

**Marin Municipal Water District  
Vegetation Management Plan Update**

**Interim Background Report No. 4**

**Vegetation Management Plan Goals and Objectives Report**

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## **MMWD Vegetation Management Plan Goals and Objectives**

This background report outlines the goals and objectives of the Vegetation Management Plan (VMP). These goals and objectives were used to develop a list of specific actions that are summarized in this report, and expanded upon in the Biodiversity Management and Fire Hazard Management Chapters. The schedule, priority, and degree of monitoring for each of these actions were established in order to fulfill the VMP goals and objectives. The reader should refer to the Glossary for a definition of terms used in this section, and refer to the Biodiversity Management and Fire Hazard Management Chapters for additional background on how and why the goals and objectives were developed, the specific actions that will implement the goals and objectives, and the techniques that will be used to carry out the actions.

The following existing management documents were instrumental in developing the VMP:

### **MMWD Mission Statement**

The District's Mission Statement is:

*It is the purpose of the Marin Municipal Water District to manage sustainably the natural resources with which it is entrusted, to provide its customers with reliable, high-quality water that maintains and protects public health at a fair and reasonable price, and to ensure the fiscal and environmental vitality of the district for future generations.*

In order to maintain its natural resources and continue to produce high-quality water, MMWD is committed to managing its watersheds to maintain natural conditions to the greatest extent possible. This VMP addresses that commitment by discussing how the vegetation can best be managed to minimize the negative consequences from wildfires, erosion, and loss of vegetative cover.

The VMP goals, objectives, and actions were developed to be consistent with the District's Mission Statement.

### **MMWD Board Policy #7: Mt Tamalpais Watershed Policy**

The Mt. Tamalpais Watershed Management Policy was adopted by the District in October 2001. The goals of this Policy are to manage watershed lands to: 1) serve as water-producing lands; 2) maintain their integrity as natural wildlands and scenic open space; and 3) provide passive daytime recreational activities consistent with potable water production and preservation of natural wildlands. The Policy also lists a specific series of actions and policies that were designed to realize these three general goals.

The VMP goals, objectives, and actions were developed to be consistent with the directions and goals included in the Watershed Policy.



## Principles Used in Developing the VMP

Based on the direction provided in Board Policy #7, developed with public input, and from the operating principles used by all natural resource managers in the region, the VMP has identified the following guiding principles:

- Commitment to maintaining high-quality water;
- Adherence to the precautionary principle;
- Commitment to regional cooperation;
- Commitment to environmental and economic sustainability and social justice;
- Commitment to integrated pest management principles;
- Commitment to protecting the ecological integrity of Mt. Tamalpais;
- Commitment to preserve, protect, restore, and enhance biological diversity; and
- Commitment to public involvement and education.

MMWD aims to preserve the existing rich biodiversity of the three watersheds while recognizing that ecological processes have already been disrupted by past and current management of the watersheds as a public water source, as well as by the proximity of Mt. Tamalpais watershed lands to residential neighborhoods.

The current mosaic of vegetation types on the watersheds has been formed by the separate and interacting effects of numerous factors including: damming of streams to construct reservoirs, the elimination of Native American burning regimes, the suppression of fires, the elimination of elk, bears, and other wildlife, logging, the construction of access roads and trails, the introduction of non-native plants and animals, the recreational use of the watersheds. Together and separately, these have affected species diversity, vegetation age and structure, and ecosystem processes. Existing biodiversity is also subject to new threats, including the spread of Sudden Oak Death (SOD) and the long-term effects of Global Climate Change (GCC).

Given the interplay of all these natural and human-caused processes, while keeping in mind its available resources, MMWD aims to:

- Maintain and, where feasible, restore and enhance natural habitats and processes in order to maintain viable populations of native species and to promote species richness, resiliency, and habitat complexity to the fullest extent possible.
- Maintain, enhance, and restore habitat needed to conserve special-status plants and animals.
- Protect high quality habitats from the spread of invasive species, departure from natural fire regimes, disease, mechanical disturbance, and other factors.
- Restore habitat that has been degraded.

- Maintain the watersheds as refugia or dispersal corridors where plants and animals displaced by ecological disruptions, such as global warming, can find either refuge or a route to other areas suited to their needs.

