



**COUNTY OF SAN MATEO**  
**Inter-Departmental Correspondence**  
County Manager's Office



**DATE:** January 11, 2012

**BOARD MEETING DATE:** January 17, 2012

**TO:** Honorable Members, Environmental Quality Committee

**FROM:** Peggy Jensen, Deputy County Manager

**SUBJECT:** Roadside Vegetation Management Study

**RECOMMENDATION:**

Accept the Roadside Vegetation Management Study for San Mateo County prepared by Baefsky and Associates and direct staff to report back on implementation of the recommendations at the April 2012 Environmental Quality Committee meeting.

**BACKGROUND:**

In September of 2011, at the direction of the Environmental Quality Committee, the County Manager's Office issued a Request for Proposals for an independent analysis of the County roadside weed management program that included recommendations for improvement. Proposers were required to specialize in Integrated Pest Management and include a biologist on their project team. The selected contractor was Baefsky and Associates. The study included field research, staff and community interviews and evaluation of roadside vegetation management practices used in other California counties.

**DISCUSSION:**

In San Mateo County, the Department of Public Works manages roadside vegetation to maintain sight distances for road users, prevent fires, maintain drainage ditches and allow water movement and minimize pavement encroachment by vegetation. The Baefsky report found that current county practices, which include mowing and spraying along roadsides, successfully maintain sight lines and reduce fire hazards. The consultants provided recommendations for improving drainage ditch maintenance and reducing pavement encroachment.

In addition, the consultants added two more program review criteria that are used by CalTrans in assessing their vegetation management program. Those criteria are control of invasive and exotic weeds and compliance with laws, regulations and policies. The consultants had recommendations in these areas and also included suggestions to improve relations with community residents.

Short term program improvement recommendations in the Baefsky report include:

- Improve internal and external communications
- Provide additional training and certification for staff
- Specific suggestions for products and spraying procedures including GPS data gathering to track vegetation control work more accurately
- Expand targeted treatment for noxious weeds such as poison oak and pampas grass
- Consider pilot projects to test new ways to manage vegetation or invasive weeds and alternative resources for management

In addition to the short term recommendations, the report included the following long term recommendations:

- Replace existing mowers with modern equipment
- Increase targeted invasive weed control
- Develop weed species based management plans for each road

The Baefsky report also evaluated five alternatives to the current combined mow and spray program used by the County for roadside vegetation management. The consultants rejected all five alternatives which included all mowing, all spraying, all organic herbicides, grazing and resident management, for a variety of reasons. The report recommends implementing an Integrated Pest Management program that incorporates the best elements of the current Spray-Mow program with the improvements recommended in their report.

The Department of Public Works will review the Baefsky report, develop a work plan that incorporates the recommendations and prepare a budget for items requiring funding. Public Works will report back to the Environmental Quality Committee in April of 2012 on the status of the work plan, the budget and funding options.

**FISCAL IMPACT:**

There are no costs associated with accepting this report and directing Public Works staff to develop an associated work plan and budget. Any future costs associated with implementing the plan will come from the Road Fund.

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# SAN MATEO COUNTY ROADSIDE VEGETATION MANAGEMENT STUDY

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January 10, 2012



PREPARED FOR SAN MATEO COUNTY

BY: Michael Baefsky

BAEFKY & ASSOCIATES

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## TABLE OF CONTENTS

<u>ITEM</u>	<u>PAGE NO.</u>
<b>EXECUTIVE SUMMARY .....</b>	<b>3</b>
<b>INTRODUCTION.....</b>	<b>9</b>
ASSIGNMENT.....	9
LIMITS OF ASSIGNMENT.....	9
PURPOSE AND USE OF REPORT .....	9
BACKGROUND.....	9
METHODS.....	11
SETTINGS .....	12
<b>OBSERVATIONS .....</b>	<b>13</b>
Table 1 – Summary of Observations.....	14
Table 2 – Examples.....	15
LINES OF SIGHT .....	16
FIRE SAFETY .....	17
VEGETATION ENCROACHMENT.....	18
NOXIOUS WEEDS .....	19
ROADSIDE DRAINAGE .....	20
LOCAL COMMUNITY CONCERNS .....	21
GOVERNMENT LAWS, REGULATIONS & POLICIES.....	22
<b>CONCLUSIONS .....</b>	<b>23</b>
<b>RECOMMENDATIONS.....</b>	<b>24</b>
Table 3 – Short Term Recommendations Summary.....	25
Table 4 – Additional Cost Approximations .....	28
REJECTED STRATEGIES .....	29
<b>SUPPORTING DOCUMENTATION</b>	
APPENDIX A – INTERVIEWS .....	30
APPENDIX B – FIELD NOTES.....	31
APPENDIX C – PRESCRIPTIVE MANAGEMENT.....	47
APPENDIX D – CERTIFICATE OF PERFORMANCE .....	48
REFERENCES.....	49

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## EXECUTIVE SUMMARY

We recommend implementing an Integrated Pest Management program for roadside weeds that incorporates the best elements of the current Spray-Mow program and more precisely targets specific weeds, modifies where, how and with what spraying and mowing occurs, uses alternative treatment methods, improves communication and takes the next steps towards licensing, implementing best management practices, increasing safety measures for roadside users and improving communication between staff and residents of unincorporated San Mateo County.

This study is an analysis of San Mateo County's (SMCO) Roadside Vegetation Management Program (RVMP). From October 10<sup>th</sup> through November 23<sup>rd</sup>, 2011 we visited and examined 29 County roads & 133 separate sites, met with and interviewed ten county staff members and three concerned residents of San Mateo County, examined pesticide use data from 2003-2010, and compared SMCO with programs in Alameda, Contra Costa, Marin, Santa Cruz, Santa Clara and other counties. Staff reviewed our report and provided editing comments that we incorporated into subsequent drafts in order to clarify and improve the overall quality of the report.

We analyzed the RVMP using seven parameters and concluded the following:

### **1. Lines of Sight – meets standards and expectations**

We found few restrictions in line of sight posed by vegetation in our surveys of county roads. Most areas needing improvement were found on Pescadero Creek Road, Alpine Road and Las Tunitas Creek Road, areas that are mowed and not sprayed.

### **2. Fire Hazard Reduction – meets standards and expectations**

Most roads that we surveyed after fire season and at least one rain episode, had bare edges and turnouts, low vegetation 3-10 feet beyond those areas, and up to 20 feet from pavement edge well managed and fire safe.

### **3. Pavement Encroachment – program can be improved**

We observed that vegetation is playing an active role in road shrinkage and is a probable contributor to pavement degradation on many roads. We noted most problems in non-sprayed areas, which have restricted spraying due to resident concern about human, pet and wildlife health.

### **4. Noxious Weed Control – program can be improved**

Many populations of invasive exotic plants were observed growing alongside County roads, although their encroachment into the roadway was limited. We noted high populations of stinkweed and bristly oxtongue, and concentrated populations of pampas grass and French broom in many parts of the county. We also believe that staff and public health and safety are compromised by poison oak's proliferation along roadsides.

### **5. Roadside Drainage – program can be improved**

We observed unpaved roadside drainage ditches in the county that were eroding, clogging and deepening. We also found that bottoms of slopes that are sprayed and/or mowed are eroding, clogging ditches, inlets and may be reducing the quality of wildlife habitat through sedimentation of waterways.

**6. Local Community Concerns – many areas need improvement**

We found that communication and trust has broken down between staff and County residents who oppose spraying, a major impediment to improving the RVMP. Areas of some resident’s concern that we believe need improvement include human, pet and wildlife health, broadcast spraying, posting & notification of planned spraying.

**7. Laws, Regulations & Policies – program can be improved**

CA pesticide use laws are adhered to in terms of licensed products and legal recommendations, but reporting of materials sprayed has not met the state’s 100% use requirement, since drift retardants and surfactants were not reported. Mixing, loading, spraying and use reporting are carried out by non-licensed personnel is not illegal, but it is not prudent. Worker safety, public and environmental health can also be improved. County policies relating to IPM, Storm Water Pollution Prevention and Environmental Best Management Practices need improvement.

Strategies that we recommend, which will **not require additional funding** and will improve the RVMP include:

RECOMMENDED STRATEGY	PROGRAM COMPONENT IMPROVED
<p>1. Not spraying low-growing indigenous (locally native) plants within twenty feet of roads. Enhancing their proliferation by overseeding bare and weedy areas.</p>	<p>+ LINES OF SIGHT                      + FIRE SAFETY                      + COMMUNITY CONCERNS                      + NOXIOUS WEEDS</p>
<p>2. Not spraying bottoms of slopes, overseeding them with low-growing, non-weedy native grasses &amp; herbaceous plants.</p>	<p>+ LINES OF SIGHT                      + FIRE SAFETY                      + COMMUNITY CONCERNS</p>
<p>3. Improve timing and herbicide selection for targeting key weeds of concern to state, county, residents and staff.</p>	<p>+ NOXIOUS INVASIVE EXOTIC WEEDS                      + COMMUNITY CONCERNS                      + WORKER SAFETY</p>
<p>4. Switch to herbicides that are approved for spraying in water, when spraying near creeks and other water bodies</p>	<p>+ COMMUNITY CONCERNS                      + GOVERNMENT</p>
<p>5. Use additional triclopyr safety guidelines</p>	<p>+ COMMUNITY CONCERNS                      + WORKER SAFETY</p>
<p>6. Improve posting, reporting &amp; communications</p>	<p>+ COMMUNITY CONCERNS                      + WORKER SAFETY</p>
<p>7. Report use of adjuvants on pesticide use reports</p>	<p>+ GOVERNMENT</p>

Recommendations are based on our assessment of the best strategies, with consideration of budget. **Short term recommendations** (less than five years) that can be phased in and will require fiscal trade-offs are presented in order of priority. **Long-term (within ten years) strategies** that can be developed using a more site & species specific weed management approach can be implemented after evaluating each road's conditions. Budget and willingness to change will determine the pace of change towards a prescriptive vegetation management within an IPM framework, which will be more effective & ecologically sound than the current spray-mow program.

Approximate costs were categorized as **high** (more than \$60,000), **medium** (\$15-\$60,000), **low** (\$6,000-\$15,000) and **very low** (less than \$6,000). Benefits were assessed based on the number of program components that would improve with their implementation; **low** (0-2), **medium** (3-5), **high** (6-7).

