



Vegetation & Biodiversity Management

Report and Work Plan 2017–2018



Mission

Marin County Parks is dedicated to educating, inspiring, and engaging the people of Marin in the shared commitment of preserving, protecting, and enriching the natural beauty of Marin's parks and open spaces, and providing recreational opportunities for the enjoyment of all generations.

Overview



Running in Loma Alta Preserve, near the community of Fairfax.

Marin County Parks manages 16,000 open space acres. Our management practices are based on science, field work, and continuous innovation.

Marin County is a regional and national leader in ecologically sound open space vegetation management. We have an “organic first” philosophy. Our goal is “getting to zero” regarding herbicide use. That means taking steps to bring invasive infestations in our preserves to a stage where there is a feasible, long term organic maintenance alternative.

Vegetation must be actively managed in open space preserves, to reduce fire hazards and protect biodiversity. Infestations of invasive weeds are found within the majority of Marin County open spaces. Unchecked, these aggressive weeds increase the possibility of wildfire near residential developments, damage wildland ecosystems, and endanger protected species. If we don’t work to control invasive vegetation, these weeds will irreversibly alter Marin’s iconic landscape.

Marin County commits significant resources to reducing herbicide use in open space preserves. In Fiscal Year 2017–18 we expect to spend \$1.7 million on herbicide-free vegetation work,

with volunteers contributing more than 6,000 hours of labor. Last year we actively managed vegetation on over 2,000 acres of land. Less than 1% of these acres required a small amount of herbicide as part of an integrated “getting to zero” treatment plan. More than 90% of the staff time spent controlling invasive plants focused on non-chemical solutions. We apply limited and targeted herbicide only in carefully considered critical use situations, where we must protect communities from the threat of a wildfire, protect endangered species, or preserve local agriculture. Conventional chemical compounds are used as a last resort, as a means for bringing infestations under control to effectively manage the site organically over the long term.

Effective invasive plant management requires integrating multiple methods into a site-specific, multi-year treatment program. Marin County Parks scientists develop individual treatment plans based on site conditions. In many cases, multiple types of treatments are required over the span of years. Treatments are timed, based on season and

Overview



Chestnut-backed Chickadee, found in all of Marin preserves with forest habitat.

Vegetation and biodiversity management is a necessary component in ensuring Marin County open spaces remain healthy and thrive for future generations.

conditions, to optimize effectiveness. Results are monitored and treatment plans modified based on how the area responds.

Marin County uses of a wide variety of organic methods.

- Manual: hand pulling, weed wrenching, weed whacking, mulching, tarping, reseeding
- Mechanical: flail or rotary mowing, heavy machinery, hydro-mechanical obliteration
- Cultural: animal grazing, prescribed burns, early detection with rapid response, preventing seed spread, avoiding unnecessary land disturbances
- Biological: insect predators or pathogens that prohibit invasive weed growth
- Organic Products: naturally occurring compounds like salt or clove oil that inhibit plant growth

Marin County encourages participation in decision making processes. We collaborate with the Marin County Fire Department when mitigating risk to our preserves and the 35,000 residents who live adjacent to our wildlands. We share knowledge about best practices with other regional land managers. We engage with Marin residents who are passionate about protecting and supporting open spaces. We gather data from the field and monitor scientific research. Collaborative conversations about maintaining healthy ecosystems while reducing critical risks help us continuously innovate and improve.

Biodiversity strengthens Marin County wildlands so they can thrive and endure environmental changes. Biodiverse ecosystems provide food and shelter for a wider range of species, create wildlife corridors across populated areas, purify natural waters, and store excess carbon in plants and soils. Biodiversity will help our preserves and our communities adapt to global warming, climate change, and other environmental challenges. Vegetation management is a necessary component in ensuring Marin County open spaces remain healthy for future generations.

Open Space Preserve Governance

Marin County Open Space District (MCOSD)
Board of Directors governs 34 County preserves.



Marin County's 34 open space preserves cover more than 16,000 acres.

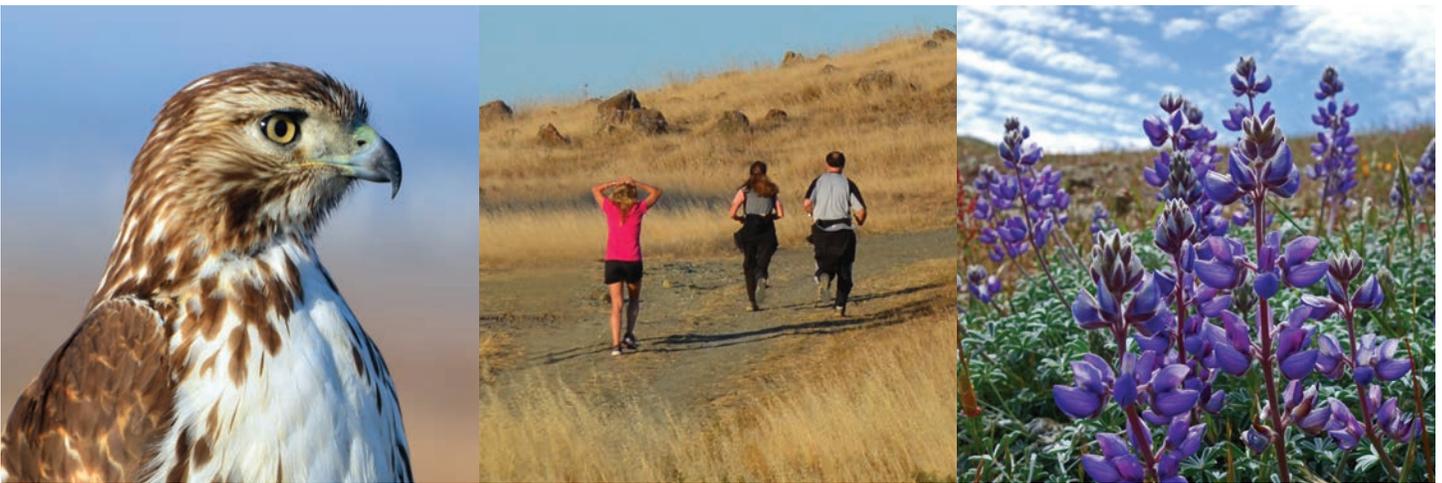
Open Space Preserve Governance

A seven-member Parks and Open Space Commission advises the MCOSD Board.

