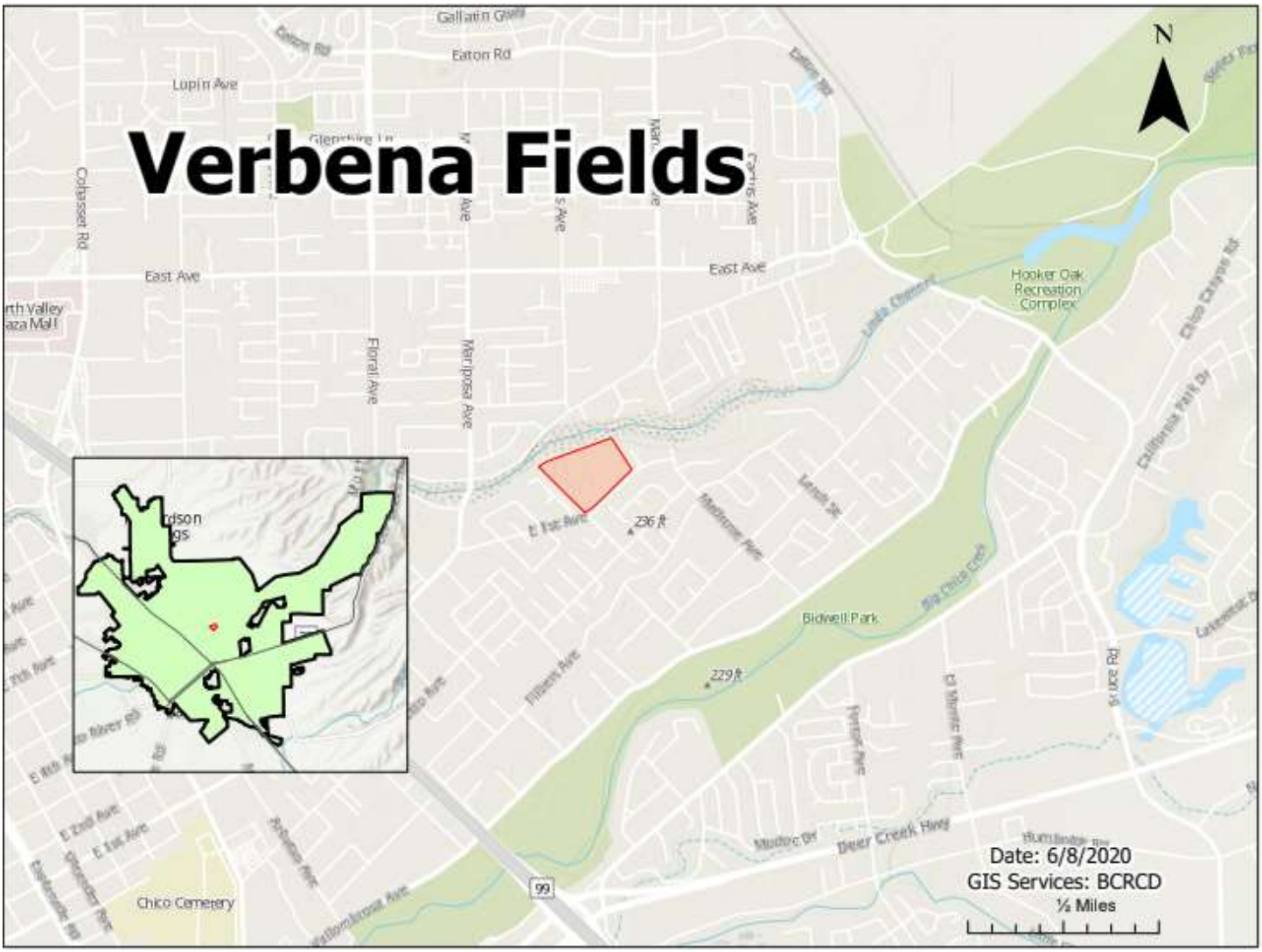
2.4 Teichert Ponds



Teichert Ponds (recommended in February 2020 by Committee to the Park Commission to be renamed as the *Peace Ponds Nature Area*) is currently maintained for use as stormwater detention hydrologically connected to Little Chico Creek. The Habitat Development Plan (Restoration Resources 2008) addresses stormwater detention, recreation and habitat enhancement, including management of invasive species, but it does not mention fire.

The City's core objectives for Teichert Ponds as stated in the 2008 HDP are to maintain stormwater detention and treatment functions, improve water quality, provide for mosquito abatement, restore and enhance wildlife habitat, improve landscape aesthetics, and provide features to enhance public use. While wetlands are usually not considered high-fire-risk areas, Teichert Ponds' location in the middle of a busy, urban residential/commercial neighborhood makes it an attractive place to build an (unauthorized) campfire. This results in a risk level for human-caused ignition that doesn't exist in most wetlands.

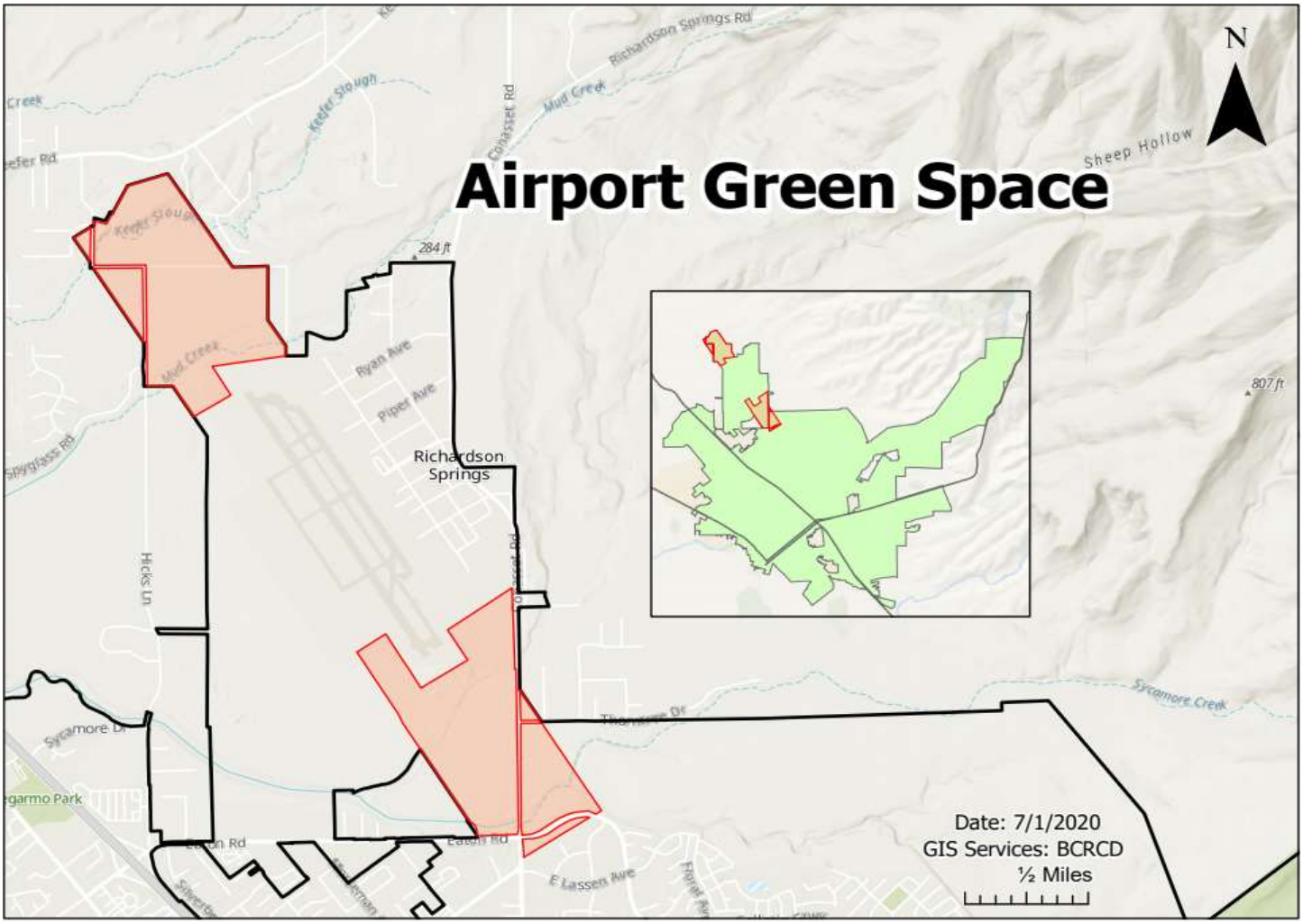
2.5 Verbena Fields



This 16-acre site is located along Lindo Channel was recontoured as a flood overflow basin and restored as a unique natural and interpretive park focused on plants of significance to the Mechoopda people, the original inhabitants of Chico. Mechoopda people still maintain, gather, and care for the living cultural resources here such as deer grass and willow. Maintenance projects in and around Verbena Fields present unique opportunities to collaborate with Native land stewards, to educate Chico community members about the plant-human relationships that have endured here since long before John and Annie Bidwell arrived, to allow citizens and schoolchildren to experience traditionally cultivated landscapes, and even to support traditional ecological management techniques such as cultural fire. Other than the restoration design and three-year native plant establishment plan (Cole 2009) developed for the restoration grant, Verbena Fields has no management plan, so this Plan serves as the first document guiding maintenance activities there.

3 Introduction to Other City Green Spaces.

3.1 Airport Green Space.



The primary objective for the lands around the Chico Municipal Airport is to support a safe landing and takeoff zone for aircraft. Therefore, vegetation management here is likely to focus on reducing the risk of ignition or the potential for a conflagration that could damage the businesses and structures around the airport. This open grassland habitat also happens to support a number of vernal pools, including 21.2 acres of known occupied habitat and 406 acres of modelled suitable habitat for Butte County meadowfoam (*Limanthes floccosa ssp. California*), a State and Federal Endangered species. This land is excluded from the Butte Habitat Conservation Plan Permit Area and thus is not available for the purchase of conservation credits (BCAG 2019). Management on these lands must address the habitat and survival needs of this species.

A small, unlevied portion of Mud Creek crosses the north end of the airport runway parcel. Otherwise, DWR is responsible for Mud Creek maintenance. DWR clears (masticates, mows, sprays) the entire length of Mud Creek that traverses the City of Chico. Within the leveed portion, DWR can also periodically remove sediment, which would otherwise fill sections of the leveed channel capacity over time.

3.2 Lindo Channel a.k.a. Sandy Gulch

Lindo Channel (historically known as Sandy Gulch) begins at the Sycamore Creek diversion structure just north of Five-Mile dam, where Big Chico Creek encounters its first diversion in its journey to the Sacramento River. There, Big Chico Creek's flow is partially diverted into Lindo Channel, an ephemeral stream that originally formed as a natural channel on the Chico alluvial fan, but was historically modified for flood control purposes in the early 1960's. Before then, flooding was a normal occurrence in much of what is now Chico, and indeed almost the entire Central Valley. The Valley's deep and fertile soils formed through repeated flooding.

Lindo Channel runs parallel to Big Chico Creek for almost eight miles before rejoining its sister channel about 2.5 miles from Big Chico Creek's confluence with the Sacramento River. Lindo Channel is still actively used today as a diversion channel to relieve flood flows in Big Chico Creek. In addition to flood control, Lindo Channel is important for groundwater recharge as well as riparian (and intermittent aquatic) habitat.

Currently, Lindo Channel is maintained chiefly by DWR. DWR ensures flood conveyance by periodic clearing of vegetation up to the Ordinary High Water Mark (OHWM) but there is currently no management plan. Below Hwy 99, the stream is mostly channelized without floodplain, so DWR removes downed wood in the channel but doesn't address banks (i.e., works exclusively within the OHWM). Upstream from the Hwy 99 crossing, however, Lindo Channel does include substantial floodplains within the OHWM. All in-channel work in California requires a Lake and Streambed Alteration (LSA) from CDFW. This permit is colloquially known as

a “1600” permit. LSA 1600 permits, if issued on a project-by-project basis, can be quite expensive. The City negotiates and pays for a 1600 permit on a project-by-project basis when it has a project in Lindo Channel. It is more desirable for an entity with significant ongoing vegetation management responsibilities to negotiate a “management and maintenance” version of the permit with CDFW. The City currently does not have such an arrangement with CDFW, but DWR does.

DWR’s arrangement with CDFW (via 1600 maintenance permit) enables DWR to cut everything under 4" dbh to ground level, leaving larger diameter vegetation untouched. DWR plans to clear this floodway every 5 years. From time to time, it is in the City’s interests to clear some vegetation from Lindo Channel for purposes of reducing fire danger, eradicating invasive plants (e.g. Spanish broom), and reducing the attractive nuisance presented by dense brush that might invite people to construct campfires. When these clearance activities are below the OHWM, then DWR can respond under its flood clearance responsibility (and under the terms of their maintenance 1600 permit). Therefore, any City requests to DWR to assist with Lindo Channel/Sandy Gulch clearance should clearly emphasize the flood clearance need for the action.

A LSA 1600 permit’s scope is potentially bank top to bank top, so work above the OHWM can sometimes require a 1600 permit. If work above the OHWM does require a 1600 permit, then in time, it would be in the City’s best interest to also develop a maintenance 1600 permit with CDFW. Project work division within Lindo Channel/Sandy Gulch would be divided up between the City (above OHWM) and DWR (below OHWM). This shared responsibility would be mapped within the CDFW 1600 permit process. More follow-up and agency consultation are required to better understand the City’s most cost-effective path to managing vegetation in Lindo Channel/Sandy Gulch.

The entire length of Lindo Channel is a priority vegetation management project for the City (see section 5.5). Vegetation management in this Riparian zone (see section 4.2.3) focuses on raising sightlines to improve public safety, reducing the likelihood that an untended campfire could start a wildfire, and reducing flotsam buildup that can hinder floodwater conveyance.

3.3 Little Chico Creek Greenway

Little Chico Creek Greenway (53 acres owned by the City) has no current management plan. The California Department of Water Resources may clear the channel up to the Ordinary High Water Mark (OHWM) to ensure flood conveyance. As stated above, DWR has an easement (sometimes written into deeds, otherwise implied by State code) for flood clearance to the OHWM (see section 3.2). Vegetation management objectives here are in many ways similar to those along Lindo Channel: i.e., reducing fire danger to neighboring structures, eradicating invasive plants (e.g. Spanish broom), and reducing the nuisance presented by dense brush that might invite people to construct campfires.

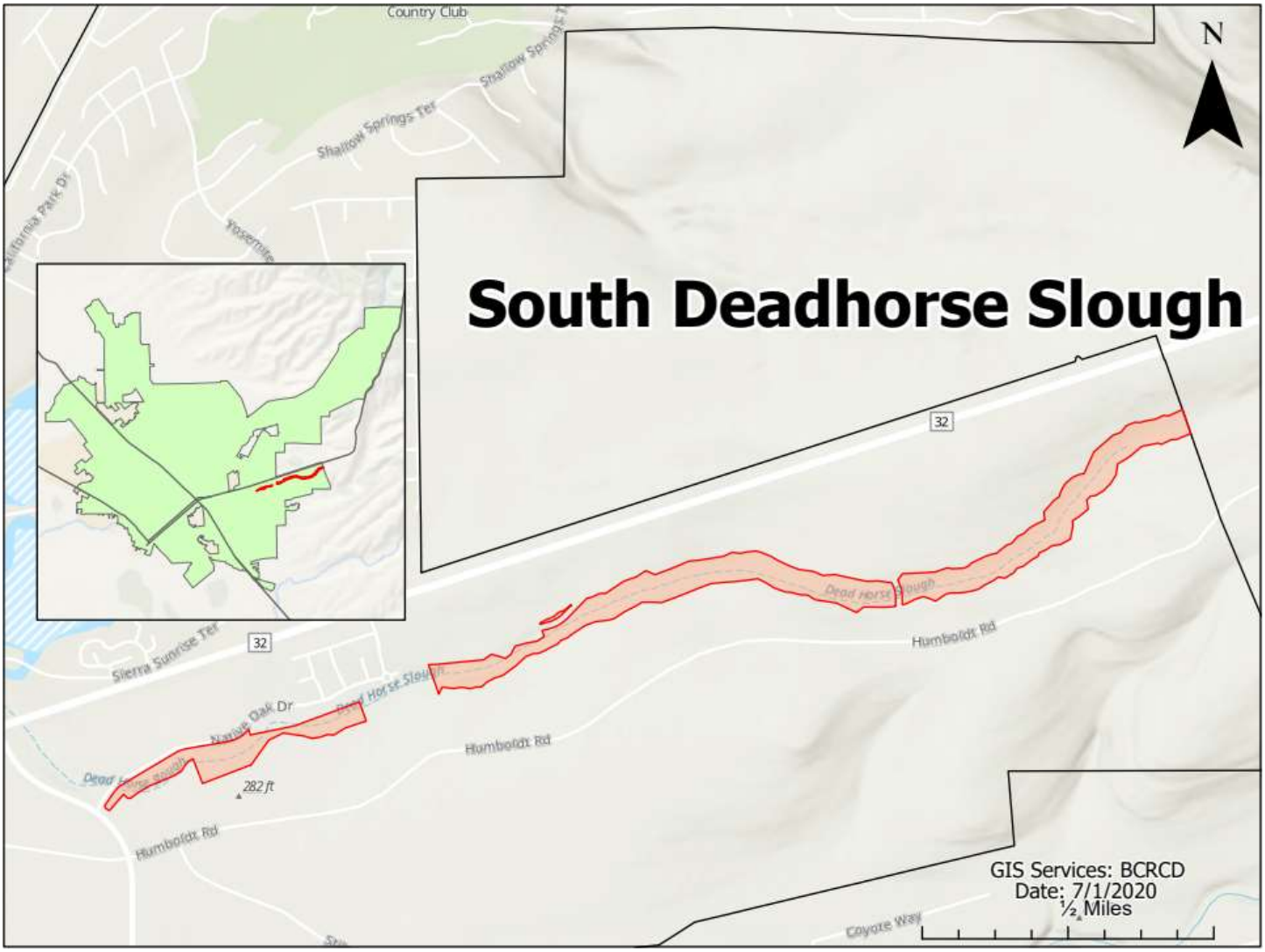
On Little Chico Creek, giant reed (*Arundo donax*) or Arundo forms large stands in places. Reducing this infestation has long been a City goal, because arundo displaces native vegetation, displaces native vegetation habitat for a wide variety of animals, and creates very attractive spaces to light illegal campfires which could easily get out of control. Arundo will burn even when green, and reducing its prevalence along Chico creekways is explicitly recommended in the Butte County Community Wildfire Protection Plan, which doubles as the CAL FIRE Butte Unit plan (CAL FIRE 2015).

An additional reason to deal with Arundo is that its shallowly anchored yet massive root balls can sometimes be undermined in high-water events and come loose from the bank. It isn't common, but these waterborne hazards have been known to cause serious erosion downstream and even damage bridges when they are trapped under

the span. Even so, it is usually much better to leave the massive root ball in place when eradicating Arundo, because removing it by hand or machine is not only very difficult but also can present bank stability issues. Common BMP for Arundo is to leave an Arundo root ball in place to hold the bank, plant fire-safe native vegetation into the root ball (e.g. willow), and, depending on the site, perhaps require monitoring to ensure that the root ball situation is not a bank stability problem (leaving open the possibility of acting on the substrate/bank for stability).

