TOWN OF FAIRFAX
COUNCIL REPORT

Date: September 5, 2012

To: Mayor and Members of the Town Council

From: Councilmember Larry Bragman

Subject: Discussion/Consideration of the Draft Vegetation Management Plan for the Marin Municipal Water District

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The Town of Fairfax has opposed the use of pesticides in the watershed since one of our residents discovered the agency spraying approximately eight years ago. Since that time, MMWD has sponsored several studies about the use of pesticides in the watershed to control "non-native" invasive species and to reduce fire risks.

MMWD will be revisiting the issue in its upcoming meeting on September 11th when it will hold a public discussion about its draft Vegetation Management Plan. The VMP and an executive summary can be found at: http://marinwater.org/controller?action=menuclick&id=659

There are two scenarios outlined in the plan: one without pesticides and one that uses them. It is hoped that our discussion can bring this issue to the Fairfax Community and get input from the public and the council about how best to protect the watershed and enhance safety.

Respectfully submitted.

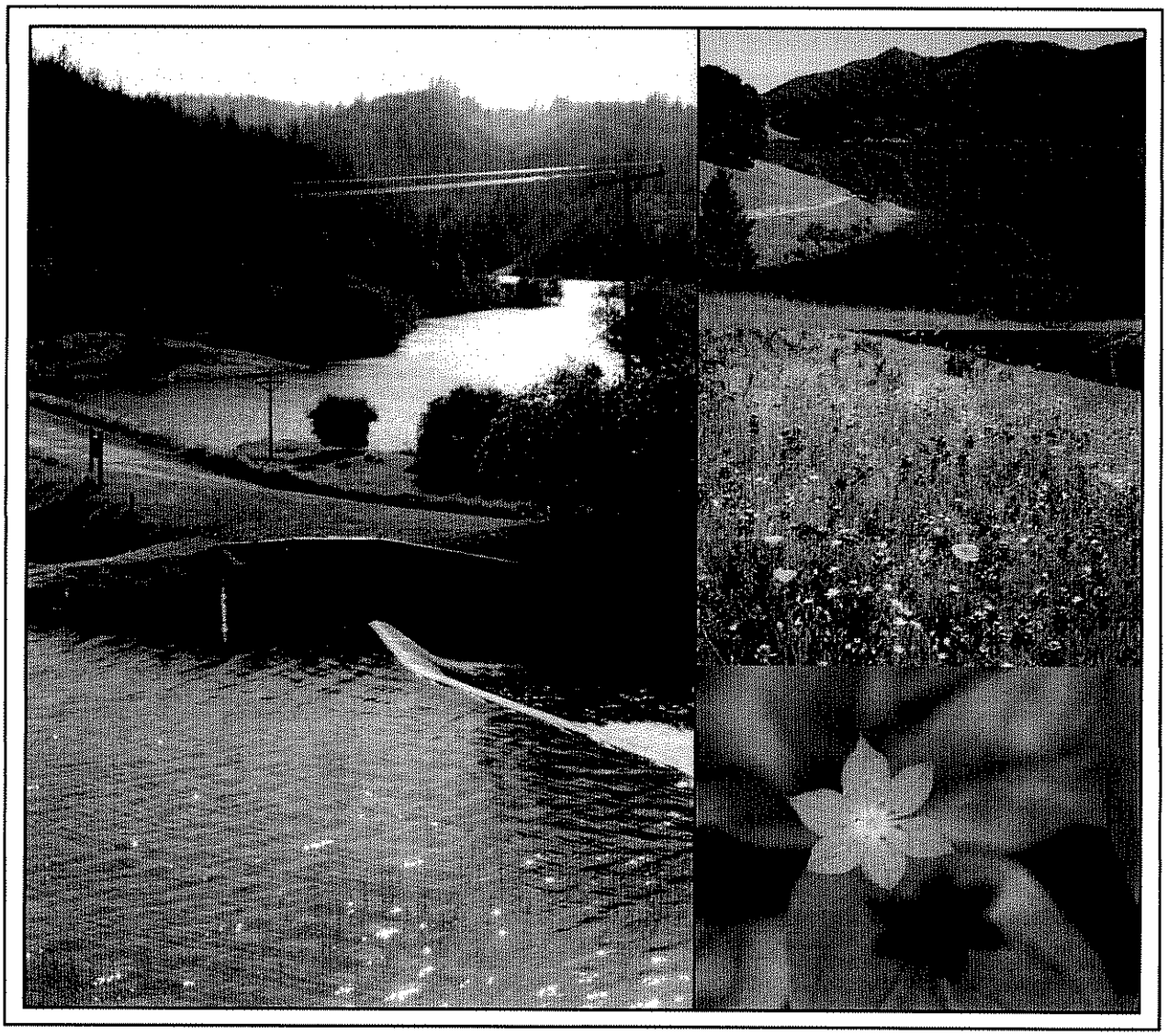
Larry Bragman

Attachment:

Draft Vegetation Management Plan

AGENDA ITEM #26

Draft Marin Municipal Water District Vegetation Management Plan for Watershed Lands



August 2012

Prepared for the Marin Municipal Water District

Prepared by Leonard Charles and Associates

Draft Marin Municipal Water District Vegetation Management Plan for Watershed Lands

August 2012

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Tamalpais: a place to walk. Close enough for an afternoon ramble, small enough to circle in a day's hike. A place to recognize the mysterious beauty of oneness and separation, of endless vistas and unique plant worlds. Surrounded by water on three sides, meeting point of many climates, clothed in such varied and intricate life. Mountain source of springs and streams, storehouse of waters, soil giver of forests and sparkling salt marshes.

Just a mountain, a part of our shared earth. A place for small pilgrimages to remember this is what we have, this is what we come from. A grassy precipice soaring above the blue Pacific, a laurel-ringed boulder. We who bestow names, who imagine the world from within our human selves: what meaning shall we give this beautiful place?

By Tom Killion, from *Tamalpais Walking: Poetry, History, and Prints*, by Tom Killion and Gary Snyder (2009). With permission of the author.