Two governing bodies provide guidance and oversight for the Marin County Open Space District vegetation management program. A seven-member Parks and Open Space Commission advises the Marin County Open Space District Board of Directors on policy regarding the 34 County preserves, totaling over 16,000 acres throughout Marin. These preserves border residential areas, providing Marin County residents with access to some of the most treasured landscapes in northern California.

In November 2016, the MCOSD Board of Directors voted to continue current practice, using the proposed vegetation management plan as an information resource when making decisions about controlling invasive plants, protecting sensitive habitats, managing fire fuel hazards, and safeguarding public health. The open space preserves are managed for habitat preservation and safety, as well as recreation.

Note: Marin County IPM (Integrated Pest Management) is not covered in this report. The County IPM program covers county parks, structures, ornamental landscapes, and traffic medians. Marin County IPM is governed by the nine-member Integrated Pest Management Commission. For more information about the IPM program visit marincountyparks.org.



Marin County's 34 open space preserves hold a wide range of habitats, from coastal marsh to redwood forests.

Community Wildfire Protection Plan

The Community Wildfire Protection Plan (CWPP) reduces wildfire threat in Marin.

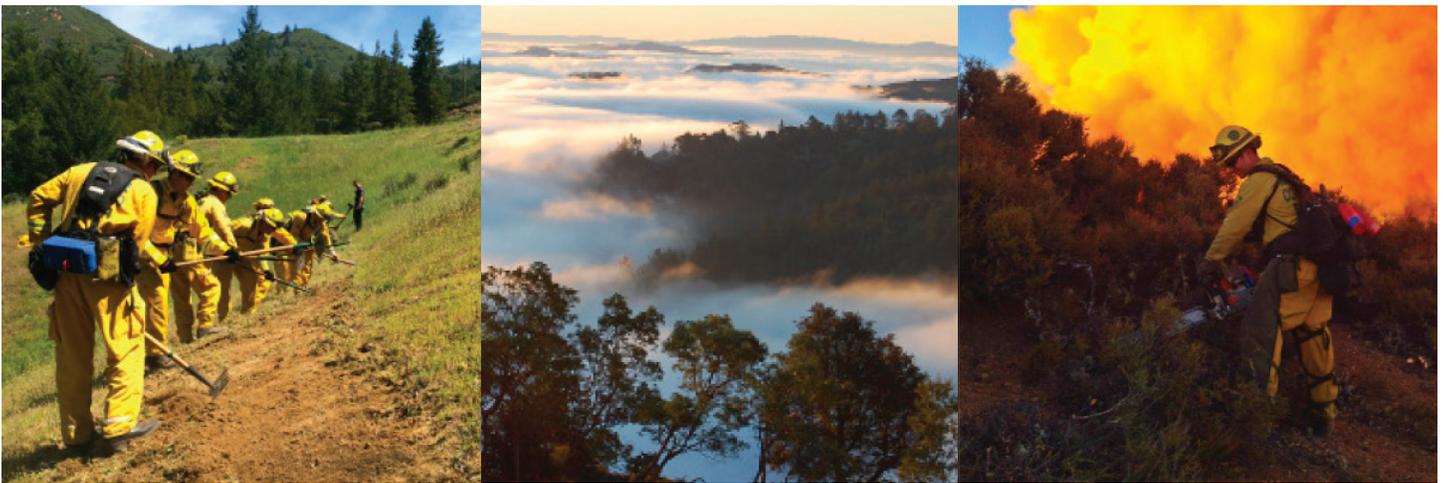
Wildfire poses a great risk to human life and property in Marin County's densely populated wildland urban interface (WUI). To address the risk of fire, Marin County fire agencies, county officials, county, state, and federal land management agencies, and local community members created the Community Wildfire Protection Plan.

Under the guidance of the Community Wildfire Protection Plan and the Vegetation and Biodiversity Management Plan (VBMP), the Marin County Open Space District vegetation management work plan aims to reduce fire risk in Marin.

We support the CWPP with projects that:

- manage open space vegetation and weeds that are a fire fuel risk
- mow and prune fire roads to maintain emergency access
- mow defensible space boundaries near homes

To download the CWPP plan visit: <http://www.readyssetgomarin.org/cwpp>.



69,000 living units border open spaces in Marin, making wildfire a serious threat.

We work to enrich the open space lands that support the plants, wildlife, and people of Marin. Our vegetation management practices are based on the principles of biodiversity and community.

Achievements

In 2016, Marin County managed 77% of invasive weed projects without herbicides.



A young volunteer helps manage broom at Ring Mountain.

Achievements

Grazers help manage weeds and reduce fire fuels on Mount Burdell, Bald Hill, Horse Hill, and King Mountain.

Grazing is an effective tool at preventing the loss of important grasslands. Native grassland habitat is uncommon and has high conservation value. At Mount Burdell, cows grazed over 1,000 acres of grassland to reduce weeds and maintain healthy native vegetation without the use of herbicides. A recent biological survey revealed that native grasslands at Mount Burdell are effectively maintained through the use of grazing. These areas have few weeds and support many native grasses along with a diversity of rare and native wildflowers.

The cows grazing Mount Burdell are managed by a locally owned, organic cattle operation that is part of Marin County's ranching history. This mutually beneficial grazing agreement allows open space lands to support local agriculture, while local agriculture is working to help keep Marin open spaces thriving and healthy.

Marin County also employs sheep, goats, and other animal grazers in vegetation management. Grazing can reduce the risk of fire by keeping fuel loads low, protecting residential communities. The best vegetation management techniques encourage healthy biodiversity while reducing risk to surrounding communities.



Animal grazers are an integral component of Marin County Open Space District vegetation management.

Achievements

After a multi-year effort, 15 acres of Camino Alto fuel breaks can be managed by hand pulling.



Invasive weeds along a fuel break in Camino Alto have been managed to the stage where they can now be maintained with hand pulling. This required some targeted application of herbicide in earlier years.

Achievements

Pampas grass can now be managed by hand removal on Ring Mountain.

Ring Mountain, one of the most botanically unique preserves, with species found nowhere else in the world, is now virtually free of the tall Pampas grass plumes that make this invasive species so recognizable. Ring Mountain used to have large Pampas grass plants spread across the mountain, with a two-acre stand of dense plants on the southern slope.

A variety of treatments—heavy equipment, mowing, and herbicide—were integrated to successfully tackle the Pampas grass infestation on Ring Mountain. A multi-faceted, multi-year treatment plan was required to bring Pampas grass under control, so it can be managed by hand in just a few days each year.

When seeds are sprouting each year, Marin County Parks staff diligently comb the hillsides of Ring Mountain to ensure that all Pampas grass is removed by hand, before the plants get too big to manage. The seeds blow in from neighboring lands on windy days, taking root in wet areas across the preserve.