#### Recommended Strategies with Additional Costs

STRATEGY	COST	BENEFIT	COMPONENT IMPROVED	TERM
8. Support getting staff licensed for pesticide use	VERY LOW	MED	+WORKER SAFETY +NOXIOUS WEEDS +WORKER SAFETY	SHORT
9. Spray during daylight hours only	MEDIUM	MEDIUM	+C. CONCERNS (health) +GOVERNMENT (IPM policy) +NOXIOUS WEEDS (accuracy) +WORKER SAFETY	SHORT
10. Spray with two-person (minimum) crew at all times	MEDIUM	MEDIUM	+COM. CONCERNS (health) +GOVERNMENT (IPM) +NOX. WEEDS +WORKER SAFETY	SHORT
11. Use surfactant when spraying	VERY LOW	MEDIUM	+LINES OF SIGHT +FIRE SAFETY +VEG ENCROACHMENT +NOX. WEED	SHORT
12. Provide Annual Endangered Species Training	VERY LOW	MEDIUM	+COM. CONCERNS (wildlife health) ++GOV'T.(IPM, laws/regs)	SHORT
13. Hire facilitator to work with staff & citizens to improve communication	MEDIUM	LOW	+COM CONCERNS +GOVERNMENT (IPM)	SHORT
14. Develop prescriptive IPM program* based on priorities	MEDIUM	MEDIUM	+NOXIOUS WEEDS +COM CONCERNS (health) + GOV'T. (IPM policy) + DRAINAGE	LONG
15. Mulch with Wood Chips from county	VERY LOW	MEDIUM	+ LINES OF SIGHT +VEG ENCROACHMENT +NOXIOUS WEEDS	SHORT

\* SEE APPENDIX C FOR EXAMPLE

<b>STRATEGY</b>	<b>COST</b>	<b>BENEFIT</b>	<b>COMPONENT IMPROVED</b>	<b>TERM</b>
16. Spot spray, mow & seed unpaved drainage ditches	VERY LOW	MEDIUM	+DRAINAGE +COM CONCERNS ++ GOV'T. (BMP, IPM policy)	SHORT
17. Make Pesticide Use & Location Records Available	VERY LOW	LOW	+COM CONCERNS (health) +GOVERNMENT (IPM)	SHORT
18. Enhance Pesticide Use Notification	VERY LOW	LOW	+COM CONCERNS (health) +GOVERNMENT (IPM)	SHORT
19. Use Available Prison Work Crews & DUI offenders to supplement staff	VERY LOW	MEDIUM	+LINES OF SIGHT +FIRE SAETY +VEG ENCROACHMENT +DRAINAGE +NOX. WEEDS	SHORT
20. *Test Bare Soils in Turnouts for Pesticide Residue	LOW	MEDIUM	+COM CONCERNS (health) ++GOV'T. (IPM, SMCWPPP)	SHORT
21. *Test Creek water for Pesticide Residue	LOW	MEDIUM	+COM CONCERNS (health) ++GOV'T. (IPM, SMCWPP)	SHORT
22. Implement Adopt-A-Road Program	LOW	MEDIUM	+LINES OF SIGHT +FIRE SAETY +VEG ENCROACHMENT +DRAINAGE +NOXIOUS WEEDS	SHORT
23. Mow stinkwort when young	LOW	LOW	+NOXIOUS WEEDS +GOVERNMENT (IPM)	SHORT
24. Use Vegetation Control@ under structures near creeks	LOW	LOW	+ C. CONCERNS (wildlife health) +GOVERNMENT (IPM)	SHORT
25. Mow & spot treat Harding grass (Cloverdale Rd.) with alternative herbicide(s)	VERY LOW	MEDIUM	+ LINES OF SIGHT +VEG ENCROACHMENT +NOXIOUS WEEDS	SHORT
26. Target and abate poison oak and control within 20 feet of roadway	MEDIUM	MEDIUM	++COM CONCERNS (health, targeting weeds) + WORKER SAFETY	SHORT
27. Target and abate woody vegetation within twenty feet of roadway	MEDIUM	MEDIUM	+ LINES OF SIGHT +VEG ENCROACHMENT +NOXIOUS WEEDS	SHORT

\* One-time, non-recurring cost



<b>STRATEGY</b>	<b>COST</b>	<b>BENEFIT</b>	<b>COMPONENT IMPROVED</b>	<b>TERM</b>
28. Burn weeds in pavement with propane torch during rainy season	VERY LOW	MEDIUM	+ LINES OF SIGHT +VEG ENCROACHMENT +NOXIOUS WEEDS	SHORT
29. Implement quarterly field-based PCA assessments & fine-tuned recommendations	MEDIUM	LOW	+NOXIOUS WEEDS + GOVERNMENT (IPM)	SHORT
30. Track and Report Precise Data	VERY LOW	LOW	+COM CONCERNS (health) +GOVERNMENT (IPM)	SHORT
31. Upgrade/Replace old mowers: <i>one every two years</i>	HIGH	MEDIUM	+LINES OF SIGHT +FIRE SAFETY +VEG ENCROACHMENT +COM CONCERNS (health)	LONG
32. Spray Milestone VM Plus for poison oak	VERY LOW	LOW	+NOXIOUS WEEDS + WORKER SAFETY	SHORT
33. Spray Garlon4 Ultra + drift retardant on emerged stinkwort before seeds set	VERY LOW	LOW	+NOXIOUS WEEDS	SHORT
34. Spray Habitat on pampas grass	VERY LOW	LOW	+NOXIOUS WEEDS	SHORT
35. Appoint Part-Time IPM Coordinator from existing staff	VERY LOW	LOW	+COM CONCERNS + GOVERNMENT (IPM)	SHORT
36. Form volunteer IPM Task Force to assist IPM Coordinator	VERY LOW	LOW	+COM CONCERNS + GOVERNMENT (IPM)	SHORT
37. Hire a full-time IPM Coordinator	HIGH	LOW	+COM CONCERNS + GOVERNMENT (IPM)	LONG

### Rejected Strategies

The following recommendations were evaluated and rejected because of a variety of reasons.

<b>STRATEGY</b>	<b>COST</b>	<b>BENEFIT</b>	<b>COMPONENT IMPROVED</b>	<b>REASON(S) REJECTED</b>
1. Graze roadsides with goat or sheep	MEDIUM	LOW	+LINES OF SIGHT +FIRE SAFETY	Note safe or practical
2. Replace all mowing with spraying	MEDIUM	MEDIUM	+LINES OF SIGHT +FIRE SAFETY +V. ENCROACHMENT	Some areas cannot be safely sprayed in terms of environmental health.
3. Replace all spraying with mowing	HIGH	MEDIUM	+LINES OF SIGHT +FIRE SAFETY +C. CONCERNS (health, broadcast spraying)	Some areas cannot be safely mowed in terms of staff safety. Mowing causes problems if used too close to creeks and other sensitive areas leading to increased sedimentation.
4. Replace current herbicides with organically approved products	MEDIUM	LOW	+C. CONCERNS (wildlife health)	Organically approved herbicides have unknown effects on wildlife and many other non-target organisms, and may be riskier to use in many areas than conventional herbicides.
5. Require that county residents who opt-out of spraying do their own non-chemical weed abatement	UNKNOWN	COST SAVINGS	+C. Concerns	Safety of county residents working on public roadsides.

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## INTRODUCTION

### ASSIGNMENT

Baefsky & Associates was hired by the San Mateo County Manager's Office to evaluate the Public Works Department's Roadside Vegetation Management Program (RVMP) and to develop short and long term strategies that are within the 2010-2011 budget, consistent with County policies, practices and commitments, and "achievable based on available resources and programmatic goals." The county requested a description of how recommended changes can be achieved "while maintaining shoulder safety and minimizing ecological impacts," and an analysis of "alternatives considered and rejected or not recommended (San Mateo County, 2011)."

### LIMITS OF STUDY

- Quantitative measurements of weeds, soil erosion and pesticide residue were not evaluated
- Spraying and mowing of roadsides was not observed in the field or reviewed via digital images
- Fire safety was not assessed during the months when fires are most likely to occur
- Work at County airports or other County non-roadside vegetation management was not assessed
- Few roads were evaluated in the Bayside area of the county
- County budget and cost data used in this report is approximate
- Costs of recommendations are estimated and approximate

### PURPOSE & USE OF REPORT

Providing an objective assessment of San Mateo County's RVMP and proposing achievable improvements that enhance human, pet and environmental health and safety of San Mateo County's roadsides are goals of this study. This report is intended to be used by the Board of Supervisors and County staff in making informed decisions about vegetation management along the County's roadsides, and to inform residents of the current status of the program.

### BACKGROUND

Control of undesirable vegetation (weeds) has historically been carried out using physical, mechanical, cultural, biological and chemical treatment methods. Species identification, ranking of different weed species relative importance, establishing treatment thresholds and monitoring are techniques that when combined and implemented are defined as Integrated Pest Management (UC IPM, 2011). Extending this approach into the roadside landscape, the term Integrated Vegetation Management has been used, which is described as "an assessment and management tool for maintaining desired vegetation, such as highway plantings, existing colonized plantings and/or colonized native species within the right-of-way. (Caltrans, 2007)"

### **Integrated Pest Management (IPM) and Integrated Vegetation Management (IVM)**

programs are concerned with:

- "Safety - minimizing fire concerns and promoting visibility of traffic, highway structures, and [visibility and general welfare of<sub>B&A</sub>] wildlife
- Controlling noxious weeds and pests
- Promoting good drainage to minimize storm-water runoff and erosion
- Protecting pavement and roadway devices
- Local communities and highway users
- Design, construction, and maintenance considerations
- Government statutes and regulation (Caltrans, 2007)"

San Mateo County has an Integrated Pest Management policy and a Water Pollution Prevention Program that affects the Roadside Vegetation Management Program. The IPM policy should be one of the main guiding policies of the RVMP since weeds are legally considered pests according to state and federal law. The WPPP specifically recommends IPM and has guidelines for weed control due to the existence of many large and small bodies of water throughout San Mateo.

**San Mateo County IPM Policy** recommends the use of cultural, physical, biological, and pest prevention measures, setting of thresholds for pest tolerance, and using chemical controls as a last resort. Employee training and reporting procedures are part of the policy (San Mateo County, 2010).

**San Mateo Countywide Water Pollution Prevention Program** emphasizes the centrality of water quality, health, safety and the environment and recommends the use of non-pesticide IPM alternatives “when feasible” and “least toxic chemicals” “when necessary” for treating pests including “unwanted plants (weeds)”. Further, they recommend encouraging “pilot projects”, reviewing “employee training practices”, performing “education outreach” and other methods to meet their goals (SMCWPPP, 2010).

**San Mateo County Watershed Protection Maintenance Standards** includes sections on Ditches and Swales and Vegetation Management Standards. Part of the Ditches and Swales standard is the preservation of “low grasses” to “filter sediment and other pollutants in stormwater, and to reduce scour by lowering the velocity of the ditch flow.” Vegetation Management standards include protection of endangered plant species prior to mowing and spraying, restrictions on herbicide use in the “Pescadero area” and guidelines for use in other areas (San Mateo County, 2005).

#### **Herbicide Spray and Mow Program**

On the approximately three hundred and fifteen miles of roads maintained by the County Public Works Department, mechanical (mowing) and chemical (spraying herbicides) are currently the only two methods used. Approximately fifty percent (157 miles) of these roads are currently designated as mowed or otherwise unsprayed, while the other fifty percent are designated as within zones where spraying is used with and without mowing (Lo Coco, 2011). Inspection of sites to be sprayed is carried out the day prior to treatment. Follow-up inspections sometimes occur, when time and budget allow (Pimental, 2011). Current costs of mowing are approximately \$450,000 per year, \$3,000 per mile per year. Spraying costs are approximately \$65,000 per year, \$414 per mile per year (Porter, 2006, 2011).

#### **Conflict Regarding Broadcast Spraying of Herbicides on County Roadsides**

County residents requested that herbicide spraying be replaced with mowing due to concerns about human, pet and wildlife health. The Public Works Department responded by instituting a policy of not spraying in some areas, posting and notifying in others, and allowing residents to opt-out of spraying for residents with property fronting on roads. Additional requests for halting of spraying were answered by a Public Works proposal to phase-in mowing over a ten year period, at a much higher cost. Currently, a moratorium on spraying has been in effect since July, 2011.

## METHODS

The original assessment was carried out from October 10<sup>th</sup> through November 23<sup>rd</sup>, and is based on visual roadside evaluations, interviews with ten San Mateo County staff members and three County residents, as well as the examination of documents provided by the County and by residents.

Baefsky & Associates and its subcontractors drove along twenty-nine county-maintained roads, and stopped to observe, analyze and document weeds, beneficial plants and wildlife habitat at one hundred and thirty-three separate locations on those roads.