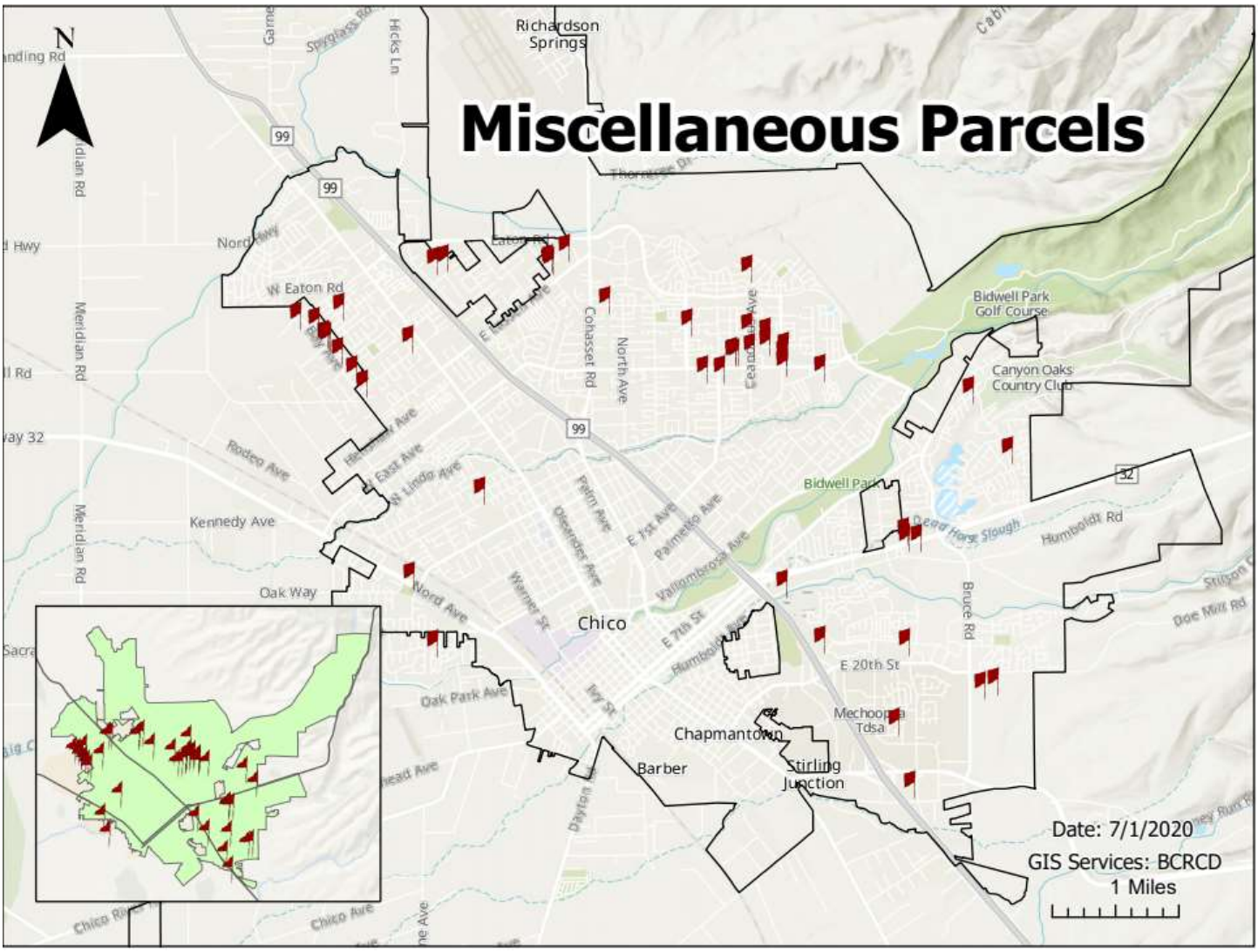
Several Arundo stands on the banks of Little Chico Creek are surely in part within the OHWM. When work needs to be done in that area, this is dealt with via the CDFW 1600 (LSA) permit (see section 3.2). The details of this implementation strategy are something to work out with CDFW via the 1600 permit, not with DWR. LCC is not a USACE project, which is why there is little to no rock on the bank at this point. However, City/County can potentially rock the bank, to protect infrastructure from flooding and erosion, if bank stability problems arise.

3.4 South Deadhorse Slough



Deadhorse Slough is a foothill drainage parallel to Highway 32 on the south side. Immediately east of Bruce Rd, it crosses Hwy 32 immediately to accept the contribution of the California Park Lake overflow outlet, then continues to flow west underneath Bruce Rd on the north side of Highway 32. It crosses again just east of the Forest Avenue light, joining Little Chico Creek just east of the Forest Avenue bridge over Little Chico Creek. The City owned portion is on the south side of Highway 32, and has no current management plan.

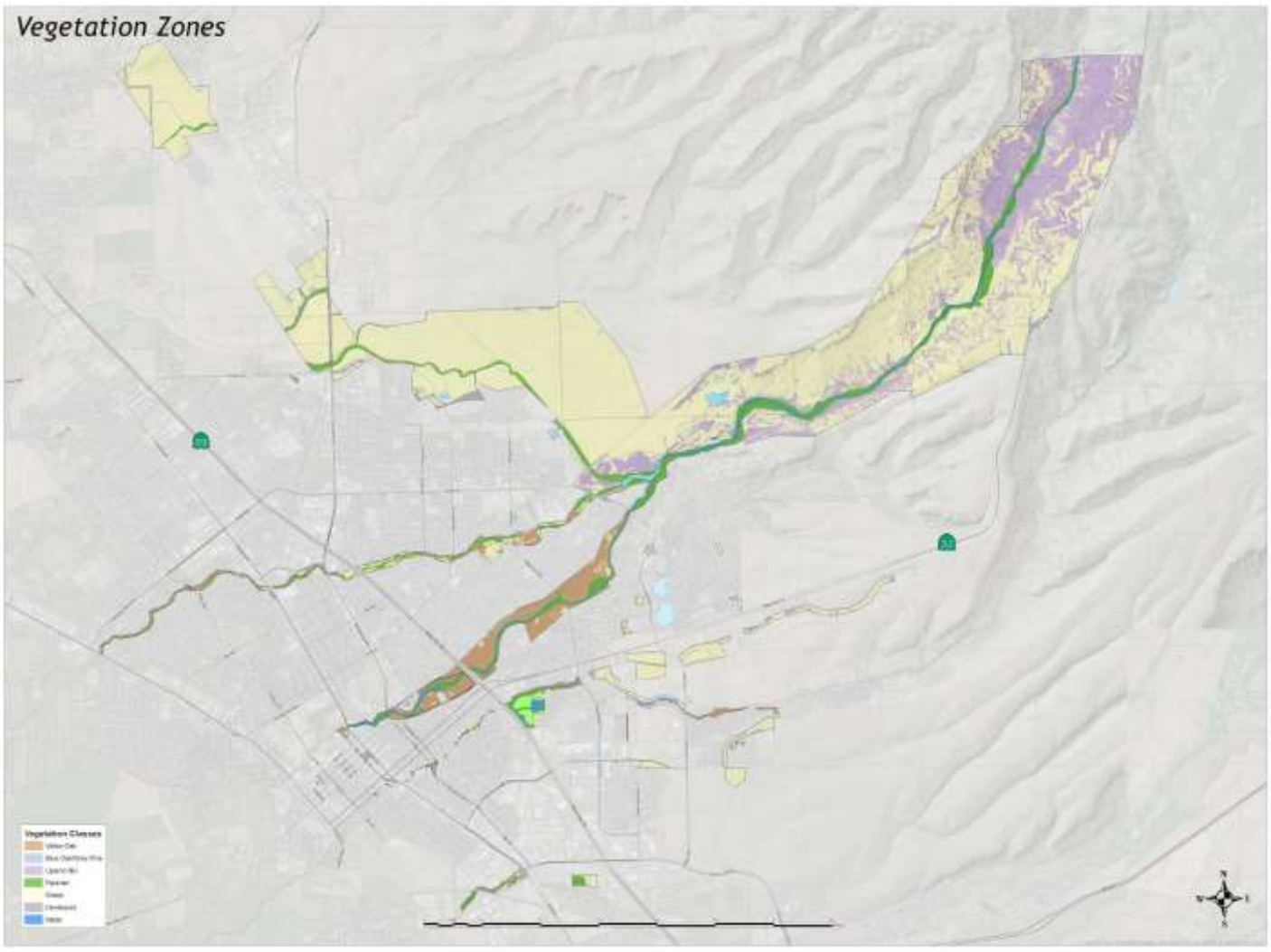
3.5 Miscellaneous City Green Space Parcels.



In spring 2020, a CSUC-ER Land Steward surveyed all the "small, scattered" parcels of City-owned land across Chico. The presence or absence of potential hazardous fuels issues and invasive plant issues were noted on each parcel and the resulting database will be used for ongoing adaptive management by the City's Public Works Department. Vegetation management on these parcels (most of which are stormwater detention basins) will focus on reducing fire danger to neighboring properties, reducing invasive species infestations that can act as seedbanks to start downstream infestations, and removing excess live or dead vegetation that could obstruct stormwater flow.

4 Vegetation Management

4.1 Vegetation Zones



4.2 Vegetation Standards and Specifications

This is a description of the ranges of acceptable fuel loading and thinning standards for each vegetation zone. The treatments applied at any one location will vary based on slope, aspect, and the particular vegetation subcommunity found there, which is why the standards are ranges. In general, the goal *outside* of fuel breaks will be to restore natural ecosystem processes (i.e., vegetation community composition/biodiversity and succession processes) and enhance natural ecosystem functions (e.g. wildlife corridors, climate change adaptation and mitigation, water supply and quality, etc.) through some combination of mechanical thinning and prescribed burning. The goal *inside* fuel breaks will be creating vegetation conditions which increase firefighter safety and the likelihood of suppression success during a wildfire. Defensible space is any thinning or hazard reduction around structures or assets of value. Fuel breaks are linear treatments usually along roads or ridges, and do not address park vegetation at large.

When tree removal is necessary to achieve identified spacing standards, invasive species will be removed first, then non-native species, and only then native species, selected to retain maximum species and structural diversity using a 'thinning from below' method retaining the largest stems. There are two main approaches to removing invasive species: area by area, or species by species. Areas heavily impacted by multiple invasive species are best managed by area. Areas lightly impacted by various species are usually managed by addressing invasive species by species. When focusing on invasive species control, it is appropriate to use a broad toolbox of treatment options and an Adaptive Management framework (i.e., follow-up and evaluate whether treatments were successful and if not, why not). An example would be to allow goats to graze down the Himalayan blackberry to a more manageable state and then follow up with herbicide.

General Vegetation Management Objectives for Defensible Space:

In general, vegetation clearance around City-owned buildings in parks, greenways, or open space areas should comply with CAL FIRE's PRC 4291 regulations, summarized below.

> *Maintain defensible space of 100 feet from each side and from the front and rear of the structure, but not beyond the property line. The amount of fuel modification necessary shall consider the flammability of the structure as affected by building material, building standards, location, and type of vegetation. Fuels shall be maintained in a condition so that a wildfire burning under average weather conditions would be unlikely to ignite the structure. Trees and shrubs should be pruned to a crown base height of 8 feet and maintained to effectively manage fuels and not form a means of rapidly transmitting fire from other nearby vegetation to a structure or from a structure to other nearby vegetation. The intensity of fuels management may vary within the 100-foot perimeter of the structure, the most intense being within the first 30 feet around the structure. Where possible, the first 2 feet out from a structure should be bare dirt, gravel, concrete, or lawn, and free of wood chips or mulch.*
>
> *Maintain any tree, shrub, or other plant adjacent to or overhanging a building free of dead or dying wood. Maintain the roof of a structure free of leaves, needles, or other vegetative materials.*
> *(California Public Resource Code Sec 4291)*

Within a range of 10-30 feet (based upon the judgement of the person doing the work) of all other park structures or recreational infrastructure which could be damaged by a fire or cause a fire ignition, including but limited to: wooden fences, interpretive signs, wooden handrails or steps, BBQs, picnic tables, or commonly-used illegal camping areas, the City will:

1. Mow all grasses (annual and perennial), weeds, and thistles to a height not to exceed 3 inches. Remove all dead or dying vegetation or woody material, and chip or spread onsite outside the 10-30' buffer. Avoid removal to the mineral soil to minimize erosion.

2. To minimize soil erosion potential, removed shrubs shall be cut at or near the ground surface and root systems left intact (with exceptions for invasives like broom).

3. Individual, diseased, damaged, or isolated gray pine trees located within 100' of any building shall be prioritized for removal.

4. Cut grass may be left on the ground surface in the 30-100' buffer around buildings to protect soil as long as it does not exceed 6 inches in height.

5. Jackpots of dead woody material with potential to cause torching into adjacent trees or damage nearby trees through radiant heat should be moved to open areas away from large trees. It is ok to leave branches

and trunks over 4 inches diameter where they lie, or spread as a chipped mulch, or removed. Full ground contact is not necessary.

6. All mulch or chipped material shall be spread to a depth not to exceed 4 inches on average; and

7. All material removed from the site shall be properly disposed of per City standards.

8. If living plants are to be removed, invasive species will be removed first, then non-native species, and only then native species selected to retain maximum species and structural diversity, using a 'thinning from below' method retaining the largest stems.

4.2.1 Grassland

Most of the Great Central Valley used to be a rippling grassland, full of vernal pools, wetlands, fire-adapted perennial grasslands, and areas of a unique mima-mound topography that supports a high biodiversity of grasses, forbs and invertebrates. In grassland ecosystems, fires can be relatively frequent -- even an annual occurrence -- but are usually swift and transient. It is possible to walk unharmed over a blackened grassland just minutes after it burns, but that doesn't mean grass fires are harmless. Grasslands usually lack overstory vegetation that can block direct impingement of wind onto the flaming front of a fire, and hence, rates of fire spread in grass are often much higher than in areas of brush or woodland. Aircraft are very effective helping corral grassland fires, even under midsummer fuel moisture conditions, but they can't operate at night or close to high-voltage powerlines.

For millennia, California's grasslands supported a thriving basket-based economy and the development of perhaps the most sophisticated basketry art cultures in the world. Mechoopda and other people cultivated high-quality basketry materials by applying regular and well-timed fire, and Chico's grasslands are adapted to regular fire to stay healthy. Although low-elevation perennial grassland is one of the most endangered ecosystems in the world, Chicoans are lucky - parts of these perennial grasslands are still here. Fire has a role to play in maintaining and protecting the ecological integrity of these rare vegetation types.

For the purposes of this Plan, "grassland" means those parts of the City's parklands that have few to no trees (e.g., most of the Airport or Bidwell Ranch; see map in 4.1). Grass, other light, flashy, or surface fuels may be found within other mapped vegetation communities/land cover types and when they are, they should be treated to the standards outlined in this section. The following management standards shall apply to grass/herbaceous fuels:

General Vegetation Management Standards for Grassland:

For most grassland areas on City-owned properties, management of the vegetation should be based upon ecological needs like controlling invasive species or creating vegetation conditions that benefit native plants. Because these grasses do not pose an imminent threat of a high intensity fire to the community, they are lower priority for treatment than areas of heavy vegetation adjacent to houses or other assets of value. That said, fast-moving grass fires can impact any of the neighborhoods along the City's northern edge, especially during red-flag north wind events, and residents living adjacent to open spaces and greenways should be encouraged to maintain defensible space and fire-safe conditions around their buildings.

Grasslands with infestations of star thistle, medusa head, and barbed goat grass are the highest priority for management. Ideally, these areas would be burned in July or August for several consecutive years to reduce the seedbed of invasives. If burned consistently, native grasses and forbs would be given the opportunity to outcompete invasive grasses, because natives are fire adapted and most invasives are not. However, due to

funding availability, restrictions and small windows for prescribed burning, it is more likely that opportune mowing will be applied. As funding becomes available, invasive grasses (such as barbed goat grass, medusa head and wild oats) should be mowed prior to drying and seed set to reduce the population spread on an annual basis until the populations are under control. Many of the invasive species are not palatable to grazing animals and can even hurt grazers. Grazing can be beneficial to reduce herbaceous fuel loads in areas of native grass species, as native grasses can lose vigor over time if their thatch is not being reduced by fire. Invasive forbs such as yellow star thistle and Klamath weed are a threat to native grasslands. These invasive forbs can also be managed through direct herbicide applications, grazing, or mowing.

4.2.2 Valley Oak

The valley oak (*Quercus lobata*) is an iconic and beloved part of the Chico community, appearing in artistic tributes on murals, bridges and signs. Valley oak woodlands are a uniquely Central Valley vegetation community that support thousands of species of plants, fungi, invertebrates and birds. Many of these live nowhere else.

Valley oak understories were maintained with cultural fire for millennia by Mechoopda people around what is now Chico. Regular low-intensity fire in oak woodlands does more than just reduce the intensity of future fires. It consumes the decaying old acorn shells, rotting wood, and other pathogenic debris around the oaks, extending their lives and keeping acorn pest populations low. Smoke rising into the oak canopy can even "fumigate" developing acorns and keep pests to a minimum, ensuring a good harvest and a healthy next generation of young oaks. With that said, large old oaks tend to both live and die by fire. Oaks are great at developing cavities (it's part of what makes them such outstanding wildlife trees) and when an ember finds its way into one of those cavities, it can land on flammable material (such as an old bird nest) and develop into a well-established fire inside of the tree. Moss on the lower reaches of the trunk often provides a pathway for even the smallest flames to travel up the tree to become established in a rotten old knothole or damaged limb. Fire inside of large hardwoods is extremely difficult and dangerous to extinguish, can spread the fire outside of the control line via falling embers, and often results in the death and weakening of major branches (even days after the surrounding under burn is cold to the touch).

Valley oaks have been consistently outcompeted by evergreen oaks since fire exclusion. Evergreen oaks photosynthesize year-round and thus grow faster than deciduous oaks. Their acorns also tend to be less palatable to wildlife, which results in more of them left lying on the ground to reproduce into thicker forests shading out Valley Oak seedlings. However, Valley oaks are more fire tolerant due to their thick bark and their less waxy cuticle. Low intensity burns help Valley oaks better compete with evergreen oaks.

General Management Standards for Valley Oak:

Open valley oak savannas with large trees have a fairly low wildfire hazard. The surface is generally well-sheltered from winds, and any fire starts will burn primarily in grass fuels. Flame lengths will generally be under 6 feet, fire control will be fairly straightforward, and extensive damage to large trees will be limited to where flames can reach up to damaged limbs or other rotten areas on the trunk. Ladder fuels and thickets increase the likelihood that fires will extend into the canopy, where exposure to more wind can flick embers into adjacent areas, complicating fire control. For this reason, wildfire hazard reduction in the valley oak community should prioritize areas with the densest understory vegetation, aiming to create open conditions under large, mature valley oaks. Vegetation management should focus on areas along access roads and in concert with other management objectives including: Raising sightlines to improve visibility into areas with illegal camping, reducing the hazard of wildfire ignitions from illegal campfires, invasive species removal, visual resource enhancement, preparing areas for the use of prescribed fire, and other ad-hoc decisions to achieve specific habitat restoration objectives.

Understory thinning in valley oak areas should first target shrubs the priority invasive species according to the list in the Appendix, then should remove any other exotics, before thinning any native vegetation. The objective of thinning, where it occurs, is to raise canopy base heights to 8 feet, remove low-hanging grape and ivy, remove thatch from decadent blackberry vines, and prune multi-stemmed shrub like species such as bay laurel back to a single healthy stem, where possible. Thinning chunks of valley oak woodland in a checkerboard pattern is a strategy to leave viny refugia for pipevine and other native climbers. Woody thinned vegetation under 4" in diameter should be chipped. Thinned stems between 4" and 8" may be chipped or may be left on the ground if they are in full ground contact, the site is flat, and leaving them does not result in excessive fuel loading (in the judgement of the person doing the work). Larger material can be piled in open areas or left in place, as long as it is far enough from the boles of nearby remnant large trees which could be damaged by radiant heat if the pile or log ignites. This material is left for wildlife habitat and nutrient cycling.

Burning in the Valley oak understory may be appropriate to manage forbs, reduce thatch fuel loads, kill invasive walnut seedlings and saplings, thin thick areas of oak regeneration, and to improve acorn quality and harvesting conditions for traditional uses by local Mechoopda people. Any burning in Valley oak should be done under weather prescriptions and with prep work (mowing and raking around each large tree, or using wetlines to check the fire's spread) which reduces the likelihood of fire getting into the large trees. One tactic for protecting large, fire-susceptible oaks from ignition would be to begin the burning project by burning 10-20' diameter rings around each large oak under very mild burning conditions, possibly at night or early in the morning, and then returning later to run a hotter broadcast burn through the rest of the understory vegetation.

