



**SPECIAL
BOARD OF DIRECTORS
SAN LORENZO VALLEY WATER DISTRICT
AGENDA
May 3, 2017**

MISSION STATEMENT: Our Mission is to provide our customers and future generations with reliable, safe and high quality water at an equitable price; to create and maintain outstanding service and community relations; to manage and protect the environmental health of the aquifers and watersheds; and to ensure the fiscal vitality of the San Lorenzo Valley Water District.

Notice is hereby given that a special meeting of the Board of Directors of the San Lorenzo Valley Water District will be held on **Wednesday, May 3, 2017 at 10:00 a.m.**, 13057 Highway 9, Boulder Creek, California

In compliance with the requirements of Title II of the American Disabilities Act of 1990, the San Lorenzo Valley Water District requests that any person in need of any type of special equipment, assistance or accommodation(s) in order to communicate at the District's Public Meeting can contact the District Secretary's Office at (831) 430-4636 a minimum of 72 hours prior to the scheduled meeting.

Agenda documents, including materials related to an item on this agenda submitted to the Board of Directors after distribution of the agenda packet, are available for public inspection and may be reviewed at the office of the District Secretary, 13060 Highway 9, Boulder Creek, CA 95006 during normal business hours. Such documents are also available on the District website at www.slvwd.com subject to staff's ability to post the documents before the meeting.

1. Convene Meeting/Roll Call

2. Additions and Deletions to Agenda:

Additions to the Agenda, if any, may only be made in accordance with California Government Code Section 54954.2 (Ralph M. Brown Act) which includes, but is not limited to, additions for which the need to take action is declared to have arisen after the agenda was posted, as determined by a two-thirds vote of the Board of Directors (or if less than two-thirds of the members are present, a unanimous vote of those members present).

3. Oral Communications:

This portion of the agenda is reserved for Oral Communications by the public for items which are not on the Agenda. Please understand that California law (The Brown Act) limits what the Board can do regarding issues raised during Oral Communication. No action or discussion may occur on issues outside of those already listed on today's agenda. Any person may address the Board of Directors at this time, on any subject that lies within the jurisdiction of the District. Normally, presentations must not exceed three (3) minutes in length, and individuals may only speak once during Oral Communications. Any Director may request that the matter be placed on a future agenda or staff may be directed to provide a brief response.

4. Written Communications:

- a. BROOM & ACACIA - L. MORGAN
- b. ROUNDUP - TERI
- c. WATER - T. MORGAN
- d. USE OF ROUNDUP - D. BELOM
- e. ROUNDUP - D. FUNDER
- f. BROOM MANAGEMENT - J. MCVAY
- g. BEST PRACTICES - B. LARGAY
- h. WATER COMPANY? -L. MORGAN
- i. SAFE WATER - S. DeANDA
- j. SCIENTIFIC AMERICAN - T. NORTON
- k. TRAININGS - J. GOMEZ
- l. SCIENTIFIC SUPPORT - K. HOLL
- m. PLAN TO CONTROL - S. SCHESSLER

5. Unfinished Business:

Members of the public will be given the opportunity to address each scheduled item prior to Board action. The Chairperson of the Board may establish a time limit for members of the public to address the Board on agenda.

- a. BROOM AND ACACIA MANAGEMENT PLAN FOR THE OLYMPIA WELLFIELD
Discussion by the Board relative to the Broom and Acacia Management Plan for the Olympia Wellfield.

6. Adjournment

Certification of Posting

I hereby certify that on April 28, 2017 I posted a copy of the foregoing agenda in the outside display case at the District Office, 13060 Highway 9, Boulder Creek, California, said time being at least 24 hours in advance of the meeting of the Board of Directors of the San Lorenzo Valley Water District (Government Code Section 54954.2).

Executed at Boulder Creek, California on April 28, 2017

Holly B. Morrison, Dist. Secretary
San Lorenzo Valley Water Dist.

Holly Morrison

From: no1alecia@cruzio.com
Sent: Monday, April 17, 2017 10:28 AM
To: Board of Directors
Cc: Brian Lee
Subject: Broom and Acacia Management Plan

PLEASE do not use the product Round-up or any other toxic chemical to help with the 'invasive' plants on SLVWD-owned property.

My best friend, also a rate payer, has a horrible sort of cancer in her blood that has been proven to be one of the causes of her type of cancer.

I cannot believe that you would deliberately and knowingly use this method to clean up weeds.

Pulling 'broom' is quite easy this year as the ground is soft. There are devices that can be used by stronger persons to remove, root and all, the broom and the rest can be pulled by even small hands. The acacia actually does not cause the problems that are commonly believed. It does not spread easily and does not cause all of the allergic reactions attributed to it and Round-up will not be effective to remove it. You have to cut it down and burn or chip up.

Round-up is TOXIC!!!!