Upon submittal of the first and second drafts of this report and a verbal presentation to staff, drafts were re-edited by Baefsky & Associates, updated with new information, and modified to improve clarity, precision and report quality.

Documents used in the preparation of this report are cited in the body of the report, and compiled in the Reference section, at the end of this report. Interview questions were prepared and submitted in writing, in person or via telephone to County Staff, and San Mateo County residents. See Appendix A – Interviews for more information on interviewees.

This report was prepared by an interdisciplinary consulting team composed of Michael Baefsky (IPM), Charles Jeffries (vegetation management) and Patrick Kobernus (biology). Baefsky managed the project, conducted the interviews and was present at all roadside inspections. Jeffries focused on vegetation management questions related to pesticide use and overall roadside maintenance concerns. Kobernus dealt with biological questions related to endangered species, particularly red-legged frog and salmonid habitat.

Field evaluations were carried out by driving, stopping, viewing and digitally imaging roads that were suggested by County staff. The following roads were assessed at one hundred and thirteen separate points. See Appendix B – Field Notes, for summarized field notes.

- Alpine Road
- Bean Hollow Road
- Beverly Drive
- Canada Road
- Cloverdale Road
- Crystal Springs Road
- Devonshire Blvd
- Edgewood Road
- Gazos Creek Road
- Higgens Canyon Road
- Highway 84
- Highway 92 near De Anza Road
- Kings Mountain Road
- La Honda Road
- Las Tunitas Road
- Lobitos Creek Road
- Lobitos Creek Cutoff
- Old La Honda Road
- Pescadero Creek Roads.
- Pescadero Road
- Pilarcitos Creek Road
- Polhemus Road
- Purisma Creek Road
- Sand Hill Road
- Skyline Blvd.
- Stage Road North of 84
- Stage Road
- Verde Road
- Whiskey Hill Road

This review of San Mateo County's RVMP is based on how well the program appears to be addressing the key concerns identified by staff including control of vegetation that affects;

- 1) lines-of-sight
- 2) fire safety
- 3) pavement degradation

In addition, we evaluated the RVMP using criteria that define Integrated Vegetation Management (Caltrans, 2007), including:

- 4) promoting good drainage including the minimization of storm-water runoff and erosion
- 5) control of noxious, invasive exotic weeds and other pests
- 6) local community concerns
- 7) adherence to government statutes, regulations, policies and best management practices

## SETTINGS

San Mateo County RVMP divides the county into two districts; Bayside, which includes unincorporated areas that are to the east of the north-south running Santa Cruz Mountains, and Coastside, which includes areas to the west of the mountain ridge. Bayside areas are mostly urban or suburban, but include regional and county parks, creeks and reservoirs that are home to endangered plant and animal species. Coastside areas are mostly rural or semi-rural and include farms and ranches, steep east-west running canyons and receive abundant moisture year round. Salmonid populations spawn in creeks and red-legged frog habitat is found in many areas, primarily on the coastside.

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## OBSERVATIONS

### **Lines of Sight – *meets standards and expectations***

Views of signs, road edge barriers, bike riders, pedestrians and opposing traffic were relatively clear on most roadsides evaluated. Las Tunitas Road on the Coastside was an exception, near the crest.

### **Fire Safety - *meets standards and expectations***

Most roadsides inspected had widths of at least three feet of either bare soil or vegetation less than six inches in height on both sides of the road. Woody vegetation is rare in areas directly adjoining pavement. Trees growing next to the roads on both Bayside and Coastside sites were exceptions.

### **Pavement Encroachment – *program can be improved***

Many roads inspected on the Coastside, especially in the No Spray areas had low growing vegetation that was encroaching into pavement, reducing width of the travel lanes and potentially damaging pavement. We observed an apparent increase of indigenous\* plant species numbers & diversity, and reduced bare and eroding soil where vegetation was mowed only.

### **Noxious Weeds - *program can be improved***

Most areas have suppressed and reduced noxious weed populations. Many weeds continue to regenerate and spread. High pampas grass, stinkwort and yellowstar thistle (invasive, exotic & noxious weed) populations noted in some areas. Poison oak growth threatens the health of workers, bike riders and pedestrians.

### **Roadside Drainage - *program can be improved***

Many unpaved drainage lines along roads were overgrown by grass and broadleaf weeds. Unsprayed areas had the worst examples of vegetation clogging drainlines and inlets. Sprayed and mowed areas had the best examples of grass lined drainage ditches. Sediment was noted in many ditches near cut and sprayed slopes. This results in the clogging of inlets and outlets, increased stream turbidity, possible increased loads of contaminants and reduction in salmonid spawning habitat quality.

### **Local Community Concerns – *many areas needing improvement***

Water quality and wildlife health as affected by spraying are concerns that citizens have expressed. We were not able to determine if the spraying was directly harming water quality or wildlife health, but we believe it unlikely, given the actual diluted products applied. However, indirect negative impacts from sprayed, eroding bare soil on slopes and other sprayed areas near creeks were widely observed. We found poor communication by staff about what, when and where herbicides were used, and equally poor understanding of the RVMP on the part of some county residents.

### **Government Laws, Regulations, Policies - *program can be improved***

Spraying is carried out in accordance with the letter of all but \*\* one applicable state and federal law regarding recommended products, mixing, loading, applications and training. County policies of IPM and SMCWPPP program have elements that have not been incorporated in the current RVMP nor are County BMP's for vegetation management & drainage in complete accord with practices. We found that , but additional steps are warranted for full legal compliance and increased safety.

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\* Indigenous = locally native

\*\* Use of adjuvants (stickers, spreaders, drift retardants) not reported on monthly pesticide use reports to State of CA

Table 1 – Summary of Observations

	RATING	EXCEPTION(S) / EXAMPLE(S)
Lines of Sight	MEETS STANDARDS & EXPECTATIONS	Las Tunitas Rd. on coast side problematic
Fire Safety	MEETS STANDARDS & EXPECTATIONS	Blue gum eucalyptus, coast live oak, coast redwood growing next to road
Pavement Encroachment	PROGRAM CAN BE IMPROVED	No Spray Zones
Noxious weeds	PROGRAM CAN BE IMPROVED	Mowed areas with higher populations of indigenous plants. Poison oak encroaching. Invasive exotics spreading
Roadside Drainage	PROGRAM CAN BE IMPROVED	Paved areas best, unpaved worst, good example of grass lined drainage on Polhemus. Bottom of slope spraying may contribute to sedimentation problems that affect wildlife habitat in creeks and other water sources
Local Community Concerns	MANY AREAS NEEDING IMPROVEMENT	Pesticide spraying concerns relate to health, safety, wildlife & habitat inadequately addressed and poorly communicated.
Laws, Regulations & Policies	PROGRAM CAN BE IMPROVED	In compliance with letter of all but one state and federal pesticide use laws. Minimal implementation of IPM, SMCWPPP and BMP's.



Table 2 – Examples

	<b>FIRE SAFETY</b>	<b>LINES-OF SIGHT</b>	<b>PAVEMENT ENCROACHMENT</b>	<b>INVASIVE / EXOTICS</b>	<b>ROADSIDE DRAINAGE</b>	<b>LOCAL COMMUNITY CONCERNS</b>	<b>LAWS, REGULATIONS &amp; POLICIES</b>
<i>Example of Sites that Meet Objectives</i>	Canada Road bare soil & low veg. up to 20 feet from pavement	Old La Honda Road	Polhemus Road, wide edges	Crystal Springs Road-	Crystal Springs Road	Pescadero and La Honda areas designated no-spray zones, managed with mowing.  Opt-out residents managed with mowing.	State licensed Pest Control Advisor makes pesticide recommendations.  Pesticide use reported to county.  Use and safety regulations comply
<i>Examples of Sites that Do Not Meet Objectives</i>	Las Tunitas & Verde Road blue gum eucalyptus near road	Pescadero Creek Road baccharis obscuring roadway near crest	Verde Road & Pescadero Creek Roads roads edges breaking down	Page Mill Rd. - pampas grass & stinkwort common in sprayed zones & next to pavement edge	Alpine Road – cut slopes sprayed & eroding	Spraying next to creek on Polhemus & Crystal Springs Road with non-aquatically approved products.  Turnouts & road edges barren of weeds, with apparent spray patterns up to 12 feet from road edge – <i>staff reports no county spraying in these areas</i>	Surfactants and drift retardants not reported to state in monthly pesticide use reports.  Spray & Mow program does not incorporate IPM or SMCWPPP policies.  BMP's for vegetation management and roadside ditches not incorporated in program.
<i>Average Example</i>	Lobitos Creek Cutoff			Devonshire Road patches of French broom	Canada Road	Most sprayed roads far from creeks.  Human exposure to herbicides minimized by dark hour spraying	Three feet the average minimum distance (observed) that is apparently sprayed away from the road edge.  Maximum distance managed from road edge (observed) is approximately twenty feet

*LINES OF SIGHT – MEETS STANDARDS & EXPECTATIONS*

San Mateo County maintained roads include many narrow winding roads used by cars, pedestrians, pets, bicycle riders, motorcycle riders and wildlife. Roads of this type are common on the Coastside, while in certain Bayside neighborhoods there are also narrow winding roads, but use is more restricted to cars and pedestrian traffic. By clearing from three to twenty feet of vegetation on both sides of the road, County staff maintains good lines-of-sight of the road and signage for all users.



Sand Hill Road



Polhemus Road

**FIRE SAFETY - MEETS STANDARDS & EXPECTATIONS**

We found that most areas had very little to no vegetation directly adjacent to the pavement due to contact herbicide use in the sprayed zones. In unsprayed zones, primarily in the Coastside district, there were areas where vegetation was encroaching on the roadway, but it was green when observed (October-November, 2011) and low in stature, posing little fire hazard. Only one or two areas were noted with elevated fire hazard due to standing dead annual vegetation, and this was not continuous, nor linked to other highly flammable vegetation.

Fire hazard severity zones in San Mateo County include areas of very high, high and moderate (CALFIRE, 2007). Within these zones the RVMP program focuses intensely on the zone directly adjacent to the pavement\*. Flammable vegetation growing along roads presents a hazard to people, property, and natural resources. Fires along roads can result from improperly extinguished cigarettes, catalytic converters under vehicles, foreign objects (such as glass) magnifying light and heat, and intentional acts of humans. Keeping vegetation (fuel) height low and maintaining weed free areas along roads reduces the risk of fires along roads.

Rows of *Eucalyptus globulus* (blue gum eucalyptus) alongside the roads posed the most elevated fire hazards observed. Due to the high amount of debris and flammable oils they create, the fire hazard is elevated wherever they occur near roadsides. Other trees growing along edges of forests or forest remnants including *Quercus agrifolia* (coast live oak) and *Sequoia sempervirens* (coast redwood), which pose fire hazards when directly adjoining roads. Lower branches have been removed or fallen from the redwoods, and the live oaks are mainly pruned back from road edges.



Canada Road



Sand Hill Road



Verde Road

\* Weed abatement standards in the Coastside Fire Protection District are enforced as mowing "weeds and grasses" to a height of no taller than four inches. The Fire Marshal has authorization to enforce this standard as much as ten feet on either side of a highway (Coastside Fire District, 2008)

PAVEMENT ENCROACHMENT – PROGRAM CAN BE IMPROVED

We did not find weed encroachment into the paved areas in Bayside, but did observe examples on the Coastside in no spray zones. Exceptions were paved drainage ditches and newly paved roadside edges.