Burning Himalayan blackberry is difficult without a decent wind. Fire is unlikely to be an effective management tool for reducing blackberry in the valley oak understory or in other wind-sheltered locations. Grazing and hand or chemical treatments will likely be more effective.

Restoring Over-dense Valley Oak Areas to Open Stands of Large Trees

There are areas of valley oak woodland which require major thinning to establish healthy and resilient future conditions. One example is the old walnut orchard in Lower Bidwell Park near the east entrance of Peterson Way from Vallombrosa Avenue. In the 1990s, after the property came into City ownership, Boy Scouts planted a large number of valley oak acorns into the walnut orchard as a first step to returning it to natural park conditions. These valley oaks are now well-established, and in places are competing with each other in an unnaturally large even-aged dense thicket. The density of trees causes drought stress, which makes the trees more flammable as well as more susceptible to damage or mortality should a fire occur. Thinning this type of stand to encourage the development of a mature, well-spaced stand of large oaks is a multi-decade project.

We suggest thinning should begin with a focus on removing diseased/distressed individuals, retaining vigorous individuals to a spacing of no more than 70 trees per acre (about 30 feet apart *on average*, some closer, some farther apart). Branches should be pruned to achieve a canopy base height of 8 feet. Non-native woody species should be removed where they compete with valley oaks for light or touch oak canopies. Alternatively, they may be girdled and left as standing snags (for wildlife habitat if >8" diameter at 12' above ground).

Woody debris over 8" diameter may be left onsite at least 10 feet away from the nearest tree, or removed. Material under 8" may be chipped and broadcast to an average depth of 4" or less. Further restoration to natural vegetation may be done, including prescribed burns (to initially treat weedy grasses and forbs) and/or planting of native seed/plugs to fill out the palette of natural diversity suitable for valley oak woodland. These goals may be achieved through multiple entries.

4.2.3 Riparian Areas

Chico's creeks define the experience of living, playing and studying here. Chico is extremely lucky to have urban creeks where salmon can still be glimpsed, and kids can splash next to turtles, orchids and pipevine swallowtails. People have always camped and traveled next to these creeks, so the City's work here sometimes focuses on keeping sightlines high, so creeks are safe to walk beside (especially downtown) and reducing ladder fuels to reduce the likelihood of conflagrations from escaped campfires. This work is done by removing invasive species first and only thinning native vegetation as a last resort. In some cases, removing invasive species is an important part of improving creeks' ecological integrity.

Creekside vegetation (including invasive vegetation) plays a role in keeping water temperatures low, so creekside vegetation removal must take the needs of salmon and other aquatic organisms into account. This accounting is negotiated through the Lake and Streambed Alteration ("1600") permit process whereby CDFW, as the trustee agency charged with protecting California's plants and wildlife, sets the terms and conditions governing the City's work inside stream corridors.

Overgrown vegetation along the southern boundary of Lower Park between Highway 99 and Five Mile Recreation Area poses the greatest WUI threat within Bidwell Park. Much of this area borders the riparian zone, and often, the worst fuel loading is on the private property adjacent to the Park. A wind-driven fire along this corridor, while a low-probability event, *could result in major structure losses*. Areas of special concern are along South Park Drive in the first 1,500 feet east of Highway 99, South Park Drive between Husa Lane and Centennial Ave, and between Manzanita Ave and Five Mile Recreation Area, along Centennial Ave. Treatment in these areas can include removal of invasives, dead and down material, and should aggressively target aerial fuels including living and dead grape vines and ivy.

General Vegetation Management Standards for Riparian Areas:

1. Minimize vegetation management except for invasive species removal.

2. Target ladder fuel treatment at riparian edges where they abut other vegetation types: here, vertical separation between top of surface fuels and lowest tree branch shall be at least 8 feet. Provide horizontal spacing between the outward canopy edge and the nearest shrub equal to three (3) times the adjacent shrub height;

3. Maintain closed canopy except for invasive species removal; where removal opens significant shaded water surface to sun exposure, a phased removal of invasives and replacement of shading by natives will be done. No canopy will be reduced beyond 50% canopy closure at any one time.

4. When possible, riparian corridors will be managed in increments so as not to remove all the dense habitat for wildlife at once. Rather, a phased approach will allow for regrowth of native species between entries, promoting a mosaic of habitat continuity.

5. **No fuel breaks will be constructed through riparian areas.**

6. This is due to the sensitivity of riparian habitats and their residents. Riparian habitats tend to have a higher moisture content and are therefore less likely to torch.

4.2.4 Blue Oak-Gray Pine

Blue oak (*Quercus douglasii*) and gray pine (*Pinus sabiniana*) are two endemic species whose partnership defines the vegetation of the Central Valley foothills. Expertly adapted to drought and high temperatures, they sustain an impressive diversity of companion fungi, invertebrates, large mammals, and birds. Gray pines are unusual in that they (and Torrey pines) have a heptane-based pitch chemistry, which makes them extremely flammable. With their nutritious nuts and soft wood for creating cavity nests, they do have an important place in the foothill ecosystem and are likely to be one of the most climate-change-adapted of California's conifers. But these "gasoline trees" are inappropriate for planting directly adjacent to structures or other high-value assets. Both these trees have thick bark which allows them to easily survive ground-based grass fires, unless either a) high densities of fuel have built up around the tree base due to past fire suppression or b) an ember finds its way into a tree cavity and ignites it from within.

This vegetation type hosts many endemic species that do not exist outside of this habitat. Blue oak recruitment has increased since fire exclusion due to urban sprawl. Blue oaks are the slowest growing oaks in this area as well as the longest lived. They also provide the most desirable acorns for wildlife foraging. These acorns were/are among the most desirable for indigenous peoples.

General Vegetation Management Standards for Blue Oak-Gray Pine:

Gray pine needle litter drapes into understory vegetation creating 'jackpots' of fuel. These areas are susceptible to torching and crowning fire behavior, which presents difficulties for wildfire control. Dense areas of undergrowth under gray pine within 150 feet of Upper Park Road, below Bear Hole, should be high priority areas for thinning.

While we do not advocate logging all of the mature gray pine on City property, Gray Pines are generally undesirable within the urbanized areas. Over the longer term, they should be targeted for thinning or removal when they are at all unhealthy in areas which are within 100 feet of a structure. Where removing gray pine is not practical, special attention should be given to reducing ladder fuels and undergrowth around the trees.

Thinning or removal of gray pine should be done when the trees are small, as removing larger trees is expensive and more dangerous. An example of a young stand/thicket of gray pine that should be treated before the trees become larger is on the southeast end of a small meadow in Lower Bidwell Park just west of the Vallombrosa Avenue entrance at Bryant Avenue. When thinning thickets, the healthiest and most vigorous trees should be chosen for retention and the others removed to achieve a goal of 10 seedlings or saplings per acre in managed areas.

It is thought that invasive grasses may reduce the recruitment of young blue oaks. Young blue oak seedlings should be protected from herbivory, by caging them, whenever management is done in these vegetation types. Invasive grasses can also be managed in the blue oak gray pine vegetation type more or less the same as in grasslands. Whenever possible, low intensity prescribed fires are the best management practice for the habitat type. Just like the valley oak woodland, low intensity fires reduce overcrowding and the potential to be over-shaded by evergreen oaks. Blue oaks should be targeted as retention trees in all vegetation types.

Defensible Space Management Standards:

In areas within 100 feet of occupied structures, all unhealthy gray pine shall be removed. Where removal of the mature trees is not possible, targeted thinning of understory/ladder fuels is recommended. Blue oaks within defensible space should be retained whenever possible.

4.2.5 Upland Mix

This vegetation category covers much of Upper Bidwell Park and describes the chaparral-like brush community with mixed oaks and pines that characterizes most of the low-elevation Sierra Nevada foothills. This community is also characterized by quick changes in geology, slope, aspect, and soil type which create a diverse mosaic of vegetation types.

The majority of Upper Park has experienced wildfire in the past 25 years. Only the area upstream of the Stoney Fire, on South Rim, areas between Annie Bidwell Trail and the Creek, and areas between the Park Road and the Creek from the Golf Course upstream to the Northern boundary have not burned. The normal fire return interval in this vegetation community is 5-12 years, and fire suppression has had varying levels of impact on the density of vegetation in the unburned areas.

The reason for the varied impact is geological. The mudflow layers in the canyon walls of Upper Bidwell Park alternate between permeable, well-watered areas with deeper soils, and dry, hard, impermeable ash layers with little soil, covered mainly with sparse grasses. Additionally, in places where it is not in the bottom of the canyon, the Lovejoy Basalt flow has created deeply weathered, stable colluvial soils on the steep toe-slopes below. The radical geology, coupled with the abundant number of deeply dissected tributaries has created a wide variety of microclimates which either magnify or reduce the magnitude of vegetation changes caused by fire suppression.

The fine-grained mosaic of habitat types in Upper Park, especially on the South Rim, creates a very *pyrodiverse* landscape, where fire severities are widely-variable, and the patch-sizes of their effects create more niches for native plant diversity. Biologists express this dynamic with the proverb, “pyrodiversity begets biodiversity”. Vegetation management in the wildland parts of the Upland Mix vegetation community will be necessarily complex and is best approached by working within individual microclimates. The landscape defines the management units.

In the unburned areas, with unnaturally long intervals between fires, shade-tolerant species such as interior live oak eventually can dominate species that need direct sunlight such as black oak. Woodlands which were historically periodically cleared by fire can become a dense thicket of competing vegetation. This change in species composition changes forest structure and wildlife habitat, among other ecosystem features. Therefore, vegetation management in this zone can be focused on compensating for the vegetation consequences of unnatural wildfire suppression over time.

General Vegetation Management Standards for Upland Mix:

This vegetation type should be managed on a microclimate basis, thus allowing for expansion of the biodiversity in each microclimate. Biodiversity in this case, however, should not include invasive species; these should be prioritized for removal by grazing, hand, mechanical, or chemical treatments. Where appropriate species are present, canopy heights should be managed to be increased over time (e.g., raising canopies through hand treatments). This may be done through removal of invasive species, thinning and pruning of shrub species, and then tree species. Where they are present, populations of black oaks, valley oaks, broad leaf maples and other deciduous trees that do not present great fire hazards should be enhanced and should be prioritized over evergreen oaks.

First, workers should select the most vigorous deciduous trees for retention; then, they should thin around those to achieve vertical and horizontal discontinuity. Care should be taken to retain a diverse vegetation community. The canopies of trees provide shade to increase the longevity of moisture availability through the dry summer months. The goal of vegetation management in this zone is to create a mosaic of biodiverse habitats through

hand or mechanical treatments, or herbicide application that can later support a prescribed burn and therefore be more wildfire ready.

Where residual older black oak or manzanita are abundant enough to form a localized patch or larger stand on their own, crews will remove competing younger interior live oak, bay, poison oak, and other shade tolerants (i.e., 'release' black oaks or manzanita). Managers should consider removing enough of the ladder fuels to be able to conduct a controlled broadcast burn in the following 2-3 years, during or after the burning of the piles.

In general, where there are concentrations of large individuals of a particular woody species surrounded by a smaller different species chosen management methods should benefit the older species in that patch. Relict species may be those dependent on fire for regeneration such as manzanita, redberry, ceanothus and others. If there are signs of grasslands or meadows that have been encroached upon by woody species, for example, relict sun-loving forbs struggling under a shady edge, vegetation management can be used to re-establish the grassland or meadow conditions in the adjacent area.

In areas that have been subject to high intensity fires, species should be managed towards a successional climax community with mature vegetation - see the *Postfire Restoration section, below.* Slope aspect is an important factor in the feasibility of prescribed burning in Upper Park. South and west-facing slopes dry out quickly after storms, while north and east slopes tend to remain wet for longer periods. This can create opportunities for late-fall or midwinter burning on the more solar slopes, when risk of escape to the wetter north slopes is very low.

Broadcast burning on north-facing slopes in the upland mix will generally be more difficult, as fuel conditions there will rarely be in a condition which allows fuels reduction objectives to be met without a higher risk of escape onto the drier aspects nearby. However, it may be possible to use low-intensity under burning to reduce leaf litter and low shrubs following projects which aim to open up the understory in north-facing black oak stands.

Gray pine is less desirable from a wildfire fuel risk standpoint. These pines may be unnaturally locally abundant or old as a result of the absence of wildfire in these wildfire-dependent vegetation types. While we do not advocate logging all of the mature gray pine on City property, Gray pines are generally undesirable within the urbanized areas and over the longer term, should be targeted for thinning or removal when they are at all unhealthy in areas which are within 100 feet of a structure. Where removing gray pine is not practical, special attention should be given to reducing ladder fuels and undergrowth around the trees. Gray pines may be girdled and retained for wildlife value and in order to achieve a more balanced and biodiverse microclimate.

Fuel break Management Standards for Upland Mix:

There are few assets at risk in the Upland Mix zone which require defensible space thinning around them. Most targeted thinning will be in areas designated as fuel breaks or 'Defensible Fuel Profile Zones'. Fuel breaks are similar to defensible space in that there are buffer zones of intense thinning with diminishing intensity of treatment farther from the core. The following recommendations are specific to ridgetop thinning and postfire restoration work on the South Rim of Bidwell Park.

1. <u>In the core area, 50' either way from the centerline of the project:</u>

    a. Prune sprouting woody species back to 1 or 2 main stems.
    b. Raise canopy base heights to 8 feet.
    c. Remove all dead or dying brush/scrub. It should be chipped or moved to an area outside the core.
    d. Remove all gray pine, living or dead.
    e. Individual shrubs should be separated from adjacent shrubs or trees by at least two times the height of the shrub crown.

f. Mowing may not be practical on the ridgetop fuel breaks, which will likely be opened up by bulldozers or hand crews during a wildfire.

2. In the area 50-100 feet from the centerline of the project:

   a. Prune sprouting woody species back to 1 or 2 main stems.
   b. Raise canopy base heights to 8 feet.
   c. Remove understory vegetation under trees, especially gray pine.
   d. Groupings of shrubs may be retained such that the grouping does not exceed 12 feet in diameter. Shrub groupings shall be horizontally separated from adjacent shrubs, shrub groupings, or trees by at least two times the height of the shrub crown.

3. In areas within the overall fuel break project area, farther than 100 feet from project centerline:

   a. Prune sprouting woody species back to 1 or 2 main stems. Limb largest trees up as high is practical.

General fuel break standards

1. To minimize soil erosion potential, removed shrubs shall be cut at or near the ground surface and root systems left intact.

2. Where chipping is practicable, all vegetative material from brush/scrub removal or trimming, smaller than 8 inches in diameter, shall be reduced to full ground contact, or chipped and spread as mulch no deeper than an average of 4", or removed. Wood larger than 8 inches in diameter can be left on site without efforts to increase ground contact but should be placed where radiant heat from the material burning will not kill adjacent large trees.

3. Avoid leaving rounds of wood or short logs in places where they could roll downhill while on fire.

4. All material removed from the site shall be properly disposed of per City standards; and

5. If living plants are to be removed, invasive species will be removed first, then non-native species, and only then native species selected to retain maximum species and structural diversity, using a 'thinning from below' method retaining the largest stems.

Post-Fire Restoration in the Upland Mix - General Marking Guidelines and Best Practices

The objective is to create an open stand of well-spaced single-or few-stemmed trees that has reduced horizontal and vertical fuel continuity. Stands should retain the larger well-spaced trees (live and dead). Emphasis should be placed on the recruitment of all oak species of all sizes.

1. Retain

   a. Retain all living oak trees of all size classes.
   b. Retain dead tree stems 8” DBH and larger that are not a hazard to roads or trails.
   c. Retain toyon, coffeeberry, and ceanothus in understory.
   d. Aim to leave herbaceous native diversity in understory intact through treatment.
   e. Retain 3-4 strongest resprouts on large standing dead bay laurels, madrones, and oaks where they do not compete with other trees.

f. Leave larger downed tree stems (especially 20+" diameter downed logs) in longer lengths (do not buck), if close to ground contact
g. Leave trees that contain an active wildlife nest and large diameter snags (12+" diameter).

2. Remove

a. In areas with hazard tree concerns or near heavily used areas, depending on site density, either cut,-lop,-and-scatter, or cut-and-pile all dead tree stems 6" DBH and smaller.
b. In instances of mature, second-growth, multi-stemmed laurels, live oak, and madrones: retain a single stem over 10" and cut the rest.
c. The need to remove dead and worst-quality trees takes precedence over spacing preferences.
d. Cut hazardous trees of any size near roads and trails with:
e. Heavy lean (on hardwoods, removal of only those branches/stems that lean toward infrastructure may be sufficient).
f. Charring all the way around the base with reduction in bark thickness and exposed wood
g. Signs of significant decay
h. Prefer to remove trees in the following order:
i. Pine (knobcone or gray pine)
    - Bay laurel
    - Madrone
    - Douglas-fir
    - Coast live oak
    - Oregon white oak
    - California black oak

These prescriptions place priority on the recruitment and sprout recovery of well-spaced overstory species including various oaks, madrone, bay laurel, and understory species including toyon, coffeeberry, and ceanothus. Invasives should be targeted for removal. All post-fire work should take precautions to avoid soil disturbance and spread weeds.

Oaks should be retained wherever possible, and their original dominant stem should be prioritized for keeping even if others must be removed. It can take even up to three to five years for an oak to resprout, so where possible, give oaks sufficient time before making a determination of live or dead. Even oaks that endured significant heating to their main stem may resprout from their crowns. Oaks tend to prefer resprouting from their original stem, possibly with the exception of cases where the original stem was already heavily infected with a pathogen.

Pacific madrones, toyon, scrub oak, and bay laurels tend to resprout from their base prolifically in cases where their original stems or leaves endured significant heating. When this occurs, pruning back all but the three to four most dominant resprouts will encourage more rapid growth into a tree form rather than a bush form. This also improves fire resilience by increasing spacing.

Depending on the amount of fuel cut on any given site and amount of available space between intact trees left standing, treated dead tree material may be lopped and consolidated into small piles (less than or equal to 4ft diameter) for future burning and habitat, or chipped and broadcast in a fine layer (<5") only along roads or where reasonable to bring a chipper.

Felled large-diameter material, especially 20 inches diameter and larger, if not hazardous to infrastructure or safety, can be left in longer lengths (ideally 20 ft long or longer) where they lie. This helps retain a "natural" appearance and provide habitat at a load between 2-6 logs per acre.

Where not a hazard to infrastructure/safety, at least four snags per acre of the largest possible diameter should be retained for habitat. Habitat snags should generally be at least 12 inches in diameter, but preferably 16 or more, and at least 20 ft tall.

To minimize ecological impact on recovering native understory vegetation, any chipping operations should minimize soil disturbance and broadcast chips away from sensitive plants. Where it is feasible, broadcast chips toward known invasive weed patches.

3. Other Near-term Actions 1-2 Years Post-fire

a. Manage weed infestations/mitigate weed impacts of cleanup activities.
b. Use crews to hand pull target weed species where and when possible. Utilize herbicide crews to remove exotic species in locations or of sizes that are not readily removable by hand pulling. Utilize propane torch during wet season as needed to support invasive species management efforts.
c. Build habitat piles in areas not directly adjacent to roads and trails.
d. Collect and spread seeds of desired plants.
e. Collect seed from on-site or near-site native bunchgrasses, herbaceous species and herbaceous species through the late spring to early fall. Store in mouse-proof, breathable container. Direct-sow grass and forb seed in the fall with rain. Bare mineral soil following pile burning is an excellent place to spread native seed.