EXECUTIVE SUMMARY

This Vegetation Management Plan (VMP) describes actions that Marin Municipal Water District (the District) would take over the next 15 years to minimize fire hazard and maximize ecological health on its watershed lands. The Mt. Tamalpais, Nicasio Reservoir, and Soulajule Reservoir watersheds constitute approximately 22,000 acres of publicly accessible wildlands characterized by both high wildfire risk and high biological diversity. The 38 management actions described in this plan were developed to meet four major goals and 16 corresponding objectives designed to minimize fire risk to lives, property, and critical water infrastructure while simultaneously protecting and enhancing the ecological values and functions on District lands. Actions described in this VMP include fuelbreak construction and maintenance, weed control, habitat restoration, vegetation mapping, and monitoring.

This plan was developed over a period of four years, with significant input from the public, District staff, technical advisors, and adjacent land managers. Plan development included an evaluation of actions taken over a 15-year period under a previous management plan (*Mt Tamalpais Final Vegetation Management Plan*, 1995), identification of existing conditions and trends on District lands, a review of scientific literature and wildland management practices in the San Francisco Bay Area, and the development and presentation of nine background reports and studies at a series of public workshops and meetings (see subsequent Tables 1-1 and 1-4). A spatial database (GIS) was developed to assist with the analysis and cost estimates.

Through this process, adequate weed control emerged as necessary for achieving both wildfire hazard reduction and biodiversity preservation goals. Uncontrolled expansion of weed species increases fuel loading, decreases emergency vehicle access, and increases fuelbreak maintenance costs. Expansion of weed species also reduces recreational access, alters ecosystem processes, decreases habitat value, and combines with climate change and landscape-scale disease processes to threaten biological diversity. Photographic analysis of areas infested by weeds suggests that a single species, French broom (*Genista monspessulana*), is currently spreading at a rate of at least 30 acres per year on District lands. Consequently, eight of the 38 recommended actions deal directly with controlling highly invasive weed species, particularly French broom.