Water that infiltrates into the road base, through either a horizontal or vertical direction, damages the road surface leading to costly repairs. Roads are therefore designed and maintained to prevent water from penetrating the surface, and shaped so water drains away from the road shoulder and base. Vegetation growing in pavement cracks, or adjacent to pavement, facilitates water movement into the road base and can prevent drainage of water away from the road base.

Problems with vegetation encroaching into roadways include roadwidth shrinkage, increased pavement breakdown and reduced lines of sight. Bayside environmental factors that minimize weed encroachment include drier microclimates, higher levels of traffic and more paved surfaces. Coastside roads are wetter, have different traffic use patterns, and there are fewer paved surfaces.



Cloverdale Road – No Spray Zone



Stage Road – No Spray Zone, Opt-Out Site



Verde Road

**NOXIOUS WEEDS - PROGRAM CAN BE IMPROVED**

We did not find evidence of a concerted effort or plan to control any specific weed on roadsides. However, awareness, concern and willingness to modify materials and methods was exhibited by staff and the public, in discussions about specific weeds, locations and solutions.

Roads are corridors for the establishment and spread of weeds that can threaten indigenous plants and animals and contribute to species losses, crop degradation and habitat pollution. When these plants spread into adjacent fields, creeks and forests they reduce biological diversity due to their weedy habits and can contribute to fire hazard and loss of wildlife habitat. Ineffective management can lead to the further spread of these undesirable plants throughout the landscape.

The key (primary) invasive exotic weeds we noted alongside county roads are stinkwort (*Dittrichia graveolens*), pampas grass (*Cortaderia selloana*) and bristly ox-tongue (*Picris echioides*). Secondary invasive exotic weeds observed included mare's tail (*Conyza canadensis*), Harding grass (*Phalaris aquatica*), everlasting cudweed (*Gnaphalium luteo-album*), and French broom (*Genista monspesulana*). Other weeds noted included fennel (*Foeniculum vulgare*), poison hemlock (*Conium maculatum*), black mustard (*Brassica nigra*), yellowstar thistle (*Centaurea solstitialis*), and tree of heaven (*Ailanthus altissima*).

A native pest of concern is poison oak (*Toxicodendron diversiloba*), which causes road user health problems, including lost work days and workers compensation claims. This weed encroaches into roadsides throughout the county.



pampas grass on Sand Hill Road



Orange colored vegetation is poison oak on Cloverdale Road

**ROADSIDE DRAINAGE - PROGRAM CAN BE IMPROVED**

We found that roadside drainage is impaired by spraying along the bottoms of slopes, which contributes to soil erosion, slope failure and sedimentation of creeks, inlets and roadside ditches, and reduces wildlife habitat and water quality. Unpaved drainage ditches can be improved on a site by site basis, with some areas completely clogged with vines and woody vegetation and others bare and eroding.

Road systems are a common right-of-way for moving water (runoff) away from adjacent land and homes. In rural areas, open roadside ditches are used to move water away from properties and roads. When these ditches contain vegetation and/or debris, water moves through them more slowly. When debris clogs a pipe running under a driveway or road the water level rises and flooding can occur. Keeping roadside ditches free from objects which slow water flow, or move in the water flow and clog culverts, reduces flooding risks.

Paved drainage ditches were noted mainly on the Bayside, but where found on the Coastside had few problems from weeds. Unpaved ditches were problematic mainly on steep east-west roads leading up to and down from Skyline Blvd including Las Tunitas Road, where ditches were hidden and clogged with weeds. Soil erosion and blockage from debris and broadleaf weeds was noted in most unpaved ditches.



sprayed unpaved ditch - Kings Mountain Road



unpaved, unsprayed ditch Stage Road



Mowed grass lined drainage Polhemus Rd.

LOCAL COMMUNITY CONCERNS – *MANY AREAS NEEDING IMPROVEMENT*

We noted a lack of communication between staff and some county residents that oppose spraying, resulting in polarized viewpoints. Local community concerns focussed on herbicide spraying and had issues with broadcast herbicide impacts on human, pet and wildlife health, lack of targetting noxious weeds, and unclear information about the spray program (Patty Mayall, 2011, Joe LoCoco, 2011)

We observed:

- Evidence of herbicide use near one salmonid stream and red-legged frog habitat in several areas
- Bare soil in and leading to and from turnouts throughout Coastside and Bayside areas that have the appearance of sprayed zones

We also noted:

- Most spray work on roadsides is a “broadcast” swath and is not targetting weed species or populations of noxious weeds or invasive exotic weeds
- Roadside pre-spray notification implemented in 2011, no post-application notice
- Difficulty in obtaining accurate records of where, what and how much acreage was sprayed



Apparent spray nozzle pattern in no-spray zone turnout



sprayed vegetation on bank above salmonid creek

LAW, REGULATIONS AND POLICIES - *PROGRAM CAN BE IMPROVED*

Staff is in compliance with laws regarding the use of herbicides, except for not reporting surfactant and drift retardant use. A licensed Agricultural Pest Control Advisor provides legally required pesticide recommendations for pesticide use in the public right of way.

Although the following practices are not in violation of current laws and regulations or local policies, we question the safety, health and environmental soundness of:

- Application of pesticides carried out in the dark between the hours of 2 and 7 AM raises questions about avoiding non-target areas, species and areas of concern
- Mixing, loading, spraying and clean-up carried out at least half of the time by one unaccompanied driver / applicator
- Mixing, loading, spraying, clean-up and record keeping carried out and being supervised by unlicensed personnel

Implementation of government policies that include Integrated Pest Management, Countywide Water Pollution Prevention and the Department's Standard Operation Procedures for Implementing IPM Policy are lacking the following:

- Integration of different techniques using pesticides as last resort
- Use of least toxic, and/or reduced risk chemicals – currently none in the tool box or being tested
- Annual Report summarizing pesticide use and pest control activities performed
- Long-term Prevention strategies
- Species-based pest control strategies
- Use of biological controls
- Applications of non-aquatic approved materials are made next to streams and creeks

Some of the Best Management Practices relating to Vegetation Management (County, Watershed Protection Maintenance Standards, 2005) are in dispute, others have not been incorporated:

- Herbicides shall not be used in the Pescadero area [*unless approved<sub>B&A</sub>*]. – *staff denies unauthorized use\**
- Herbicides may be applied to dry ditches when no rainfall or runoff is expected to occur within 14 days of application – *concerned citizens have reported that this is not the case, staff disputes*
- Herbicides shall not be used on any slope where bare erosive soil may result – *common on cut slopes*
- Herbicides shall not be broadcast sprayed, but shall be selectively sprayed at the plants targeted for removal – *we were not able to determine how much if any spot or targeted spraying has been carried out*
- Low grasses are highly desirable in earthen roadside ditches as they filter pollutants from stormwater runoff, and reduce the velocity of flows, thereby reducing the erosive forces – *not implemented*
- “where mechanical ditch pulling is not required, low grasses should be preserved within the ditches to filter sediment and other pollutants in stormwater, and to reduce scour by lowering the velocity of the ditch flow” – *not implemented*

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\*In turnouts throughout the county spraying appears to have been done. This issue has been noted elsewhere in the report. We recommend sampling soil and water in these locations for herbicide residue.



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## CONCLUSIONS

### **1. Lines of Sight – meets standards and expectations**

We found few restrictions in line of sight posed by vegetation in our surveys of county roads. Most areas needing improvement were found on Pescadero Creek Road, Alpine Road and Las Tunitas Creek Road, areas that are mowed and not sprayed.

### **2. Fire Hazard Reduction – meets standards and expectations**

Most roads that we surveyed after fire season and at least one rain episode, had bare edges and turnouts, low vegetation 3-10 feet beyond those areas, and up to 20 feet from pavement edge well managed and fire safe.

### **3. Pavement Encroachment – program can be improved**

We observed that vegetation is playing an active role in road shrinkage and is a probable contributor to pavement degradation on many roads. We noted most problems in non-sprayed areas, which have restricted spraying due to resident concern about human, pet and wildlife health.

### **4. Noxious Weed Control – program can be improved**

Many populations of invasive exotic plants were observed growing alongside County roads, although their encroachment into the roadway was limited. We noted high populations of stinkweed and bristly oxtongue, and concentrated populations of pampas grass and French broom in many parts of the county. We also believe that staff and public health and safety are compromised by poison oak's proliferation along roadsides.

### **5. Roadside Drainage – program can be improved**

We observed unpaved roadside drainage ditches in the county that were eroding, clogging and deepening. We also found that bottoms of slopes that are sprayed and/or mowed are eroding, clogging ditches, inlets and may be reducing the quality of wildlife habitat through sedimentation of waterways.

### **6. Local Community Concerns – many areas need improvement**

We found that communication and trust has broken down between staff and County residents who oppose spraying, a major impediment to improving the RVMP. Areas of some resident's concern that we believe need improvement include human, pet and wildlife health, broadcast spraying, posting & notification of planned spraying.

### **7. Laws, Regulations & Policies – program can be improved**

CA pesticide use laws are adhered to in terms of licensed products and legal recommendations, but reporting of materials sprayed has not met the state's 100% use requirement, since drift retardants and surfactants were not reported. Mixing, loading, spraying and use reporting are carried out by non-licensed personnel is not illegal, but it is not prudent. Worker safety, public and environmental health can also be improved. County policies relating to IPM, Storm Water Pollution Prevention and Environmental Best Management Practices need improvement.

## RECOMMENDATIONS

Strategies that we recommend, which will not require additional funding and will improve the RVMP include:

RECOMMENDED STRATEGY	PROGRAM COMPONENT IMPROVED
<p>1. Not spraying or mowing low-growing indigenous (locally native) plants within twenty feet of roads. Enhancing their proliferation by overseeding bare and weedy areas.</p>	<p>+ LINES OF SIGHT + FIRE SAFETY + COMMUNITY CONCERNS + NOXIOUS WEEDS</p>
<p>2. Not spraying bottoms of slopes, overseeding them with low-growing, non-weedy native grasses &amp; herbaceous plants.</p>	<p>+ LINES OF SIGHT + FIRE SAFETY + COMMUNITY CONCERNS</p>
<p>3. <b>Improve timing and herbicide selection for targeting key weeds of concern to state, county, residents and staff.</b></p>	<p>+ <b>NOXIOUS INVASIVE EXOTIC WEEDS</b> + COMMUNITY CONCERNS + WORKER SAFETY</p>
<p>4. Switch to aquatic herbicides when spraying near creeks.</p>	<p>+ COMMUNITY CONCERNS</p>
<p>5. Use additional triclopyr safety guidelines</p>	<p>+ COMMUNITY CONCERNS + WORKER SAFETY</p>
<p>6. Improve posting, reporting &amp; communications</p>	<p>+ COMMUNITY CONCERNS + WORKER SAFETY</p>
<p>7. Report use of adjuvants on pesticide use reports</p>	<p>+ GOVERNMENT</p>

Recommendations are based on our assessment of the best strategies, with consideration of budget. **Short term recommendations** (less than five years) that can be phased in and will require fiscal trade-offs are presented in order of priority. **Long-term (within ten years) strategies** that can be developed using a more site & species specific weed management approach can be implemented after evaluating each road’s conditions. Budget and willingness to change will determine the pace of change towards a prescriptive vegetation management within an IPM framework, which will be more effective & ecologically sound than the current spray-mow program.

Approximate costs were categorized as **high** (more than \$60,000), **medium** (\$15-\$60,000), **low** (\$6,000-\$15,000) and **very low** (less than \$6,000). Benefits were assessed based on the number of program components that would improve with their implementation; **low** (0-2), **medium** (3-5), **high** (6-7).