4. Ongoing Post-fire Restoration Activities 2-4 Years Post-fire

a. Reseed with native plants where appropriate.
b. Continue collection of native seeds through each late spring to early fall; direct-sow seeds with fall rains. To reduce required effort, bring seed collection bags on hikes or projects or whenever out in wildland areas for other reasons. Focus seed dispersal efforts into disturbed, open, or unvegetated areas, such as in footprints of heavy equipment operation or burned piles of vegetation.
c. Maintain fuel breaks; perform ongoing vegetation management to meet the vegetation zone standard(s), including pruning new growth.
d. Use a combination of hand thinning, pruning, chipping, moving, and burning to reduce accumulated live and dead fuels less than 8 inches in diameter. Reduce basal resprouts on trees in burned areas down to 3-4 dominant resprouts. Keep and promote oaks as much as possible and leave burned oak trees standing for 3-5 years where not a threat to infrastructure to allow for sufficient recovery opportunity.

5. Long-Term Actions 5+ Years Post-Fire

a. Reintroduce fire where appropriate in treated areas to achieve desired vegetation conditions.
b. After initial post-fire rehabilitation and cleanup efforts are complete, and five years after the fire, reintroduce broadcast prescribed burning to areas that present logistical benefits from burning, including amongst road and trail systems.
c. Maintain fuel breaks; perform ongoing vegetation management to meet the vegetation zone standard(s), including pruning new growth.

4.3 Vegetation Management Tools

To provide context and a common starting point for discussion, this section defines and explains a wide range of vegetation management tools, techniques, actions and methods. It also specifies best management practices to ensure resources remain protected. Readers are encouraged to refer back to this section when reading the project proposals or maintenance recommendations in the other parts of this Plan.

Vegetation management for fire hazard mitigation means thinning, pruning, removing, rearranging, or otherwise altering vegetation in order to (1) make ignitions less likely and (2) make fire behavior less severe. The vegetation management toolbox is large, because nature is varied. No two acres are exactly alike. Tactics may need to change from site to site – or, on the same site, from season to season. On the other hand, conditions on some sites may be stable enough to make a standard prescription appropriate. In general, vegetation management techniques can be classified into five categories:

- Biological (e.g., grazing)
- Hand Labor (e.g., hand pulling, cutting)
- Machine Labor (e.g., tractors, masticators)
- Chemical (e.g., herbicide)
- Fire

Below, we will discuss each of these five main vegetation management techniques that may be implemented in the Plan Area. This discussion will cover relevant equipment, application, timing, limiting factors, special considerations and BMPs. Selection of a qualified and trained contractor, appropriate training, scheduling, and supervision to carry out vegetation management treatments and any associated BMPs are also key components of an effective vegetation management program.

Finally, because vegetation tends to grow back, we can expect most treatment techniques may need to be repeated (alone or in combination with other techniques) over time. Therefore, an adaptive approach that allows for ongoing adjustment of techniques is best. Adaptive management allows the City and partners to achieve the desired vegetation outcomes and standards listed in this VFMP. Vegetation management techniques will be dictated by site-specific conditions and by the relative effort needed to meet identified vegetation management standards, which are provided in Section 4.5.

4.3.1 Biological Techniques

Grazing

Grazing, in a fire mitigation context, means managing livestock with the goal of altering vegetation, especially the fine fuels, which drive wildfire spread. Managers may target grazing to reduce fuel loads, to rearrange fuels, to favor certain plants over others, or all three. Different livestock concentrate on different types of vegetation: for instance, horses are good at reducing the fine flashy fuel we know as grass, while goats are often willing to remove berry vines, shrubs, and the fresh growth of young trees. Some livestock are large or athletic enough to trample fuels, thereby changing the fuel orientation from vertical to horizontal. This rearrangement can significantly alter fire behavior even if the livestock did not actually consume much vegetation.

Livestock each have different grazing habits and not all livestock are ideally suited for grazing treatments in all areas. Most livestock, with the exception of goats, do not consume significant amounts of live or dead, tough, woody plant material. Even goats will not consume as much woody material in the summer and fall as they will in the spring, when many shrubs are at their most palatable (and the animals undergo their seasonal

growth surge). In general, no matter the species, livestock are better at maintaining fuel breaks than they are at creating them.

Grazing can be a relatively inexpensive and effective treatment method. Sometimes, it can even generate revenue (but usually not). Doing grazing correctly takes substantial oversight and attention, so labor costs (including professional herders and portable fences) can be significant. This labor cost is indispensable for protecting riparian zones and sensitive resource areas, and to minimize erosion potential. If grazing animals are not moved to a new location as soon as the grazing objective is met, the grazing can become counterproductive. Fortunately, the North Valley has several professional grazing contractors who are experienced at using targeted grazing to achieve management objectives while protecting resources. It is important for the City and the contractor to have a shared understanding of how much the animals will be attended, and what is expected of the herder(s).

Livestock need to be protected from predators. This includes domestic dogs, who can sometimes kill livestock from sheer harassment (or "trying to play") even if they do not actually attack the animals. Dog-livestock conflicts may need management in City parks. Some contractors use livestock guardian dogs as working partners.

Grazing management plans should be site- and objective-specific. They should also identify the optimal stocking rate, timing, and duration, as well as the desired conditions (such as reduction in canopy coverage or residual dry matter (RDM)), even if these desired conditions cannot be achieved in just one grazing cycle. Plans should contain trigger points or thresholds for turning animals into and out of the area. These thresholds can be anything that is both relevant and measurable: for example, % canopy closure, estimated tons/acre of vegetation, etc.

Plans should also note areas of concern (e.g., erodible banks) for grazers to watch out for. Maps or sketches showing sensitive areas need not be highly precise or sophisticated, as long as they are clear, and the herder or contractor thoroughly understands managers' expectations. Any features that will concentrate animals' impacts (e.g., mineral licks or watering troughs) should be placed outside of sensitive areas. If grazing near a stream, the plan usually includes a stream buffer, which need not be very large (see below). Finally, every grazing plan should include measures to prevent the movement and introduction of highly flammable/rapidly spreading plants and diseases.

Some areas need to be grazed annually, which others benefit from a "two years on, one year off" or other pattern of grazing. In many cases, at least after initial environmental review is conducted, grazing is best thought of as a maintenance activity rather than as a project in and of itself. Grazing is a "blunt tool" useful principally to reduce biomass and sometimes shift species ratios; if targeted long-lasting effects on species composition are desired, they are usually achieved by following up with hand labor or targeted herbicide application. The City of Chico has already successfully used goats to temporarily reduce blackberries and other unwanted vegetation in and around Bidwell Park and other places.

Best Management Practices for Grazing

Riparian Zones

Streams and watercourses within proposed grazing areas should be identified and assessed prior to turn-out. Temporary fencing can keep animals out of creeks and prevent water contamination. The stream buffer doesn't need to be very large: Unless feces are deposited in or immediately adjacent to a streambed (on the order of a meter or so), there is little danger of significant bacterial contamination from overland flow (EBMUD 2001). Besides bacterial contamination, nitrogen and phosphorus runoff are concerns from grazing livestock. However, bringing livestock into an area for a short, relatively intense pulse of grazing mimics the activity of historic

herds of ruminants and thus arguably reproduces nutrient cycling conditions with which the watershed would have evolved.

Sensitive Biological and Cultural Resource Areas

Grazing areas are often assessed for presence of sensitive biological and cultural resources prior to turn-out. This ensures areas with special-status plants, animals, historic or pre-historic resources, and other areas or items of cultural significance, can be fenced out from the grazing area if necessary. In particular, areas with highly erodible or unstable soils often warrant exclusion. However, it is not always necessary to exclude animals from an area just because a sensitive resource is present. Many cultural resources will be unharmed by grazing, and targeted grazing at the right time can even be a tool to promote rare plant recruitment.

Other Best Management Practices

A BMP for goat grazing to reduce Himalayan blackberry thickets (and other perennial resprouting undesired plants) necessarily includes follow up with herbicide to consolidate gains, prolong positive effects, and increase the effectiveness of funds spent. Additional BMPs include routine monitoring, proper selection of qualified contractors, inclusion of BMPs in grazing contracts, and properly addressing safety concerns regarding use of electric fences in public spaces.

Biological Control Agents

Some vegetative fuels are best controlled with natural enemies. Examples include weevils that eat unwanted plants' seeds, caterpillars that defoliate them, fungi that blight them, or even viruses that stunt their growth. For example, the Scotch broom beetle (*Bruchidius villosus*) feeds on the seeds of Scotch broom, a highly flammable invasive weed. Scotch broom can thrive on roadsides and dry creek bottoms, eliminating these corridors' usefulness as firebreaks. Any biological control agent release would be coordinated with Butte County Ag. The following information is not a prescription for any action but is to provide a common starting point for discussions in case biological control ever becomes a proposed project inside Chico.

Biological control agents are usually used to control invasive, not native, vegetation. Unlike local native organisms, the biological control agent evolved in the invasive weed's homeland, so it must be imported from that area of origin. Some biological control agent introductions have had unintended consequences (e.g., the biological control agent is sometimes found to feed on native vegetation too, or it disrupts local food chains). Many, however, have been successful. Sometimes, the same biological control agent is a success in one part of the world but a failure in others. For example, the Scotch broom beetle (native to Europe) seems to be providing effective broom control in parts of the U.S. but had unintended consequences when it was introduced to New Zealand.

Biological control agents are not just for invasive weeds. They can also attack invasive pests that are hurting native trees. For example, recently insurgent tree pests like the Gold-Spotted Oak Borer (*Agrilus aurogutattus*), a beetle, and sudden oak death (*Phytophthora ramorum*), a fungus, can kill large numbers of mature oak trees in a short time, turning vibrant oak woodlands into standing dead fuels. These pests may one day be managed with biological control, too, although they are not correct now.

This Plan does not contemplate the release of any new biological control agents not yet present in Chico. However, this background is provided for context because monitoring biological control agent populations may be key to some integrated pest management (IPM) guidelines, which are found in this Plan. For example, guidelines may state that chemical or mechanical control of a weed is warranted if its biological control agent is not abundant enough to keep its population in check.

Best Management Practices for Biological Control Agents

Food webs are complex and unpredictable, and introducing new species can have serious unforeseen consequences. It is wise to only use biological control agents that are well established in the local bioregion (if not at the specific site one is managing). The University of California Cooperative Extension is the authority on biological control of weeds and pest species in California.

Reseeding

Plants can be kept in check by insects and diseases, but also by other plants. Plants readily compete with each other for food (sunlight) as well as for water, space, and pollinators. Sometimes, managers can use plants' natural competitive instincts to human advantage by giving one plant species a helping hand over others. For example, managers may try to restore perennial grasslands at the expense of star thistle. Even though both vegetation communities readily burn, bunchgrasses are more likely to support a patchy and self-limiting (i.e., low intensity) fire, whereas dense star thistle is more likely to support higher flame lengths.

Seed can be scattered by hand, but this is usually not very effective unless very well-timed and under the right conditions (e.g., disturbed or near-bare soil, hand-sowing quickly followed up with appropriate mulching with e.g. weed-free straw, and a good rain coming). Seeds can be drilled into the ground with a push-seeder, or planted with a seed drill pulled behind a tractor or 4x4. Seed drills can be no-till or regular. No-till drills disturb the soil surface very little, and they are useful when planting into a flat mulch of mostly dead or dormant vegetation. Regular drills tend to churn up the soil surface, and they are useful when existing vegetation needs to be removed before a seed can be planted (e.g., for light-dependent germinators). There are few opportunities to use these seed establishment tools in Chico. Of course, there are other ways to prepare a good seedbed, such as fire (see section below).

Plants can also be established from plugs, seedlings, saplings, cuttings, and other methods of propagation. These planting methods range from relatively non-invasive (e.g., sticking dormant willow cuttings into a riverbank) to relatively resource-intensive if the propagules are well-rooted and require a large planting hole.

An important consideration for plantings is whether they will need to be watered to allow the desired vegetation to outcompete its opponents. Carefully targeted irrigation can give desirable plants a competitive advantage but is resource-intensive and not always feasible. Irrigated plants are far more fire-resistant than non-irrigated plants, and irrigated lawns or golf courses make excellent firebreaks.

4.3.2 Hand Labor Techniques

Hand labor treatments involve pruning, cutting, or removal of trees, shrubs, and grasses by hand or using hand-held equipment (including mechanized hand-held equipment, such as string trimmers and chainsaws). Other hand labor treatments involve removing dead wood and litter or applying mulches. Hand labor can be selective and targeted, so it is often appropriate in areas with difficult access and/or sensitive resources (such as in riparian areas). Hand laborers usually have a light impact on the land, except sometimes on steep erodible slopes or during very wet weather. Depending on the situation, hand labor may be more or less dangerous for the workers who engage in it, compared with machine labor.

Hand labor generates debris when pulling, pruning, and cutting vegetation. The debris can be removed, burned on site, chipped on or near the site, or scattered on site if that is consistent with fuel loading objectives.

Hand labor is relatively accessible to students and volunteers because some hand labor treatment techniques require little expertise and manual skill. However, appropriate supervision and adequate training is always

essential. If the objective is to identify and retain one type of plant, the hand laborers need to be able to identify that plant. Even distinguishing live from dead trees can take a surprising amount of skill. Trees to be removed are marked beforehand by a qualified arborist, but it is of paramount importance that the laborers understand and interpret the marking system the same way as the manager(s).

Hand tools include, but are not limited to, shovels, Pulaski hoes, McLeod tools, string or blade trimmers (potentially using different blades according to materials being treated), "weed wrenches" (tools that pull both shrub and root system out), chain saws, hand saws, machetes, pruning shears, and loppers. Personal protective equipment (PPE) typically includes long pants and long-sleeved shirts, gloves, safety goggles or face shield, hard hats, and sturdy boots.

Hand labor *can* be used to solve almost any vegetation problem, although it is not the most cost-effective option on every site. For example, hand-held string trimmers can mow grass, greatly reducing its potential to fuel wind-driven fires but are not cost-effective for large fields. Handheld cutting tools can thin brush and prune up the lower branches of trees to reduce ladder fuels. While masticators are certainly faster (see 4.4.3), hand- cutting allows managers great flexibility to create space between and around trees or clumps of trees (mosaic thinning) and/or to thin out the vegetation under the dripline of trees (dripline thinning). Hand-cutting also allows crews to be highly selective. Dead, dying, and invasive plants are usually prioritized for removal. In some cases, highly flammable plants like gray pine might be prioritized for removal over oaks. Hand removal techniques are most useful in WUI or Intermix areas and/or around high-value resources, such as cultural sites or park management facilities.

Hand labor crews can also be used to apply mulch. Mulch, in this context, means any material applied to vegetation to physically hinder its growth. Mulch can be biodegradable, such as a deep layer of wood chips, or it can be non-biodegradable, such as a 5-mil layer of black plastic. In addition to inhibiting weed growth, mulch can protect bare soil from rainfall impact, provide soil nutrients during the decomposition process, and help retain soil moisture, depending on the application.

Best Management Practices for Hand Labor

The following BMPs should be implemented, where feasible, when utilizing hand labor vegetation management techniques. In all circumstances, tools and equipment should be utilized only for their intended use. Marking systems should always be explained before work starts to ensure laborers interpret them the same way management does. Laborers should always be able to explain the reason for the work they are doing, and what plants they are leaving intact and why. The CSUC Reserves are developing a training program for wildland managers that includes training crews on how to avoid sensitive resources during vegetation management, and the City intends to use CSUC crews from time to time both to do hand work and to train other crews to do hand work.

Tool and Equipment Use

1. Ensure equipment operators and project personnel are properly trained in equipment use;

2. Ensure that vehicles and equipment arrive at the treatment area clean and weed-free;

3. Protect retained trees and vegetation from tool and equipment damage;

4. Service and fuel tools only in areas that will not allow grease, oil, fuel, or other hazardous materials to pass into streams or retained vegetation; and
5. Remove from the site and properly dispose of all refuse, litter, trash, and non-vegetative debris resulting from vegetation treatment operations, and other activity in connection with vegetation treatment operations.

6. All internal combustion tools should be fitted with a spark arrestor.

4.3.3 Machine Work

Machine labor means all fuel reduction methods that employ motorized heavy equipment. Machines can treat grass (e.g., mowers, diskers) or woody material (e.g., masticators, feller-bunchers). Machine techniques rearrange vegetation structure, crush or chip/shred material, and move material to landings, staging areas, or burn piles. For example, mowers leave cut material on the ground surface, and masticators shred/chip brush and heavier woody vegetation, leaving treated material in a compacted chip layer on the ground surface. Neither of these machines actually *remove* fuels; instead, they alter fire behavior just by *rearranging* fuels. Of course, machines can also remove fuels entirely, usually by transporting them to a landing where they are burned or loaded into a truck.

Heavy equipment is usually equipped with either rubber tires or tracks, although skids and cables are also used. In some instances, two or more pieces of heavy equipment will work in concert to achieve the fuel treatment standard. For example, a feller-buncher might cut trees, while another piece of equipment moves the cut material to a landing or staging area where it can then be further treated or transported off site.

Machine equipment is generally used in more uniform fuels where its use more efficiently reaches treatment standards. Constraints to machine use include:

- steep slopes;
- dense tree cover machines can't move through;
- saturated soils;
- a high need for selectivity in plant removal; and
- high-fire-hazard weather conditions where equipment use could result in ignition.

Machine labor is typically not able to be as selective as hand labor. Machines are also more likely to result in damage to retained vegetation than hand labor, in many cases. Finally, machines usually require more training to operate than hand tools.

Machines are often used in conjunction with other treatment techniques, particularly hand labor (prior to machine treatment) and prescribed fire (following machine treatment). Timing of the treatments plays a large part in determining treatment success. More common mechanical techniques to treat or reduce fuel loads are described in the following sections.

Grading

Grading means using a tractor-mounted metal blade to scrape away and reshape the top inch to several inches of soil. It is a seriously ground-disturbing activity that carries a relatively high potential of damage to cultural and historical resources like old wagon ruts and tribal artifacts, so it is not contemplated for use on City parklands. However, during fire emergencies, CAL FIRE may bulldoze firebreaks to stop the spread of wildfire. The resultant "dozer scars" can pose erosion and invasive weed issues if left un-addressed. Therefore, grading may have some beneficial applications to rehabilitate dozer scars.

Mowing

Mowing tools include rotary mowers on wheeled tractors, straight-edged cutter bar mowers, or flails. Mowing does not involve soil disturbance. Mowing results in shorter, more compacted fuels, which reduces potential flame length and fire spread rates. Under ideal conditions, approximately 5 acres can be mowed per day,

depending on the treatment area's slope and accessibility. Timing of mowing has an impact on the type of grasses and forbs promoted.

Mowing is typically required annually, sometimes more than once per year depending on late spring storms. Mowing may be used in conjunction with other techniques, such as disking, a light soil-disturbance technique. Mowing may not be appropriate in areas where special-status species have potential to occur.

Disking

Disking is a fuel reduction technique where a tractor drags several circular, slightly angled blades behind it, each blade offset a few inches from the next. These blades cut the sod and lightly mix it into the top few inches of soil, creating a strip of exposed earth which does not retain enough fuel to carry a fire. Disking does not work in areas with tall or dense vegetation; these areas must be mowed first. Disking of fuel breaks is a common practice along the perimeter of open spaces, ranches, and roadways. A tractor with disk attachment can typically disk a 6- to 15-foot-wide swath in a single pass (depending on the size of the attachment), disking approximately 2 acres per day. Disking is typically done once a year, in early summer, once grass is dry and cured enough so that it will not regrow during that growing season. For example, the perimeter of Bidwell Ranch is commonly disked as a firebreak in early summer.

Disking creates an uneven surface that reduces water velocity and can even improve water infiltration; however, when aligned with steep slopes, disking could result in erosion. While disking is an effective barrier to surface fire spread, it can promote weed growth, depending on the seedbank and timing.