To accomplish these aims, MMWD will strive to realize the following goals and objectives. The objectives are statements of purpose that describe what must be accomplished for the VMP to be considered a success. The actions and techniques that will be used to realize these objectives are described in detail in the Biodiversity Management and Fuelbreak Chapters of this VMP.

## **Goal 1 – Maintain existing significant biological resources.**

MMWD watershed lands support an exceptionally rich assemblage of vegetation types and habitats, including many that support special-status species of plants and animals. These resources are valuable in their own right; in addition, they are components of watershed ecosystems that provide high-quality water, clean air, recreation, solitude, and the other amenities associated with a large tract of largely undeveloped land.

There are many existing threats to these resources, threats that will be significantly magnified with the coming change in the climate. Though the magnitude and specific geographic effects of global climate change remain unknown, it is expected to dramatically affect vegetation and wildlife. The District watershed lands and other adjacent public lands can play an important role by serving as refugia and dispersal corridors for species as they attempt to cope with what may be rapid and severe temperature and other environmental changes. Though the District has essentially no control over the causes or rate of climate change, the District can act to make the watershed ecosystems as healthy and therefore as "resilient" as possible.<sup>1</sup> Given the uncertainties surrounding future ecosystem changes, promoting resiliency of the watershed ecosystems to maintain biological diversity is an important management goal.

This first goal recognizes the importance of the biological resources found on the District's watershed lands and the role these lands will play in the coming decades of global warming and other large-scale ecological changes. This goal also identifies methods designed to ensure that the location and status of all significant resources are known, and that measures are taken to preserve them.

Another aspect of this goal is control and eradication of invasive species like French broom and yellow star-thistle, since these invasive species alter ecosystem processes such as nutrient cycling, soil moisture recharge, and wildfire frequency and intensity. They also alter community structure, impacting wildlife. These invasive species are

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<sup>1</sup> Resilience is the capacity of an ecological system to absorb shocks or perturbations and still retain its fundamental function, structure, identity, and feedbacks, often as a result of adaptive adjustment to changing conditions.

constantly expanding at the expense of native species, thereby reducing plant and animal diversity and significantly reducing the resilience of the ecosystem. Invasive species are opportunistic plants that have much wider tolerances to climate, soil and moisture conditions, and other environmental factors than most native species. They have few natural enemies, which allows more energy to be directed towards growth and seed production. They have well-developed seed dispersal methods, fast growth rates, and produce abundant seed; these are all attributes that are likely to allow them to adapt and spread at the expense of native species during rapid climate change. Their control and eventual elimination<sup>2</sup> is critical to the future health of the watershed's native ecosystems.

**Objective 1.1 Complete the inventories and mapping of significant biological resources and high priority invasive species.**

In order to manage significant biological resources, it is essential to have a thorough inventory of them and know where they are located.<sup>3</sup> To protect these resources from infestation by invasive species, a map of the existing location of the high priority invasives must be completed and updated regularly.<sup>4</sup> Additional recommended actions include: completing the inventory and mapping of special-status plant populations; conducting a bryophyte inventory; completing an inventory and map of high quality grasslands; and preparing an inventory and map of old growth coast redwood stands.

**Objective 1.2 Detect changes to special-status species populations and other significant resources.**

To ensure long-term protection for special-status species and other significant biological resources, the District will need to monitor those resources to determine their condition and to identify any new threats or changes in the environment. Recommended actions include developing and implementing a monitoring program that identifies the condition of, and tracks threats to, special-status species and other significant resources from weed invasion, vegetation succession, or other factors. VMP priorities will be revised as needed to address these threats.

**Objective 1.3 Protect special-status species and other sensitive resources from disturbance caused by District maintenance, construction, and fuelbreak projects.**

A key step the District can take to protect and preserve biological resources is to make sure that actions it takes to maintain the public water supply, facilitate recreational

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<sup>2</sup> Complete elimination is probably not feasible. However, it is possible to eradicate populations to the extent where subsequent control requires minimal monitoring and effort.

<sup>3</sup> "Significant biological resources" are defined as special status species of plants and animals, wetlands, aquatic resources, and important and high quality habitats. These habitat types are defined in the Biodiversity Chapter; they include oak woodlands, old growth redwoods, and native grasslands. "High quality habitats" are areas or sites within important habitats that remain relatively undisturbed by human activity, and that have relatively low levels of non-native plant cover, meaning that they are relatively uninvaded by invasive species. See Section 2 of the Biodiversity Management Plan for a more detailed definition of high quality habitat.