Table 3 Recommended Strategies with **Additional Costs**

STRATEGY	COST	BENEFIT	COMPONENT IMPROVED	TERM
8. Support getting staff licensed for pesticide use	VERY LOW	MED	+WORKER SAFETY +NOX. WEEDS +WORKER SAFETY	SHORT
9. Spray during daylight hours only	MEDIUM	MEDIUM	+C. CONCERNS (health) +GOV'T. (IPM policy) +NOX. WEEDS (accuracy) +WORKER SAFETY	SHORT
10. Spray with two-person (minimum) crew at all times	MEDIUM	MEDIUM	+C. CONCERNS (health) +GOV'T. (IPM) +NOX. WEEDS +WORKER SAFETY	SHORT
11. Provide Annual Endangered Species Training	VERY LOW	MEDIUM	+C. CONCERNS (wildlife health) ++GOV'T.(IPM,laws,regs)	SHORT
12. Hire facilitator to work with staff & citizens to improve communication	MEDIUM	LOW	+C. CONCERNS +GOV'T. (IPM)	SHORT
13. Develop prescriptive IPM program* based on priorities	MEDIUM	MEDIUM	+NOX. WEEDS +C. CONCERNS (health) + GOV'T. (IPM policy) + DRAINAGE	LONG
14. Mulch with Wood Chips from county	VERY LOW	MEDIUM	+ LINES OF SIGHT +V. ENCROACH +NOX. WEEDS	SHORT
15. Spot spray, mow & seed unpaved drainage ditches	VERY LOW	MEDIUM	+DRAINAGE +C. CONCERNS ++ GOV'T. (BMP, IPM policy)	SHORT
16. Make Pesticide Use & Location Records Available	VERY LOW	LOW	+C. CONCERNS (health) +GOV'T. (IPM)	SHORT
17. Enhance Pesticide Use Notification	VERY LOW	LOW	+C. CONCERNS (health) +GOV'T. (IPM)	SHORT
18. Use surfactant when spraying	VERY LOW	MEDIUM	+LINES OF SIGHT +FIRE SAFETY +V. ENCROACH +NOX. WEED	SHORT

\* SEE APPENDIX C FOR EXAMPLE

<b>STRATEGY</b>	<b>COST</b>	<b>BENEFIT</b>	<b>COMPONENT IMPROVED</b>	<b>TERM</b>
19. Use Available Prison Work Crews & DUI offenders to supplement staff	VERY LOW	MEDIUM	+LINES OF SIGHT +FIRE SAETY +V. ENCROACH +DRAINAGE +NOX. WEEDS	SHORT
20. Test Bare Soils in Turnouts for Pesticide Residue	LOW	MEDIUM	+C. CONCERNS (health) ++GOV'T. (IPM, SMCWPPP)	SHORT
21. Test Creek water for Pesticide Residue	LOW	MEDIUM	+C. CONCERNS (health) ++GOV'T. (IPM, SMCWPP)	SHORT
22. Implement Adopt-A-Road Program	LOW	MEDIUM	+LINES OF SIGHT +FIRE SAETY +V. ENCROACH +DRAINAGE +NOX. WEEDS	SHORT
23. Mow stinkwort when young	LOW	LOW	+NOX. WEEDS +GOV'T. (IPM)	SHORT
24. Use Vegetation Control@ under structures near creeks	LOW	LOW	+ C. CONCERNS (wildlife health) +GOV'T. (IPM)	SHORT
25. Mow & spot treat Harding grass (Cloverdale Rd.) with alternative herbicide(s)	VERY LOW	MEDIUM	+ LINES OF SIGHT +V. ENCROACH +NOX. WEEDS	SHORT
26. Target and abate poison oak and control within 20 feet of roadway	MEDIUM	MEDIUM	++C. CONCERNS (health, targeting weeds) + WORKER SAFETY	SHORT
27. Target and abate woody vegetation within twenty feet of roadway	MEDIUM	MEDIUM	+ LINES OF SIGHT +V. ENCROACH +NOX. WEEDS	SHORT
28. Burn weeds in pavement with propane torch during rainy season	VERY LOW	MEDIUM	+ LINES OF SIGHT +V. ENCROACH +NOX. WEEDS	SHORT
29. Implement quarterly field-based PCA assessments & fine-tuned recommendations	MEDIUM	LOW	+NOX. WEEDS + GOV'T. (IPM)	SHORT

<b>STRATEGY</b>	<b>COST</b>	<b>BENEFIT</b>	<b>COMPONENT IMPROVED</b>	<b>TERM</b>
30. Track and Report Precise Data	VERY LOW	LOW	+C. CONCERNS (health) +GOV'T. (IPM)	SHORT
31. Upgrade/Replace old mowers: <i>one every two years</i>	HIGH	MEDIUM	+LINES OF SIGHT +FIRE SAFETY +V. ENCROACH +C. CONCERNS (health)	LONG
32. Spray Milestone VM Plus for poison oak	VERY LOW	LOW	+NOX. WEEDS + WORKER SAFETY	SHORT
33. Spray Garlon4 Ultra + drift retardant on emerged stinkwort before seeds set	VERY LOW	LOW	+NOX. WEEDS	SHORT
34. Spray Habitat on pampas grass	VERY LOW	LOW	+NOX. WEEDS	SHORT
35. Appoint Part-Time IPM Coordinator from existing staff	VERY LOW	LOW	+C. CONCERNS + GOV'T. (IPM)	SHORT
36. Form volunteer IPM Task Force to assist IPM Coordinator	VERY LOW	LOW	+C. CONCERNS + GOV'T. (IPM)	SHORT
37. Hire a full-time IPM Coordinator	HIGH	LOW	+C. CONCERNS + GOV'T. (IPM)	LONG

Table 4 Additional Cost Estimates

<b>STRATEGY</b>	<b>COST ESTIMATES</b>
1. Support getting staff licensed for pesticide use	5% pay increase
2. Spray during daylight hours only	\$3-5,000
4. Provide Annual Endangered Species Training	\$1500 plus employee time
5. Hire facilitator to work with staff & citizens to improve communication	\$10-20,000
6. Develop prescriptive IPM program* based on priorities	\$50,000 1st year, 35,000 thereafter
7. Mulch with Wood Chips from county	\$2-3,000 initial trial
11. Use surfactant when spraying	Less than \$200/year
13. Test Bare Soils in Turnouts for Pesticide Residue	\$3-4,000 3-4 reps and 3-5 materials
14. Test Creek water for Pesticide Residue	\$4-5,000 2 reps/ 3 materials
22. Implement quarterly field-based PCA assessments & fine-tuned recommendations	\$10-15,000 depending on scope
30. Hire a full-time IPM Coordinator	\$160,000 total cost per year

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\* SEE APPENDIX C FOR EXAMPLE

### Rejected Strategies

The following recommendations were evaluated and rejected because they did not meet one or more of staff's criteria for rejection including adherence to existing policies & mandated practices, no compromising of roadway safety, and no negative ecological impacts.

STRATEGY	COST	BENEFIT	COMPONENT IMPROVED	REASON(S) REJECTED
1. Graze roadsides with goat or sheep	MEDIUM	LOW	+LINES OF SIGHT +FIRE SAFETY	Not safe or practical
2. Replace all mowing with spraying	MEDIUM	MEDIUM	+LINES OF SIGHT +FIRE SAFETY +V. ENCROACHMENT	Some areas cannot be safely sprayed in terms of environmental health.
3. Replace all spraying with mowing	HIGH	MEDIUM	+LINES OF SIGHT +FIRE SAFETY +C. CONCERNS (health, broadcast spraying)	Some areas cannot be safely mowed in terms of staff safety. Mowing causes problems if used too close to creeks and other sensitive areas leading to increased sedimentation.
4. Replace current herbicides with organically approved products	MEDIUM	LOW	+C. CONCERNS (wildlife health)	Organically approved herbicides have unknown effects on wildlife and many other non-target organisms, and may be riskier to use in many areas than conventional herbicides.
5. Require that county residents who opt-out of spraying do their own non-chemical weed abatement	UNKNOWN	COST SAVINGS	+C. Concerns	Safety of county residents working on public roadsides.

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## APPENDIX A - INTERVIEWS

John Beall, biologist specializing in weeds, County Dept. of Agriculture Weights & Measures  
*Provided information about invasive exotic weeds in San Mateo County via telephone interview. Answered questions about weeds in San Mateo County via email.*

Jo Chamberlin, San Mateo County unincorporated area resident  
*Interviewed via telephone about spraying in areas near her property that is located on a county maintained road.*

Fred Crowder, Agriculture Commissioner, San Mateo Co Dept. of Agriculture/Weights & Measures  
*Provided written and verbal answers to questions, along with State documents requested via email, telephone and in-person. Responded verbally to follow-up questions.*

Steve Fischer, Supervisor Spray & Coastside Roadsides, San Mateo Co, Dept. of Public Works  
*Answered written and verbal questions submitted via phone, email, and in-person during a roadside meeting and driving tour. Responded in writing to follow-up questions.*

Peggy Jensen, Deputy County Manager, San Mateo County  
*Request for proposal and contract letting coordinator. Met in person and communicated via email regarding contract logistics, and reason for Manager's Office interest in this study. Approved and administered contract for this study and report.*

Joe LoCoco, Deputy Public Works Director, San Mateo County Dept. of Public Works  
*Provided written and verbal answers to questions along with County documents and documentation requested via email telephone, and in person. Responded verbally and in writing to follow-up questions.*

Patty Mayall, San Mateo County unincorporated area resident  
*Provided written and verbal answers to questions and provided emails from county residents who are opposed to or concerned about "broadcast" herbicide spraying, along with County meeting notes and other documents related to the history of the pro-mow movement.*

Scott Pimentel, Roadside Maintenance Technician, San Mateo County Public Works Department  
*Interviewed via telephone about details of mixing, loading, spraying, monitoring and mowing County roads. Scott is the primary technician who carries out roadside spraying program.*

Jim Porter, Director Department of Public Works, San Mateo County  
*Telephone interview regarding public works request for this study and the department's perspective on roadside vegetation management issues.*

Lennie Roberts, Legislative Advocate for San Mateo County, Committee for Green Foothills  
*Telephone interview regarding county program, pesticide use concerns, invasive exotic weeds, solutions to weed and vegetation management problems.*



## APPENDIX B – FIELD NOTES

The following plants are classified as either weeds or potential beneficials in terms of roadside vegetation management in San Mateo County. Invasive, exotic and noxious species are identified as weeds. Indigenous (locally native) species are classified as potentially beneficial, with the exception of poison oak.

