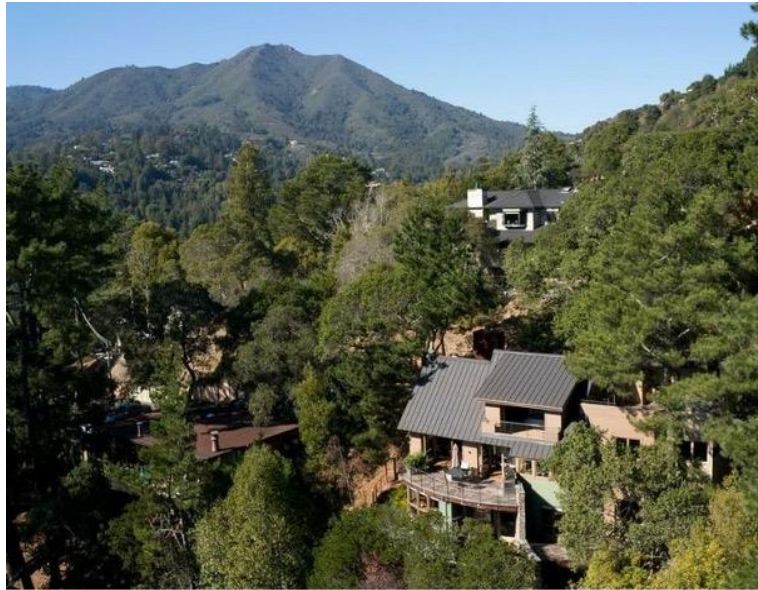


ECOLOGICALLY SOUND PRACTICES FOR VEGETATION MANAGEMENT



Marin Wildfire Prevention Authority
ESP Partnership

May 30, 2021 Final Draft

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ECOLOGICALLY SOUND PRACTICES FOR REDUCING WILDFIRE RISK IN MARIN COUNTY

Intensifying climate change and extensive fuel build-up are contributing to the increasing threat of wildfire throughout Marin County and, to the extent possible, should be addressed through ecologically sound practices that minimize release of greenhouse gases and protect the biodiversity and resilience of Marin's landscapes . . .

--Joint Powers Agreement, Marin Wildfire Prevention Authority

The Ecologically Sound Practices Partnership (ESP Partnership) is a collaboration of fire agencies and the environmental community in Marin whose purpose is to assist the Marin Wildfire Prevention Authority (MWPA) in delivering its work in an environmentally sound manner.

The ESP Partnership's primary goals are to prepare a set of recommended best practices to guide work and to provide expertise during the development of projects, particularly those related to managing vegetation on wildlands, home landscapes, and other properties. In June 2020, interested parties began working on three areas of focus: vegetation management and habitat protection, carbon resource management, and defensible space for ecological benefit.

Like much of California, Marin is at high risk from increased wildfire, in large part driven by climate change. Our deepening global environmental crisis also includes biodiversity loss and increased drought, flooding, and pollution. The ESP Partnership's recommended practices are intended to produce positive results in meeting these multiple threats at the same time.

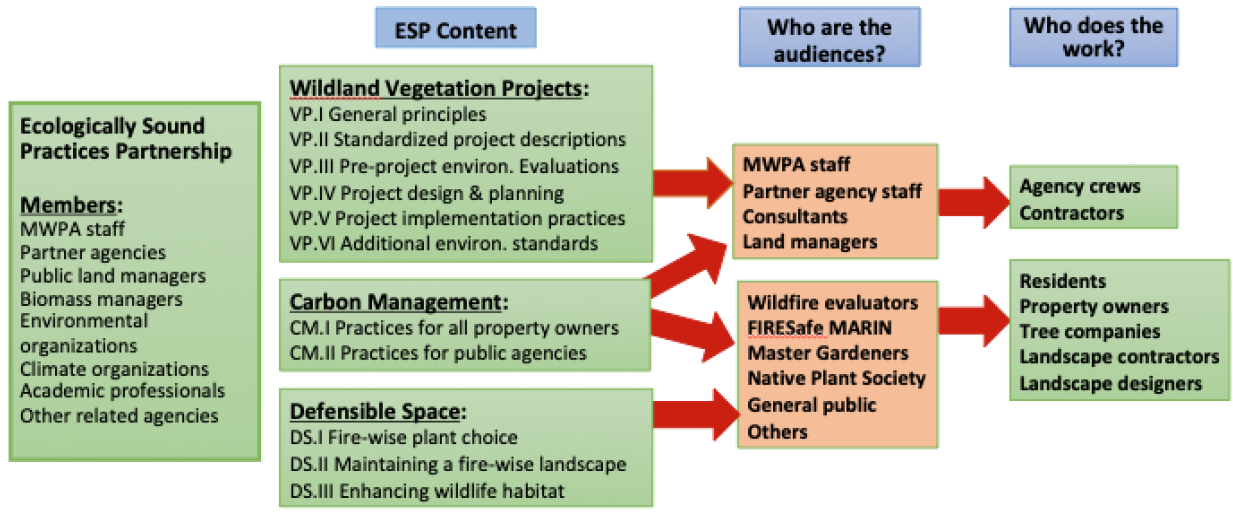
The following set of Ecologically Sound Practices have direct value to a number of audiences: MWPA and its partner agency staff and consultants, land managers, public education and landscape professionals, and the residents and property owners of Marin.