Mechanical Crushing/Mastication

A tractor or similar equipment may be used to crush vegetation. A common way of doing this is with a blade that is kept slightly off the ground. A variety of attachments may also be used, including rollers (e.g., brush hog), a horizontal cutting blade (which operates similar to a large mower), or a set of chains to flail the material being treated. The blade cuts or breaks off the shrub tops, knocks down larger shrubs, and compacts the treated material, which is then left to dry so that it can be subsequently scattered or piled and burned. Sometimes, a Bobcat with a grapple arm is used to pull shrubs directly out of the ground and pile them for crushing. Using these and similar treatment techniques, some soil is disturbed where the equipment travels and where some shrubs are uprooted.

Because crushed brush dries out faster than live brush, it will often burn well even in midwinter, when surrounding live brush still has a high moisture content. Thus, by crushing brush in fall, operators can create islands or windrows of drier brush that will burn in February when fire conditions are safe and surrounding vegetation is relatively slow to ignite. Burning these islands or windrows can create a desirable mosaic pattern which enhances habitat and fire safety, compared to homogenous vegetation.

Flailing treatment involves the use of tractors with affixed or towed mowing heads that cut or flail small diameter material, especially grasses and thin shrubs like broom. Some attachments include an articulated arm or boom that can reach 10 feet to 15 feet from a vehicle (Tiger mower).

Masticating equipment (installed on Bobcats, wheeled or crawler-type tractors, excavators, or other specialized vehicles) is used to cut or shred shrubs and trees into small pieces that are then scattered across the ground, where they act as mulch. Shrubs and sapling-size trees are typically masticated with Bobcats and crawler-type tractors, while excavators are often used when larger trees are removed. Bobcats typically operate on slopes with gradients less than 20%, while excavators and tractors can operate on slopes with gradients up to 45%.

Crushing and masticating brush do not, by themselves, remove fuel. They just rearrange it so that it is more horizontal than vertical. The resulting deep layer of woody mulch does not burn as quickly or with as high flame lengths as the standing brush would have. But if it does ignite, it can burn with a long heat residency that may result in higher tree mortality than a shorter burn racing through the brush. This is because the deep layer of woody mulch can produce enough heat to cook tree roots deeper underground than normal wildfire heat penetrates. Fires in smoldering mulch can also be very difficult to extinguish. These problems are more likely to result when the layer of crushed fuel is quite deep.

Chipping

Chippers can shred long branches and into wood chips small enough to run between a person's fingers. Larger grinders, such as tub grinders, can chip logs up to 24 inches in diameter. Most chippers are stationary when they operate, and need to have woody material brought to them. However, tracked chippers also exist and can be driven from pile to pile across the landscape.

Chipping reduces the size of materials by passing them through a series of high-speed blades. The result is chips or mulch, which is deposited into a truck bed or on the ground in a pile or broadcast on a site. The smaller the wood chip, the less flammable the resulting chipped mulch. To be fire-safe, and to protect the roots of surviving plants from future fires, chips should be scattered and not piled more than 4-6" deep. Chips should be raked away from retained trees to prevent root crown rot.

Tree Removal

Sometimes, it is necessary to remove whole trees. This is most commonly done with chain saws, but sometimes with feller-bunchers. Yarding equipment (described below) is then used for transporting cut material to a landing or staging area. Tree removal can be selective (removing individual trees within a stand and retaining others) or broad (removing all trees in a stand or portion thereof). Selective tree removal is used to reduce vertical and horizontal continuity between retained trees and in shaded fuel breaks. The open space created by selective thinning minimizes the potential for crown fire transition (upward movement of fire from the ground into tree canopies) and crown fire spread (horizontal movement of fire from tree canopy to tree canopy). Broad tree removal is not contemplated in this VFMP.

When trees are removed using chain saws, workers typically first use chain saws to cut and drop trees to the ground, then to de-limb them and buck them (i.e., cut them into smaller lengths). By contrast, feller-bunchers are large mechanized pieces of equipment used to harvest or remove trees in a short period of time. Because they tend to be less selective in their application, they are typically not used in areas where tree retention is identified as a treatment standard. While feller-bunchers typically have a 24- inch- to 30-inch-diameter limit for the size of trees that they can remove and can create a large amount of debris requiring removal for further treatment, they generally reduce the amount of skidding and on-site soil disturbance.

Following their use, treatment of residual material is typically performed using hand labor techniques. Removal of more than one or two trees from a site usually requires the establishment of a flat landing area, which is an area of land used during operations to sort, store, and load logs onto trucks or to chip them into mulch. (Felled trees are not always removed from a site; sometimes, simply laying the tree down on the ground can be sufficient to meet fuel loading objectives. Downed trees can provide good habitat for some species.)

Not all dead trees need to be removed. Where they pose no hazard to lives or infrastructure, it is beneficial to leave snags on the landscape to act as habitat and fall on their own time. 2-4 snags per acre are often left in wildland settings to support cavity-nesting songbirds, woodpeckers, raptors, and a host of other creatures.

Hazard trees are only defined as such where there is an identified fall hazard target, namely a paved road or parking area, structures, or places where people may congregate such as benches or picnic tables. In most cases, this does not include trails.

Yarding

Yarding is the process of transporting cut trees, or portions thereof, from their cut location to a landing or staging area for subsequent treatment (e.g., tub grinding) or for transport off-site. This transportation can be done with tractors, which can negotiate relatively steep slopes, but which can sometimes leave significant scars where chains and logs drag along the ground surface, increasing the potential for erosion and compaction and requiring additional treatment to remediate the soil surface. Thus, yarding with tractors works best where slopes are not too steep.

Yarding can also be accomplished with cables, helicopters, or even mules, but these tactics are not contemplated in this Plan. An exception is that DWR uses a crane to remove flood-obstructing fallen trees from creeks. Removal by crane prevents drag damage to the banks and channel.

History of Machine Treatment Use in the Plan Area

The City of Chico has a long history of using some of the mechanical techniques identified in the previous sections in portions of the Plan Area to manage vegetation for fire hazard reduction purposes. Mechanical equipment is used on an as-needed basis to grade or disk fire trails, control highly flammable/rapidly spreading species, reduce surface fuels (e.g., mowing grasses), chip and spread trimmings and downed material, to thin vegetation, and to maintain fuel loads. Machine techniques are also used in concert with hand labor treatment efforts. When using machines, areas such as steep bare hillsides that are prone to erosion are avoided, and plants identified for retention are protected.

Best Management Practices for Machine Treatments

The following BMPs should be implemented, where feasible, when utilizing mechanical vegetation management techniques. In all circumstances, equipment should be utilized only for its intended use.

Heavy Equipment Use

The following practices should be implemented when using heavy equipment for vegetation management activities:

1. Utilize equipment that causes the least amount of soil disturbance for the job;

2. Ensure equipment operators and project personnel are properly trained in equipment use;

3. Install water breaks, as needed, for graded or disked areas that are not otherwise stabilized;

4. Ensure that vehicles and equipment arrive at the treatment area clean and weed-free;

5. When feasible and necessary, control fugitive dust resulting from equipment use by watering disturbed areas;

6. Protect retained trees and vegetation from potential damage resulting from heavy equipment use;

7. To minimize soil disturbance, leave stumps from removed trees and shrubs intact, with stump heights not exceeding 6 inches, as measured from the uphill side;

8. Use the smallest and fewer machines necessary to meet the vegetation management standard;

9. Fix any heavy equipment-caused damage by regrading or recontouring any areas of soil disturbance, including from dragging or skidding of trees;

10. Avoid heavy equipment use on unstable slope areas, slopes with gradients exceeding 65%, slopes with gradients between 50% and 65% where the erosion hazard rating is high or extreme, or slopes with gradients over 50% that lead without flattening to sufficiently dissipate water flow and trap sediment before reaching a stream or other water resource.

11. Service and fuel heavy equipment only in areas that will not allow grease, oil, fuel, or other hazardous materials to pass into streams or retained vegetation;

12. Remove from the site and properly dispose of all refuse, litter, trash, and non-vegetative debris resulting from vegetation treatment operations, and other activity in connection with vegetation treatment operations;

13. Ensure that hazardous materials spill kits are available on all heavy equipment. ensure that all equipment with an internal combustion engine using hydrocarbon fuels is equipped with a spark arrestor, as defined in California Public Resources Code Section 4442.

Tree Removal

To the fullest extent possible and with due consideration given to topography, lean of trees, utility lines, local obstructions, and safety factors, trees should be felled away from streams, sensitive biological resources areas, and retained trees. Cabling, sectional removal, or other felling techniques should be employed, where feasible, to minimize impacts to streams, sensitive biological resource areas, and retained trees.

4.3.4 Chemical Techniques

Chemical techniques involve the use of herbicides or growth regulators to kill vegetation or prevent growth. Chemical techniques are typically used in combination with other types of fuel reduction treatments, such as hand cutting. Herbicide may be used to prevent buildup of fuels, but herbicides do not by themselves remove any vegetation from a treatment area. Application of herbicides and other chemicals is typically performed by hand, and can include injecting, spraying, dripping, or dusting chemicals onto undesirable vegetation. Hand application allows flexibility and precision in application and is ideally suited for small treatment areas.

Herbicide and growth regulator application requires specific storage, training, and licensing to ensure proper and safe use, handling, and storage. Only personnel with the appropriate license are allowed to use chemicals to treat vegetation. In California, no herbicide may be used without first being registered through the Department of Pesticide Regulation (DPR). During the registration process, the registrant must perform over 120 tests on each product to assess its safety to people, wildlife, and the environment. Representatives of several state agencies participate in this review to assist DPR. These agencies include Air Quality, Water Quality, Agriculture, Fish and Game, and the Office of Environmental Health Hazard Assessment. Notices of the “Decision to Register” for each herbicide are posted for at least 30 days for public comment before such herbicide is finally licensed for use in the state. As part of the registration process, the herbicide usage label is developed. Because DPR’s pesticide registration program is certified as a “functional equivalent” of an Environmental Impact Report under the California Environmental Quality Act (CEQA), herbicide use in compliance with a label is by definition compliant with CEQA.

It is possible to utilize an herbicide for off-label uses, with the recommendation of a licensed pest control advisor (PCA). (Some agencies (such as the USFS) choose to require a PCA recommendation even for on-

label uses, but for the City this would be a redundant expense.) Personal protective equipment is essential to limit personnel exposure to chemicals. This includes long pants and long-sleeved shirts, minimum 14 mil chemical resistant gloves, safety goggles, and full leather upper footwear.

Each herbicide or growth regulator comes with its own label instructions for safe application, including required PPE, and required no-entry period (technically known as a re-entry interval or REI) after herbicide application. In the case of every herbicide currently used by the City, it is safe for pets and the public to re-enter the area as soon as the application has dried, generally a few minutes after the application. The herbicide product usage label will also state whether it requires a certain buffer distance from water. Some herbicides are labelled for use as an 'emergent aquatic' herbicide; for these herbicides, it is safe and legal for the spray to incidentally hit the water surface in the process of targeting a plant growing over water.

The remainder of the herbicides used by the City carry no specified buffer to water, regardless of concentration, but simply do not allow the wet spray to contact any surface water. While there is always some risk of damaging non-target vegetation, more options for bio-specific herbicides (herbicides that target one group or family of plants, as opposed to broad-spectrum herbicides) exist now than ever before.

Herbicides

Herbicides can be used alone or as a secondary vegetation treatment technique following manual (hand labor), goat grazing, or mechanical removal. In the latter case, the herbicides control sprout growth and regeneration. The advantage of herbicide treatments is that they typically kill plants quite effectively, and can prevent treated plants from setting seed, while having the potential to be precisely targeted at problem species if that is a concern. Thus, in the long run, targeted plants are eliminated, although it may require follow-up treatments. Some disadvantages include the necessity of applicators to be trained and then licensed by the State of California, the cost of application and safety equipment, the cost of the herbicide itself, and in some cases the potential to affect non-target vegetation and/or wildlife. Despite these disadvantages, herbicides, or herbicides in combination with hand/mechanical removal, are the most widely used and economical techniques for controlling certain types of vegetation.

Herbicides are broadly classified into two basic types: pre-emergent and post-emergent. Pre- emergent herbicides prevent plants from germinating (emerging from the seedbank in the soil) and some also act on early seedling development. As such, they have a larger potential to impact seeds of desired species remaining in the soil, and often have longer persistence times in the environment. Post-emergent herbicides are applied directly onto the plants, killing them, preferably before they have the chance to mature and set seed for another season. With proper equipment and training, herbicides can be applied selectively, minimizing impacts to seeds of desired species residing in the soil. However, should the target vegetation be intermixed with growing desired vegetation, the chance of affecting desired vegetation would be increased.

Different plants vary in their response to any particular herbicide and can also vary in their response depending upon in which stage of their life cycle the herbicide is applied. For this reason, seasonality is an important consideration in herbicide application.

Some herbicides are specific to particular groups of plants, while others are “broad-spectrum”. Careful targeting of the right herbicide for the right species at the right time of year reduces the amount of herbicide used, saves money and time, and reduces the chance of herbicide coming into contact with non-target vegetation.

Herbicide application is useful following removal of all tree and other perennial species that have the ability to regenerate from root fragments, whenever it was not possible to remove all plant fragments. Herbicide use should be limited to localized applications rather than foliar applications to eliminate the possibility of drift

and impacts to neighboring desirable vegetation. Obviously, herbicides must always be applied in accordance with state and federal law, i.e.: in accordance with the product usage label or a PCA Recommendation for use.

Herbicides are sometimes the most or the only cost-effective way to control vegetative fuels. They sometimes offer lower environmental impacts compared to the non-herbicide alternative. (An example is with giant reed, *Arundo donax*, an aggressive invasive fuel that can grow 20' tall and will burn green. It grows on creek banks where erosion is a serious concern. Killing the stand by mechanically removing its large root wads is much more destructive to the creek banks than killing the stand by carefully applying herbicides in the right season, such as **imazapyr** which comes with an emergent aquatic formulation for use over/near water, where other herbicides are not appropriate.)

Herbicides can also provide wildlife benefit when used strategically. For example, targeted applications of **triclopyr ester** are sometimes applied to woody plants using basal spray, cut stump, or foliar application. In a forestry context, this technique can control infestations of Scotch broom and resprouting brush, allowing native trees to better establish. The chemical can also be used for targeting broadleaf weeds in a monocot stand, such as to target blackberry invading a grassland.

Glyphosate can be used sparingly for woody plants using direct injection, cut stump, or foliar, and is also used to control Arundo. It is generally used as a highly targeted spot spray, not a broadcast application. Glyphosate is a useful herbicide because its next best alternatives are more dangerous to human health (too limiting in their Warning/Danger label) and are more likely to harm non-target species or to have residual pre-emergent effects. It is a best management practice to always use the least toxic alternative that provides acceptable and cost-effective control of the problem. (For more about best management practices involving chemical treatments, see below.)

Some herbicides are highly selective and have low risk of harming non-target species. For example, **aminopyralid** or **clopyralid** are "selectives" targeting only legumes and composites. If the right mix of species is present, these chemicals can provide excellent control of yellow star thistle or broom in grasslands. (When high populations of native composites and/or legumes are present, these chemicals are no longer a good choice.) Herbicides can be an important complement to prescribed fire for yellow star thistle control. The herbicides listed above are not the only ones the City would ever consider using, but any herbicide used would need to be consistent with the best management practices spelled out below.

Growth Regulators

Growth regulators are a form of chemical vegetation management, but they are not herbicides. Rather than killing plants, they stimulate or inhibit plant hormones to alter a plant's metabolism and physical architecture, but they allow it to continue living. This class of chemicals is sometimes called TGRs (Tree Growth Regulators). Even though they are not herbicides, they are still regulated and registered by the EPA under its Federal Insecticide, Fungicide and Rodenticide (FIFRA) program, and they still carry warning/danger/caution labels and their own requirements for PPE.

An example of a TGR is the chemical marketed under the trade name Cambistat (paclobutrazol 22.3%). When injected into the soil around a tree, Cambistat inhibits the production of gibberellins, the hormones that elongate cells in trees (making branches longer). When a tree produces less gibberellins, its branches might take three years to grow the same amount that untreated trees grow in one year. Since the tree is still producing the same amount of energy but not using it to lengthen its branches, the tree may compensate by producing much more chlorophyll (turning a darker green), and by investing more in root development, and producing more abscissic acid, which can make the tree more drought-resistant.

TGRs are especially useful under power lines because they increase the interval between needed prunings. Conflicts between trees and power lines are one cause of fire. Thus, TGRs can reduce the amount of labor and money required to keep power lines fire safe.

Methods of Chemical Application

Cut and Daub

Cut and daub treatment is recommended for larger highly flammable/rapidly spreading plants, such as large trees and shrubs, to control regrowth and kill the portion of the plant remaining belowground. Cut and daub involves the cutting of plant stalks or trunks and then the direct application of an appropriate systemic herbicide directly to the cambium layer of the freshly cut stump or stem. It is also called “hack and squirt”. A hatchet may be used to reach the cambium in larger trees such as Ailanthus. A drill with a very long bit is useful on palm trees. For Ailanthus in particular, it is critical that the herbicide treatment occur soon enough after the plant is injured so that the herbicide is carried into the plant tissue. If enough time elapses to allow the cut surface of the severed plant to dry out, a fresh cut should be made prior to herbicide application.

Root Injection

Some chemicals are designed to be injected into the root zone of a plant. Some growth regulators work this way. Each chemical is always applied as directed on its label.

Foliar Spray

Foliar spray simply means spraying herbicide directly on a plant’s leaves. Discussions of foliar spray should distinguish between 'broadcast spray' and 'spot spray'. Both are vulnerable to drift from wind generally approaching 10mph, but broadcast spray is less precise and more likely to damage non-target plants. Spot spraying is most commonly used within the City for a foliar application, because workers are most commonly treating individual plants in a multispecies environment. However, an applicator may occasionally need to overspray a small stand, for example if using a selective broadleaf herbicide on thistle emerging from a swale of Santa Barbara sedge.

Some plants, like Arundo, are best controlled by a fall foliar spray when the plant is busy preparing for winter by shunting as much sugar as it can from its leaves to its roots. Herbicides can hitch a ride on this sugar traffic and kill the plant’s roots much more efficiently, and with fewer ounces of herbicide used, than other methods of application. By contrast, foliar spray is not suitable for Spanish broom, because of its open foliage habit; instead, the applicator grasps the broom canopy and “drizzles” a higher concentration herbicide onto smaller portion of green leaves with a direct controlled application, avoiding drift.

Use of an adjuvant (a substance that helps the chemical stick to leaves) can improve success and require less herbicide per unit of vegetation. Adjuvants can be complex, patented polymers, or they can be as simple as molasses. The herbicide-adjuvant mixture is always determined by a licensed Pest Control Advisor (PCA).

Best Management Practices for Chemical Techniques

The following BMPs should be implemented, where feasible, when utilizing chemical vegetation management techniques.

1. Herbicide use should be considered when other treatment techniques are determined to be infeasible, ineffective, or not cost-effective in achieving desired management and maintenance standards;

2. Herbicide labels are in themselves the law. If a proposed use is off-label, then the City will consult with a state-licensed Pest Control Advisor to identify the appropriate site-specific herbicide application approach to meet vegetation management standards;

3. The timing of herbicide applications should be considered to optimize effectiveness on the target weed, while minimizing impacts to adjacent retained vegetation and nearby resources.

4. Only herbicides bearing Caution labels (i.e. not Warning or Danger labelled) are used by the City of Chico. No 'Restricted' chemicals are expected to be used. Certain additive Crop Oils (adjuvants) currently have a Warning label (due to potential eye damage from spray), but this is a concern to the Applicator and does not reflect a concern to public, pets, or the environment.

5. The lowest recommended rate to achieve vegetation management objectives of both herbicides and surfactants should be utilized to achieve desired control;

6. An indicator dye is added to the tank mix to help the applicator identify areas that have been treated and better monitor the overall application;

7. In general, the use of broadcast (spray) applications should be minimized, prioritizing localized or direct applications (e.g., cut and daub) where effective. Spot foliar spraying (such as with a hand pumped wand sprayer, manual with low volume output directed with a wand directly at a target) is a direct application. Often, directed (spot) foliar application is the most effective method, minimizing collateral damage and susceptibility to drift while still fixing the problem.