Ring Mountain's rare habitat requires constant vigilance to keep Pampas grass from returning.

Achievements

Hand removal is an essential component of the Bolinas Lagoon restoration.



Parks staff and volunteers work together as part of ongoing efforts to remove invasive vegetation from Bolinas Lagoon Preserve.

Achievements

Marin County citizens volunteer in nearly every aspect of land stewardship.

Volunteers of all ages and abilities contribute through community volunteer events, special events and programs. These efforts are critical in helping us restore natural habitats and educating and engaging the community in a shared commitment to protecting Open Space lands.

In Fiscal Year 2015-16, 1,304 volunteers contributed 6,044 hours towards invasive weed control on 13 county open space preserves. We engaged youth from 17 Marin County public and private schools on community service field trips, as well as a variety of after-school programs and summer camps.

We collaborated on weed management projects with government, corporate, and non-profit organizations including but not limited to:

Access4Bikes	Greater Farallones NMS	One Tam
Audubon	GreenPlay	REI
BioMarin	Marin County Bicycle Coalition	University of San Francisco
Bold Earth	Marin Horse Council	Wells Fargo
Boy Scouts of America	Marin Master Gardeners	Whole Foods
California State Parks	Marin Municipal Water District	
Golden Gate National Parks Conservancy	National Park Service	



Volunteers and community partnerships are an essential component of the Marin County Open Space District vegetation management program.

Achievements

Staff and volunteers are trained in early detection to prevent new weeds from taking hold.



Early detection is an essential component in managing the re-infestation and spread of invasive plants.

Achievements

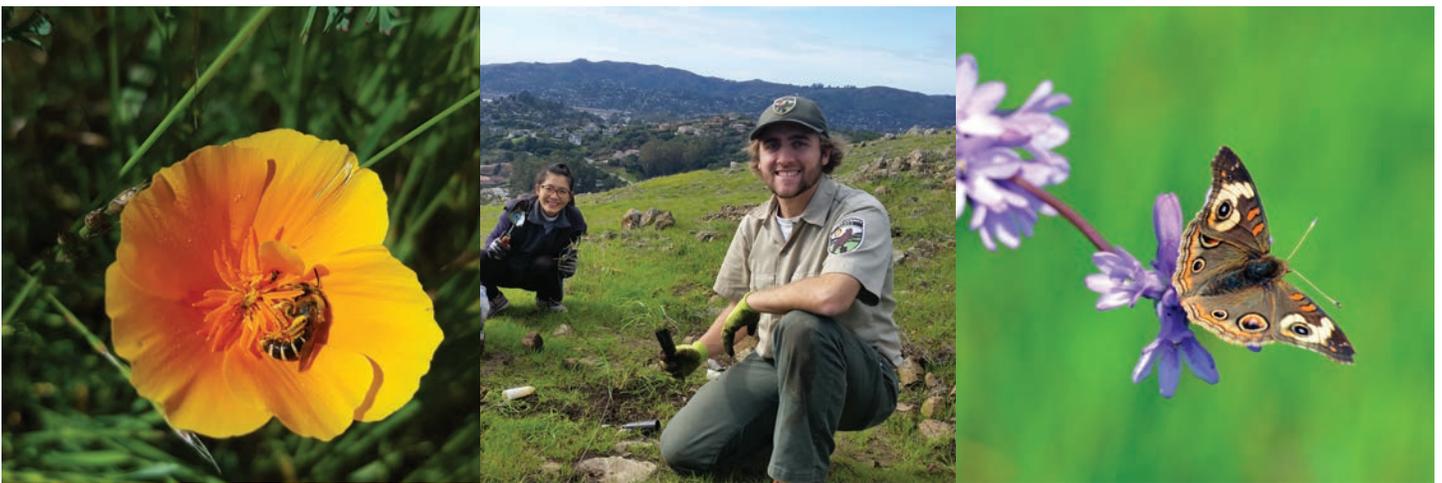
Side-by-side testing will determine how to best manage invasive grasses.

Grasslands are some of the most diverse and important habitats in our region. Marin County Parks continuously explores ways to improve grasslands for wildlife and pollinators, as well as recreation. Unfortunately, there are few grasslands left in California, and those that remain are largely invaded by nonnative grasses that don't provide space for the rich diversity of wildflowers that used to exist.

Invasive grass removal and restoration planting can help increase the quality of our grasslands. These two techniques are often combined in a positive feedback loop where weeds are reduced, thereby benefiting the plantings, and successful plantings begin to take over the habitat, thereby further reducing weeds.

In selected areas, nonnative grasses are removed from plots using different removal methods. Later, **the plots are compared to each other and to untreated areas to determine the benefits of each method.** By hand pulling or weed whipping nonnative annual grasses at the right time of year, we hope to make a difference in some of the most sensitive areas.

Marin is lucky to have so many grasslands, and our goal as a community is to protect their beauty and habitat for many years to come.



Grasslands are threatened by invasive species, but careful restoration techniques can help keep them safe.

Achievements

Research is being conducted to compare goat grazing versus herbicide on King Mountain.



Max the llama guards his flock of goats at King Mountain.

Vegetation Management Trends

The environment continues to change, so we observe, learn and adapt. We are committed to exploring new materials, concepts, and techniques that will help reduce the need for herbicides. We work together with other public land management agencies, scientists, researchers, and the local community to stay informed about trends and discoveries, increase our awareness of ongoing research about invasive plants, and to adapt to the changing landscape.

Multi-faceted solutions. Treatment sites often require multiple methods used in conjunction or conducted in phases over time. Treatment plans should provide long term solutions using the safest and most effective methods. Conventional product applications are reserved for critical use in limited situations, and always with the goal of transitioning away from chemical use.

An ounce of prevention is worth a pound of cure. Early Detection and Rapid Response (EDRR) identifies potential threats in time to allow efficient and environmentally sound decisions to be made. EDRR can stop the spread of new and emerging invasive species before they become established. It is one of the most cost-effective and ecologically viable methods for controlling invasive species and is well worth the effort to protect natural resources.

Data-driven treatment plans. Pilot programs, monitoring, and analysis of methods help identify the most effective and ecologically sound solutions.

Physical labor. Getting to zero herbicide use depends on persistent hands-on work, such as digging, hand pulling, weed wrenching, using power tools, and operating chainsaws. It often requires working in difficult conditions, pushing through dense shrubs and poison oak, and traversing steep slopes in remote locations. Successful ecological vegetation management requires dedication and many person hours.