This plan adopts the principles of the District's Integrated Pest Management (IPM) Program for weed control. Under this program, a combination of available methods is identified to manage weeds with the least possible hazard to people and the environment, using the most effective and economical means available. In preparing this draft plan, considerable effort went into evaluating available weed control options: four of the nine background reports and studies generated to support plan development focus exclusively on weed control methods and their potential impacts. Twenty-five methods were evaluated, including variations on hand pulling, mowing, prescribed burning, flaming, mulching, grazing, pressurized water, hot foam, and the use of three formulated

organic herbicides[1], three conventional herbicides, and two surfactants[2]. Those methods that could effectively meet the District's vegetation management objectives are described in Chapter 7 of this plan.

Two distinct approaches to weed control and implementation cost estimates of each approach are described in Chapter 6. Both approaches address public and District concerns regarding the protection of water quality, plants and animals, and human health. Under Approach 1, weeds would be managed using only mechanical equipment, hand labor, formulated organic herbicides, and prescribed fire. As discussed in Chapter 6, this approach is able to achieve some but not all of the goals and objectives identified in the plan. Under Approach 2, limited amounts of three conventional herbicides – glyphosate, triclopyr, and clopyralid – would be used in combination with the Approach 1 methods. These three herbicides were carefully selected after extensive research based on the District needs and environmental effects. Thirty herbicide-use restrictions would be instituted to protect water quality and minimize risk to people and the environment. These restrictions include limitations on quantity and frequency of use, timing, and proximity to water and other sensitive resources, as well as requirements for applicator training, reporting, and public notification. As discussed in Chapter 6, Approach 2 would meet more of the plan's objectives than would occur under Approach 1 and would do so at a significantly lower implementation cost.

Two Approaches to Weed Control

Approach 1: Use only mechanical equipment, hand labor, formulated organic herbicides[1], and prescribed fire.

Approach 2: Use the above tools, as well as limited use of three conventional herbicides.

1. Goal 1: Minimize the risk from wildfire

The District is responsible for managing its watershed lands to minimize the risk of wildfire. Over 25,000 structures housing approximately 45,000 residents are within two miles of District lands along a wildland-urban interface (WUI) that has a California Department of Forestry and Fire Protection Fire Hazard rating of "High" to "Very High." Wildfire also poses a threat to water quality and distribution, and to the ecosystem functions and values provided by watershed lands. Climate change, forest diseases, and the proliferation of weeds increase the risk posed by wildfire. The District has been actively addressing this responsibility by implementing many measures that were recommended in its original 1995 VMP, such as completing construction of 915 acres of the recommended 1,100-acre fuelbreak system and improving regional fire fighting capabilities through a pipeline upgrade program.

This VMP identifies the District and adjacent assets most at risk from a wildfire involving District lands. It recommends completion of the fuelbreak system and delineates 50

[1] Formulated organic herbicides are herbicides approved for use in organic agriculture with active ingredients comprised of naturally occurring compounds including vinegar and clove oil. See Appendix F for further description.

[2] A chemical compound added to a pesticide that acts as an emulsifier, enhances absorption and effectiveness of the pesticide, and/or changes the surface tension of a solution as a control for spray drift.

distinct fuelbreak projects to be completed and maintained over the next 15 years. The plan incorporates newer standards for fuelbreak design and defines portions of the fuelbreak system as defensible space, primary fuelbreak, secondary fuelbreak, emergency access ingress-egress, and wide area fuelbreaks. It sets priorities for both new construction and maintenance. The plan identifies the expansion of perennial weed species through the fuelbreak system as a threat to public safety and a significant factor in cost increases relative to fuelbreak maintenance. It prescribes construction and maintenance actions designed to reduce and, in places, reverse weed spread through the fuelbreak system. Finally, the plan identifies opportunities for inter-agency and public-private collaboration relative to fire safety.