<sup>4</sup> The list of "high priority invasive species" is included in Section 2 of the Biodiversity Management Plan.

access, and minimize wildfire risk do not cause loss of or damage to sensitive resources – impacts that subsequently would require mitigation or restoration. Recommended actions include: developing and implementing a standardized monitoring program for all District activities that affect biological resources; and developing a list of Best Management Practices for watershed maintenance, construction, and fuelbreak projects to prevent the spread of invasive species and other unintended adverse impacts from district activities.

**Objective 1.4 Preserve the biological diversity and structure of significant vegetation types that are in the process of being modified due to fire suppression.**

Most vegetation types on the District lands are adapted to a wide range of fire regimes. However, vegetation types can be vulnerable to changes to their natural fire regime (i.e., the fire regime that occurred prior to European colonization). If fires become either too hot, too frequent, or too large, this can result in a change of the vegetation type or displacement of certain species. Some of the vegetation types on the watersheds have been adversely affected by the suppression of fire. The following actions are recommended for oak woodlands, chaparral, and mesic meadows, which are the vegetation types that are most at risk, but also stand a reasonable chance for restoration over the next 15 years. Both of these relatively diverse and open community types are being invaded by Douglas fir and other woody species, resulting in altered community structure and biological diversity.

Develop and implement a Landscape Fire Plan that identifies locations in grasslands, oak woodlands or other significant, important or high quality habitats where succession resulting from fire suppression is changing community structure and composition. The plans will identify actions to either reintroduce fire into the landscape or conduct actions that mimic the results of a wildfire.

**Objective 1.5 Preserve significant aquatic features (e.g., streams, lakes), wetlands (e.g., seeps, springs, marshes), and associated vegetation types.**

Wetlands and other aquatic resources are designated as significant biological resources because of their importance to many species of animals and plants, which in many cases is reflected in the organism's legally protected status. Recommended actions include: completing an inventory and map of wetlands; and developing and implementing a program to protect these aquatic resources.

**Objective 1.6 Eradicate high priority invasive species from high quality habitats.**

High quality habitats are specific areas that have one or more of the following characteristics:

- Low levels of human-caused disturbance;
- Large areas of undisturbed habitat with low levels of non-native plant cover; and
- Identification as an important climate change buffer (such as climate change refugia or plant/animal migration corridors).

The main watershed on Mt. Tamalpais is the Lagunitas Creek watershed, which drains

the north side of the mountain and contains four reservoirs used as drinking water sources. The Lagunitas Creek watershed is defined as very high quality habitat. It is a large landscape unit containing a variety of important plant communities and low levels of invasive species. It has few roads and trails, remains relatively undisturbed by human activities. The watershed's heterogeneous topography contains a variety of microclimates, providing potential climate change refugia for many plant and animal species.

Recommended actions are to remove seeding plants of broom, pampas grass, and goatgrass from the watershed. Eliminating invasive species from this watershed is a high priority of the VMP.

Other actions include removing specific invasive plant populations from the Redwood Creek and Arroyo de Corte Madera watersheds on the south face of Mt. Tamalpais and from relatively undisturbed sites in the Soulajoule and Nicasio watersheds. Re-treatment and monitoring will be done to ensure long-term success of these actions. The Biodiversity Management Chapter prioritizes which invasive plant populations should be addressed first.

**Objective 1.7 Prevent the spread of invasive non-native plant species into high quality habitat.**

Equally important as eradicating high priority invasive plant populations from high quality habitats is to prevent them from spreading into currently uninfested habitats. Recommended actions include developing and implementing an Early Detection Rapid Response (EDRR) plan, which will detail how new invasions will be identified, reported, and treated. It is also recommended that program be developed to prevent the dispersal of invasive plant species, incorporating prevention and follow-up measures for actions that have the potential to bring new seed (or other reproductive material) into unaffected portions of the watershed.

**Objective 1.8 If resources are available, eradicate high priority invasive plant species from habitats that are not high quality.**

There are large populations of high priority invasive plants in areas of the watersheds that do not meet the criteria defining high quality habitat. These areas have biological value in that they support at least some native species and could become high quality habitat if invasives were removed. Recommended actions for the District include controlling seeding and/or removing high priority invasive species from other habitats that do not meet the definition of being high quality habitat. If resources are limited, invasive plant eradication in these habitats might not occur. The Biodiversity Management Chapter prioritizes which invasive plant populations should be addressed first.