Weed tolerance. Healthy ecosystems maintained without herbicides will include some non-harmful weeds. Intact communities are more resistant to invasive species and therefore require less management while providing high ecosystem value.

Climate change. Drought, temperature shifts, extreme weather, and rising sea levels are bringing new challenges, as some ecosystems struggle to adapt and become more susceptible to pests and disease.

“Getting to zero” means managing invasive weed infestations in our preserves to the stage where there is a feasible, long- term organic maintenance alternative.

Infestation Assessment

We manage priority invasive weed infestations in 28 open space preserves.



Marin County's 34 open space preserves cover more than 16,000 acres. We currently manage invasive weeds in 28 of these preserves.

High Priority Invasive Plant Species Summary

Acacia (*Acacia spp.*) is a tree that was introduced as a landscape ornamental and has escaped cultivation in some areas. Acacia trees develop root suckers that grow to become large clonal populations.

Goatgrass (*Aegilops triuncialis*) is an annual invasive grass that threatens California's ranching pastures and native grasslands.

Thoroughwort (*Ageritina adenophora*) is an invasive weed that is not well established in Marin. It is toxic to horses and other grazers.

Beachgrass (*Ammophila arenaria*) forms a dense cover that changes beach topography and excludes native plants.

Iceplant (*Carpobrotus edulis*) is a ground-hugging succulent with a creeping habit. It often forms deep mats covering large areas that degrade soil health.

Distaff thistle (*Carthamus lanatus*) forms dense stands that crowd out other vegetation and is difficult to eliminate because of a persistent seed bank.

Star thistle (*Centaurea spp.*) grows as a deep-tap-rooted winter annual that produces one to many solitary, spiny, yellow flower-heads during late spring, summer, and fall.

Pampas/Jubata grass (*Cortaderia spp.*) is an ornamental escape plant that grows rapidly, and produces numerous seeds that can travel long distances (up to 20 miles).

Broom (*Cytisus and Genista spp.*) is a woody shrub that forms dense stands, blocks firefighter access along fire roads and increases fire intensity by acting as a ladder fuel.



Left to right: Broom, goatgrass, and yellow star thistle.

High Priority Invasive Plant Species Summary

Blue gum (*Eucalyptus globulus*) Blue gum aggressively invades native plant communities, is extremely flammable, and under severe weather conditions could produce drifting ignition material.

Tall fescue (*Festuca arundinacea*) invades open habitats such as native grasslands. It forms extensive colonies that displace native vegetation.

Fennel (*Foeniculum vulgare*) is an erect perennial herb that can drastically alter the composition and structure of grasslands, coastal scrub, riparian, and wetland communities.

Pepperweed (*Lepidium latifolium*) is a long-lived perennial weed that thrives in wet areas.

Invasive sea lavender (*invasive Limonium spp.*) is an ornamental escape plant native to the Mediterranean. It grows in coastal areas and sand dunes.

Mayten (*Maytenus boaria*) is a tree that is a fast emerging threat in California. Introduced as a landscape ornamental, this tree has recently made the list of Exotic Pest Plants of Greatest Ecological Concern in California.

Harding grass (*Phalaris aquatica*) is a fast-growing, rapidly spreading weed that quickly creates a monoculture, killing other plants, and damaging coastal valley and foothill grasslands.

Himalayan blackberry (*Rubus armeniacus*) is a strong competitor. It easily resprouts from roots and rapidly displaces native plants.

Invasive cordgrass (*Spartina alterniflora X Spartina foliosa*) spreads clonally to become a dense circular patch of up to 20 meters in diameter. Invasive cordgrass does not provide suitable habitat for native salt marsh shorebirds.



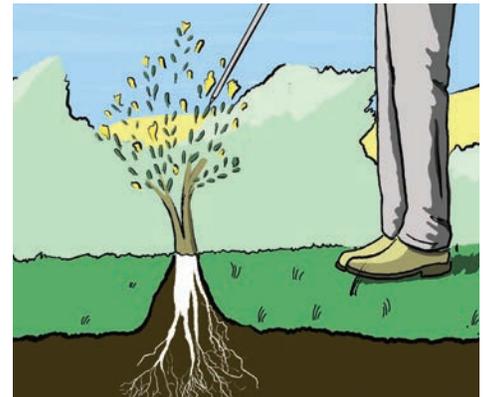
Left to right: Fennel, pepperweed, and invasive cordgrass.

Infestation Assessment

High priority invasive Broom degrades habitat and increases fire danger in many locations.



Broom has spread throughout Marin over the past 20 years. It has invaded over 500 acres of County open space preserves, destroying ecosystems and posing a serious wildfire hazard. If not actively managed, it will transform Marin landscapes into a Broom monoculture.



When cut, Broom grows back stronger and thicker. A single plant can produce more than 12,000 seeds, which survive for up to 50 years. Manual management alone is not effective in addressing the Broom crisis. Targeted herbicide is sometimes needed to control Broom.



Once a plot of Broom has been diminished, the area may then be managed with persistently applied organic methods, helping to maintain biodiversity and ecosystem well-being with zero herbicide.

Infestation Assessment

Unsuccessful treatment can exacerbate the spread and density of Broom.



Without effective follow-up work, Broom that has been cut quickly regrows into dense thickets that impede access and threaten habitat.

Infestation Assessment

“Plants Out of Place”: Early Detection Priorities

Group 1 plant species below are primary targets during early detection and rapid response survey work. These plants are known threats to Marin habitats, but are not yet well-established.

Algerian sea lavender (*Limonium ramosissimum*)

Andean tussockgrass (*Stipa manicata*)

Buffalo berry (*Solanum rostratum*)

Butterfly bush (*Buddleja davidii*)

Cape ivy (*Delairea odorata*)

Cape weed (*Arctotheca calendula*)

European sea lavender (*Limonium duriusculum*)

Fountaingrass (*Pennisetum setaceum*)

Goatgrass (*Aegilops triuncialis/A. cylindrica*)

Gorse (*Ulex europaeus*)

Japanese honeysuckle (*Lonicera japonica*)

Japanese knotweed (*Fallopia japonica*)

Klamathweed (*Hypericum perforatum*)

Leafy spurge (*Euphorbia virgata*)

Mayten (*Maytenus boaria*)

Myrtle leaf milkwort (*Polygala myrtifolia*)

Old man’s beard (*Clematis vitalba*)

Rattlebox (*Sesbania punicea*)

Rosemary grevillea (*Grevillea rosmarinifolia*)

Russian knapweed (*Acroptilon repens*)

Salt water cord grass (*Spartina alterniflora x foliosa*)

Smilo grass (*Stipa miliacea*)

Stinkwort (*Dittrichia graveolens*)

Thoroughwort (*Ageratina adenophora*)

Tree of heaven (*Ailanthus altissima*)

Woolly distaff thistle (*Carthamus lanatus*)

For more information visit California Invasive Plant Council: cal-ipc.org.

