

# ECOLOGICALLY SOUND PRACTICES FOR VEGETATION MANAGEMENT



Marin Wildfire Prevention Authority  
ESP Partnership

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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 living, evolving, flexible set of recommended best practices to guide wildfire risk reduction work and to provide expertise during the development of projects, particularly those related to managing vegetation on wildlands, home landscapes, and other properties. The ESP Partnership recognizes that wildfire risk reduction is the primary goal of the MWPA. In June 2020, interested parties began working on recommendations for 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.

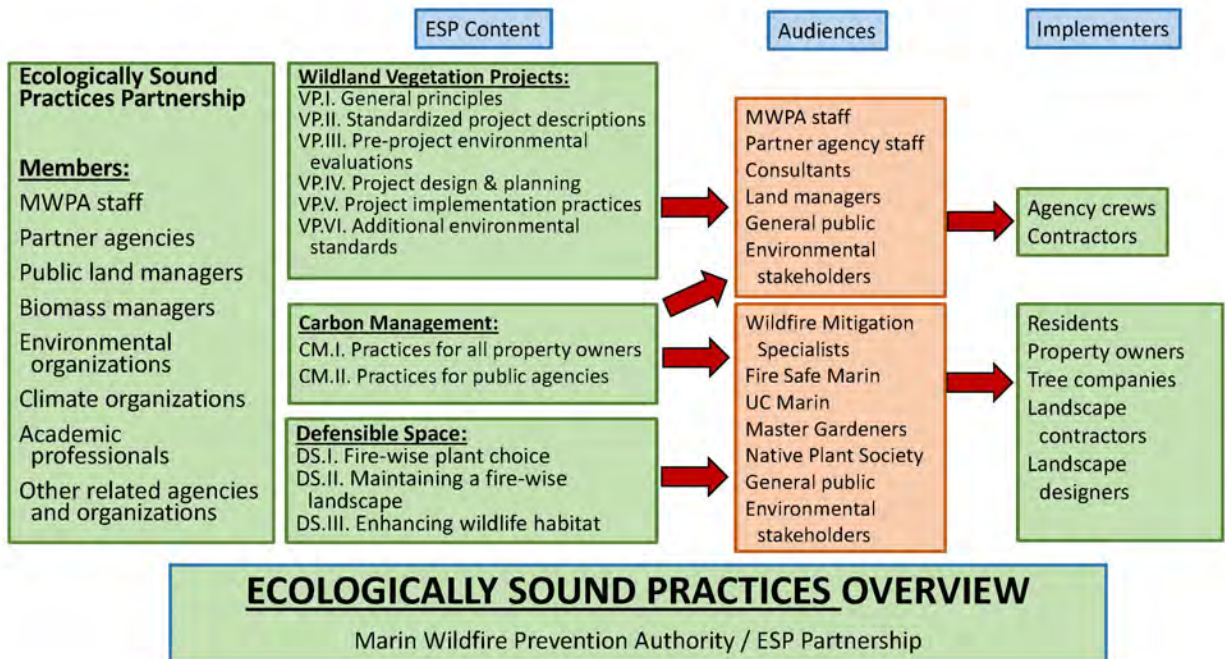
The first section, **Ecologically Sound Practices for Vegetation Treatment Projects in Wildlands**, recognizes that large fires can start in these lands, but also that these areas protect important natural resources and critical habitat. The recommendations strive to improve long term fire protection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

These Ecologically Sound Practices are intended to 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.

MWPA’s projects will comply with the California Environmental Quality Act and other state, federal, and local regulations, and with the language of Measure C, which requires that MWPA actions be conducted with the ultimate goal of fire protection and prevention. In addition, MWPA intends to implement these Practices to the greatest extent possible. MWPA staff will continue to seek input from representatives of ESP and other environmental stakeholders. Because of widely varying conditions and circumstances, flexibility may be needed when applying the Practices in specific instances. MWPA Board, staff, consultants, and legal counsel will determine how best to incorporate these Practices into individual projects.



# **Ecologically Sound Practices for Vegetation Management Projects in Wildlands**

## **Marin Wildfire Prevention Authority**

### **Introduction**

The MWPA will be funding vegetation management 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. The California Board of Forestry and Fire Protection’s California Vegetation Treatment Program (CalVTP) is referenced in the practices described below as it represents a high standard for environmental compliance and includes a certified Programmatic Environmental Impact Report that comprehensively addresses anticipated effects of vegetation treatment activities for fire risk reduction.

The practices outlined in this document, in some cases, reiterate existing laws and legal requirements, which the MWPA has already committed to following. Additional information may, at the discretion of the MWPA, help projects be implemented in a more ecologically sound way than required by law.

### **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. To ensure the ongoing efficacy of vegetation management projects developed for fire safety such as fuel breaks, they should be considered permanent facilities that require long-term maintenance. Monitoring of impacts on natural resources, invasions by exotic plant species, and outcomes as compared to desired conditions should be considered. Some invasive plants such as eucalyptus and broom present challenges due to their sprouting response or large existing seed banks in project area soils, but also present

opportunities for fire experts and ecological experts to work toward common goals.  
NOTE: this is deleted from this location as it's the same as #7 below.