2. *Goal 2: Preserve and enhance existing significant biological resources*
Goal 3: Restore degraded habitats

Another major focus of the plan is to protect important biological resources and ecosystem functions on the District's lands. The District's watersheds support a rich variety of communities and organisms, including more than 85 distinct plant assemblages, 900 species of vascular plants and at least 400 species of vertebrate animals, as well as many more species of fungi and invertebrates. Of the species that are known or likely to occur on District lands, there are approximately 50 plant species of special significance, including seven that are listed as rare, threatened or endangered at the federal or state level. There are also 42 animal species of special significance with potential to occur on District lands or in District waters. Because substantial portions of the District's watershed lands are topographically diverse, largely undisturbed, and connected to other extensive tracts of protected open space, they provide critical migration corridors and refugia for species as they adapt and move in response to rapid changes in their environments. In recognition of these significant contributions relative to global biodiversity, UNESCO[3] included the Mt. Tamalpais Watershed as one of the 13 significant areas of the Golden Gate Biosphere Reserve in 1988.

This Vegetation Management Plan identifies a number of threats to biological diversity and ecosystem function within the District's watershed lands. The most significant include the introduction and rapid spread of weed species, changing patterns of wildfire occurrence and fuel loading, increased incidence and extent of forest diseases such as Sudden Oak Death (caused by *Phytophthora ramorum*), and rising temperatures and changing rainfall patterns associated with climate change. Of more than 200 non-native plant species known to occur on or immediately adjacent to District lands, 30 have been identified as "ecosystem disruptors" – capable of changing nutrient, fire, and water cycling as well as degrading habitat structure and value for wildlife and native plant species. The most extensive and problematic weed species on District lands include three species of broom – French, Scotch (*Cytisus scoparius*) and Spanish (*Spartium junceum*) – as well as barbed goatgrass (*Aegilops triuncialis*) and yellow star-thistle (*Centaurea solstitialis*). Human-induced changes in wildfire patterns include a hundred year history of fire suppression and a corresponding buildup in fuels. While reducing the threat of catastrophic wildfire remains a top priority, some species (e.g. *Ceanothus masonii*) and plant communities (e.g., oak woodlands) are dependent on periodic fire to stimulate seed germination, release vital soil nutrients, clear thatch, and thin less fire-

[3] The United Nations Educational, Scientific and Cultural Organization.

tolerant competitor species. Sudden Oak Death and other forest diseases are now rampant, killing thousands of tanoak *(Notholithocarpus densiflorus)* and true oaks *(Quercus* species). Climate change is predicted to further exacerbate the problems described above and contribute to a significant decrease in forest extent within the next 60 years.

This VMP identifies enhancing ecosystem resiliency as a key strategy for the District to pursue. Resiliency is defined as an ecosystem's ability to absorb shocks or perturbations and still retain desirable ecological functions such as the ability to provide breeding and foraging habitat for wildlife, the ability to support significant biological resources such as rare, threatened, or endangered species, the ability to regenerate desired plant communities following a disturbance, the ability to cycle nutrients, and the ability to protect water quality. Primary ways to enhance resiliency are to minimize disturbance, mimic lost or diminished ecosystem processes such as naturally occurring wildfire, restore native plant communities, and eliminate or reduce weed populations. Inventorying and monitoring ecosystem vital signs and identifying and protecting currently resilient areas are also essential.

The plan recommends a number of vegetation-related actions to enhance resiliency. These include tracking change over time by inventorying and monitoring significant resources and populations including special-status plant species, wetlands, non-vascular plants, fungi, oak woodlands, grasslands, and weeds. The plan recommends the development and/or improved use of Best Management Practices (BMPs) to protect sensitive plant species and habitats from recreation as well as District construction and maintenance activities. The plan recommends development and implementation of a program to restore the positive landscape-level effects of wildfire.

While the VMP addresses elimination or control of 27 other species of weeds that are highly invasive, the majority of recommended weed control actions are focused on broom populations in the Mt. Tamalpais Watershed. The actions are prioritized within the framework of five distinct vegetation management zones (see Figure 4-3) that are defined relative to existing ecosystem function and degree of disturbance.

- Zone 1 (Refugium Zone) represents 90% of the Mt Tamalpais Watershed and is characterized by large expanses of high-quality habitat with a minimal degree of human disturbance and weed invasion. As such it has the highest biological value and is considered the most vital to protect. Recommended actions in this zone include the complete elimination of four known isolated broom populations and stepped-up enactment of an Early Detection Rapid Response Program (EDRR) designed to stop nascent weed colonies before they can get a foothold to expand and degrade ecosystems.