**Goal 2 Restore degraded habitats.**

Many sites on the watersheds have been degraded by factors such as fire suppression,

historic logging and grazing, construction of roads and other infrastructure, and other processes that were listed in the introduction to this section of the report. To the degree that resources are available, the District will act to restore these sites, beginning with the least degraded.

**Objective 2.1 Treat degraded sites to restore high quality habitat.**

Develop and implement the five 10-year restoration plans described in the Biodiversity Management Chapter for specific sites with high quality grassland, oak woodland, streams and wetlands, and other high quality habitats at risk due to invasive plant species invasion or other environmental processes.

**Goal 3 Review and revise management decisions in response to changing conditions.**

Over time the ecosystems on District lands, like those in the rest of California, will be significantly affected by global climate change, nitrification, and invasion of pathogens such as Sudden Oak Death and madrone blight. In addition, the ongoing suppression of fire throughout most of the watershed lands and the surrounding region will also continue to alter ecosystem dynamics.

While these potentially large-scale changes are taking place, new information is likely to be developed about the efficacy and environmental impacts of various invasive species control and other restoration techniques. District monitoring will provide data about what works and what does not. To address these changes and incorporate new information as it becomes available, the District will continue to review and revise the VMP and its management approach and strategies to keep up to date with changing conditions.

**Objective 3.1 The District will monitor changes and, if warranted, revise its management approach.**

The District will measure changes both in natural conditions and those resulting from District actions, and will revise programs and actions to best meet VMP objectives. Recommended actions include: developing a standardized format that identifies objectives, success criteria, monitoring protocols, and other pertinent data for each specific project undertaken as part of the VMP; evaluating the success of high priority invasive species removal and revegetation projects in reestablishing native vegetation types, and when warranted replanting treated areas; and developing a review process for all projects, programs, BMPs, and management regimes to determine whether they are meeting the District's management objectives or need to be revised.

**Objective 3.2 Update Integrated Pest Management policies and techniques in response to new information.**

Recommended actions include developing a program for evaluating new pest/weed management technologies as well as reviewing the suitability of tools and strategies currently in use.

**Objective 3.3 Develop a long-term vegetation management strategy that takes into account possible large-scale changes from forest pathogens, global climate change, and increased nitrification.**

Recognizing that large-scale changes, such as SOD and global climate change, are occurring, MMWD will study these macro-processes to determine a long-term management strategy. Recommended actions include: mapping SOD spread; developing and implementing a plan to monitor plant succession in canopy openings resulting from the loss of SOD-killed trees; participating in regional climate change studies and forums; and redoing the Mt. Tamalpais watershed vegetation map in 2014 in order to document vegetation changes at the landscape scale. It is also recommended that the District fund a graduate-level research assistant who can provide academic input to develop focused field trials and studies. To the degree that the data gathered from these efforts allow, develop a long-term strategy for managing District lands.

**Objective 3.4 Experiment with emerging invasive species control and restoration techniques and incorporate those that are effective into the VMP.**

To provide the best approaches and techniques to control invasive species and restore degraded habitats, the District will experiment with promising new techniques. Recommended actions include experimenting with techniques to control teasel on the Nicasio watershed; assessing the feasibility of introducing livestock grazing for thistle control in the Soulajoule watershed; conducting additional experiments to determine the efficacy of new biological herbicides; and discussing with state and federal researchers the possibility of using District lands as release sites for biological control agents that pose no hazard to special-status plants or any other special-status species or important habitat.

**Objective 3.5 Continue to work with the public to foster education, research, and volunteer efforts.**

MMWD has an active volunteer program, which assists staff in implementing various invasive species control and restoration projects. The District also works with schools and other groups and individuals wishing to learn about the watershed lands and their resources. The watershed lands are also used by many biological researchers to conduct studies and research. Recommended actions include: continuing to promote and implement volunteer efforts in restoration and invasive species control; encouraging biological research on SOD, forest diseases/pests, plant succession in response to GCC and nitrification, and invasive species control and restoration techniques; and continuing to review the results of that research in managing the watershed lands.