The first section, **Ecologically Sound Practices for Vegetation Treatment Projects in Wildlands**, recognizes that large fires can start in these lands, but also that these areas protect important natural resources and critical habitat. The recommendations strive to improve long term fire protection while taking into account the role that fire has always played on these lands.

The second section, **Ecologically Sound Practices for Carbon Management**, recognizes that actions taken to reduce wildfire risk can also reduce carbon emissions and improve carbon sequestration. Healthy vegetation and healthy soils can pull carbon out of the atmosphere and help counter climate change, and thus ultimately reduce fire danger.

The third section, **Ecologically Sound Practices for Defensible Space**, lists actions that will improve defensible space while also supporting biodiversity, fighting climate change, and reducing pollution.

We present these Ecologically Sound Practices in hopes that they become part of the operational fabric for the work funded through MWPA, so that our communities and our natural lands are both fire adaptive and ecologically sound.



ECOLOGICALLY SOUND PRACTICES OVERVIEW
Marin Wildfire Prevention Authority / ESP Partnership

Ecologically Sound Practices for Vegetation Treatment Projects in Wildlands

Marin Wildfire Prevention Authority

Introduction

The MWPA will be funding vegetation treatment projects on open lands in the wildland urban interface. These projects, such as “fuel breaks” or “fuel reduction zones,” are typically aligned with the perimeter of communities and are intended to reduce wildfire intensity and provide firefighters an increased chance of stopping a wildfire. Projects to improve safety along escape routes also may involve extensive roadside treatments where these recommendations would be applicable. Treatment methods may include the use of hand and power tools, heavy equipment, prescribed burning, and livestock grazing, among others. The following recommendations are provided to support implementation of projects in a way that maintains ecological values to the greatest extent possible.

These guidelines are intended to assist MWPA and fire agency staff or their consultants in developing projects. Sections I and II are general principles or guidelines that provide a framework for managing fuel breaks and reporting project detail. The remaining sections are primarily actions that take place during environmental compliance or California Environmental Quality Act (CEQA) review, project implementation, and post project evaluations.

I. General best management principles

1. Projects should strive to protect the biodiversity and resilience of Marin’s landscape and ensure that ecological values are retained or restored. Ecological values may include protection of special status wildlife and plants, special status plant communities, important wildlife habitats, and native species cover and diversity.
2. Vegetation management projects should be considered permanent facilities that require long-term maintenance and monitoring of impacts on natural resources, invasions by exotic plant species, and outcomes as compared to desired conditions. In general, the MWPA should monitor for maintenance, and the lead agency or property owner should monitor for environmental impacts.
3. Project proponents and contractors should have or obtain expertise concerning environmental resources that may exist on or near vegetation management project sites and contractors should be trained regarding mitigation requirements of the environmental compliance documents associated with the project.
4. Projects will comply with all CEQA requirements; however, even projects that are categorically exempt should be subject to a consistent evaluation of on-site natural resources and potential impacts to these resources. In all instances, project proponents must provide substantial evidence that the project meets exemption criteria (see

section IV below).

5. In support of full transparency and public accountability the MWPA should maintain a web-based project database that provides project detail, current status, long term monitoring needs, and links to CEQA documentation (see section II. below for detail).
6. The burden of periodic maintenance requirements from past projects increases over time, even as new projects come on line. To ensure that the MWPA does not exceed its financial or operational capacity to maintain desired conditions in completed projects, annual work plans should include follow-up maintenance.
7. MWPA should also monitor and maintain the efficacy of all treatments, including broom removal, grazing, and prescribed burning.
8. The recently completed update of Marin's Community Wildfire Prevention Plan provides a framework from which MWPA-funded member agencies can develop plans and programs for treatment projects.