Group 2 plant species out of place are not known to be a problem. These include plants that escape from nearby residential or commercial landscaping. Group 2 plants are mapped so that we can monitor their spread.

Group 3 plant species already have had negative impacts on local biodiversity and resources. New outlier populations of these species are mapped to be included in future prioritization analysis for control work. Sometimes these species are prioritized at the local or project level but are not managed regionally.

New invasive plant infestations are found each year, and may recur even when plants appear to have been eradicated. Some invasive weeds distribute seeds that can germinate 50 years in the future. The 2017–18 work plan focuses on “getting to zero” while giving staff scientists the necessary tools for reducing fire risk, protecting species, and supporting local agriculture.

Success requires a variety of methods, combining techniques, and adapting to observations.

Manual and Organic Methods

Hand pull. This method is the most widely used because it is the simplest and, in many cases, most effective. It is commonly used alone or in conjunction with other methods as a follow-up or initial treatment. Even when mature plants are difficult or impossible to pull by hand (as with invasive trees), hand pulling can be used on new seedlings. Weed wrenches help by preventing strain when removing difficult, woody plants.

Mow. Strategically timed mowing can reduce the seeds of many weeds, such as invasive annual grasses. The window for effective seed control is very short. However, mowing can also be used to temporarily reduce fuels and reduce the chance that weed seeds spread along roads and pathways.

Mulch or Tarp. Covering an area with tarps, straw, chips, and/or cardboard to prevent plant growth or seedling establishment is a good tool in some locations. However, it does not allow for preserving desirable plants in the area. Tarps are often difficult to install and maintain, and they must be removed so they don't become trash on the landscape.

Animal grazing. Cattle, sheep, goats, and horses, can help reduce fuels and weeds. They are able to cover large areas that are difficult for people to maneuver. Like all methods, they may have negative impacts that should be weighed against the positive ones so that a net benefit is obtained.

Flaming and prescribed burns. Environmental conditions must be perfect, and this tool is best combined with active follow-up. Safety of staff, visitors, and nearby residential areas must be the top priority. Often fire is used to burn small piles for fuel reduction projects.

Insect predators and pathogens. New helpful organisms are being developed and released by qualified scientists. While they usually target agricultural weeds, some fight with us against wildland weeds.

Organic herbicides. Organic chemicals typically cause the top of a plant to wither. Existing products don't impact large rooted plants, so they aren't effective at managing priority wildland species, although they might provide assistance in special cases. These products should be considered over conventional herbicides when tackling annual weeds within smaller areas in residential landscaping or urban areas.

Conventional products are used in limited, targeted applications for critical use only.

Conventional Products

Triclopyr (Garlon) is used as a systemic, foliar herbicide or stem treatment for woody plants and brush. It is selective and does not harm grasses growing in the area of application.

Glyphosate (Aquamaster) is a non-selective, broad-spectrum, systemic herbicide. We only use this in a few specific locations where an effective alternative is not yet available.

Imazapyr (Habitat) is a non-selective, broad-spectrum, systemic herbicide that is effective on certain species such as mayten and cordgrass.

Fluazifop (Fusilade) is used for control of annual and perennial grass weeds. Because it is selective to grasses, native broadleaf plants are not harmed.

Critical Use

Critical use is limited to the following three situations:

- mitigating a significant risk to public safety such as wildfire
- protecting critical habitats
- fighting invasive or exotic species that post a threat to local agriculture

Proposed Vegetation Management Projects

REGION 1 PROJECT NAME	INVASIVE SPECIES TARGETS	PROPOSED ORGANIC METHOD	PROPOSED CONVENTIONAL METHOD	OBJECTIVES
Alto Bowl Fire Protection	Broom (<i>Cytisus and Genista spp.</i>)	Hand pull (volunteers needed!) Power tools	Tryclopyr (Garlon) selectively applied once annually over a 2-day period in spring/summer in fuelbreak areas north of Bob Middagh Trail and east of fire road Critical use: Fire protection	Engage community Promote biodiversity Reduce fire fuel Transition to zero herbicide
Baltimore Canyon Crown to Coronet Fire Protection	Broom (<i>Cytisus and Genista spp.</i>)	Power tools	Tryclopyr (Garlon) selectively applied once annually over a 2-day period in spring/summer in fuelbreak areas Critical use: Fire protection	Promote biodiversity Reduce fire fuel Transition to zero herbicide
Blithedale Summit Thoroughwort Control	Thoroughwort	Hand pull		Promote biodiversity Prevent spread and avoid the need for herbicide
Blithedale Summit Corte Madera Ridge Access and Fuelbreak	Broom (<i>Cytisus and Genista spp.</i>)	Power tools		Reduce fire fuel Maintain emergency access
Blithedale Summit Ryder Ridge Access and Fuelbreak	Broom (<i>Cytisus and Genista spp.</i>)	Power tools		Reduce fire fuel Maintain emergency access
Blithedale Summit Two Tanks Emergency Access	Broom (<i>Cytisus and Genista spp.</i>)	Power tools	Tryclopyr (Garlon) selectively applied once annually over a 2-day period in spring/summer in fuelbreak areas Critical use: Fire protection	Maintain emergency access Promote biodiversity Transition to zero herbicide
Blithedale Summit Hillside Fire Protection	Broom (<i>Cytisus and Genista spp.</i>)	Power tools Sheep grazing	Tryclopyr (Garlon) selectively applied once annually over a 2-day period in spring/summer in fuelbreak areas Critical use: Fire protection	Promote biodiversity Reduce fire fuel Test alternative methods Transition to zero herbicide