- Zone 2 (Infrastructure – Fuels Reduction and Weed Elimination Zone) is comprised of relatively weed-free fuelbreaks and service road corridors that transect Zone 1. The recommended action in this zone is to eliminate broom and other perennial weed species that could easily spread into Zone 1.

- Zone 3 (Infrastructure – Fuels Reduction Zone) is also comprised of fuelbreaks and service road corridors. However, because weed populations in this zone are

both extensive and bounded by other established weed stands, the recommended action is to limit vegetation management to fuel load reduction only.

- Zone 4 (Control Weed Spread Zone) is similar to Zone 1 in that it is relatively free of management activities and weeds. However, because it is completely surrounded by extensive weed populations, it is vulnerable to rapid weed encroachment. The recommended action here is to maintain the status quo through EDRR and limited weed management.

- Zone 5 (Limited Action Zone) is characterized by poor habitat quality and extensive stands of broom. The recommendation is to limit weed control to actions that would prevent spread into Zone 4.

The VMP also identifies the need for habitat restoration at seven locations including Potrero Meadow, Pine Point, Elliot Trail, High Marsh/Hidden Lake, Hidden Meadow, and the Deer Park Valley Oak woodlands in the Mt Tamalpais Watershed as well as the island in the Nicasio Reservoir. Habitat restoration differs from weed control by identifying a target plant community or ecosystem function to achieve, rather than simply targeting weed(s) for elimination. Restoration actions include weed control, re-contouring slopes, rerouting trails, removing accumulated thatch, amending soils, and seeding and/or planting native species as needed. The VMP recommends individual restoration plans be developed for each of the seven locations and implemented as resources allow.

3. *Goal 4: Review and revise management decisions in response to changing conditions*

This VMP is intended to have a useful life of approximately 15 years. Even during that time, conditions will change and new information will be derived from the success or failure of past actions and research done elsewhere. As this occurs, the recommendations of this plan will need to be revised accordingly. To do this, the District will employ *adaptive management*, which emphasizes a "learn by doing" approach that incorporates the results of monitoring and scientific information to inform future management decisions. This ongoing process consists of implementing field actions to manage natural resources, monitoring ecosystem and human responses to these actions, comparing the results against expectations, and adjusting future actions. These feedback loops give managers information about which actions are effective, and which are not, so that any need for a new approach or different management action is quickly identified.

The VMP identifies specific areas where the District needs to proactively seek out or generate new information and respond accordingly. These include fuelbreak design and function, climate change, nitrogen deposition, forest disease, species migration, weed control tools and techniques, and the environmental fate and human health effects of chemicals alone and in combination. Similarly, the District will need to be continually responsive to changes in laws and regulations pertaining to building codes, zoning, endangered species protections, noxious species quarantines, clean drinking water standards, carbon emissions, and worker safety. Finally, the District needs to conduct

sufficient monitoring of both its natural resources and the effects of District actions to detect and respond to critical changes.

Chapter 5 provides a template for an adaptive management approach to wildfire risk reduction and biodiversity preservation. It identifies 13 actions that fall into the broad categories of increased monitoring of natural resources, improved tracking and assessment of management actions, research and experimentation with regard to weed control, and development of additional plans or strategies to respond to emerging challenges.

4. Implementation: Cost, Priorities, and Anticipated Outcomes

To fully implement the VMP, the District must undertake all 38 recommended actions and meet their specified targets. The actions fall into two broad categories: direct vegetation manipulation (fuelbreak construction and maintenance, weed control, hazard tree removal, and habitat restoration) and on-going assessment (inventorying, monitoring, data analysis, research, and additional planning). Targets corresponding to on-the-ground vegetation manipulation actions are listed below in order of highest priority:

- Implementation of the rotational maintenance cycle throughout the entire 1,100-acre fuelbreak system so each area is treated at least once every five years. Approximately 300 acres would be treated annually;
- Implementation of the Early Detection – Rapid Response Weed Program (EDRR) to all roads, primary and secondary fuelbreaks, defensible space fuelbreaks, and 25% of trails annually surveyed, and 30% of existing known sites treated annually;
- Elimination of broom in Zone 2 fuelbreaks within 15 years (324 gross[4] acres);
- Extirpation of barbed goatgrass from the Mt. Tamalpais Watershed within 15 years (32 gross acres);
- Completion of the fuelbreak system within five years (185 new acres built);
- Elimination of broom from Zone 1 within 15 years (56 gross acres);
- Elimination of yellow star-thistle from the Mt. Tamalpais Watershed within 15 years (105 gross acres);
- Prevention of broom spread into Zone 4 through the elimination of broom in Zone 5 (574 gross acres); and
- Control of other invasive weed populations as resources become available.