II. Project proponents should provide standardized project descriptions/data for a MWPA Project Tracking Database that includes the following:

1. physical address if applicable
2. project map with standard map conventions (preferably linked to GIS database managed by MarinMap or others)
3. habitat type/plant community
4. acreage
5. slope & aspect
6. past treatments or disturbances
7. methods/equipment
8. treatment protocol (spacing, species choices, etc.)
9. timing of work
10. extent of ground disturbance
11. amount of vegetation to be cut (including plant types, sizes and spacing)
12. methods for disposal of vegetation: chipping, masticating in place, lop and scatter, pile burning including technique, or removal (including destination and process for disposal)
13. access routes
14. smoke management plan/permit requirements
15. post-treatment maintenance frequency and intensity (especially for sites with existing invasive plant species or other issues that may require follow-up treatments)
16. links to: survey reports, CEQA compliance documents, notices of exemption, permits
17. project status (e.g. planning, implementation, completed, follow-up)
18. before and after project photographs

III. Pre-project environmental evaluations

Habitat assessments should be conducted by qualified professionals before and after site treatments. Minimum qualifications for biological professionals are set forth in Section 3.6.3 of the Final Program EIR for the California Vegetation Treatment Program, page 3.6-117.

Assessments should cover the following:

1. invasive plants
2. special status plants and wildlife
3. sensitive habitats/natural communities, such as oak woodlands, bay forests, coastal scrub, chaparral, perennial grasslands, bishop pine woodlands
4. watercourses, wetlands, riparian corridors and aquatic habitats
5. wildlife nursery sites or habitat (including bird nests and burrows)
6. Northern spotted owl habitat
7. slope stability/erosion

IV. Project design and planning best practices

1. Describe desired habitat conditions.
2. Identify potential impacts on natural resources in the project area.
3. Design projects to avoid or mitigate adverse impacts on special status species and sensitive natural communities.
4. Assure that native plant diversity and wildlife habitat are retained or improved.
5. Assure that the proportion of native plant species compared to non-native invasive plant species remains the same or preferably increases; take steps to prevent or mitigate reinvasion after project completion.
6. Give priority to fuel-breaks close to communities.
7. Consistent with maintaining the functionality of shaded fuel breaks, keep canopy trees, maintain native understory, keep large down wood and snags to the greatest extent feasible, and remove as much non-native vegetation as possible.
8. Give priority to removal of non-native trees, e.g. eucalyptus, acacia, Monterey pines.
9. Include erosion and sediment control measures that limit discharge and protect all downstream aquatic resources. Minimize soil disturbance and compaction.
10. Consistent with CALFIRE Vegetation Treatment Plan (VTP) goats, cattle, or other herbivores should not be used on steep slopes (over 50% grade) or on sites with special

status plant species or over 10% native herbaceous cover. Timing and duration of grazing should be designed to protect and promote native plants.

V. Best practices for implementation of vegetation management projects

1. Avoid wetlands, riparian habitats, stream conservation areas, and stream banks, and establish buffer areas in accordance with VTP guidelines or other applicable agency vegetation management plans.
2. Avoid work in bird nesting season; however, if not feasible, conduct timely surveys (within 1 week of work) and provide buffers around active nests, or wait until young have fledged.
3. Protect special status plants and wildlife with visibly marked buffers and/or avoidance, in accordance with VTP guidelines or other applicable agency vegetation management plans.
4. Take steps to assure that the proportion of native plant species compared to non-native invasive plant species remains the same, or preferably increases.
5. When removing invasive plants, use Integrated Pest Management treatments. Implement Early Detection Rapid Response methods on sites vulnerable to invasion by new species.
6. Protect Northern spotted owl habitat and wood rat nests.
7. Implement long-term monitoring by appropriate parties, as necessary.

VI. Comply with additional environmental standards of practice

In addition to the practices listed above, project proponents should implement the best management practices, mitigation measures and standard treatment requirements set forth in [Section 3.6.3 of the Program EIR for the CalFire Vegetation Treatment Plan \(entitled Impact Analysis and Mitigation Measures\)](#). (Project-specific guidance for biological resources, including relevant databases, can be found in Appendix B.) Where applicable, however, the practices and mitigation measures set forth in vegetation treatment plans developed by California State Parks, the National Park Service or Marin agencies may instead be implemented.