Proposed Vegetation Management Projects

REGION 1 PROJECT NAME	INVASIVE SPECIES TARGETS	PROPOSED ORGANIC METHOD	PROPOSED CONVENTIONAL METHOD	OBJECTIVES
Blithedale Summit Blithedale Ridge Access and Fuelbreak	Broom (<i>Cytisus and Genista spp.</i>)	Hand pull		Promote biodiversity Reduce fire fuel Maintain emergency access
Blithedale Summit Middle Summit Access and Fuelbreak	Broom (<i>Cytisus and Genista spp.</i>)	Power tools		Reduce fire fuel Maintain emergency access
Camino Alto Fire Protection	Broom (<i>Cytisus and Genista spp.</i>)	Hand pull Power tools	Triclopyr (Garlon) selectively applied once annually over a 2-day period in spring/summer in fuelbreak areas except hand pull area east of Camino Alto Fire Road Critical use: Fire protection	Promote biodiversity Reduce fire fuel Transition to zero herbicide
Horse Hill French Broom Control	Broom (<i>Cytisus and Genista spp.</i>)	Hand pull		Promote biodiversity Prevent spread and avoid the need for herbicide
Horse Hill Fire Protection	Broom (<i>Cytisus and Genista spp.</i>)	Hand pull (volunteers needed!) Power tools Flaming		Engage community Promote biodiversity Reduce fire fuel
King Mountain Fire Protection	Acacia, Broom (<i>Cytisus and Genista spp.</i>)	Goat grazing	Triclopyr (Garlon) selectively applied once annually over a 2-day period in spring/summer in fuelbreak areas north of fire road Critical use: Fire protection	Promote biodiversity Reduce fire fuel Test alternative methods Transition to zero herbicide

Proposed Vegetation Management Projects

REGION 2 PROJECT NAME	INVASIVE SPECIES TARGETS	PROPOSED ORGANIC METHOD	PROPOSED CONVENTIONAL METHOD	OBJECTIVES
Cascade Canyon Toyon Fuelbreak	Broom (<i>Cytisus and Genista spp.</i>)	Hand pull		Promote biodiversity Reduce fire fuel
Cascade Canyon Broom Control	Broom (<i>Cytisus and Genista spp.</i>)	Hand pull		Promote biodiversity Prevent spread and avoid the need for herbicide
French Ranch Pampas Grass Control	Pampas/Jubata Grass	Hand pull		Promote biodiversity Prevent spread and avoid the need for herbicide
French Ranch Broom Control	Broom (<i>Cytisus and Genista spp.</i>)	Hand pull		Promote biodiversity Prevent spread and avoid the need for herbicide
Gary Giacomini Broom Control	Broom (<i>Cytisus and Genista spp.</i>)	Hand pull		Promote biodiversity Prevent spread and avoid the need for herbicide
Maurice Thorner Broom Control	Broom (<i>Cytisus and Genista spp.</i>)	Hand pull		Promote biodiversity Prevent spread and avoid the need for herbicide
Roy's Redwoods Broom Control	Broom (<i>Cytisus and Genista spp.</i>)	Hand pull		Promote biodiversity Prevent spread and avoid the need for herbicide
Roy's Redwoods Harding Grass Control	Harding Grass	Hand pull		Promote biodiversity Prevent spread and avoid the need for herbicide

Proposed Vegetation Management Projects

REGION 2 PROJECT NAME	INVASIVE SPECIES TARGETS	PROPOSED ORGANIC METHOD	PROPOSED CONVENTIONAL METHOD	OBJECTIVES
Loma Alta Star Thistle Control	Star Thistle	Hand pull		Promote biodiversity Prevent spread and avoid the need for herbi- cide
Loma Alta Broom Control	Broom (<i>Cytisus and Genista spp.</i>)	Hand pull		Promote biodiversity Prevent spread and avoid the need for herbi- cide

Proposed Vegetation Management Projects

REGION 3 PROJECT NAME	INVASIVE SPECIES TARGETS	PROPOSED ORGANIC METHOD	PROPOSED CONVENTIONAL METHOD	OBJECTIVES
Ignacio Valley Broom Control	Broom (<i>Cytisus and Genista spp.</i>)	Hand pull		Promote biodiversity Prevent spread and avoid the need for herbicide
Indian Valley Broom Control	Broom (<i>Cytisus and Genista spp.</i>)	Hand pull		Promote biodiversity Prevent spread and avoid the need for herbicide
Loma Verde Star Thistle Control	Star Thistle	Hand pull		Promote biodiversity Prevent spread and avoid the need for herbicide
Loma Verde Broom Control	Broom (<i>Cytisus and Genista spp.</i>)	Hand pull		Promote biodiversity Prevent spread and avoid the need for herbicide
Lucas Valley Distaff Thistle Control	Distaff Thistle	Hand pull		Promote biodiversity Prevent spread and avoid the need for herbicide
Lucas Valley Star Thistle Control	Star Thistle	Hand pull		Promote biodiversity Prevent spread and avoid the need for herbicide
Pacheco Valle Broom Control	Broom (<i>Cytisus and Genista spp.</i>)	Hand pull	Triclopyr (Garlon) selectively applied once annually over a 1-day period in spring/summer in fuelbreak areas Critical use: Fire protection	Promote biodiversity Prevent spread and avoid the need for additional herbicide Reduce fire fuel Transition to zero herbicide

Proposed Vegetation Management Projects

REGION 4 PROJECT NAME	INVASIVE SPECIES TARGETS	PROPOSED ORGANIC METHOD	PROPOSED CONVENTIONAL METHOD	OBJECTIVES
Deer Island Goatgrass Control	Goatgrass	Hand pull Power tools		Promote biodiversity Prevent spread and avoid the need for additional herbicide Transition to zero herbicide
Deer Island Pepperweed Control	Pepperweed		Imazapyr (Habitat) selectively applied once annually over a 2-day period in spring/summer Critical Use: Species protection	Promote biodiversity Prevent spread and need for additional herbicide Transition to zero herbicide
Indian Tree Star Thistle Control	Star Thistle	Hand pull		Promote biodiversity Prevent spread and avoid the need for herbicide
Little Mountain Distaff Thistle Control	Distaff Thistle	Hand pull		Promote biodiversity Prevent spread and avoid the need for herbicide
Little Mountain Star Thistle Control	Star Thistle	Hand pull		Promote biodiversity Prevent spread and avoid the need for herbicide
Mount Burdell Goatgrass Control	Goatgrass	Hand pull		Promote biodiversity Prevent spread and avoid the need for additional herbicide Transition to zero herbicide
Mount. Burdell Fuel Reduction and Medusahead Control	Invasive annual grasses (e.g. Medusahead, Wild oat, Italian wild rye, false brome)	Cattle grazing		Promote biodiversity Prevent spread and avoid the need for herbicide Reduce fire fuel