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 best management practices, project design and implementation features, or mitigation requirements of the environmental compliance documents associated with the project.
4. Vegetation management projects will comply with all CEQA requirements. 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. Periodic maintenance requirements from past vegetation management projects increase over time, even as new projects come online. Annual work plans should therefore include follow-up maintenance.
7. The MWPA should conduct monitoring as required through the environmental compliance process and to determine appropriate maintenance intervals and activities. The MWPA may also choose to collaborate with the implementing agencies, academic institutions, property owners, and/or other partners to gather data on projects for long-term monitoring, to track effectiveness of treatments (including broom removal, grazing, and prescribed burning), to track ecological indicators, and/or to inform an adaptive management approach.
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. Subsequent updates, additional planning efforts, datasets, and studies should also be consulted for additional guidance and analysis.

**II. Project proponents should continue to provide standardized project descriptions/data for a MWPA Project Tracking system that includes the following, as applicable and available:**

1. physical address
2. project map with standard map conventions (preferably linked to GIS database managed by MarinMap or others or a .kmz file)
3. habitat type/plant community
4. acreage
5. slope & aspect, as feasible
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 and monitoring 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 unless release of information could present a risk to sensitive biological, cultural, or other resources
17. project status (e.g., planning, implementation, completed, follow-up)
18. before and after project photographs (in keeping with potential privacy concerns)

### **III. Pre-project environmental evaluations**

Where appropriate, habitat assessments for WUI and wildland vegetation management projects 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 can include a desktop analysis and field surveys, depending on site conditions, activities proposed, and potential for sensitive species to be present and cover the following, as needed:

1. invasive plants
2. special status plants and wildlife
3. Sensitive Natural Communities, as defined by California Department of Fish and Wildlife, may be determined through the use of the most recently updated and fine-scale vegetation mapping or habitat mapping spatial data, and should be reviewed where data is available. Golden Gate National Parks Conservancy (GGNPC) Marin County Fine Scale Vegetation map data, and/or VegCAMP at [wildlife.ca.gov](http://wildlife.ca.gov), may include suitable habitat data. Sensitive Natural Communities may include certain vegetation alliance groups of coastal scrub, chaparral, perennial grasslands, bishop pine woodlands, areas of serpentine soils, and others.
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 anticipated fire risk reduction benefits.
2. Describe desired habitat conditions.
3. Identify potential impacts on natural resources in the project area.
4. Design projects to avoid or reduce adverse impacts on special status species and Sensitive Natural Communities, consistent with the above (refer to Section III. 3.), CEQA requirements, and permitting requirements.
5. Design projects with consideration for maintaining or improving native plant diversity and wildlife habitat to the extent feasible, and in the context of wildfire resiliency, as many native plants, such as bunch grasses, carry fire less effectively across a landscape than non-native invasive plants, such as non-native annual grasses.
6. Design projects with consideration for maintaining or increasing native plant cover to the extent feasible.
7. Follow a “house out” approach that prioritizes fire risk reduction strategies in and around communities ahead of fuel breaks in remote wildlands.
8. To the extent feasible, within shaded fuel breaks, keep canopy trees, keep a portion of native understory, keep a portion of large down wood and snags that provide wildlife habitat, incorporate refugia into the design, and target non-native vegetation in order to achieve desired habitat objectives where compatible with achieving fire fuel management objectives.
9. Give priority to removal of fire-hazardous non-native trees, e.g., eucalyptus, acacia, Monterey pines where compatible with achieving fire fuel management objectives.
10. Include erosion and sediment control measures, as needed, that limit discharge and protect downstream aquatic resources. Use biodegradable erosion-control materials. Minimize soil disturbance and compaction.
11. Consistent with CALFIRE Vegetation Treatment Plan (VTP), timing and duration of grazing should be designed to protect and promote native plants. Herbivory should be prescribed to avoid significant erosion and sedimentation.

**V. Best practices for implementation of vegetation management projects**

1. Conduct work so as to avoid or minimize adversely affecting 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. Obtain



appropriate permits if a project is to affect regulated waters or habitats.

2. Take steps to avoid adversely affecting nesting birds. For projects that may adversely affect nesting birds, 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 monitor the nest to ensure no disturbance. Alternatively, wait until young have fledged.
3. Protect special status plants and wildlife with visibly marked buffers and/or avoidance, where needed, in accordance with VTP guidelines, the CEQA review process, project design features, or other applicable agency vegetation management plans.
4. Take steps to maintain, or potentially and preferably increase, as feasible, the proportion of native plant species compared to non-native invasive plant species.
5. Take steps to prevent or reduce reinvasion of non-native, invasive plant species during and following project implementation to the extent feasible. When removing invasive plants, use Integrated Pest Management treatments. Implement Early Detection Rapid Response methods, as appropriate and feasible, on sites vulnerable to invasion by new species. Reduce the spread of Sudden Oak Death and other pathogens by tools and equipment.
6. Endeavor to protect northern spotted owl habitat, improve its resilience to fire, and avoid adverse impacts to wood rats.
7. Implement long-term monitoring by appropriate parties, as necessary and appropriate for fire prevention.