Ecologically Sound Practices for Carbon Management

Marin Wildfire Prevention Authority

A fundamental way to reduce the threat of wildfire is to reduce the greenhouse gases that are causing climate change to intensify. Lowering fuel loads can help prevent the release of large amounts of carbon dioxide from catastrophic wildfire. Reusing the carbon contained in vegetation cuttings for productive purposes, like mulch, energy, and wood products can further reduce greenhouse gas emissions. And maintaining and enhancing the health of Marin's diverse landscape can enable it to keep drawing down carbon out of the atmosphere. These carbon management practices apply to every scale of landscape, from large open space to single yard. They are addressed to individual property owners, supplementing Defensible Space practices, with a separate section addressing additional concerns of public agencies managing larger properties and projects.

I. Carbon Management Practices for all Property Owners

A. Maintain healthy plants and ecosystems for optimal carbon capture and sequestration

1. Follow pruning, water management, soil health, habitat enhancement, and other maintenance practices that sustain healthy vegetation while reducing wildfire risk.
 - i. See associated ESP for 'Wildland Vegetation Projects' and 'Defensible Space'
 - ii. See ['Maintain Your Fire-smart Garden' at UC Marin Master Gardeners](#)

B. Maintain an extensive tree canopy

1. Protect and promote the health of large trees (except for designated fire-hazardous trees) and mature forests. The trunks of large trees ignite less readily than smaller vegetation while sequestering large amounts of carbon for long periods of time. Large trees also build healthy, carbon-rich soil by actively returning nutrients to the ground.
2. Where needed to protect structures or other improvements, create 'shaded fuel breaks' by reducing fuel at ground level while maintaining a healthy canopy. Decrease the 'laddering' of fire into the canopy in such areas by removing lower branches, generally up to 6 - 10' or 1/3 of the tree's height, whichever is less.
3. In defensible spaces, space trees to reduce competition and provide growing conditions allowing each tree to reach full size without crowding other trees or structures, thereby reducing future pruning and slowing the spread of fire. (A few large trees sequester more carbon, with less fire hazard, than an overcrowded stand of smaller trees.)
4. Locate and maintain trees where they can cool buildings, minimize heat islands, reduce runoff, and help maintain groundwater and atmospheric moisture.
5. Prioritize planting and maintenance of larger 'high sequestration' trees, where ecologically appropriate.
 - i. See 'large trees' list at [CA Native Plant Society Marin Chapter](#)

- ii. [Also see San Rafael Street Trees \(4' planter size and larger\) list](#)
- iii. [The Firesafe Marin 'Fire Smart' tree list includes a few additional large species](#)
- iv. [Some top sequestration trees are at Drawdown Marin 'Carbon Capture' \(slides 9 & 10\):](#)
- v. [You can calculate the carbon sequestered by a given species at i-tree](#)
- vi. See ['Considerations for Choosing Plants' at UC Marin Master Gardeners](#)

C. Protect and enhance native plant communities

1. Reduce fuel loads to levels typical of Marin's fire-tolerant native plant communities subject to natural fire return intervals.
2. When reducing fuel loads, focus first on dead or diseased vegetation and on removing/reducing non-native invasive and highly flammable species, timing work to limit the spread of their seeds.
3. Re-plant with fire-tolerant and fire-resilient native species adapted to site conditions.
 - i. See ['plant replacement lists' for 'fire-smart' native trees, grasses, groundcovers, and shrubs at Ca. Native Plant Society Marin Chapter](#)

D. Maintain healthy soil able to absorb and store carbon

1. Maintain trees and groundcover, and use mulch, jute geotextile material, erosion catchment wattles that biodegrade over time, or other practices to protect soil from erosion and runoff. Plant and maintain deep-rooted perennial native grasses.
2. Avoid chemical pesticides and fertilizers that are often derived from fossil fuels and can cause the release of nitrous oxide, a potent greenhouse gas; use natural means instead (e.g., attracting birds and other insect predators, applying compost).
3. Minimize disturbance and compaction of soil from equipment or grazing.
4. Encourage retention, spread, and continuity of mycelia and other constituents of the soil biome to support healthy roots and vegetation.
5. Use compost and composted mulch to help maintain soil cover, soil moisture, fertility, and carbon in defensible spaces and working landscapes.
 - i. Purchase compost and mulch derived from Marin green cart yard & kitchen trimmings at local suppliers such as [Redwood Landfill](#) and [West Marin Compost](#)
 - ii. See more on [mulch at Firesafe Marin](#)
 - iii. See ['Putting Carbon Back in Your Soil' at UC Marin Master Gardeners](#)
 - iv. Track [biomass from truck or green cart to organic compost at Redwood Landfill](#)
 - v. [Marin Sanitary Service green cart information](#)
 - vi. [Marin Carbon Farms convert compost to food & sequestration](#)