Proposed Vegetation Management Projects

REGION 4 PROJECT NAME	INVASIVE SPECIES TARGETS	PROPOSED ORGANIC METHOD	PROPOSED CONVENTIONAL METHOD	OBJECTIVES
Mount Burdell Hidden Lake Rare Navarretia Protection	Pennyroyal	Hand pull		Promote biodiversity
Mount Burdell Star Thistle Control	Star Thistle	Hand pull Seed/Planting		Promote biodiversity Prevent spread and avoid the need for herbi- cide
Rush Creek Broom Control	Broom (<i>Cytisus and Genista spp.</i>)	Hand pull Seed/Planting		Promote biodiversity Prevent spread and avoid the need for addition- al herbicide Transition to zero herbicide

Proposed Vegetation Management Projects

REGION 5 PROJECT NAME	INVASIVE SPECIES TARGETS	PROPOSED ORGANIC METHOD	PROPOSED CONVENTIONAL METHOD	OBJECTIVES
Bald Hill Fuel Reduction	Broom (<i>Cytisus and Genista spp.</i>)	Grazing Hand pull		Promote biodiversity Prevent spread and avoid the need for herbicide Reduce fire fuel
Santa Venetia Marsh Broom Control	Broom (<i>Cytisus and Genista spp.</i>)	Hand pull		Promote biodiversity Prevent spread and avoid the need for herbicide
Santa Venetia Marsh Fennel Control	Fennel	Hand pull Flower and seed removal		Promote biodiversity Prevent spread and avoid the need for herbicide
Santa Venetia Marsh Harding Grass Control	Harding Grass	Hand pull		Promote biodiversity Prevent spread and avoid the need for herbicide
Santa Venetia Marsh Pepperweed Control	Pepperweed	Cover (fabric or plastic)	Imazapyr (Habitat) selectively applied once annually over a 1-day period in spring/summer	Promote biodiversity Prevent spread and avoid the need for additional herbicide Transition to zero herbicide
Terra Linda/Sleepy Hollow Goatgrass Control	Goatgrass	Hand pull Mow Propane flaming Seed/Planting	Fluazifop (Fusilade) applied to select areas over a 1 day period in winter/spring; Glyphosate (Aquamaster) selectively applied as a follow-up treatment once annually over a 2-day period in spring/summer following a spring mowing. Critical Use: Agricultural threat Species protection	Promote biodiversity Prevent spread and avoid the need for additional herbicide Transition to zero herbicide

Proposed Vegetation Management Projects

REGION 5 PROJECT NAME	INVASIVE SPECIES TARGETS	PROPOSED ORGANIC METHOD	PROPOSED CONVENTIONAL METHOD	OBJECTIVES
Terra Linda/ Sleepy Hollow Star Thistle Control	Star Thistle	Hand pull Propane flaming		Promote biodiversity Prevent spread and avoid the need for herbicide
Terra Linda/ Sleepy Hollow Pampas Grass Control	Pampas/Jubata Grass	Hand pull		Promote biodiversity Prevent spread and avoid the need for herbicide
Terra Linda/ Sleepy Hollow Broom Control	Broom (<i>Cytisus and Genista spp.</i>)	Hand pull		Promote biodiversity Prevent spread and need for herbicide
Ridgewood Fire Protection	Blue Gum	Power tools	Tryclopyr (Garlon) selectively applied to cut stumps once annually over a 2-day period in summer/fall in fuelbreak area. Critical use: Fire protection	Promote biodiversity Reduce fire fuel Transition to zero herbicide
Lucas Valley Rare Buttercup Protection	Pennyroyal	Hand pull		Promote biodiversity

Proposed Vegetation Management Projects

REGION 6 PROJECT NAME	INVASIVE SPECIES TARGETS	PROPOSED ORGANIC METHOD	PROPOSED CONVENTIONAL METHOD	OBJECTIVES
Bolinas Lagoon Acacia Control	Acacia	Hand pull		Promote biodiversity Prevent spread and avoid the need for herbicide
Bolinas Lagoon Beachgrass Control	Beachgrass	Hand pull		Promote biodiversity Prevent spread and avoid the need for herbicide
Bolinas Lagoon Broom Control	Broom (<i>Cytisus and Genista spp.</i>)	Hand pull		Promote biodiversity Prevent spread and avoid the need for herbicide
Bolinas Lagoon Fennel Control	Fennel	Hand pull		Promote biodiversity Prevent spread and avoid the need for herbicide
Bolinas Lagoon Iceplant Control	Iceplant	Hand pull Cover with fabric or plastic		Promote biodiversity Prevent spread and avoid the need for herbicide
Bolinas Lagoon Invasive Cordgrass Control	Invasive Cordgrass		Imazapyr (Habitat) selectively applied once annually over a 1-day period in summer/fall. Critical use: Species protection	Promote biodiversity Prevent spread and need for additional herbicide Transition to zero herbicide
Bolinas Lagoon Invasive Sea Lavender Control	Invasive Sea Lavender	Hand pull		Promote biodiversity Prevent spread and avoid the need for herbicide
Bolinas Lagoon Tall Fescue Control	Tall Fescue	Hand pull		Promote biodiversity Prevent spread and avoid the need for herbicide
Bolinas Lagoon European Sea Rocket Control	European Sea Rocket	Hand pull		Promote biodiversity

Proposed Vegetation Management Projects

REGION 6 PROJECT NAME	INVASIVE SPECIES TARGETS	PROPOSED ORGANIC METHOD	PROPOSED CONVENTIONAL METHOD	OBJECTIVES
Bolinas Lagoon Bird's Foot Trefoil Control	Bird's Foot Trefoil	Hand pull		Promote biodiversity
Bolinas Lagoon Monterey Pine Control	Monterey Pine	Hand pull		Promote biodiversity
Bothin Marsh Invasive Sea Lavender Control	Invasive Sea Lavender	Hand pull		Promote biodiversity Prevent spread and avoid the need for herbicide
Bothin Marsh Alkalai Russian Thistle Control	Alkalai Russian Thistle	Hand pull		Promote biodiversity Prevent spread and avoid the need for herbicide
Old Saint Hilary's Broom Control	Broom (<i>Cytisus and Genista spp.</i>)	Hand pull Seeding/planting Propane flaming	Tryclopyr (Garlon) selectively applied once annually over a 1-day period in spring/summer Critical use: Species protection	Community engagement Promote biodiversity Prevent spread and need for additional herbicide Transition to zero herbicide
Old Saint Hilary's Fennel Control	Fennel	Hand pull		Promote biodiversity Prevent spread and avoid the need for herbicide
Old Saint Hilary's Endangered Jewelflower Protection	Italian Rye Grass, Wild Oat	Hand pull		Promote biodiversity
Old Saint Hilary's Pampas Grass Control	Pampas/Jubata Grass	Hand pull Power tools		Promote biodiversity Prevent spread and avoid the need for herbicide
Old Saint Hilary's Thoroughwort Control	Thoroughwort	Hand pull		Promote biodiversity Prevent spread and avoid the need for herbicide