4.3.5 Prescribed Fire and Cultural Burning

The purpose of prescribed fires is to burn up fuel at a time and place of humans' choosing. By intentionally burning when conditions are right for low- to moderate-intensity fire, and when atmospheric conditions promote good smoke dispersal, managers can reduce fuels, replicate a natural process, improve habitat for many native fire-dependent species, and still protect public health and safety. Burning piles of cut vegetation is called pile burning, while setting fire to a designated prepared area is called broadcast burning. The terms prescribed fire and controlled burning are interchangeable.

Cultural burning is human-led fire that draws on Native Californian traditional ecological knowledge (TEK) and is timed to promote culturally important plants and other species. Native Californians often prefer to distinguish between "cultural burning" and "prescribed fire," because the latter term can connote modern, agency-centered techniques that are not always consistent with ecological outcomes sought by Native land managers. (For instance, CAL FIRE and federal managers often burn in different seasons and with different objectives than traditional managers.) All native plant species in the Chico area evolved with regular cultural burning by the Mechoopda people. The expression "good fire" is sometimes used as an informal blanket term covering both prescribed fire and cultural burning.

Both broadcast and pile burning are often (but not always) implemented in conjunction with hand labor and machine treatment done as pre-burn preparations. This pre-fire "burn unit prep" can include rearranging fuels to make them more (or less) continuous, removing some fuels to ensure shorter flame lengths or lower burn intensity, or creating fire lines around resources managers don't wish to burn. All these tasks can be completed using either hand or machine labor.

Broadcast burning can be a cost-effective way to quickly reduce a large volume of woody material remaining after other fuel treatment operations. The more homogeneous the fuel is, the more homogeneous the broadcast burn will be. However, all burns can be expected to vary in intensity and completion across the burn unit.

"Hot-spots" of more complete combustion, as well as islands of unburned fuel, are normal, and the heterogeneity they create contributes to a mosaic structure that is usually beneficial for habitat. Likewise, some tree mortality after a fire is normal. Dead trees are an important part of any wild landscape. A burn plan usually includes a range of acceptable tree mortality.

Broadcast burning can be implemented on a scale measured in square feet or in hundreds of acres. Treatment boundaries are often roads, trails, or other non-burnable features, reducing the number of firebreaks that need to be created. Under the right conditions, even the transition zone from sunny open meadow to the dripline of winter oak trees can be used as a firebreak. Changes in aspect (the direction a slope faces) can also be used as effective control lines in the late fall and winter, when south-facing slopes dry quickly after a rain, but north-facing slopes are still too wet to carry fire. Using natural fire lines reduces labor costs and preparation time and minimizes soil disturbance and the potential for soil erosion. Midslope fire lines require holding forces to work directly in the smoke from the fire below. When at all possible, burn units should be designed in a way that minimizes the amount of midslope fire line.

Broadcast burning can be used in all vegetation types. However, some vegetation types and exposures have more frequent "burn windows" (opportunities to burn because conditions allow for effective control of fire) than others. Also, the proximity of structures, roads, businesses and neighborhoods can be an important limiting factor on prescribed fire and cultural fire. These limitations are due at least as much to concern about smoke impacts from smoke as it is to concerns about fire escaping the unit.

Broadcast burning may occur any time of year. Early fall burns are the most common for cultural burning and are generally most closely aligned with the natural fire cycle found in California. Spring burns are often convenient for agencies and provide good public safety; however, there may be impacts to animal and plant reproduction. Midsummer (late June into July) burns, when the atmosphere is very stable, can provide the opportunity to consume extensive brushfields or star thistle infestations, and can avoid smoke impacts because smoke from fires lofts so well during this season. However, "in-season burns" (i.e., burns during declared fire season, which certainly includes summer) are difficult to implement because most fire departments are too busy suppressing fires to devote time to lighting them.

How do managers decide where and when to light a burn? As the name expresses, a prescribed fire is based on a prescription. A prescription specifies the conditions under which the fire is to be lit. It could include factors like seasonality, wind speed and direction(s), humidity range, and ecological triggers such as a certain species having completed its reproductive cycle for the year. Those conditions are chosen based on the objectives (what we want the fire to accomplish). A fire with the objective of killing half the small trees in a stand will have a different prescription than a fire with the objective of consuming just the top layer of leaf litter. Both broadcast burns and pile burns have prescriptions.

Pile burning

As an alternative to a broadcast burn, piles can be built and burned. Tractors or hand crews can create piles of material on flat or gently sloping ground that can be burned during moderately cool to very wet conditions. The volume of fuel in the piles can produce localized heat which may impact adjacent retained vegetation or temporarily sterilize the soil directly below the pile. The type and moisture of the fuel in the piles, as well as the spatial arrangement of the fuels, can have a significant impact on how much smoke the piles emit as they burn. Piles of vegetation may be burned any time after the vegetation has sufficiently dried - the lowest-risk proposition is to trap or cover the pile with craft paper, and then burn it in the winter after soaking rains. Spring burns can smolder for months and re-emerge as a wildfire later.

Tools and resources needed for burning

Cultural fires are often lit by bundles of dry grass or herbs. Other handheld tools, such as drip torches, lighters, matches, propane torches, diesel flame-throwers, and fusees (flares), may also be used for igniting prescribed fires. Mass ignition techniques may include the use of terra-torches and heli-torches. These types of ignition devices release an ignited, gelled fuel mixture onto the area to be treated. Helicopters may also be used to drop hollow polystyrene spheres ("ping-pong balls") containing potassium permanganate that are injected with ethylene glycol immediately before ignition. The sphere ignition method is best used for spot-firing projects in light fuels. In this VFMP, only handheld ignition devices are contemplated.

Prescribed burns must be conducted by trained personnel. Training can be formal or informal. Examples of formal training include the NWCG (National Wildfire Coordinating Group) trainings, TREXes (training exchanges), or CAL FIRE trainings. Examples of informal training include the family-based fire traditions of ranching or Native cultures. Some people who have received informal training have an extremely nuanced and sophisticated understanding of fire, and some people who have received formal training have a better understanding of how to fight fires than of how to light them. Conducting prescribed fires safely requires both skills.

Personnel can be from State, local, volunteer, private for-profit, or non-profit fire crews. Utilizing personnel and equipment from a variety of crews provides the added benefit of joint training under prescribed rather than emergency conditions.

Prescribed burning requires proper planning and the development and approval of a prescription or burn plan, which can be developed by the local fire protection district or contractors in consideration of fuel reduction requirements, local weather conditions, and available resources for fire management. The following sections summarize the planning needs for implementing prescribed burns.

Planning Good Fire

The following describes the steps that must be completed prior to initiating prescribed fire activities.

Burn Plan/Prescription

Working with a fire management specialist, managers develop a site-specific prescription and burn plan. This plan establishes goals and procedures for the prescribed burn. You can find examples of burn plans in the Projects section, section 5. Burn plans take into account the site characteristics and the likely behavior of the fire, including the heat output, length of burn, best ignition sources and points, and optimal fire control methods, as well as the firing pattern (i.e., whether fires will be lit from the top of the unit down or the bottom up or in some other pattern). Each element of the burn plan depends on the type, age, density, and condition of vegetation; the site's terrain; solar exposure; and local and prevailing wind patterns, as well as the managers' and the community's goals for the burn. The prescription identifies the boundaries of the burn area, locations of control lines, acceptable fuel moisture ranges and weather conditions, and required personnel and equipment. Before ignition, fuel moisture content must be measured to assess if the treatment area is safe to burn.

Agency and Air District Review

Under CEQA, local and regional regulating agencies need to review the burn plan to identify potential environmental impacts and develop mitigation measures. Some burns may need very little to no review.
The Butte County Air Quality Management District (BCAQMD) requires preparation of a smoke management plan (SMP) for any burn below 1000' elevation. Almost all the lands in this Plan are below 1000,' but the upper portion of Ten Mile House Rd, for example, is above 1000'. However, development of an SMP is a

best management practice for all City burns regardless of elevation. An SMP maps the location of sensitive receptors (i.e., schools, homes, businesses) and lists measures managers will take to maximize smoke dilution and minimize smoke production. In addition to the preparation and approval of a smoke management plan, the BCAQMD requires notification of the burn and that burning is conducted on a permissive burn day. The BCAQMD selects burn days based on air quality, weather conditions, and wind patterns; provides the burn's acreage allocation the morning of the burn; and provides the "all clear" designation prior to initiation of the burn.

Pre-burn Site Preparation

Not every burn unit needs prep. However, hand labor or mechanical treatments are often conducted prior to initiation of a prescribed burn to remove and treat larger material (trees, shrubs, slash). A common goal of burn unit prep is to remove ladder fuels that may allow for crown fire transition. Site preparation also includes the establishment of fire lines needed to control the fire if they do not already exist. These fire lines are typically constructed using bulldozers or by hand using scraping tools. Occasionally they are "burned in" with a strip of fire under conditions that limit fire spread.

Burn Notification

Notifying the local or surrounding communities, local fire departments, CAL FIRE, media, and BCAQMD is an essential component to avoid potential misinterpretation of the prescribed burn as a wildfire. Notification to interested and affected parties and the media are also repeated the day of the prescribed burn. Temporary road signs are usually placed on nearby roads. Prescribed fires sometimes generate high levels of public safety concerns over the chance of fire escape from control lines, and the rapid distribution rate of smoke, ash, and particulate matter may raise additional concerns from the public. These concerns are strongest in areas where prescribed fires are rare. Many communities have found that as prescribed fires become a more common part of normal life, public concern about them decreases.

Post-Burn Follow-up and Evaluation

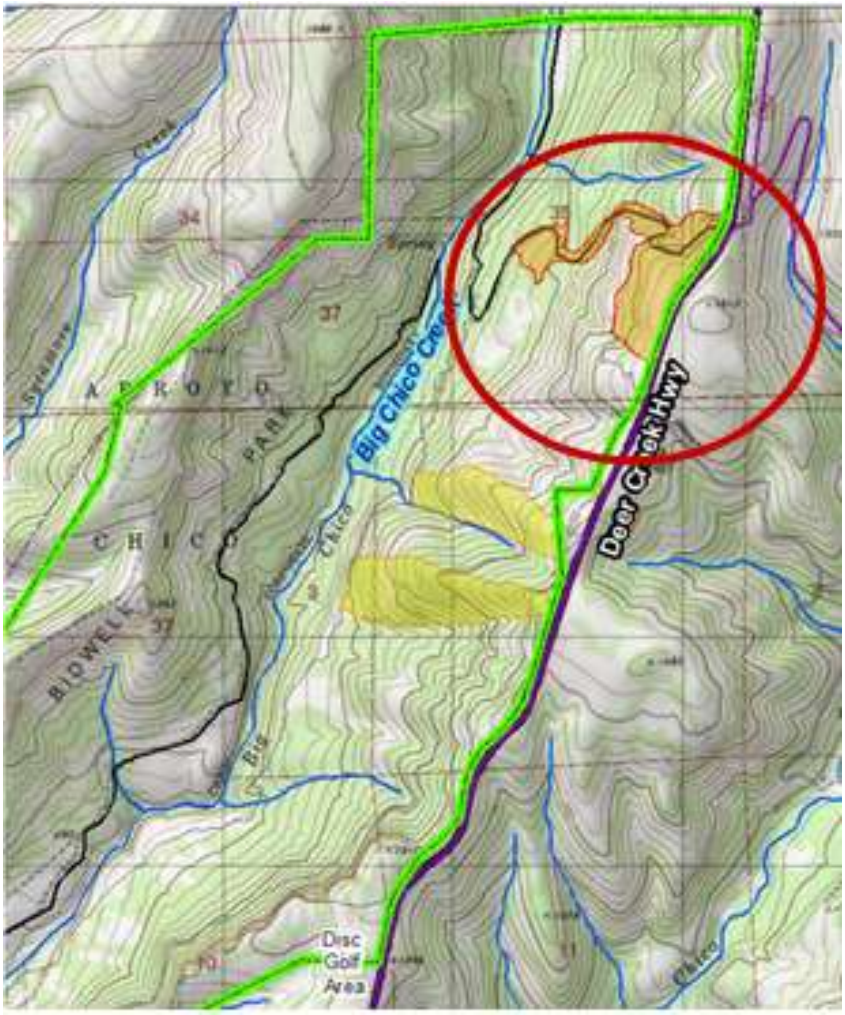
Crews must patrol the burn area until no more hotspots (smoldering or hot areas) remain. In heavy timber, this can take weeks; in grassland, it can take hours. The process of patrolling a burn unit and making sure all hotspots are "dead out" is called "mop-up".

Following completion of the prescribed burn, the results are evaluated to determine if additional treatment is needed to achieve goals. (Evaluating results of treatment is a key principle of Adaptive Management and is not limited to prescribed fire. Regardless of the treatment, afterwards managers should ask: Were goals achieved? If not, why not? What institutional or procedural problems occurred and how could they be remedied? How could the process or implementation be improved specifically?) The art and science of evaluating the results of a burn is called fire effects monitoring, or FEMO.

If follow-up is needed, additional treatment methods could include hand labor or mechanical treatment of unburned or partially burned materials. Follow-up and evaluation efforts may occur from 1 to 2 years after the burn, or longer. Grazing is often a useful follow-up treatment a year to two years after a burn. Fire is cyclical by its nature, and a single fire does not produce as good results as several fires in a row, spaced out along the area's natural fire return interval (FRI). The FRI in most of the Plan area ranges from 1 to 12 years. Therefore, it is reasonable to think of prescribed or cultural fire as a maintenance activity that can be expected to recur in the same unit one to several times per decade.

5. Projects

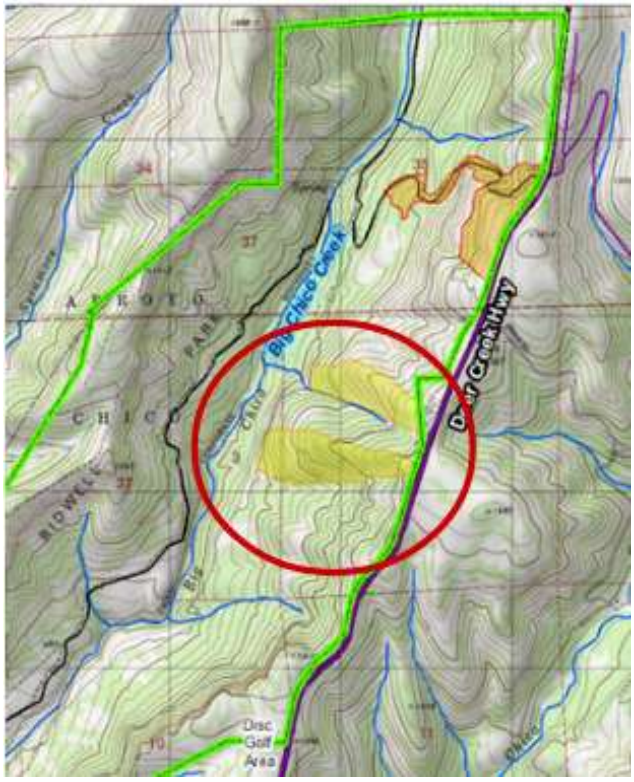
5.1 "Ten Mile House" Oak Restoration and Wildfire Resilience Project



This project will implement understory thinning in black oak stands adjacent to the 10 Mile House trailhead and upper portions of the 10 Mile House Road, and reduce hazardous fuels and potential wildfire intensities complementary to CAL FIRE's Highway 32 fuel break and along 10 Mile House Road, a major fire access to the northeastern portion of Bidwell Park.

The project will thin from below to create open understory conditions under mature black oak trees, remove decadent understory vegetation in the margins of the black oak stands, and create conditions which may allow future understory burns to be used to maintain open conditions in the black oaks. Additionally, opening up the black oak understory may improve scoping and construction of new multiple-use trails which could provide access and control opportunities for firefighters conducting both prescribed fire and wildfire control operations.

5.2 “Dozer Lines” Oak Restoration and Wildfire Resilience Project



This project will implement thinning and postfire restoration activities to improve the utility of two key fireline locations on the South Rim of Bidwell Park.

These two ridges had bulldozer firelines installed during the 2016 Santos and 2018 Stoney Fires. Moving upcanyon on the South Rim of Bidwell Park or the CSU, Chico Big Chico Creek Ecological Reserve (BCCER), these are two of the last places where bulldozers can be used to install firelines during a wildfire. While bulldozer firelines can have a major impact on vegetation and soils, they are part of firefighting in California, and it is unlikely CAL FIRE will not use them on future fires in the Park. This project aims to create vegetation conditions adjacent to the existing bulldozer fireline alignments which will increase the likelihood they will be effective during future wildfire events. Also, there are large accumulations of slash and debris adjacent to the firelines which will be burned during the course of this project.

This project will prune dead material out of trees affected by the recent fires, remove clumps of dead trees directly adjacent to the firelines, and prune resprouts on a larger area of south-facing slopes adjacent to each fireline with the objective of preventing multiple sprouts on each stump from becoming a dense brush field. The long-term goal is to steward the woodland toward long-lived, single stem, fire-resilient trees that sequester stable carbon, and to promote a diverse understory capable of supporting wildlife and thriving through fire events. Ideally, these slopes will be good candidates in 5-10 years for late-season or midwinter prescribed fires which will maintain healthy and fire-safe levels of vegetation on these tactically important ridges.

5.3 Middle and Upper Park Star Thistle Burns

Background

Yellow starthistle ("YST"; *Centaurea solsitialis*) is an invasive weed that can be found almost everywhere in Bidwell Park. It forms especially dense thickets in Middle and Upper Park **(SEE MAP)**. In some places, YST crowds out native bunchgrass habitat, replacing a vegetation community where grass fires are inherently patchy and self-limiting with one that can burn at surprising intensity and flame height (up to 40' with good winds). Under oaks, these more intense YST fires increase oaks' chances of mortality from fire, compared to the native bunchgrass community with which the oaks evolved. YST infestations often co-occur with medusa head and barbed goat grass, so, given the natural habitat preservation objectives of Bidwell Park (BPMMP, 2008), timing of burns or other treatments should be optimized to address multiple invasives at once whenever possible (see e.g. Brownsey et al).

Objectives

Enhance recreational values, reduce the intensity of future fires, and promote a healthy native grassland consistent with patchy and self-limiting wildfire behavior by addressing hotspots of yellow starthistle ("YST"; *Centaurea solsitialis*) with well-timed fire and other means.

Policy Rationale

1. Utilize prescribed fire used as a management tool to protect and enhance habitats and reduce the risk of catastrophic fires within Bidwell Park (BPMMP, 2008).
2. Eliminate undesirable or invasive plants that compete with or reduce native vegetation or degrade wildlife habitat for endangered or threatened species (BPMMP, 2008).
3. Improve age class diversity within existing mature, even-age stands of oak and other plant communities (BPMMP, 2008) by encouraging young oak recruitment as a positive byproduct of fire.
4. Reducing the fuels and infestation patches along nearby landscapes such as roads, trails, and neighboring back yards will increases safety for the community members who use the park daily, if maintained regularly (BPMMP, 2008).

Project Description

Areas to be burned will be delineated by a professional burn planner, based on YST data already gathered by DCR crews. The burn planner will delineate their units based on landscape control features such as roads, trails, and oak driplines, as well as topography and contingency escape/access routes. The burn planner will create a plan that specifies burn objectives and a burn prescription including weather conditions, fuel moisture, acceptable oak mortality, and fuel loading on the landscape. The burn plan will also specify acceptable firing and holding resources and their required qualifications, if any. The burn plan will indicate a preferable firing pattern. The burn plan will specify a burn window, which will be selected to target the unique phenology of YST, which is usually best controlled with June burns just prior to release of YST seed.