COMMON NAME	<i>Scientific Name</i>	WEED OR POTENTIAL BENEFICIAL
green acacia	<i>Acacia dealbata</i>	Weed
box elder	<i>Acer negundo</i>	Potential beneficial
white alder	<i>Alnus rhombifolia</i>	Potential beneficial
pigweed	<i>Amaranthus spp.</i>	Weed
ragweed	<i>Amroisia spp.</i>	Weed
madrone	<i>Arbutus menziesii</i>	Potential beneficial
mugwort	<i>Artemisia vulgaris</i>	Potential beneficial
wild oats	<i>Avena fatua</i>	Weed
coyote brush	<i>Baccharis pilularis</i>	Potential beneficial
mustard	<i>Brassica rapa</i>	Weed
ripgut brome	<i>Bromus diandrus</i>	Weed
shepherds purse	<i>Capsella bursa-pastoris</i>	Weed
iceplant	<i>Carpobrotus edulis</i>	Weed
owls clover	<i>Castilleja exserta</i>	Potential beneficial
purple star thistle	<i>Centaurea calcitrapa</i>	Weed
Italian thistle	<i>Centaurea iberica</i>	Weed
yellowstar thistle	<i>Centaurea solstitialis</i>	Weed
pineapple weed	<i>Chamomilla suaveolens</i>	Weed
soap plant	<i>Chlorogalum spp.</i>	Potential beneficial
clarkia	<i>Clarkia spp.</i>	Potential beneficial
yerba buena	<i>Clinopodium douglasii</i>	Potential beneficial
poison hemlock	<i>Conium maculatum</i>	Weed
fleabane	<i>Conyza bonariensis</i>	Weed
mares tail	<i>Conyza canadensis</i>	Weed
pampas grass	<i>Cortaderia selloana</i>	Weed
turkey mullein	<i>Croton setigerus</i>	Potential beneficial
nutsedge	<i>Cyperus esculentus</i>	Weed
German ivy	<i>Delairea spp.</i>	Weed
teasel	<i>Dipsacus fullonum</i>	Weed
stinkwort	<i>Dittrichia graveolens</i>	Weed
fireweed	<i>Epilobium angustifolium</i>	Potential beneficial
equisetum	<i>Equisetum arvense</i>	Weed (indigenous)
beach aster	<i>Erigeron glaucus</i>	Potential beneficial
St. Catherine's lace	<i>Erigonum giganteum</i>	Potential beneficial
filaree (red stem)	<i>Erodium cicutarium</i>	Weed
blue gum eucalyptus	<i>Eucalyptus globulus</i>	Weed
blue gum eucalyptus	<i>Eucalyptus globulus</i>	Weed
common spurge	<i>Euphorbia maculata</i>	Weed
red fescue	<i>Festuca rubra</i>	Potential beneficial (probably not indigenous)
fennel	<i>Foeniculum vulgare</i>	Weed
French broom	<i>Genista monspessulana</i>	Weed
cudweed	<i>Gnaphalium calcitrapa</i>	Weed

<b>COMMON NAME</b>	<b>Scientific Name</b>	<b>WEED OR POTENTIAL BENEFICIAL</b>
grindelia	<i>Grindelia camporum</i>	Potential beneficial
Algerian ivy	<i>Hedera canariensis</i>	Weed
Toyon	<i>Heteromeles arbutifolia</i>	Potential beneficial
velvet grass	<i>Holcus lanatus</i>	Weed
catsear	<i>Hypochaeris spp.</i>	Weed
fluellin	<i>Kickxia spuria</i>	Weed
creeping wildrye	<i>Leymus triticoides</i>	Potential beneficial
tanbark oak	<i>Lithocarpus densiflorus</i>	Potential beneficial
native honeysuckle	<i>Lonicera hispidula</i>	Potential beneficial
silver bush lupine	<i>Lupinus albifrons</i>	Potential beneficial – endangered species habitat
cheeseweed	<i>Malva spp.</i>	Weed
sticky monkey flower	<i>Mimulus aurantiacus</i>	Potential beneficial
bee balm	<i>Monarda spp.</i>	Potential beneficial
purple needlegrass (State Grass of California)	<i>Nassella pulchra</i>	Potential beneficial
redwood sorrel	<i>Oxalis oregana</i>	Potential beneficial
oxalis	<i>Oxalis pes-caprae</i>	Weed
Harding grass	<i>Phalaris aquatica</i>	Weed
bristly oxtongue	<i>Picris echioides</i>	Weed
bristly oxtongue	<i>Picris echioides</i>	Weed
plantain	<i>Plantago spp.</i>	Weed
rabbit's foot grass	<i>Polygogon monspeliensis</i>	Weed
almond	<i>Prunus dulcis</i>	Weed
douglas fir	<i>Pseudotsuga menziesii</i>	Potential beneficial
coast live oak	<i>Quercus agrifolia</i>	Potential beneficial
wild radish	<i>Raphanus raphanistrum</i>	Weed
coffeeberry	<i>Rhamnus californica</i>	Potential beneficial
Himalayan blackberry	<i>Rubus armeniacus</i>	Weed
native blackberry (Pacific Blackberry)	<i>Rubus ursinus</i>	Potential beneficial
willow	<i>Salix spp.</i>	Potential beneficial
Russian thistle	<i>Salsola tragus</i>	Weed
sage	<i>Salvia spp.</i>	Potential beneficial
lizard tail	<i>Saururus cernuus</i>	Potential beneficial
coast redwood	<i>Sequoia sempervirens</i>	Potential beneficial
sow thistle	<i>Sonchus oleraceus</i>	Weed
hedge nettle	<i>Stachys bullata</i>	Potential beneficial
dandelion	<i>Taraxacum officinate</i>	Weed
poison oak	<i>Toxicodendron diversilobum</i>	Weed
CA bay laurel	<i>Umbellularia californica</i>	Potential beneficial
perriwinkle	<i>Vinca major</i>	Weed

## SITE INSPECTION ON 10.19.11

STOP #	LOCATION	LOCALE	DOMINANT WEEDS	BENEFICIALS	NOTES
1	HIGHWAY 92 (CALTRANS)	WEST - Between Delaware & Ralston	mare's tail, common spurge	none	<i>pavement cracks, joints, residual herbicide with proflaminate selects for mare's tail</i>
1	HIGHWAY 92 (CALTRANS)	WEST - De Anza Blvd. off-ramp	none	none	<i>wood chip mulch, deep near road, slopes away from road</i>
2	Canada Road (SM CO.)	SOUTH - Near 92, above Upper Crystal Springs Reservoir	stinkwort, yellowstar thistle, broom, Avena fatua, mare's tail	purple needlegrass, baccharis	<i>6' swath sprayed, area above sprayed, pin-stream gap missed, bicyclists &amp; car traffic</i>
2	Canada Road (SM CO.)	SOUTH - between Highway 92 & Filoli	none	none	<i>0 weeds; 15' from pavement</i>
2	Canada Road (SM CO.)	SOUTH - between Highway 92 & Filoli	poison oak	baccharis	<i>soil eroding where mowed high on steep slope</i>
2	Canada Road (SM CO.)	SOUTH - between Highway 92 & Filoli	grasses		<i>soil eroding at toe of slope where sprayed</i>
2	Canada Road (SM CO.)	SOUTH - near Filoli	multiple	?	<i>flat areas</i>
3	Edgewood Road (SM CO.)	EAST - Canada Rd. to Highway 280	Poison oak	purple needlegrass	<i>parking area appears to have been sprayed with herbicides</i>

<b>STOP #</b>	<b>LOCATION</b>	<b>LOCALE</b>	<b>DOMINANT WEEDS</b>	<b>BENEFICIALS</b>	<b>NOTES</b>
3	Edgewood Road (SM CO)	EAST - Canada Rd. to Highway 280	Poison oak	none	<i>mowed nearby</i>
4	Highway 280 (CALTRANS)	SOUTH - Sand Hill Rd.	Stinkwort, yellowstar thistle (key) Russian thistle, common spurge, sow thistle (secondary)	purple needlegrass, turkey mullein	<i>eroding where mowed, 15' turnout, 15' mowed, sprayed 15', eroding cuts</i>
4	Highway 280 (CALTRANS)	SOUTH - Sand Hill Rd.	stinkwort		<i>eroded soil, plants &amp; debris clogging storm drain inlet</i>
5	Sand Hill Road (SM Co)	corner Highway 280	wild oats, fleabane		<i>6' sprayed zone on eroding cut slope,</i>
5	Sand Hill Road (SM Co)	corner Highway 280	wild oats, fleabane		<i>eroding slope, sprayed &amp; mowed above clogged storm drain inlet</i>
5	Sand Hill Road (SM Co)	WEST to Whiskey Hill Rd.	broom, pampas grass	none	<i>steep, eroding slope</i>
5	Sand Hill Road (SM Co)	WEST to Whiskey Hill Rd.	fluevellin ( <i>Kickxia spuria</i> )		
5	Sand Hill Road (SM Co)	WEST to Whiskey Hill Rd. near Woodside Rd.	germinating grasses	indigenous oaks	<i>sprayed turnout</i>
5	Sand Hill Road (SM Co)	WEST to Whiskey Hill Rd. near Woodside Rd.	broom seedlings	coast live oak	
5	Sand Hill Road (SM Co)	WEST to Whiskey Hill Rd. near Woodside Rd.	poison oak	almond	<i>close to roadside</i>

<b>STOP #</b>	<b>LOCATION</b>	<b>LOCALE</b>	<b>DOMINANT WEEDS</b>	<b>BENEFICIALS</b>	<b>NOTES</b>
6	Whiskey Hill Road (SM Co)	NORTH TO Highway 84	germinating grasses	coast live oak	<i>flat areas, suitable for mulch</i>
6	Whiskey Hill Road (SM Co)	NORTH TO Highway 84	<i>Phytophthora ramorum</i> symptom on CA bay laurel leaf	coast live oak	<i>flat areas suitable for mulch</i>
6	Whiskey Hill Road (SM Co)	NORTH TO Highway 84	germinating grasses	germinating grasses	<i>drainage ditches</i>
6	Whiskey Hill Road (SM Co)	NORTH TO Highway 84	germinating grasses & broadleaves	germinating grasses	<i>paved drainage ditch</i>
7	Highway 81 (CALTRANS)	WEST TO Kings Mtn. Road	none	none	<i>natural mulch in paved drainage ditch, will clog inlet drains, soil eroding where moved upslope</i>
7	Highway 81 (CALTRANS)	WEST TO Kings Mtn. Road	<i>Phytophthora ramorum</i> symptom on tanbark oak	tanbark oak	
7	Highway 81 (CALTRANS)	WEST TO Kings Mtn. Road	none	coast redwood	<i>natural mulch, shrubs pushed back 15' from road, improved lines of sight</i>
8	Kings Mountain Road (County)	above Woodside	shaded, few weeds;	CA bay laurel	
8	Kings Mountain Road (County)	above Woodside	vinca		<i>drainage ditches</i>
8	Kings Mountain Road (County)	above Woodside	rabbits foot grass		
8	Kings Mountain Road (County)	above Woodside	few	none	<i>mulched</i>
9	Kings Mountain Road (CALTRANS)	SOUTH TO Skyline Blvd/Hwy 35	few		

<b>STOP #</b>	<b>LOCATION</b>	<b>LOCALE</b>	<b>DOMINANT WEEDS</b>	<b>BENEFICIALS</b>	<b>NOTES</b>
10	Skyline Blvd/Hwy 35 (CALTRANS)	SOUTH TO Alpine Road west		Douglas fir	<i>vegetation maintained further back from road than county</i>
11	Alpine Road (County)	WEST TO Pescadero Creek Road	poison oak	Madrone, coast live oak, sticky monkey flower	<i>narrow, winding, minimal management</i>
12	Pescadero Creek Road (County)	WEST TO Pescadero	yellow star thistle, poison hemlock, Himalayan blackberry	beach aster	<i>mowed, vegetation encroaching on road edges</i>
12	Pescadero Creek Road (County)	WEST TO Pescadero	Baccharis, Himalayan blackberry, coast live oak		<i>vegetation encroaching on road edges, lines-of-sight obstructed; mowed</i>
12	Pescadero Creek Road (County)	WEST TO Pescadero	Himalayan blackberry, perennial grass		<i>sidewalk crack edges, road degradation</i>
12	Pescadero Creek Road (County)	WEST TO Pescadero	Poison oak, Himalayan blackberry		<i>next to road</i>
12	Pescadero Creek Road (County)	WEST TO Pescadero	Himalayan blackberry, poison oak, perennial grass	weeds = beneficials	<i>preventing further erosion &amp; road degradation</i>
12	Pescadero Creek Road (County)	WEST TO Pescadero	yellow star thistle, germinating grasses & forbs		<i>sprayed road edge in no-spray zone</i>
12	Pescadero Creek Road (County)	WEST TO Pescadero	germinating grasses & forbs		<i>sprayed turnouts, edge of pavement &amp; ditches</i>
12	Pescadero Creek Road (County)	WEST TO Pescadero	ragweed		<i>mowed</i>
12	Pescadero Creek Road (County)	WEST TO Pescadero			<i>large open areas, good for mulch</i>