Proposed Vegetation Management Projects

REGION 6 PROJECT NAME	INVASIVE SPECIES TARGETS	PROPOSED ORGANIC METHOD	PROPOSED CONVENTIONAL METHOD	OBJECTIVES
Ring Mountain Taylor Road Fire Protection	Broom (<i>Cytisus and Genista spp.</i>)	Hand pull	Tryclopyr (Garlon) selectively applied once annually over a 2-day period in spring/summer Critical use: Fire protection Species protection	Promote biodiversity Reduce fire fuel Transition to zero herbicide
Ring Mountain Broom Control	Broom (<i>Cytisus and Genista spp.</i>)	Hand pull Seeding/planting		Community engagement Promote biodiversity Prevent spread and avoid the need for herbicide
Ring Mountain Fennel Control	Fennel	Hand pull Flower and seed removal		Community engagement Promote biodiversity Prevent spread and avoid the need for herbicide
Ring Mountain Harding Grass Control	Harding Grass	Hand pull	Fluazifop (Fusilade) or Imazapyr (Habitat) selectively applied up to twice annually over a 2-day period in spring/summer (only if hand pulling in spring 2017 is not effective) Critical use: Species protection	Promote biodiversity Prevent spread and avoid the need for herbicide
Ring Mountain Mayten Control	Mayten		Imazapyr (Habitat) or Tryclopyr (Garlon) selectively applied to cut in bark once annually over a 2-day period in summer/fall Critical use: Species protection	Promote biodiversity Prevent spread and avoid the need for additional herbicide Transition to zero herbicide
Ring Mountain Pampas Grass Control	Pampas/Jubata Grass	Hand pull Power tools		Promote biodiversity Prevent spread and avoid the need for herbicide

Proposed Vegetation Management Projects

REGION 6 PROJECT NAME	INVASIVE SPECIES TARGETS	PROPOSED ORGANIC METHOD	PROPOSED CONVENTIONAL METHOD	OBJECTIVES
Ring Mountain Star Thistle Control	Star Thistle	Hand pull		Community engagement Promote biodiversity Prevent spread and avoid the need for herbicide
Ring Mountain Tall Fescue Control	Tall Fescue	Hand pull	Imazapyr (Habitat) selectively applied once annually over a 1-day period in spring/summer. Critical use: Species protection	Promote biodiversity Prevent spread and need for additional herbicide Transition to zero herbicide
Ring Mountain Endeavor Fire Road Repair and Restoration	Wild Oat, Fennel	Hand pull Power tools Propane flaming Planting		Promote biodiversity
Ring Mountain Invasive Annual Grass Control	Invasive annual grasses (e.g. Medusahead, Wild oat, Italian wild rye, false brome)	Hand pull		Promote biodiversity Test alternative methods
Ring Mountain Bull Thistle Control	Bull Thistle	Hand pull		Community engagement Promote biodiversity Prevent spread and avoid the need for herbicide
Ring Mountain Wild Mustard Control	Wild Mustard	Hand pull		Promote biodiversity Prevent spread and avoid the need for herbicide
Ring Mountain Monterey Pine Control	Monterey Pine	Hand pull Power tools		Promote biodiversity
Ring Mountain Rosy Sandcrocus Control	Rosy Sandcrocus	Hand pull		Promote biodiversity Prevent spread and avoid the need for herbicide

Proposed Vegetation Management Projects

DISTRICTWIDE PROJECT NAME	INVASIVE SPECIES TARGETS	PROPOSED ORGANIC METHOD	PROPOSED CONVENTIONAL METHOD	OBJECTIVES
Emergency Access	Woody species encroaching on access routes	Mow Prune		Maintain emergency access
Defensible Space	Invasive annual grasses (e.g. Medusahead, Wild oat, Italian wild rye, false brome)	Mow		Reduce fire fuel

These projects reflect our annual work priorities and aim to meet the goals of the Vegetation and Biodiversity Management Plan and achieve our mission. Based on volunteer availability and our ability to respond to a new critical need, we will adapt appropriately.

Additional details about treatment plans at specific locations is available upon request. Contact the Vegetation and Fire Ecologist at (415) 473-5089.

This year we have been given the opportunity to gather stakeholders, evaluate recent trend data, and make plans to improve our approach over the coming years. By understanding the challenges we will face in the years ahead, our team is prepared to monitor our success, adapt to changing needs, and continue to engage the community on our progress.

This work plan identifies priority projects and creates the foundation for accountability that will benefit our environment and communities. It builds upon past efforts and strives to create a more dynamic work plan where we encourage engagement and innovation.

Vegetation and Biodiversity Management Team



From left to right: Greg Reza, Sarah Minnick, Pete Frye, and Mischon Martin.

Mischon Martin **Chief of Natural Resources and Science**

Mischon has worked professionally in Natural Resources and Science for over 20 years. In addition to her current role, she has served in a number of positions with Marin County Parks, including Resource Ecologist and Natural Resources Program Manager. Mischon oversees the planning and implementation of a variety of landscape-level restoration and vegetation management projects throughout Marin County parks and open space preserves. Her work focuses on improving habitat for endangered species, as well as reducing fire fuels and managing the spread of invasive species. Mischon holds a Bachelor of Science in Biology.

Pete Frye **Resource Specialist**

Pete's primary responsibilities include vegetation restoration, supervising field crew work, and mapping. He started his career with Marin County Parks 14 years ago, as a seasonal parks employee. Pete has a Bachelor's degree in Environmental Studies and a Master's degree in Environmental Remote Sensing and Geographic Information Systems.

Sarah Minnick **Vegetation and Fire Ecologist**

Sarah has over ten years of experience in land conservation and vegetation management, including six years working for the National Park Service. In her current position at Marin County Parks, she focuses on vegetation and biodiversity management, including habitat restoration and monitoring, fire protection, invasive weed control, rare species mapping, monitoring and preservation, and community engagement. She holds an undergraduate degree in Mathematics/Biology and a graduate degree in Conservation Ecology.

Greg Reza **Volunteer Program Coordinator**

Greg has organized volunteer projects at Marin County parks and open spaces for over 20 years. He builds community with local schools, groups, businesses, and non-profit organizations, coordinating the many thousands of volunteers each year needed to support ecologically sound vegetation management and habitat restoration. Greg holds a Bachelor's degree in Environmental Studies and Planning with a concentration in Conservation and Restoration.