When final unit maps are available, resource surveys will be conducted on the delineated areas by specialized survey crews. Surveys must also analyze for resources that are not within the burn units but could be damaged during ingress/egress or from indirect results of the fire, like smoke.
To prevent damage to protected mature oaks, any unacceptably high fuel loads present on the units will be chipped or carefully pile-burned until the unit is in prescription for fuel loading. Hand lines will be dug, mowed or wetlined as necessary. The burn will be implemented after obtaining final permission from the Butte County Air Quality Management District and, because the burn window will be during declared fire season, CAL FIRE.

Follow-up treatment the next spring, as soon as YST basal rosettes are visible, will be with spot applications of aminopyralid or clopyralid, which are narrow-spectrum "Caution" label herbicides that target thistle and bean family plants but not grasses. All applications will be performed by a qualified and licensed applicator and relevant riparian buffers as specified in the BPMMP-EIR, or on the pesticide label, whichever is greater, will be observed. If the post-burn YST emergence is too great to realistically control with spot-spraying herbicides, the burn should be repeated the next year, and sometimes for a third year, until the post-burn emergence is spotty enough to control with herbicide. Three successive years of burning are not uncommon to control YST.

Regulatory Permits Needed

- Butte County Air Quality Management District Burn Permit
- Smoke Management Plan
- CAL FIRE Permit (LE 5)

Additional considerations

YST populations can't be transformed into native grasslands in one year, but after three or four years a significant transformation can usually be seen. Monitoring the change in the grassland composition can be a promising citizen science opportunity through partnerships with Friends of Bidwell park (http://friendsofbidwellpark.org/potentially-invasive-plant-species-in-bidwell-park/) or other group(s) to provide

phenology and population data for Park managers to use. The project is also a worthwhile study opportunity for CSU, Chico master's candidates in botany or ecological sciences.

5.4 Verbena Fields Stewardship

Verbena Fields is a 20-acre former gravel quarry which was restored to resemble the natural state that existed prior to gravel mining. The area features walking trails, large open fields, riparian areas along Lindo channel, and a large seasonal wetland. The park is culturally important to the Mechoopda tribe who were heavily involved in its restoration. The park is currently tended by the Mechoopda tribe and in addition to being a public park is used as an outdoor classroom to teach traditional ecological knowledge.

Several objectives have been identified for work in the park. These include the reduction of fire hazard, the removal of invasive species, and the promotion of Mechoopda cultural heritage using burning to encourage native plant species. When the park was established large numbers of willow cuttings were planted along Lindo channel. These willows, now mature, have collected large amounts of dead woody debris from the channel. This debris should be hand piled and burned on site. Additionally, willow thickets should be cleared around the base of mature trees. Any grapevines grown over the tops of mature trees should be cut at the base, pulled from the trees, and allowed to dry for use by the Mechoopda.

Invasive broom can be found along the banks of Lindo channel. Members of the Mechoopda have been hand pulling the broom, but much remains left to be done. Broom should be pulled and removed from the site. This will need to be undertaken annually until the seed bank in the soil has been depleted. To a lesser degree yellow star thistle can also be found along the channel and should also be pulled.

The Mechoopda people have long used fire to tend the land. At Verbena fields fire can be used to promote the growth of native grasses and the elimination of star thistle in the large fields. Fire can also be used to maintain the small groups of oak found scattered around the open areas.

Note that ‘On banks’ means within a fuel break standard distance (probably 100’) from WUI, e.g. residence property boundary fences, and ties into the larger Lindo Channel vegetation management project, below.

5.5 Lindo Channel Vegetation Management

This project area is to take place along Lindo Channel (Sandy Gulch) between Nord Avenue and Manzanita Avenue. Any projects along Lindo Channel will be done under supervision and negotiation through the Lake and Streambed Alteration ("1600") permit process with CDFW, as the trustee agency charged with protecting California's plants and wildlife, sets the terms and conditions governing the City's work alongside stream corridors containing riparian vegetation. It is recommended by this document and CDFW to attain a 1600 maintenance permit, so a permit does not have to be filed each time.

The goal of this vegetation management is to reduce fuel loading along Lindo Channel, and thus in the WUI that snakes through the City of Chico. Management entries should be done in a "checkerboard" pattern. This will allow for vegetation to exist in multiple successional stages for wildlife.

The project area has become severely overgrown. There is an additional safety concern since the overgrown vegetation has attracted illegal campers due to all of the hiding places it provides. In the summer of 2019, people encamped within the Lindo Channel started a fire which burned a large elderberry plant.

Objectives: Initial entries should eradicate invasive species and reduce ladder fuels. On flat ground on the banks, create 8 feet of vertical separation between ground species and canopies. Provide horizontal spacing between the outward canopy edge and the nearest shrub equal to three (3) times the adjacent shrub height. See

appendix for prioritized invasive species list. Mature trees will be managed by pruning up limbs up to 8 feet to reduce ladder fuels and increase vertical separation. Trees less than 8 inches in diameter can be removed where it is necessary to reduce fuel connectivity. Chipped depth will not exceed 4 inches, though no soil will be left exposed. Unhealthy mature or invasive trees may be removed.

On slopes exceeding +/-10% no soil will be left exposed. However, leaving material on the ground will be up to the discretion of CDFW and the 1600 permit.

An average 50% of canopy cover will be maintained at all times throughout management. This can be achieved through biological (out of the channel), hand labor, tracked machine labor or chemical (150 feet away from the high water line). For best results a mixture of treatments and intervals may be necessary. This channel will need to be continually managed, though treatments will get less and less intensive over time.

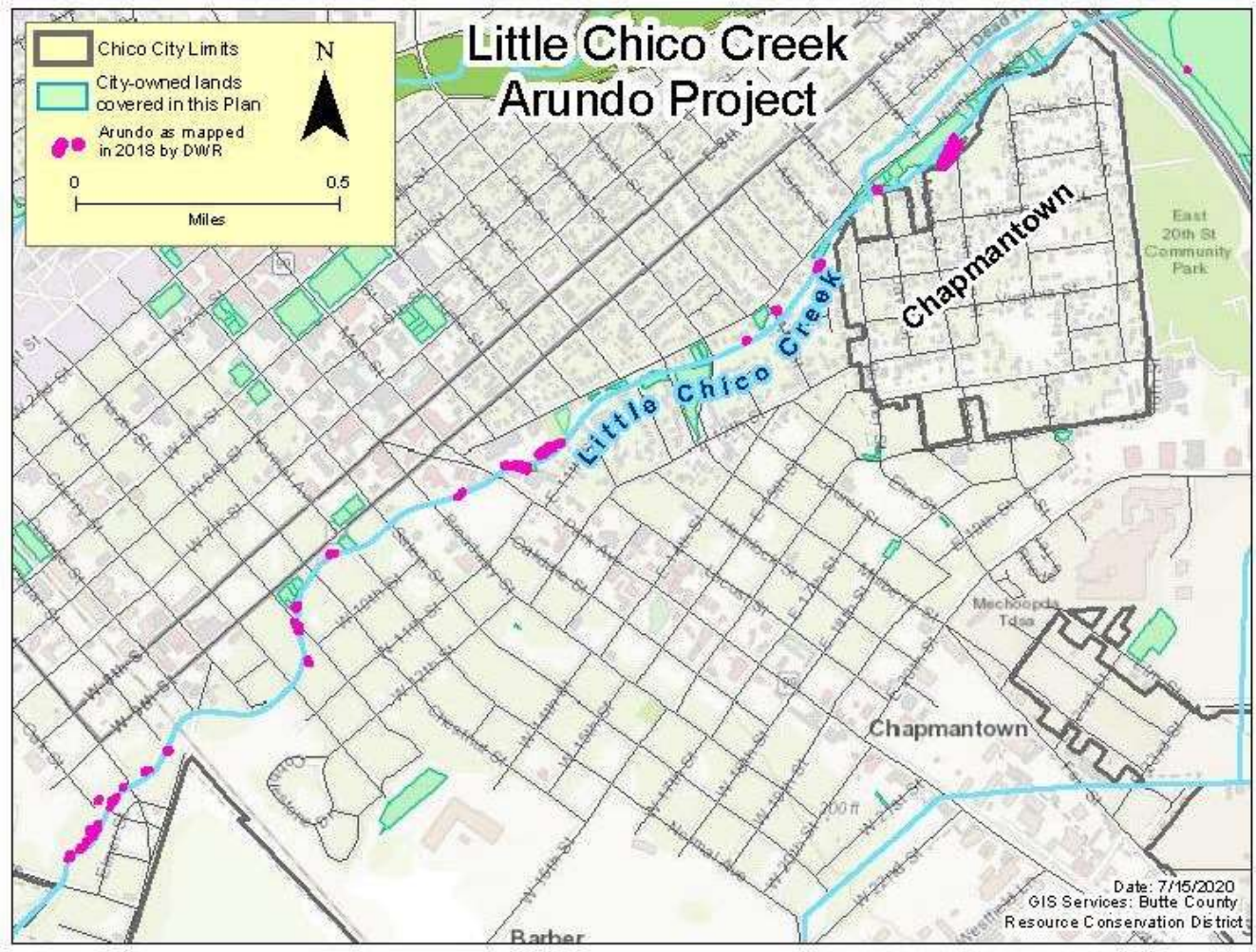
There are large populations of elderberry plants throughout the riparian corridor alongside the Lindo Channel. Elderberry is currently federally protected due to the Valley Elderberry Longhorn Beetle (VELB)'s dependency on these plants. Management around these plants must defer to USFWS guidelines as long as they are federally protected. Other shrubs will be managed in order to protect these plants for posterity.

All cut material will be lopped and scattered, chipped, or hauled off. Chipped depth will not exceed 4 inches, though soil will not be exposed. Lopped and scattered material, when fresh, will not exceed 1 foot in depth from bare mineral soil. Cut material will be kept within the project boundary on flat ground and will not enter into the sloped area. Water will not be present in the channel when work is completed. The project area is currently being used as an encampment, which brings a lot of refuse. The hope is that as areas are managed within the project boundary on a rotation, including trash pickup, it will be less attractive to encampments.

Every effort will be made to eliminate erosion as a result of management. Leaving chips in place, lopping and scattering, and leaving stumps in place will slow overland flow. Vegetational bands will be kept intact for a few years on either end of the project before they are also managed. This will reduce the chances of damaging erosion.

5.6 Little Chico Creek Arundo Management

Giant reed (*Arundo donax*) is an invasive grass which forms large, durable, single-species thickets that can grow 15 feet tall. Dense arundo stands may provide inviting shelter for camping, but their dry thatch makes them very vulnerable to ignition from campfires. In fact, arundo will readily burn even when green, and because of its value as a privacy screen, it is sometimes allowed to grow in lines or walls from the creek up to neighboring yards or homes. This creates ideal fuel connectivity for transmitting fire from creek ways to neighboring homes. Other problems with arundo include its relatively poor quality as wildlife habitat and its dense, hard, plate-shaped root masses. Like chunks of pavement, these root masses stabilize banks well at first but can lead to massive bank failure when, sooner or later, they are undermined during a high-water event. Root masses can be many feet across and weigh hundreds of pounds. Although it isn't common, large arundo root masses have come loose from banks during storms elsewhere in California and have damaged downstream infrastructure like bridges. In Chico, the largest arundo infestations are along Little Chico Creek, which borders the disadvantaged community of Chapman town.



Replacing arundo with well-chosen native vegetation such as well-maintained, open willow plantings would achieve several objectives. It would reduce urban fire hazard and intensity, improve wildlife and pollinator habitat, better stabilize banks, create culturally important willow gathering opportunities for Mechoopda and other residents, and create a safer creekside environment offering better visibility for walkers and joggers. It

would also create outdoor education opportunities for children to learn about natural creekside vegetation, and its uses, right in the middle of town.

Much work has already been done (and continues to be done) to monitor, map, and address arundo infestations in the city. An integrated arundo eradication program would likely need to be grant-funded, unless City budgetary allocations shift to invest more funds in parklands. The project would:

1. Work with DWR and CDFW to develop a maintenance 1600 permit allowing the City to extend its work in the Little Chico Creek channel and on banks.

2. Treat arundo with a mix of mechanical and chemical techniques, using an integrated pest management approach that takes advantage of seasonal metabolic changes in the arundo plant to kill the root ball with a minimum effective application of low-toxicity herbicides. These techniques are necessary because they will kill the arundo without disturbing the root mass.

3. Repeat above step(s) above for 2-3 years to exhaust the energy reserves arundo stores in its roots.

4. When a patch of arundo is dead, plant willow and other native plants into and around the root ball at optimal, fire-safe densities

5. Possibly (as supported by grant funding source priorities) create trails and/or interpretive features educating visitors about the value of willow communities to wildlife, pollinators, and humans, both in Chico and around the world.

6. Monitor plantings and Arundo control for three seasons (alternatively, 7 years from initial control) to ensure desired result and ensure dormant Arundo root buds don’t resprout.

7. If needed to maintain the health of the willows/native plantings, follow up with suitable maintenance techniques like goat grazing, cultural fire, or hand work.

8. Continue to pursue funding through grants to work with private landowners and CFD to ensure homeowners continue to have defensible space. By investing in CEQA and permitting, this project will also provide an opportunity for landowners to pay for arundo removal on City land bordering their property, if and when the City does not have funds for eradication.

5.7 Nature Center Clearing Restoration

Restoration Plan for Nature Center west side clearing area.

Purpose

Restore the cleared area and surroundings (total two acres) to native vegetation. No recreation nor interpretive features were considered (but could be). Within the tree canopy opening ("clearing" of ~0.7 acre), plantings will complement existing volunteer natives such that intended spacing is consistent with a shaded wildfire-fuel break vegetation spacing standard[1] after 10-15 years. All non-natives will be controlled over the entire two acres during the three years of establishment following initial plantings.

Location

The two acre area is delimited by Cedar Grove Way, the bike path on north side of East 8th Street, a line following the west roof line of the Nature Center to the large Valley oak between Nature Center and Lab, a line from that Valley oak to trunks of two walnut trees west of the Lab, and the paved road on the north side.

Means

Restoration consists of establishment of desirable plants without irrigation, and control of undesirables. Establishment of desirable plants involves finding native volunteers on site (selecting for species variety and structure at the shaded fuel break spacing standard) and encouraging their successful growth over three years. This may include placing temporary protection (staked tree tubes, wire mesh) from animals (deer, rodents, people) and wood chip mulch, and removing competing plants including natives within the mulch perimeter of 24+" radius from each selected plant.

Additional natives need to complement volunteers for several reasons: lack of distribution of trees to reestablish shade canopy; the heavy wood chips on the site will suppress native seed bank that could otherwise volunteer; expected mortality ('crop failure' to weather or pathology, herbivory, human damage); and the opportunity to add native species diversity value in the course of restoration (ecological succession from sunny opening herbs/shrubs to shaded forest) of this future shaded Valley oak forest stand. Blue and interior live oak (10% of trees to be established) are suggested to hedge/adapt for climate change future (e.g. lowering of ground water table killing Valley oaks).

Weed control will be needed for the three seasons of establishment: typically this may be early March and mid-May for winter-spring control of annual weeds, May for follow up on resprouting stumps, and fall for treating additional mature trees to be phased out as plants grow out in the clearing.

Irrigation is not necessary, however manual irrigation during the first year or two can help ensure establishment: after rains cease in April irrigate weekly to extend the spring growing season until temperatures are 85-90degF, and thereafter once a month deeply (e.g. 5 gallons/tree) until fall/winter rain.

Follow Up Work (3 years after plant establishment)

It may take 4-8 years for Valley oaks from acorns to grow sufficiently above deer browse height plus develop free standing trunk support before removing tree tubes and stakes. Phasing out exotic trees remaining on the site (Catalpa, hackberry, incense cedar, black walnut, pistache) should be done after the clearing has sufficient growth to keep the area from looking too bare, perhaps starting in fall 2023. If any of these individuals do not pose a potential fall hazard and they are >7"diameter at 12' they might be left standing dead as a snag for wildlife habitat (for bole nesting birds, bats, or perches), or if felled then the bole positioned on the site as intact as possible (i.e., minimize bucking up) with full ground contact as downed coarse woody wildlife habitat (e.g. for insects important to food chain, reptiles, amphibians). Neither dead snags nor ground contact coarse wood contribute to wildfire fuels hazard with respect to fire spread on this flat site. Vegetation should then be monitored ongoing for invasives and promptly treated to prevent invasives spread, like the rest of the park but priority for value-added restoration sites such as this.

TASK CALENDAR

Task Calendar - Restoration Plan for Nature Center clearing area.	
DRAFT 7/14/20 JD	
Timing depends on weather	**Task** (Expected 'weeds' are annotated in the 6/19/19 BPPC NRC agenda site survey report.)
2020 = year 0	
November	Last fall weed control followup.. Remove coast(?)live oak seedlings along Cedar Grove Way.
	Determine # of what native plants desired, purchase plants and planting materials (materials/cost estimate attache
early December	Planting installed with protection and mulched.
2021 = year 1 of planting establishment	
late January	Monitor winter annual weeds, start Vinca control (spray new growth through April).
March	Monitor to treat winter-early spring weeds.
April	Monitor to treat cut stump resprouts through June. ?supplemental watering until 85-90degF.
late May	Monitor to treat spring weeds. Maintain planting protection.
June	?supplemental watering monthly until fall/winter rain.
October	Monitor to treat weeds. Maintain planting protection.
December	Evaluate planting mortality and replant.
2022:yr 2 lateJan	Monitor winter annual weeds, start Vinca control (spray new growth through April).
March	Monitor to treat winter-early spring weeds.
April	Monitor to treat cut stump resprouts through June. ?supplemental watering until 85-90degF.
late May	Monitor to treat spring weeds. Maintain planting protection.
June	?supplemental watering monthly until fall/winter rain.
October	Monitor to treat weeds. Maintain planting protection.
December	Evaluate planting mortality and replant.
2023:yr 3 lateJan	Monitor winter annual weeds, start Vinca control (spray new growth through April).
March	Monitor to treat winter-early spring weeds.
April	Monitor to treat cut stump resprouts through June. ?supplemental watering until 85-90degF.
late May	Monitor to treat spring weeds. Maintain planting protection.
June	?supplemental watering monthly until fall/winter rain.
October	Monitor to treat weeds, to remove planting protection as ready.
	?start phasing out exotic mature trees by priority: hackberry, pistache, Catalpa, walnut, incense cedar.
2024 March	Monitor to treat weeds, to maintain planting protection.
October	Monitor to treat weeds, to remove planting protection as ready. ?phase out exotic trees.
2025 March	Monitor to treat weeds, to maintain planting protection.
October	Monitor to treat weeds, to remove planting protection as ready. ?phase out exotic trees.
2026 March	Monitor to treat weeds, to maintain planting protection.
October	Monitor to treat weeds, remove planting protection. ?phase out exotic trees.

Estimated Costs

Nursery stock and protection materials, planting labor/tools, weed control labor/materials.

Planting materials cost estimate

	#	$/	cost
tree tubes 5', bird net, zip tie	50	4	$200
orchard stakes 8'x2"round	50	5	$250
hardware cloth 3/8", roll 25' x 24"	1	45	$45
Valley oak acorns/existing pots	20	on hand	$-
shrubs elderberry, coffeeberry, false indigo, buttonwillow, .	30	10	$300
herbs milkweed, goldenrod, .	49	3	$147
x200 plugs of grass, sedge	2	155 + 190	$345
			$1,287

tbd in red

Planting skilled labor estimated 45 hours (not volunteers).
Weed control, existing City contract estimate $1400 through fall 2023.