<b>STOP #</b>	<b>LOCATION</b>	<b>LOCALE</b>	<b>DOMINANT WEEDS</b>	<b>BENEFICIALS</b>	<b>NOTES</b>
13	Stage Road (County)	NORTH TO Highway 1	common spurge		<i>weeds in pavement cracks - no spray zone</i>
14	Stage Road (County)	NORTH ACROSS Highway 1			<i>sprayed - did not inspect</i>
15	Highway 1 (CALTRANS)	NORTH TO Tunitas Creek Road			<i>did not inspect</i>
16	Tunitas Creek Road	EAST - to Skyline Blvd./Hwy 35	bristly oxtoongue, wild oats, tall fescue		<i>farms, flat near Highway 1, vegetation encroaching into road, no spray</i>
16	Tunitas Creek Road	EAST - to Skyline Blvd./Hwy 35	wild oats, bristly oxtoongue		<i>clogged drain inlets, no spray</i>
16	Tunitas Creek Road	EAST - to Skyline Blvd./Hwy 35	velvet grass, malva, dandelion		<i>clogged drain inlets, no spray</i>
17	Skyline Blvd/Hwy 35 (CALTRANS)	NORTH TO Highway 92			<i>not evaluated</i>

10.28.11

STOP #	LOCATION	LOCALE	DOMINANT WEEDS	BENEFICIAL	NOTES
1	POLHEMUS	E - NEAR HWY 92	Picris echioides, pampas grass, mustard, wild oats	purple needlegrass in mowed, St. Catherine's lace & Q.a. above mowed	<i>no id low forb in mowed zone, eroding edge, bare near paving, bare where mowed low on slope, 0-5' sprayed, 5-15' mowed, deer browse on teasel in mowed zone</i>
1	POLHEMUS	E - NEAR HWY 92, wet area	common spurge, Avena fatua, bristly ox tongue	Lotus scoparius,	<i>sprayed zone 3-12" heights</i>
1	POLHEMUS	E - NEAR TIMBERLAKE AVE	bristly ox tongue (few), poison oak (far), dried grasses (low, sparse )	coast live oak	bare, eroding sprayed edge over paved ditch, scrub jay in mowed zone
1	POLHEMUS	E - NEAR TIMBERLAKE AVE	Picris e., Harding grass, poison oak scattered in mow zone 4-15' from ditch, spray zone sparse Picris	Lotus s., soap plant, Ca fescue	<i>soil eroding</i>
1	POLHEMUS	E - NEAR TICONDEROGA AVE	fennel, Picris, wild oats, lox tongue in paved ditch & edge of? sprayed hillside	purple needle grass, owls clover	
1	POLHEMUS	E - NEAR BUNKER HILL DRIVE	bristly ox tongue, Harding grass, pampas grass, (fennel in mowed), nutsedge in wet	lotus, owls clover, purple needle grass in mowed	<i>wet, standing water, not sprayed</i>
1	POLHEMUS	E - BUNKER HILL DRIVE to ASCENSION	mustard (germinating), stink weed, crawling , bristly ox tongue in sprayed zone	purple needle grass, coast live oak	<i>slide area, deer area sprayed gravel ditch, deer browsed bristly oxtongue</i>
1	POLHEMUS	E - BUNKER HILL DRIVE to ASCENSION	poison oak	purple needle grass	<i>turnout gravel weed free (residuals), 3-5' sprayed upslope eroding, 15-20 upslope mowed, eroding</i>



STOP #	LOCATION	LOCALE	DOMINANT WEEDS	BENEFICIAL	NOTES
1	POLHEMUS	E - BUNKER HILL DRIVE to ASCENSION			<i>water, gravel, sediment into inlet to creek across road, green blue gum eucalyptus</i>
1	POLHEMUS	E - corner ASCENSION	stinkwort, Harding grass, germinating grasses in sprayed & mowed	purple needle grass in mowed, baccharis & coast live oak near	
2	CRYSTAL SPRINGS RD.	W -CS TERRACE TO TARTAN RD	poison oak, sedge, mustard, blackberry	native honeysuckle, black maple, bay	<i>5-6' bare (residuals), 3-5' sprayed, woody blue gum eucalyptus pruned back, running water 50' from spraying</i>
2	CRYSTAL SPRINGS RD.	W -CS TERRACE TO TARTAN RD, San Mateo Creek			<i>sprayed 50' from creek, running water</i>
2	CRYSTAL SPRINGS RD.	N - POLEHMUS	pampas grass, poison oak	sedge, bay	<i>serpentine, bare gravel edges? residuals? Standing water at inlet</i>
2	CRYSTAL SPRINGS RD.	N - POLEHMUS	plantain, native grasses in mowed, fleabane, cudweed, plantain in sprayed zone	native grasses, coast live oak	<i>3-5' bare gravel, 2' sprayed ditch, 3-5' sprayed slope, 3-10' mowed slope, across from creek, near inlet</i>
2	CRYSTAL SPRINGS RD.	S			<i>curbs &amp; no turnouts</i>
3	POLHEMUS	W - near Ascension	germinating grasses, Harding grass, Picris, blackberry, poison oak	willow	<i>10' residuals, 3-5' spraying, 10' mowed, spraying &gt;100' from creek</i>
3	DEVONSHIRE BLVD	LYNTON AVE.	broom, oxalis, purple star thistle, wild oats	coast live oak, ornamentals, purple needle grass	<i>paved ditch, 3-5' sprayed, slope, bare soil, eroding into ditch</i>
3	DEVONSHIRE BLVD	ACROSS 385 Post box	broom	Ca fescue, toyon, coast live oak, juniper	<i>sprayed 3-5' vertical, soil eroding</i>
4	BEVERLY DRIVE	NEAR BAY VIEW DRIVE	ripgut brome, Acacia dealbata, ice plant		<i>untreated to road</i>
5	CLUB DRIVE	N -NEAR POPPY LANE	stinkwort, poison oak	baccharis, toyon, yerba buena	<i>into street &amp; road cracks, fire hazard, lines of sight compromised</i>

STOP #	LOCATION	LOCALE	DOMINANT WEEDS	BENEFICIAL	NOTES
6	VERDE ROAD	E -NEAR HIGHWAY 1	German ivy, germinating broadleaves & grasses	baccharis	<i>Eucalyptus globulus</i> shade, ditches bladed, 5' spray zone
6	VERDE ROAD	E -NEAR HIGHWAY 1	German ivy, H. blackberry, ripgut brome, Vinca major, Hypericum ., germinating grasses	bee balm, Leymus triticoides	<i>blue gum eucalyptus</i> shade & mulch
6	VERDE ROAD	SE - NEAR PURISMA CREEK ROAD	blackberry & poison oak mowed, sheep's cud, pineapple weed, prickly lettuce in sprayed zone, stinkwort above	beach daisy	treated 6', many weeds, mowed, 20' beyond, edge of road eroding & bare, red tailed hawks sited, residual herbicides in gravel breaking down or dispersing
6	VERDE ROAD	NE - NEAR PURISMA CREEK ROAD	Jonson grass, germinating grasses, filaree, mustard near Verde rd., grasses& fireweed across ditch mowed	bee balm, baccharis	road is being undermined by unlined ditch
7	PURISMA CREEK ROAD	NE - near Verde Rd	cudweed, bristly ox tongue fireweed in sprayed, blackberry, horehound above mowed	aster, baccharis	asphalt ditch
7	PURISMA CREEK ROAD	SE near Verde Rd	poison hemlock, cudweed, Himalayan blackberry	bee balm, baccharis	8' spray zone, unpaved ditch eroding
7	PURISMA CREEK ROAD	S- ELKUS ENVIRONMENTAL CENTER	filaree, tall fescue, Picris tongue? freeway daisy mowed		8' edge of pavement patches of spurge & filaree, mowed to ground
7	PURISMA CREEK ROAD	N- ELKUS ENVIRONMENTAL CENTER	?freeway daisy, mustard, bindweed in sprayed blue gum eucalyptus, blackberry, poison hemlock, bristly ox tongue to fence 8'		only mowed to fenceline, not sure if done this year or not?
7	PURISMA CREEK ROAD	1425 & 1435			bladed & shaped roadside & ditch
7	PURISMA CREEK ROAD	2209	Italian thistle thick on south side of road		

STOP #	LOCATION	LOCALE	DOMINANT WEEDS	BENEFICIAL	NOTES
7	PURISMA CREEK ROAD	2234	Algerian ivy up to edge of road		
7	PURISMA CREEK ROAD	2700		coast redwood, white alder shade	<i>few weeds, possible sprayed zone</i>
7	PURISMA CREEK ROAD	2766	narrow, blue gum eucalyptus near road		<i>shaded, mulch, few weeds</i>
7	PURISMA CREEK ROAD	turnout on creek side	blue gum eucalyptus, grasses near rd., blackberry & horehound beyond spray	bee balm	<i>7-8' historical spray, 3' residual</i>
8	VERDE RD	N OF PURISMA CREEK ROAD	E side wild oats, Picris, catsear (sprayed) baccharis, poison hemlock, bristly ox tongue & blackberry (mowed)		<i>paved ditch, 12' treated, including gravel roadside, only 3' above gravel, mowed beyond</i>
8	VERDE RD	N OF PURISMA CREEK ROAD	germinating grasses & broadleaf		<i>W side in shade few grass &amp; broadleaf weeds 6'</i>
8	VERDE RD	N OF PURISMA CREEK ROAD		creeping wildrye	
9	LOBITOS CREEK CUTOFF	NEAR HIGHWAY 1	W - plantain, moss, poison oak, Harding grass	lotus scoparius, other wildflowers	<i>sprayed 5-8' upslope through ditch, gravelly eroding, mowed 5-6' above</i>
9	LOBITOS CREEK CUTOFF	NEAR GINA'S RANCH	wild radish & poison oak, poison hemlock		
9	LOBITOS CREEK CUTOFF	> VERDE	stinkwort, poison oak hemlock, cudweed, blackberry	clarkia, fireweed	<i>edge of paving</i>
9	LOBITOS CREEK CUTOFF	> VERDE	conyza, poison hemlock, cudweed		
9	LOBITOS CREEK CUTOFF	> VERDE	velvet grass German ivy, Harding grass		
9	LOBITOS CREEK CUTOFF	> VERDE	catsear, shepherds purse, velvet grass, Harding grass, pampas grass	willow	

<b>STOP #</b>	<b>LOCATION</b>	<b>LOCALE</b>	<b>DOMINANT WEEDS</b>	<b>BENEFICIAL</b>	<b>NOTES</b>
9	LOBITOS CREEK CUTOFF	TUNITAS CREEK ROAD	field bindweed, German ivy, mustard, poison hemlock, stinging nettle, cudweed	white alder	<i>CA quail</i>
10	STAGE RD	N OF 84	plantain, cudweed, poison oak, mustard, blackberry, coffee (mowed low), germinating grasses	bare turnout & road edge to 5-6', looks sprayed to 9-10'	
10	STAGE RD	N OF 84	ragweed, cudweed, conyza	clarkia, sticky monkey flower	<i>sprayed</i>
11	LA HONDA ROAD	flat section			<i>revegetation site by CAL Trans</i>
12	OLD LA HONDA RD	NEAR PORTOLA ROAD			<i>low grasses in ditches, looked well maintained on the drive by, Google Map 2011 shows areas that look sprayed</i>