E. Choose ways to dispose of cuttings that reduce greenhouse gases or increase sequestration

1. Use a chipper and spread chips as mulch (avoid excess chips in native ecosystems).
2. Use curbside green bins, and consider home composting.
3. Utilize and encourage the development of low-GHG biomass disposal options in Marin. Ask your hauler if cuttings can be directed to one or more of the following products, and support resource recovery infrastructure that expands available options:
 - a) Compost & mulch – maintains soil moisture, fertility, sequestration
 - b) Biochar – sequesters carbon long-term, retains soil moisture
 - i. [Biochar basics at Carbo Culture](#)
 - c) Anaerobic digestion (wet or dry) for electricity, fertilizer
 - i. [Track landfill gas to electricity at Redwood Landfill](#)
 - ii. [Marin Sanitary Service commercial ‘food to energy’ conversion](#)
 - d) Gasification/pyrolysis for electricity, biochar, hydrogen (potential Marin pilot)
 - e) Combustion for electricity (potential Marin pilot)
 - f) Wood products—sequester carbon for product’s life (potential Marin pilot)

II. Additional Carbon Management Practices for Public Agencies

A. Reduce fire threats to the Marin landscape

1. Manage vegetation to avoid the release of large amounts of carbon dioxide from catastrophic wildfire on Marin’s landscapes, which currently sequester about 25% of Marin’s greenhouse gas emissions every year.
 - i. [View Marin Community Wildfire Prevention Plan](#)
2. Continue to monitor countywide vegetation maps to identify ‘carbon sinks’ and develop practices that maintain, enhance, and track their health and extent.
 - i. View [One Tam Marin Vegetation Map project](#)
3. Follow local tree ordinances, urban forestry programs, and climate action plans.

B. Manage biomass for low greenhouse gas emissions and high sequestration

1. Minimize GHG release during vegetation management and disposal, including from sources such as saws, chippers, transportation, and processing where feasible.

2. Determine and use lowest-emission/highest sequestration methods of biomass disposal, including onsite practices such as:
 - a) Chipping or ‘masticating’ and broadcasting (while avoiding build-up of chips and other biomass that could harm native ecosystems).
 - b) Lopping and reuse of material (e.g., to cover old trails or enhance habitat).
 - c) Controlled burns – prescribed burns, ‘conservation’ pile burns, ‘air curtain burners’ to reduce emissions, ‘carbonator’ or ‘flame-cap kilns’ for biochar.
 - i. [Onsite way to produce biochar & reduce emissions](#)
 - ii. [Community prescribed burns](#)
 - d) Grazing – employ livestock and practices that increase the health of plants (see VT.IV.10. above for more on grazing practices)
 - i. [‘Match.Graze’](#) onsite options
3. Support low-GHG uses and processes for vegetation disposed offsite, such as compost, biochar, electricity generation, and wood products (see CM.I.E.3 above).
4. Optimize carbon sequestration and minimize GHG emissions at all stages of management, with the goal of balancing the emissions from management activities with the carbon sequestered.
 - i. [Marin Biomass Recovery Study](#)
 - ii. [California Biomass Collaborative overview of biomass & GHG goals](#)
 - iii. [Drawdown Marin GHG emission reduction & sequestration strategies](#)

C. Provide fire-wise and climate-smart public educational materials & presentations

1. Prioritize hardening structures & safe evacuation in disaster preparedness materials.
 - i. See more on home hardening: <https://www.firesafemarin.org/home-hardening>
2. Emphasize ecologically sound practices for vegetation management.
 - i. Also see [‘Earth-Friendly Gardening’ at UC Marin Master Gardens](#):
 - ii. See [‘The Climate-Friendly Gardener’](#)
3. Include ecologically sound disposal practices for vegetation removed.
4. Provide workforce training and public education on maintenance practices, including their carbon management and climate mitigation rationale.

Ecologically Sound Practices for Defensible Space

Marin Wildfire Prevention Authority

Defensible Space is needed to reduce the intensity of wildfires as they approach homes or other structures, and reduce the likelihood that vegetation near buildings will ignite from embers. Defensible space creates a safer place for firefighters to operate and for residents to evacuate. Defensible space may also reduce the likelihood that a structural fire will spread to neighboring homes or wildlands.