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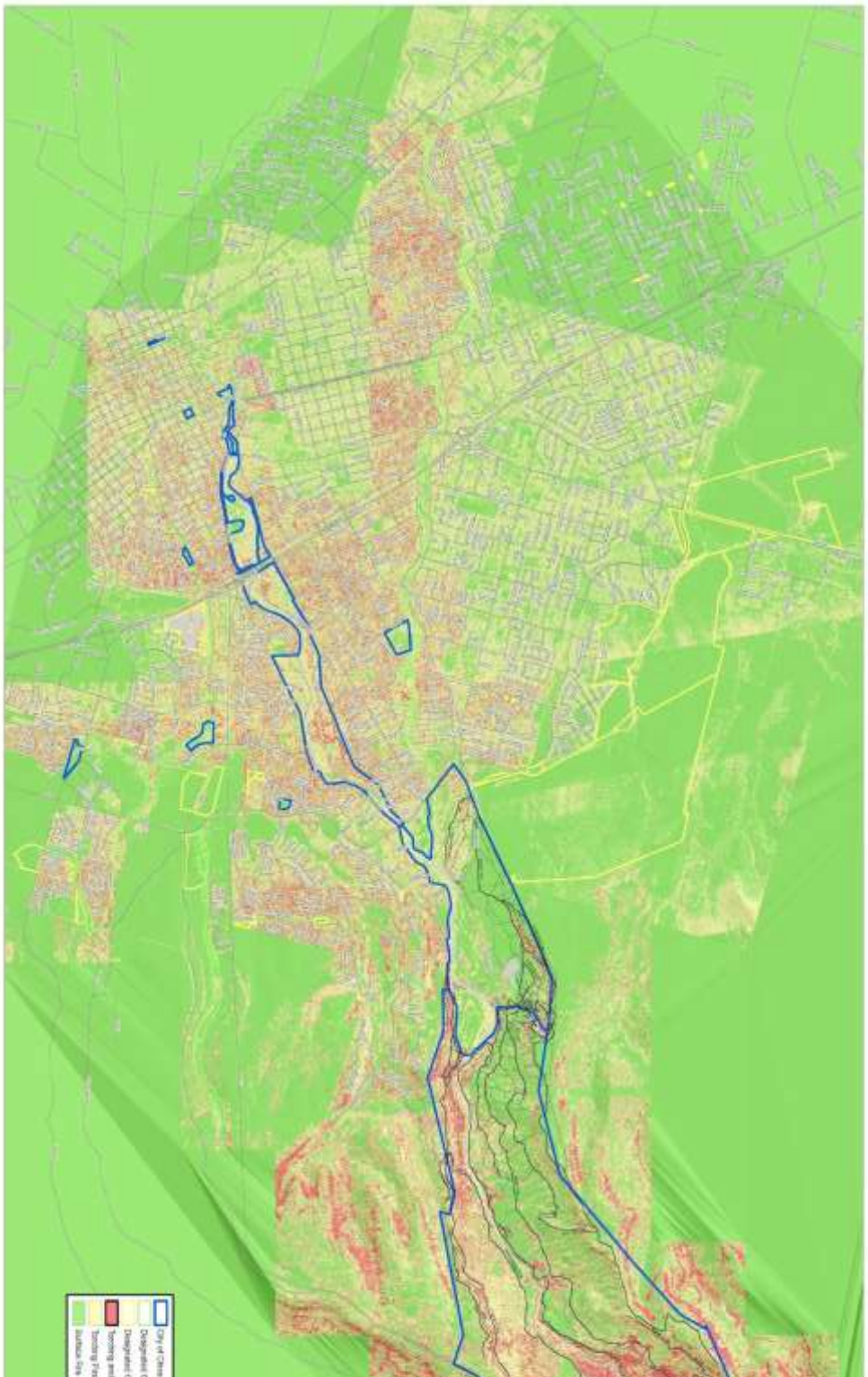
[1] Shaded fuel break standard for this purpose: individual tree canopies separated by >=15' of open sky after 10-15 years growth= canopy ~20'diameter for Valley oak; shrubs separated by open space that is 2x their mature height from adjacent shrubs or tree trunks or herb patches; herbs planted in patches of 100-400sqft by species.

6. Appendices

It is very important to the City that vegetation management decisions be based on sound and up-to-date data. Therefore, rather than rely on old documents such as vegetation surveys of Bidwell Park done over a decade ago, for this Plan the team developed original data products to inform the work. These products include a LiDAR-based fuels assessment that is by far the most detailed vegetation layer ever developed for the City parklands; numerous task and species prioritization guidelines to aid Parks staff in targeting their resources on the problems that will yield the biggest bang for the buck, and, for the first time, a comprehensive database of all the small and scattered City-owned parcels where vegetation could potentially pose fire risk problems (e.g. stormwater detention basins).

6.1 Fire Risk Assessment by Deer Creek Resources

Based on LiDAR flights in 2018-19, DCR was able to develop a vegetation layer so detailed that individual trees can be picked out. LiDAR allows viewers to map the density of the understory even beneath tree canopies, regardless of time of year, so the red areas on the following map suggest high-priority zones to thin ladder fuels. (There are exceptions: for example, in immediate riparian corridors, denser vegetation is often ecologically appropriate, and sometimes it is more fire-safe to leave vegetation intact (so it can block surface winds) than to remove it.) This map drove project planning and development for Upper Park fuels reduction projects and will continue to guide vegetation management prioritization in City parklands, ensuring that project selection is based on high-quality and up-to-date data.



6.2 Task Prioritization

Few land managers have the financial resources to implement all the projects they would like to. The City, like most public and private land managers, must prioritize its projects to reap the "biggest bang for the buck". Unfortunately, placing high priority on one project inevitably means postponing another. A consistent, transparent and data-based prioritization methodology helps depersonalize these decisions and provides continuity of management across administrations. One such proposed methodology is attached as an appendix to this Plan. Although priorities do change with changes in personnel, culture, and climate, the Parks Division will always strive to rank projects based on the values they protect, the durability of their effects, the cost-effectiveness they offer, and the number of co-benefits they provide (e.g. fuels reduction projects should also be expected to improve multiple recreational opportunities and wildlife habitats at once).

6.3 Invasives Prioritization

A comprehensive weed control program encompasses prevention, early detection and rapid response (EDRR), ongoing maintenance control of areas previously cleared, ongoing infestation reduction by species or by site, and (where infestations have displaced natives and the disturbance of infestation removal is significant), restoration plantings of natives. The strategy selected should correspond to the stage and severity of infestation and to the values at risk. Not all non-native species are invasive and not all invasive species pose an equal threat to the ecosystem, recreation values, or public safety. The City of Chico prioritizes invasives for removal based on the threat(s) they pose and the cost-effectiveness of action.

Like all vegetation management, invasive weed management should take an Adaptive Management approach. This means that after every City action to (in this case) reduce an invasive weed infestation, an observer should follow up to assess whether the action worked, to what extent, and how management should be adjusted in the future. If the action was not successful (didn't meet its goals), the observer should try to discern the most likely reasons why. If the action ***was*** successful, it's also important to know why, so that should also be pinpointed and recorded.

Of course, such a management strategy depends on having clear, measurable goals for each management action. Goals are usually quantitative (e.g., "reduce Arundo stands by 10% every year for 5 years"; "eliminate all fuels between ground level and 6' within three feet on either side of the trail", "promote a fine-grained mosaic where no single even-aged patch is larger than 10 acres"). The form on the next page can be updated for City use and supplemented with prompts suited to Adaptive Management (e.g.; "Management goal:"). Then it could be loaded onto City crew tablets (when they are purchased) for use around the parklands. Entering this data directly into tablets creates a digital record of all the weed management actions around the parklands, and each entry can be automatically georeferenced as it is recorded (even in areas without cell phone reception), eliminating misunderstandings from crew members trying to describe the problem location on paper.

Invasive Plant Assessment field survey form (from Hall, J 2015):

Appendix 3. Invasive Plant Assessment Form

WEED ASSESSMENT FORM

Observer Name:

Date:

Location ID:

GPS Location:

Weed Name:

Growth Stage:

- Seedling
- Rosette
- Bolting
- Flowering
- Fruiting
- Seed set
- Mature
- Dormant
- Dead

Extent of Infestation:

- Single Plant
- Scattered Plants
- Line (Along Road, Ditch, Fence, etc.)
- Small Patch (<.25 acre)
- Moderate Patch (.25 – 1 acre)
- Large Patch (1-5 acres)
- Very Large Patch (>5 acres)

Canopy Cover Class (based on Daubenmire classification):

- <1%
- 1-5%
- 5-25%
- 25-50%
- 50-75%
- 75-95%
- 95-100%

Abundance (abundance is based on the area occupied by a species relative to the area of its ecological niche):

- LOW - represents an infestation that is early on the invasion curve
- MEDIUM - represents the rapid expansion phase
- HIGH - represents an infestation that has filled the available ecological niche and is no longer spreading appreciably.

Trend (overall trend of plant population):

- Spreading Rapidly (doubling in 10 years) explosive growth.
- Spreading
- Stable
- Decreasing - population could be decreasing due to management or other factors.
- Absent - population is not found and presumed eradicated

Notes:

Optional Photo:

Making Chico parklands fire-resilient does involve cutting some trees and shrubs, but not all trees and shrubs will be treated equally. Invasive species will be removed first, then non-native species, and only then (if required to meet vegetation reduction targets) native species, selected to retain maximum species and structural diversity using a 'thinning from below' method that retains the largest stems. The City's "least wanted list" of invasive species can and should change over time as new threats emerge and old ones may become less urgent, but as of 2020 some top priorities for removal would be the following. These species were selected because they significantly increase fire danger compared to the native vegetation they displace, are particularly disruptive to native ecosystems, cause economic damage or significant problems for recreation/transportation (e.g. puncturevine), or some combination of these.

This list is just an example. A full list of low, medium, and high priority species for removal during fire resiliency projects will be included in the VFMP EIR.

- ***Arundo donax*****,** Giant Reed.
  (Butte CWPP (2015) recommends "future Vegetation Management Programs that will help eradicate the very invasive and non-native Arundo weed that has taken over local waterways and channels" because Arundo is a dangerous ladder fuel.)
- ***Cystisus scoparium***, Scotch broom.
- ***Genista monspessulana***, French broom.
- ***Spartium junceum***, Spanish broom.
- ***Centaurea solsticialis,*** yellow starthistle.
- ***Colutea arborescens***, bladder-senna.
- ***Tribulus terrestris***, puncturevine.
- ***Ligustrum***, privet.
- ***Phytolacca americana***, pokeweed.
- ***Rubus armeniacus***, Himalayan (Armenian) blackberry. "...Using herbicides after clearing and burning was very effective in eradicating vines and allowing natives to regenerate." p. 2 BP_vegManPlan2007_061211.
- ***Hedera***, ivy.

6.4 Miscellaneous Parcels Survey

A spring 2020 survey of all miscellaneous City-owned parcels generated a database of fuels management issues. In all, 41 small parcels were surveyed, totalling acres. The parcels were assessed for the presence of 16 invasive species, elderberry bushes, and a variety of nesting bird habitats. Any fuels management or fire hazard issues that were found were described in the database. The maximum diameter of plants present was described. Neighboring land uses and any potential ignition hazards contributed by neighboring uses (including any power lines or electrical equipment) were also noted. Twelve parcels were noted to have existing or potential fuels management issues. Public Works crews can now focus their efforts on these parcels as resources allow.

6.5 A Note on CEQA

A major goal of this Plan is to increase the pace and scale of future vegetation management in Chico's parks, while protecting sensitive resources and keeping the public informed and engaged. To meet those goals, the Plan is designed to streamline future CEQA review. This will be accomplished through a programmatic EIR that will be completed on this Plan. When the final Plan is released, the EIR process will commence.

What is CEQA review and why is it such an important factor in managing our parklands? The following section provides background on CEQA, why it is important, how it can sometimes slow down the pace of ecological restoration on public lands, and how the City is trying to improve its CEQA practices so it can manage our shared parklands efficiently, effectively, and equitably.

CEQA, or the California Environmental Quality Act, was enacted in 1970 to serve as the backbone for all future environmental law and policy in California. Simply put, CEQA requires that whenever an agency or local government inside California has to make a decision, that agency or government must:

- Analyze the situation to see if the decision could have impacts on the environment;
- If it could have impacts, analyze those impacts to see if they could be significant;
- If they could be significant, find ways to reduce them (or mitigate them) until they are no longer significant, *if possible*;
- Keep the public, relevant agencies, and other governments informed throughout the process; and
- Provide the opportunity for the public, relevant agencies, and other governments to meaningfully comment on projects.

CEQA was designed to give the public a say in the public's business. It ensures projects can't be approved behind closed doors or without gathering adequate data. However, as valuable as CEQA is, it has gradually become a major obstacle to increasing the pace and scale of natural resources management in California. Preparing a new CEQA document for every vegetation management project is cumbersome, expensive, and impractical. (Even though CEQA has some exemptions and doesn't apply to ministerial (non-discretionary) actions, in practice it really does apply to a lot of things.) In Butte County, land managers estimate the CEQA process adds six months to two years to most fuels reduction projects.

There is a better way to get land management done while still complying with the letter and spirit of CEQA. Rather than analyze each new project from scratch, an agency can write a *programmatic EIR* that analyzes the effects of a total program of vegetation management. This Plan is the program of vegetation management the City intends to analyze and approve through an EIR process in 2020-21.

A programmatic EIR allows managers to "front-load" CEQA analysis in advance. For example, it may include resource inventories of certain areas, so crews don't have to conduct them later. It may specify mitigation measures (best practices or recipes) future workers can follow to automatically have their work be considered

no-impact. It may identify areas where a certain practice is considered no-impact because we already know (based on surveys) there's nothing there that could be harmed by the practice.

In real life, no EIR can meet all the CEQA needs for all the projects a city will ever want to do. Time and money are limited, and humans are fallible. So, cities write the best EIRs they can, and the next time they want to do a project, they (and the public) can see at a glance whether that new project falls within the scope of the existing EIR or not. If a new project is entirely within the scope of an existing EIR, the city can legally proceed with the project without requiring any new CEQA documents (CEQA guidelines §15168(c)). If a new project is partly within the scope of the EIR, the city and its taxpayers have still saved time, because the new CEQA document need only analyze the parts of the project that aren't already covered by the EIR.

CEQA sounds complicated, and it is. But at its heart, it is nothing more than a way to plan. When you want to do something, first you make a plan (the project description). Then, you may start to think about all the things that could go wrong.

Some decisions, like going out for dinner, are low risk by their very nature (i.e., they deserve a notice of exemption), unless there are exceptional circumstances (such as a global pandemic). Other decisions, like switching careers, are a bit more complex. You might think about the surrounding context of your life (in other words, you'd analyze the environmental setting) and you might make a written list of all the ways things could go sour (the initial study). Next, you'd re-assess the things that could go wrong, one by one, and you'd figure out whether they would really matter, and how much. If it turned out none of them would be disasters, that's a negative declaration. If some of them have the potential for serious harm, but then you found ways to change your plan so the potential for harm goes away (mitigations), then that's a *mitigated* negative declaration. If you can't figure out how to eliminate the potential for harm, you need to analyze the problem in much greater detail, and that's an EIR.

However, there are also other reasons to prepare EIRs. Writing an EIR does not, by itself, mean that the potential for problems is very large. Often, EIRs are prepared simply because the project or program is very big -- or it is innovative, controversial, or affects a lot of people. An EIR is useful for big projects or programs because it provides an orderly, step-by-step framework for examining a big decision (or set of decisions) and -- just as importantly -- for recruiting everybody you know to give you advice.

7 Bibliography/References

BCAG (Butte County Association of Governments). 2019 (June 28). Butte Regional Conservation Plan. Last accessed online at http://www.buttehcp.com/BRCP-Documents/Final-BRCP/index.html on July 7, 2020.

Chico Heritage Association, 1983. Chico Historic Resource Inventory.

City of Chico, October 2004. Chapman/Mulberry Neighborhood Plan. Adopted October 5, 2004. City Planning Division from neighborhood original plan prepared by County residents of the Chapman/Mulberry Neighborhood.

City of Chico, 2008. Final Bidwell Park Master Management Plan Update, including Natural Resources Management Plan. Prepared by EDAW, Sacramento, CA. Available online at: http://www.chico.ca.us/document_library/departments/general_services/Parks/BidwellParkMasterManagement Plan.asp . Parts cited: Description of the Park: Section 1. Regarding fire plan: 5.4.1.2, C.5-5, C.5-8.

Brownsey, Philip, Josh Davy, Theresa Becchetti, Maddison L. Easley, Jeremey J. James, and Emilio A. Laca. "Barb Goat grass and Medusa head: Timing of Grazing and Mowing Treatments." (2016). https://escholarship.org/uc/item/5qd4t38r

CAL FIRE. 2015 (Nov. 3). Butte County Community Wildfire Protection Plan. Accessed online through www.buttecounty.net.

City of Chico. 2010. Draft Natural Resources Management Plan, Bidwell Park, Chico, California. Draft report. Dan Efseaff. General Services Department, Parks Division. Chico, California

City of Chico, January 31, 2012. Comanche Creek Greenway Management Plan. General Services Department, Parks Division.

Cole, Roger, October 29, 2009. Verbena Fields restoration plan. Interactive Design.

Design, Community and Environment (DCE), 2008. Comanche Creek Vegetation Plan. Submitted to the City of Chico. August 01, 2008. Berkeley, California.

Design, Community and Environment (DCE), 2008. Southwest Chico Neighborhood Improvement Plan. Adopted by City of Chico, Resolution no.99-08. December 02, 2008. Berkeley, California.

DiTomaso, J.M., Kyser, G. B., and Pitcarirn, M.J.. “Yellow starthistle management guide.” (2006). https://www.cal-ipc.org/docs/ip/management/pdf/YSTMgmtweb.pdf

DiTomaso, J.M., G.B. Keyser et. al., 2013. Weed Control in Natural Areas in the Western United States. Weed Research and Information Center, University of California. 544 pp.

EBMUD (East Bay Municipal Utility District). 2001. East Bay Watershed Range Resource Management Plan. December 2001.

Eckardt, S. et. al., November 2019. Revised draft, City of Oakland, California, Vegetation Management Plan. Prepared for City of Oakland Fire Department (contact: Angela Robinson Pinon), by DUDEK (Auburn, CA contact Scott Eckardt, RPF) with assistance from Horizon Water and Environment (Oakland, CA; contact: Ken Schwarz).

Foothill Associates, June 25, 1999. Preserve Management Plan, Foothill Park East, Chico, California. Prepared for U.S.Army Corps of Engineers and Drake Homes.

Foothill Associates, February 26, 2014. Wildwood Estates Preserve, Operations and Management Plan, City of Chico, Butte County, California. Prepared for U.S. Army Corps of Engineers on behalf of Guillon, Inc.

Funes, Rebekah. 2008. City of Chico Bidwell Park: Effectiveness Monitoring in an Adaptive Management Framework. Prepared for City of Chico Parks Division. Internship project for: Sustainable Communities: Solving Resource Management Needs through Community Participation.

GEM (Geo Environmental Management) 2001. Sandy Gulch (Lindo Channel) Resource Inventory. Prepared for City of Chico, July 2001.

Hall, Jonathan, 2015. Integrated Vegetation Management Plan for Open Space Lands of the City of San Luis Obispo, CA 2015-2020. The Land Conservancy of San Luis Obispo County. Credit: "This plan is a modification of a weed management plan template produced by The Nature Conservancy".

Restoration Resources 2008. “Teichert Ponds Restoration Habitat Development Plan.” Rocklin, CA: Prepared for City of Chico, Aug, 26, 2008.

River Partners, February 29, 2008. Site Inventory for Bidwell Ranch, Chico, Butte County, California. Draft. Dan Efseaff and Colleen Martin. Chico, California.

River Partners May 28, 2010. “Lindo Channel Elderberry Mitigation Project End of Season Memo,” or: “2009 End of Season Report for the East Fifth Avenue Reconstruction - Lindo Channel Elderberry Mitigation Project.” Prepared for City of Chico by Michael Rogner.

U.S. Fish and Wildlife Service and California Plant Council, 2018. *Land Manager’s Guide to Developing an Invasive Plant Management Plan.* Cal-IPC Publication 2018-01. National Wildlife Refuge System, Pacific Southwest Region, Inventory and Monitoring Initiative, Sacramento, CA. California Invasive Plant Council, Berkeley CA. Available at www,cal-ipc.org and data gov.