## 11.4.11

STOP #	LOCATION	LOCALE	DOMINANT WEEDS	BENEFICIAL	NOTES
1	POLHEMUS RD.	CRYSTAL SPRINGS ROAD	malva, equisetum, mustard	willow	
1	POLHEMUS RD.	CRYSTAL SPRINGS ROAD	equisetum, mustard, German ivy	willow	
1	POLHEMUS RD.	CRYSTAL SPRINGS ROAD	German ivy	willow	
2	PILARCITOS CREEK	Highway 92	filaree, barley, malva, bristly ox-tongue		<i>Steelhead stream. County mows; malva, equisetum, radish, mustard, German ivy. No spray zone. Recent drain replacement took 8 years to permit</i>
3	HIGGINS CANYON ROAD	Highway 1	filaree, malva, bristly oxtongue		<i>Area within red-legged frog injunction, sprayed with Finale+Milestone VM, adjacent to brussel sprouts field.</i>
4	VERDE ROAD	Highway 1	<i>Vinca major, Eucalyptus globulus</i>		<i>Eucalyptus debris clogs ditches, toe of slope sprayed &amp; eroding</i>
5	VERDE ROAD	Purisma Road	bristly ox-tongue, cudweed, mare's tail	bee balm, creeping wildrye	<i>roads sprayed in March, 2011. Discussed county PCI. Noted white-tailed kite &amp; great blue heron in fields near roads.</i>
6	PESCADERO ROAD	Highway 1	pampas grass, fennel, germinating grasses		<i>no-spray zone, mowed once, shoulders bare of vegetation</i>
7	CLOVERDALE ROAD		Harding grass, teasel, poison oak		<i>no spray zone, bike lane infested with Harding grass, drainage ditches clogged</i>

11.10.11

<b>STOP #</b>	<b>ROAD</b>	<b>LOCALE</b>	<b>WEED</b>	<b>BENEFICIAL</b>	<b>NOTES</b>
1	POLHEMUS	Bunker Hill Road (?San Mateo Creek)	Italian thistle, mare's tail,	Needle grass, Lotus paniculata, purple needlegrass, owl's clover	<i>Standing water in ditch, sediment eroding from sprayed toe slope, clogging drainage, red-legged frog habitat</i>
2	POLHEMUS	between Bunker Hill Dr. & Ascension Dr.	wild oats	needlegrass., Q. agrifolia	<i>Sparsely vegetated eroding slope sprayed at toe, mowed upslope enhancing indigenous bunchgrass population</i>
3	POLHEMUS	between Bunker Hill Dr. & Ascension Dr.		Q. agrifolia	<i>Sediment clogging drainage ditch and inlet drain, oak leaves and shade minimizing weeds in many areas</i>
4	POLHEMUS	Ascension Drive	stinkwort, Italian thistle, mare's tail	purple needlegrass	<i>Excellent indigenous grass habitat enhanced by ongoing mowing - model for similar areas</i>
4	POLHEMUS	Ascension Drive		purple needlegrass	<i>model for grass lined drainage</i>
5	CRYSTAL SPRINGS ROAD	Tartan Trail Rd. to Woodridge Rd.		Lupinus albifrons	<i>Lupine is habitat for endangered Mission blue butterfly</i>
5	CRYSTAL SPRINGS ROAD	Tartan Trail Rd. to Woodridge Rd.		native blackberry	<i>good erosion control plant, common along many roadsides</i>
6	CRYSTAL SPRINGS ROAD	Woodridge Rd. to Tartan Trail	mare's tail, bristly oxtongue		<i>sprayed to edge of creekbank, directly above steelhead creek</i>

<b>STOP #</b>	<b>ROAD</b>	<b>LOCALE</b>	<b>WEED</b>	<b>BENEFICIAL</b>	<b>NOTES</b>
7	POLHEMUS	Crystal Springs Rd.			<i>sprayed edges of pavement approximately 60' from creek, bank slopes towards creek</i>
8	POLHEMUS	across Ticonderoga Road	poison oak	coast live oak, Festuca spp.	<i>mowed slope with good population, holding slope, sprayed toe of slope eroding</i>
8	POLHEMUS	Ticonderoga Road	bristly oxtongue		<i>bare sprayed soil at top of slope 20' from red-legged frog habitat/ creek</i>
9	PILARCITOS CREEK ROAD	North of Highway 92	German ivy, mustard	hedge nettle, willow, equisetum	<i>very close to creek</i>
10	HIGGENS CANYON ROAD	Near Highway 1			<i>bordered by brussel sprouts fields, from Highway 1 to 60 feet from willow thicket unlikely to harbor red legged frog, flat area</i>
11	HIGGENS CANYON ROAD	Arroyo Leon	pigweed, mustard, wild radish	willow, hedge nettle, native blackberry, CA bee plant, native aster,	<i>bare turnouts and edges of fields, sprayed close to frog habitat, bare soil, flat</i>
11	HIGGENS CANYON ROAD	Arroyo Leon			<i>farmer's spray rig dripping residue along edge of road</i>
12	HIGGENS CANYON ROAD	2207	brome, malva, mustard		<i>vegetation to road edge</i>
13	HIGGENS CANYON ROAD	2281	blue gum eucalyptus	creeping wildrye	<i>eucalyptus shade &amp; mulch inhibiting weeds, road edge still sprayed, toe of slope across street is eroding</i>

<b>STOP #</b>	<b>ROAD</b>	<b>LOCALE</b>	<b>WEED</b>	<b>BENEFICIAL</b>	<b>NOTES</b>
14	VERDE ROAD	Between Purisma Creek Road & Cobitos Creek Cutoff			<i>roads sprayed 3-6', mowed to 20', bare soil eroding from spray on bare soil and cut slopes, red-legged frog ponds visible closer to the coast</i>
15	STAGE ROAD	Between Highway 84 and Pescadero Road	exotic grasses, poison oak	Lizard tail, native blackberry	<i>Vegetation to road edge, unsprayed, all mowed</i>
16	BEAN HOLLOW ROAD	Between Pescadero Road and Reservoir Road	pampas grass, nutsedge		<i>vegetation to road edge, some sprayed areas along edges</i>
17	BEAN HOLLOW ROAD	Between Pescadero Road and Reservoir Road			<i>mulch from mowed rowed edge suppressing weeds</i>
18	BEAN HOLLOW ROAD	between Reservoir Road and Lake Lucerne	willow		<i>mowed woody plants along roadside</i>
19	BEAN HOLLOW ROAD	Lake Lucerne	bristly oxtongue, plantain	Grindelia spp., coffeeberry, sage, mugwort	<i>sprayed turnout, unsprayed</i>
20	BEAN HOLLOW ROAD	Lake Lucerne	bristly oxtongue, plantain, grasses		<i>under guard rail</i>
21	GAZOS CREEK	Corner Highway 1	Fennel, pampas grass		<i>vegetation to road edge (unsprayed)</i>
22	GAZOS CREEK		jubata grass		<i>profuse along roadside</i>
23	CLOVERDALE ROAD	DOUBLE DOG RANCH	teasel, poison oak, Harding grass, bristly ox tongue		<i>ditch clogged near ditch, creek across road red-legged frog habitat, unsprayed zone</i>
24	PESCADERO CREEK ROAD			coast redwood, redwood sorrel	



## APPENDIX C – PRESCRIPTIVE VEGETATION MANAGEMENT PROGRAM *EXAMPLE*

By evaluating each road’s conditions and priorities, a prescriptive approach to vegetation management can be developed that will be more effective and ecologically sound. Examples of prioritized challenges & IPM strategies for selected County roads are listed below:

Table 4: Long Term Prescriptive Vegetation Management Plan - example

<i><b>PRIORITIES</b></i> →	Lines of Sight	Fire Safety	Vegetation Encroachment	Roadside drainage	Noxious weeds	Community Concerns	Government laws, regulations & policies
COUNTY ROAD							
POLHEMUS ROAD				Soil erosion & sedimentation of salmonid creek exacerbated by spraying for bare soil on roadsides & spraying & mowing slopes <b>Enhance beneficial slope vegetation by targeted spraying &amp; overseeding</b>		Weeds sprayed up to areas near creeks <b>Spray with aquatic herbicides and/or treat around structures with asphalt composite (Vegetation Control@)</b>	
PESCADERO ROAD					Pampas grass at road edge not controlled by mowing or spraying with current suite of products <b>Spot treat with Habitat@</b>		
CLOVERDALE ROAD			Harding grass in bike lane not controlled by mowing <b>Mow &amp; spray regrowth with glyphosate or imazapyr</b>				

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## APPENDIX D - CERTIFICATION OF PERFORMANCE

I, Michael Baefsky certify:

- That I have personally inspected the sites referred to in this report, and have stated my findings accurately. The extent of the evaluation is stated in the attached report;
- That I have no current or prospective interest in the vegetation or the property that is the subject of this report and have no personal interest or bias with respect to the parties involved;
- That the analysis, opinions, and conclusions stated herein are my own;
- That my analysis, opinions, and conclusions were developed and this report has been prepared according to commonly accepted professional practices;
- That no one provided significant professional assistance to the consultant, except as indicated within the report;
- That my compensation is not contingent upon the reporting of a predetermined conclusion that favors the cause of the client or any other party.

I further certify that I am CA Agricultural Pest Control Advisor #74617, CA Qualified Applicator #33786, and have been involved in the practice of Integrated Pest Management, Plant Health Care, Arboriculture, Ecological Soils Management, and the study of plant pests for over thirty years.

I, Charles Jeffries certify:

- That I have personally inspected the sites referred to in this report, and have stated my findings accurately. The extent of the evaluation is stated in the attached report;
- That I have no current or prospective interest in the vegetation or the property that is the subject of this report and have no personal interest or bias with respect to the parties involved;
- That the analysis, opinions, and conclusions stated herein are my own;
- That my analysis, opinions, and conclusions were developed and this report has been prepared according to commonly accepted professional practices;
- That no one provided significant professional assistance to the consultant, except as indicated within the report;
- That my compensation is not contingent upon the reporting of a predetermined conclusion that favors the cause of the client or any other party.

I further certify that I am a CA Agricultural Pest Control Advisor #74620 and CA Qualified Applicator #83036 and have been involved in the practice of Integrated Pest Management, Vegetation Management, Invasive Species Control, and Landscape Management for over 25 years.

I, Patrick Kobernus certify :

- That I have personally inspected the sites referred to in this report, and have stated my findings accurately. The extent of the evaluation is stated in the attached report;
- That I have no current or prospective interest in the vegetation or the property that is the subject of this report and have no personal interest or bias with respect to the parties involved;
- That the analysis, opinions, and conclusions stated herein are my own;
- That my analysis, opinions, and conclusions were developed and this report has been prepared according to commonly accepted professional practices;
- That no one provided significant professional assistance to the consultant, except as indicated within the report;
- That my compensation is not contingent upon the reporting of a predetermined conclusion that favors the cause of the client or any other party.

I further certify that I am a wildlife biologist with over 16 years' experience working in the County of San Mateo, and I have USFWS 10(a) (1) (A) Recovery Permit for the California red-legged frog and Callippe silverspot butterfly.

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