#### **VI. Comply with additional environmental standards of practice**

In addition to the practices listed above, as appropriate given the scale and impact of projects, project proponents should consider incorporating the best management practices, mitigation measures and standard treatment requirements set forth in [Section 3.6.3 of the Program EIR for the CALFIRE VTP \(entitled Impact Analysis and Mitigation Measures\)](#). (Project-specific guidance for biological resources, including relevant databases, can be found in Appendix B.) Where applicable, the practices and mitigation measures set forth in vegetation treatment/management plans developed by California State Parks, the National Park Service, CAL FIRE (e.g., Forest Practice Rules), or Marin agencies should be considered.

## **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 yards. 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 per guidance from CALFIRE, local fire agencies, project biologists, foresters, and/or other experts, as appropriate (generally up to 6 – 8’ 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. Where consistent with defensible space recommendations, 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 feasible and 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. Where feasible, 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. To the extent feasible, 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). If member agencies determine that pesticides are required to meet project objectives, ensure that Integrated Pest Management practices be incorporated into the project.
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, for instance by allowing some organic material to decompose naturally where appropriate and by retaining plants that support mycorrhizal growth.

5. Use compost and composted mulch to help maintain soil cover, soil moisture, fertility, and carbon in defensible spaces and working landscapes.

- i. Consider purchasing compost and mulch derived from Marin green cart yard and kitchen trimmings through local suppliers.
- ii. See more on [mulch at Firesafe Marin](#)
- iii. See [‘Putting Carbon Back in Your Soil’ at UC Marin Master Gardeners](#)
- iv. Learn more about composting at local facilities, such as [West Marin Compost](#), [Redwood Landfill](#), and [Marin Sanitary Service](#).
- v. [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, where appropriate and with consideration for wildfire hazard (avoid excess chips more than a few inches deep 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. Consult the Marin Biomass Recovery Study currently being developed through the Marin Resource Conservation District. 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 and often can be done by residents at home

b) Biochar – sequesters carbon long-term, retains soil moisture and may be feasible for agencies and organizations

- i. [Biochar basics at Carbo Culture](#)

c) Anaerobic digestion (wet or dry) creates electricity and/or fertilizer and may be feasible for agencies and organizations

- i. [Track landfill gas to electricity at Redwood Landfill](#)
- ii. [Marin Sanitary Service commercial ‘food to energy’ conversion](#)

d) Gasification/pyrolysis - creates electricity, biochar, hydrogen (potential Marin pilot) and may be feasible for agencies and organizations

e) Combustion – can be tailored to create electricity and may be feasible for agencies and organizations

- f) Wood products—sequester carbon for product’s life (potential Marin pilot) and may be feasible for residents, agencies, and organizations

## 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, where feasible, 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 or increase wildfire risk).
  - b) Lopping and reuse of material (e.g., to cover old trails or enhance habitat) where consistent with fire risk reduction goals
  - 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. Emphasize 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 benefit for climate change.

## Ecologically Sound Practices for Defensible Space, Guidance for Residents

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, removing fire prone plants, and using 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 their 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

When designing and managing landscaping around the home, property owners should 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. See the Fire Safe Marin and UC Marin Master Gardeners websites for additional resources as they are developed.
6. Choose plants that attract pollinators, support songbirds, foster biological pest control, and reduce the need for pesticides.
7. When designing a garden for new plantings, generally space shrubs to be consistent with current guidance (generally to be 3-5ft apart or 2-3 time the plant's height 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](#).
8. Do not introduce invasive plants and remove existing ones.
9. 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, residents should assess their yard and home landscape for flammable materials. See Marin Master Gardeners '[firesmart landscaping maintenance](#).' Follow current guidance from your local fire district or defensible space inspection report, which may include:

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. Follow current guidance from your local fire district or defensible space inspection report to ensure that mulch materials do not contribute to fire risk around the home.

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. Do not overwater on Red Flag Days as it may deplete 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

To slow runoff, residents should consider 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.
2. To maintain slope stability, consider replacing fire hazardous plants with deep-rooted, native, low fire risk plants consistent with recommendations for fire smart landscaping.
3. When vegetation is removed from steep slopes, erosion control measures should be added to reduce runoff, improve infiltration, and recharge groundwater.
4. Include jute geotextile material and erosion catchment wattles that will biodegrade over time. See Marin Master Gardeners '[preventing erosion](#).'

#### E. Pruning, Thinning, and Mowing

Residents should 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 follow requirements set forth in local fire codes (generally 3-4 inches in most jurisdictions). 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

Residents should 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 or current guidance set forth in local and local fire codes (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. (See DS.III.A.4 below for wildlife values.)

#### 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**

Residents should consider coordinating 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. Consider installing 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, avoid removing vegetation containing active nests (containing eggs or nestlings) until the chicks have fledged and left the area, 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