Defensible space landscapes also can play an important role in combating climate change and maintaining a biodiverse and sustainable environment. Increased public outreach, expanded home and property inspections, and more frequent enforcement of wildfire ordinances offer the opportunity to transform under-managed properties into fire smart, water wise, biodiverse, and climate friendly landscapes throughout Marin. These Ecologically Sound Practices for Defensible Space provide guidance for making landscapes more sustainable and biodiverse by emphasizing maintenance practices and design modifications that reduce fire intensity, remove fire prone plants, and use native and other plants needed for bees, butterflies, birds, and other wildlife to thrive.

The intended audience for these practices is ultimately the individual residents or property owners who are responsible for designing and maintaining defensible space. In addition, these practices are intended to inform and assist the development of educational and training materials by organizations who deliver information to residents and landscape professionals, such as FIREsafe Marin, UCCE Master Gardeners, California Native Plant Society, and fire service home inspectors as well as potential certification programs for fire agency inspectors.

I. Plant choice

Focus on geographically appropriate California native plants and low-water-use plants that thrive in a Mediterranean climate and are easy to maintain.

1. Grow ‘the right plant in the right place’ for microclimate and garden conditions.
2. Choose plants that store water in leaves and stems, do not produce excessive dead, dry, or fine debris, maintain high moisture content with limited watering, require little maintenance, and contribute to the ecological health of the surrounding area.
3. See the [‘how to choose plants’](#) page of the UC Marin Master Gardeners website.
4. See the [‘fire smart landscaping’](#) page of the Marin chapter of the California Native Plant Society for a list of native plants to replace plants considered fire-hazardous by Marin fire authorities. These native plants can serve similar functions in the garden as those

fire-hazardous species.

5. Choose plants that attract pollinators, support songbirds, foster biological pest control, and reduce the need for pesticides.
6. When designing a garden for new plantings, generally space shrubs so they will be 3-5ft apart at maturity. Avoid or reduce situations where shrubs are under tree canopies. Space shrubs and trees for easy maintenance, with increased spacing on slopes. See [CA Public Resources Code 4291](#).
7. Do not introduce invasive plants and remove existing ones.
8. Prune and thin for plant health and vegetative fuel reduction.

II. Maintenance

A. Clean up – Start with the house and work out

Prior to fire season assess your yard and home landscape for flammable materials. See Marin Master Gardeners '[firesmart landscaping maintenance](#).'

1. Remove dead or dry leaves and pine needles from your roof and rain gutters, and within 5ft of structures. Repeat regularly during fire season.
2. Prune branches that overhang any roofs or deck.
3. Remove combustible material on or under decks, overhangs and fences.
4. Do not allow construction materials, recreational equipment, or other debris to accumulate next to structures.
5. Move wood piles at least 30 feet from any structure.
6. Keep propane tanks clear of debris and set 30 feet away from structures.

B. Mulch and Compost

Soil that retains moisture keeps plants greener and less flammable. The higher the soil's carbon content, the more water it can absorb. Add compost and composted mulch where needed to help retain soil moisture, fertility, and carbon and to encourage mycelia and other constituents of the soil biome that support healthy vegetation.

1. Use permeable, noncombustible (inorganic) mulch materials 0-5' around the perimeter of any structure and to create fuel breaks throughout the property. If

planting within the 0-5ft zone, succulent or high water content plants are suitable.

2. Use compost or composted mulch beyond 5 feet, to hold moisture and eliminate weeds, while leaving some bare soil for ground nesting bees.
3. Limit the depth of wood chips or other organic mulch to 3 inches.
4. Separate large composted wood chip areas with paths or non-flammable materials such as gravel, rocks, decomposed granite or stones to break up continuity of flammable materials on the landscape.
5. Where hardscape is required, use permeable materials to allow rainwater to percolate below ground, reducing run-off and erosion.
6. Secure mulch, compost, and biochar (which also helps retain soil moisture) from local suppliers like West Marin Compost and Redwood Landfill.

C. Water Management

Be water-wise. Design landscapes and irrigation systems to work together. Use drip or low-flow overhead spray irrigation where appropriate and adjust the schedule to irrigate deeply and less frequently to keep your plants appropriately hydrated throughout the year.

1. Group and irrigate plants according to their watering needs. Watering more than necessary can encourage quick and excessive plant growth, increasing the fuel load, or cause root rot that results in increased flammability.
2. Maintain irrigation systems to avoid leaks, ensure proper plant hydration, and avoid runoff into streets, walkways, and storm drains.
3. Irrigate as normal on Red Flag Days. Overwatering depletes the water our fire departments need and does not help plants resist embers or heat from fire.
4. Practice rainwater catchment and retain storm water on site.