The cost of full implementation would far exceed the District's current vegetation management budget of approximately $875,000 per year (based on expenditures between Fiscal Year 2007 and 2011). Under Approach 1 ("weed control without the use of conventional herbicides"), the full implementation cost of the VMP is estimated at nearly $5,600,000 per year. Under Approach 2 ("weed control with limited integration of conventional herbicides"), the full implementation cost is estimated at nearly $1,600,000 per year.

[4] Gross acreage refers to how many acres in have some broom present. Net infested acreage refers to how many solid acres of broom are within that gross acreage.

It is anticipated that the District's operational budget for vegetation management will not grow appreciably in the near term. Therefore, the VMP describes an implementation strategy that prioritizes actions and focuses the District's existing resources on the most important, achievable objectives. Lower-priority actions would be undertaken only as additional resources become available through grant awards, partnerships, and/or sustainable increases in the District's operational budget. In setting the priorities reflected in the preceding target list, the VMP emphasizes protection of people and property, protection of existing high-quality habitat and significant species, and preventative maintenance.

The VMP provides a comparison of anticipated outcomes under the two weed control approaches, presuming the District's vegetation management budget remains close to current levels. As shown in Table ES-1 below, all the on-the-ground vegetation management targets would be fully met using Approach 2, while the majority would not be met under Approach 1. Specifically, under Approach 1, only 89% of the fuelbreak system would be completed and few weed elimination goals would be met; the total acreage of broom infestation would increase by approximately 300 acres over 15 years. In contrast, under Approach 2, the entire fuelbreak system would be completed, and the weed management targets met. Under Approach 2, it is anticipated the total area infested by broom would decline by approximately 165 acres over 15 years.

5. Techniques for Fuelbreak Management and Weed Control

The scale of the on-the-ground vegetation management needs that are identified in this VMP requires tools and techniques that are both effective and cost-efficient when used over hundreds of acres. The setting – within biologically unique and diverse lands that drain into a drinking water supply system – requires techniques that pose minimal risk to the District's watersheds and the people who work and recreate within them. Therefore, development of this VMP included a thorough analysis of the tools and techniques available for fuelbreak management and wildland weed control – five background reports were generated in the process (see the subsequent Table 1-1). The tools and techniques selected for use in the VMP are those determined to be capable of meeting plan objectives with the least risk to water quality, ecosystem health, and humans. They are summarized in Chapter 7 along with a number of use restrictions and measures intended to maximize both efficacy and safety.

Table ES-1
Predicted Attainment of Vegetation Management Targets
Under the Two Plan Approaches

Management Target	% of Target Met Under Approach 1 (no herbicides)	% of Target Met Under Approach 2 (limited initial herbicide use)
Complete the recommended fuelbreak system	91%	100%
Complete cyclical maintenance to meet design standards in constructed fuelbreaks (Zones 2 and 3)	100%	100%
Eliminate broom in the Refugium Zone (Zone 1)	41%	100%
Eliminate broom in Zone 2 fuelbreaks	44%	100%
Prevent expansion of broom into Zone 4, which currently is relatively weed-free	<90%	100%
Implement EDRR and prevent new weed invasions	<80%	100%
Extirpate goatgrass	100%	100%
Eliminate yellow star-thistle	36%	100%
Manage 23 other highly invasive weed species	18%	100%
Develop and implement preservation and restoration plans	100%	100%
Conduct monitoring and adaptive management actions	100%	100%

Note: For more information see Section 6.6: Plan Implementation for Vegetation Treatment Actions