**Goal 4 Minimize the risk to life and property from wildfire.**

**Objective 4.1 Prevent destruction of structures and loss of life from wildfires.**

Because the intensity of a fire closest to a structure is most closely related to whether

the structure would survive, fuel management to reduce this fire intensity is needed. This can be done by reducing the chance of fire spreading into and through tree crowns and by reducing the ability of the fuelbeds to burn intensely. Recommended actions include managing fuels through mowing, creating discontinuous fuels (both horizontally and vertically), and recommending best management practices for creating defensible space for residential neighbors adjacent to the watershed lands.

**Objective 4.2 Minimize the size of wildfires on the watersheds.**

The existing fuelbreak plan will be revised and implemented in order to reduce the chance of wildfires escaping from the watershed to neighboring private and public properties. A variety of fuelbreaks will be constructed and maintained. Fire sizes should also be minimized to prevent excessive soil erosion that would adversely affect water quality and reduce the storage capacity of the reservoirs. The plan includes three types of fuelbreaks. Primary Fuelbreaks are 100- to 200-foot-wide strips in strategic locations (on ridgetops or next to roads or other low-hazard natural features) that are designed to control lower intensity fires and to provide for firefighter safety, or on the flanks of higher-intensity fires,. Secondary Fuelbreaks are 60- to 100-foot wide strips constructed primarily next to roads. They are designed to provide anchor points for controlling lower intensity fires and to improve firefighter safety. Wide Area Fuelbreaks are locations where fuels are reduced to protect manmade resources and to meet biodiversity management objectives. Examples of the latter would be in oak woodland treatments where the understory fuels are reduced or meadow restoration where shrubs or Douglas fir trees are removed.

**Objective 4.3 Reduce the potential for fire ignitions.**

Fuels in areas with a high potential for ignition (e.g. power line transformers, grassy areas adjacent to roads) are to be managed to minimize the chance of ignition. This can be done by either cutting and removing easily ignitable fuels, or by increasing the moisture content of the fuels by changing the vegetation type.

**Objective 4.4 Manage fuels to provide safe access and evacuation.**

The intent of fuel management for fire access is to manage fuels to allow safe vehicular access to strategic parts of the watersheds. The width of fuel management required is the least wide of the various fire management objectives (i.e., access, containment, or structural survival), for it is not expected that a "stand" would be made in these locations. Where fire access is the sole objective, a fuelbreak need not be built or maintained. Recommended actions include mowing grass, thinning understory, and pruning trees.

Travel routes to be used for evacuation are places where most deaths occur during wildfires. Evacuees are often disoriented and panicked because of smoke and heat across the travel route and in the general area. Managing vegetation adjacent to the evacuation routes will diminish the smoke in the area nearest the road, thereby providing increased visibility. Reducing fuels along the travel route will also reduce the heat the evacuees may need to withstand. The width of management along the evacuation routes is based on the flame lengths expected to occur in the area.

**Objective 4.5 Manage broom in fuelbreaks.**

The presence of broom in fuelbreaks means that the District needs to re-enter the fuelbreak at least annually in order to prevent seeding, prevent the additional spread of the broom populations, and decrease fuel loading of the fuelbreak. By controlling the spread of broom, and eventually eliminating it where feasible, the District will enhance the ability of the fuelbreaks to support native vegetation, and reduce the time and resources needed to treat these fuelbreaks. Recommended actions include developing a program to eliminate broom populations in fuelbreaks and in areas adjacent to the fuelbreaks. Removing broom from fuelbreaks is the highest priority regarding vegetation management.

**Objective 4.6 Work with other agencies and landowners to reduce fire hazard.**

An additional 470 acres of adjacent have been identified as having strategic importance to the MMWD Fuelbreak system. MMWD will partner with local fire departments and adjacent owners (private, county, state and federal) to encourage adequate fuels management in these strategic zones.

**Goal 5 Preserve the aesthetics and recreational opportunities of District lands.**

**Objective 5.1 Continue to manage the watersheds to provide recreational opportunities for visitors.** The variety of vegetation on the watershed lands is a valuable resource for many members of the public. In addition, many people use the watersheds for hiking, riding, biking, fishing, and other recreational pursuits. These users want to have access to the lakeshores and trails. Vegetation must be managed to preserve the aesthetics and recreational opportunities of the watershed lands. Recommended actions include: keeping lakeshores and trails open by controlling broom and other invasive species, and maintaining a rich mosaic of diverse plant communities and wildflowers.