D. Erosion and Steep Slopes

Slow runoff by maintaining plant cover and using strategically located berms, swales and rain gardens, as well as water-permeable surfaces.

1. Leave in place or restore enough vegetation and roots to maintain a stable slope and prevent erosion. Preferably, use deep-rooted native plants.
2. When vegetation is removed from steep slopes, erosion control measures should be added to reduce runoff, improve infiltration, and recharge groundwater.

3. Include jute geotextile material and erosion catchment wattles that will biodegrade over time. See Marin Master Gardeners '[preventing erosion.](#)'

E. Pruning, Thinning, and Mowing

Cut out dead, dried, and diseased wood to increase space between plant groupings and tree branches while being sensitive to nesting birds, wood rats or other wildlife habitats.

1. Monitor plant height and prune lower vegetation to reduce the risk of fire spreading into tree canopies.
2. Regularly prune woody, twiggy or overgrown shrubs to remove accumulated dry material and remove dead wood.
3. Cut back vines and groundcovers to remove build-up of dry stems and dead leaves.
4. Prune lower tree limbs away from understory vegetation that would allow fire to move from the ground to the upper portion of the tree. Remove climbing vines from trees.
5. Gently thin tree canopies to remove deadwood and twiggy growth and maintain separation between trees. Avoid topping trees.
6. Mow annual grasses and weeds to about 4-6 inches tall. Mow before 10 am and not on hot or windy days.
7. Prior to mowing, inspect for invertebrates or other wildlife.
8. Use hand pulling or string trimmers (vs. lawnmowers) for clearing weeds, grasses, or other fine vegetation.

F. Tree and Plant Care

Prune at the right time of the year; fall and winter are best to remove excess growth and dead wood. Avoid pruning in the spring or summer to discourage the spread of disease and prevent excess growth of certain species.

1. Remove tree branches within 6-10 feet of the ground or up to $\frac{1}{3}$ the height of the tree, whichever is less, to mimic the conditions in a healthy forest (see DS.III.A.4 below)
2. Leave the branch collar when making flush cuts to reduce injury to the tree.
3. The space between an understory shrub and the lowest branch of a tree should be 3 times the height of the understory shrub.

4. Remove the portion of a tree that extends within 10 feet of the outlet of a chimney or stovepipe. See [CA Public Resources Code 4291 \(a\)\(2\)](#).
5. Avoid planting trees under power lines to prevent having to remove them later. Pre-existing trees and shrubs under power lines should be pruned to prevent contact with the lines. When planting near power lines, choose fire-resistant species, favoring natives where possible. See [PG&E's 'Right Tree, Right Place' guidelines](#).
6. Trees should only be removed if dead or advised to do so by inspectors because they pose a fire hazard.

G. Climate Change

Climate change is a major factor contributing to increased wildfires in Marin. See the Carbon Management Section of these Ecologically Sound Practices for more ways to reduce it.

1. As temperatures increase, keep plants hydrated during heat events, and frequently monitor. Thriving plants are more resistant to embers and radiant heat from wildfire.
2. Choose electric or battery powered gardening tools over gas powered.
3. A primary goal of all fuel treatments, including the maintenance of defensible space, is to reduce fire intensity and encourage healthy plants. Such treatments generally release less carbon, restore vital soil nutrients, and encourage healthy forests and new growth that maximizes long-term carbon sequestration.
4. Consider household energy efficiency improvements and other steps to reduce the greenhouse gas emissions that are driving climate change and intensifying wildfires. For comprehensive climate mitigation and adaptation actions, see [Resilient Neighborhoods](#).

H. Home Hardening

Hardening the home to resist ignition is important since buildings are often more vulnerable than surrounding vegetation. Strategies include installing ignition resistant roofing, retrofitting ember resistant screens over vents, enclosing eaves, closing in the open space under decks, separating wooden fences and gates from the house, and installing ignition resistant siding. See Firesafe Marin '[harden your home](#)'.

III. Wildlife habitat

Coordinate with neighboring Firewise USA sites to create fire-resilient wildlife habitat corridors; provide drinking water and plants suitable for wildlife diets; limit the use of pesticides, herbicides, and chemical fertilizers; and reduce the likelihood of habitat destruction from high intensity wildfires. Our landscapes are shared with a host of other living creatures. Each decision we make also affects them.

A. Structural habitat

A well maintained defensible space can create or enhance structural habitat for wildlife use, often including an open understory canopy ideal for foraging bats, raptors, and owls.

1. Leave Dusky-footed wood rat nests intact. Dusky-footed wood rats are an important food source for raptors. Multiple generations use these 'pile of sticks' homes.
2. Install bat, owl, and bird nest boxes 10-15ft above ground and away from buildings. Boxes require annual cleaning.
3. Space plants for wildlife shelter; clear dead leaf litter under shrubs less than 5ft high.
4. Dead branches, limbs close to the ground, and logs serve as wildlife habitat. Small areas of such material may be left in place beyond the 30ft zone around structures.

B. Food/ Forage

Encourage plants that serve as perennial food sources for pollinators, insects and small mammals. The most suitable food sources are native plants with which wildlife has co-evolved. See [Marin Master Gardeners plant lists](#).

1. Plant native nectar plants for pollinators and native trees and shrubs that produce berries for songbirds and mammals. Remove invasive vines that reduce nesting habitat for songbirds.
2. If one cannot plant natives, best practice is to plant non-invasive Mediterranean drought-tolerant plants that are not designated fire-hazardous.

C. Sources of Water

Provide summer water sources for butterflies, birds and mammals.

1. Encourage the use of non-chlorinated ponds and birdbaths.
2. Keep swimming pools and water troughs covered when not in use or build wildlife escape ramps.

D. Bare Ground

Bare ground is beneficial for ground nesting insects and sun basking for reptiles such as lizards and snakes.

1. Maintain ample areas of bare ground within the zone 0-5ft from the house and integrate strategically throughout the landscape.

E. Decomposers

Slow, spread, and sink rainwater to support nematodes, fungal network, and nutrient cycling.

1. Wet months in Mediterranean climates are the most valuable time for rainfall to slowly move through soil profile. This allows decomposers to cycle nutrients, and for mycorrhizae and nematodes to build up soil.
2. Outside the 0-5ft zone, leave dead leaves on the ground in the winter to encourage decomposers.
3. Use composted mulch where feasible in the 5ft- 30ft zone, to a depth of about 3 inches, to keep roots moist in the summer months, as well as provide habitat for soil organisms and other wildlife.
4. Beyond the 30ft zone, leaf material and dead branches are encouraged to a maximum depth of 3" to reduce evapotranspiration and enhance habitat in the top soil horizon.

F. Bird Nesting Season

Marin County is part of a migratory bird flyway, and many birds nest here. Reduce impacts to bird nesting and foraging.

1. Inspect for the presence of nesting birds prior to performing vegetation work, and when possible, perform work outside of bird nesting season.
2. When cutting grass in the spring and summer months (as required to reduce flammable fine fuels) inspect the area first for ground nesting birds, reptiles, and mammals.
3. Remove dead branches and prune trees adjacent to structures in the winter whenever possible. Winter work is less likely to disturb nests and reduces the maintenance required during fire season.

IV. General Resources:

1. [Ecologically Sound Practices Partnership \(ESP\)](#)
2. [University of California Marin Master Gardeners \(MMG\)](#)
3. [University of California Integrated Pest Management \(UCIPM\)](#)
4. [FIRESafe Marin \(FSM\)](#)
5. [California Native Plant Society & CalScape \(CNPS\)](#)
6. [Marin Municipal Water District \(MMWD\) Watershed Approach to Landscaping](#)
7. [Marin Audubon Society](#)
8. [University of California Climate Wise Gardening](#)
9. [University of California Tree Care and Management](#)
10. [PG&E planting considerations](#)
11. [CalPoly SelecTree](#)
12. [California Invasive Plant Council \(CalIPC\)](#)
13. [Ecological Artisans](#) Effective Erosion Control: Straw Wattle

V. Wildlife Resources:

1. [International Bat Conservation Biologist](#) – Bethany Shultz
2. [Xerces Society List of habitat guide for pollinators](#) –
3. [Bruns Lab- Point Reyes Vision Fire- study](#)- UC Berkeley lab that study mycological community. [Reference to be confirmed.]
4. SF Mycological group - grow mushrooms in your garden - Ken Lenshfield
5. [Marin Native Plant Society - Replacement plant list](#)
6. [Habitat Structure in Montane Forests](#) –US Forest Service
7. Point Reyes National Seashore Wildlife and Bird Biologist – Dave Press
8. Water Wise - Greg Ruben - micro sprinklers (drip saturates the drip zone). Landscaper in S. California
9. [Marin Municipal Water District – Watershed Approach to Landscaping](#)
10. [Marin Beekeepers](#) – Bonnie Morse