I accidentally breathed it years ago and my lungs have been having problems ever since. Have you ever noticed that the agricultural workers wear hazmat suits when applying it to our food sources? Have you ever wondered why there are so many cases of cancer now and what caused them?????

The many many chemicals produced to remove weeds and thus applied to our food sources are most likely the primary causes of this epidemic. Cancer takes years to develop and is not detected when it starts, so people do not attribute their physical horrors to the chemicals eaten and breathed.

When you apply Round-up or any other spray, it goes into the air and down into the ground. The wind carries it far and wide, the applying person get to breath it as well as anyone nearby. The rest goes into the ground and you do know where it goes from there, ultimately into the water supply which I believe is your primary concern and duty to protect.

I will try to be at the meeting on the 20th, but my own physical difficulties my prevent it.

PLEASE think about what I have written here.

Thank you for your time in reading this. I would wish that it could be read for your rate payers before making your final decision.

Sincerely,
Lilian Morgan
rate-payer, Lompico

Holly Morrison

From: Teri <martinteri@yahoo.com>
Sent: Tuesday, April 18, 2017 3:59 PM
To: Board of Directors
Subject: Round Up

Good Afternoon -

I'm writing regarding the proposal to use Round Up to get rid of invasive plants. I write to request that this poison NOT be used in the environment.

I'm sure the Board can come up with ideas on other ways to rid invasive plants, such as initiating volunteer days to have people come out and remove the plants.

I hope my message is not lost in the ether, or ignored.

Best regards,
Teri in Felton

Holly Morrison

From: Morgan <jasminewins@yahoo.com>
Sent: Monday, April 17, 2017 11:29 PM
To: Board of Directors
Subject: Water

Please do not use Round up near our watershed period. Tonya Morgan

Holly Morrison

From: DENNIS BELOM <dennisbelom@yahoo.com>
Sent: Wednesday, April 19, 2017 8:39 AM
To: Rick Rogers
Cc: Holly Morrison
Subject: Use of Glyphosate/Roundup

To R Rogers and the SLVWD Board:

I have read a letter to the editor in the local paper that states that the SLVWD is considering week abatement in the watershed by using glyphosate. I will not be able to attend the meeting this Thurs, the 20th but I must state that this would be a tremendous error from a health standpoint for the community. I am including a recent article on the decision of California's environmental agency to consider this a cancer causing agent.

Glyphosate to be Listed under Proposition 65 as Known to the State to Cause Cancer

The Office of Environmental Health Hazard Assessment (OEHHA) has determined that glyphosate (CAS No. 1071-83-6) will be added to the list of chemicals known to the state to cause cancer for purposes of Proposition 65[1]. The effective date of this listing will be determined following a decision from the Court of Appeal regarding a request for a stay in the pending case Monsanto v OEHHA.[2] A separate Notice will be published, along with an updated Proposition 65 list, when the chemical is added to the list.

Health and Safety Code section 25249.8(a) incorporates California Labor Code section 6382(b)(1) into Proposition 65. Regulations describing the process for listing chemicals via the Labor Code are set out in Title 27, Cal. Code of Regs., section 25904. The law requires that certain substances identified by the International Agency for Research on Cancer (IARC) be listed as known to cause cancer under Proposition 65. Labor Code section 6382(b)(1) refers to substances identified as human or animal carcinogens by IARC. An explanation of the carcinogenicity classifications used by IARC and the processes used by IARC to develop these classifications may be found in the IARC Preamble[3], which is also available at the following URL: <http://monographs.iarc.fr/ENG/Preamble/CurrentPreamble.pdf> (link is external).

The basis for the listing of glyphosate was described in a public notice published in the September 4, 2015, issue of the California Regulatory Notice Register (Register 2015, No. 36-Z). The title of the notice was "Notice of Intent to List Chemicals by the Labor Code Mechanism: Tetrachlorvinphos, Parathion, Malathion, and Glyphosate." The publication of the notice initiated a public comment period. OEHHA previously reviewed and responded to comments on the listing of tetrachlorvinphos, parathion and malathion. A public notice of the listings of these compounds was published in the May 20, 2016 issue of the California Regulatory Notice Register (Register 2016, No. 21-Z); and responses to the comments received were posted on OEHHA's website on May 20, 2016[4].

OEHHA received 9,183 comments relevant to glyphosate and OEHHA's responses are posted with the Notice of Intent to List and are available on OEHHA's website.

In addition, the intestinal flora of every person exposed to Glyphosate is at risk since the mechanism of action is to affect the Shikimate pathway that is a part of the normal intestinal flora that we depend on for our health. As little as 1ppm will kill bacteria and as little as 0.5 ppm will cause endocrine disruption. Applying Glyphosate to the watershed will result in contamination of our water supply which will potentially create a serious health hazard.

In light of the above, I strongly object to the use of Glyphosate products in or near any of our watershed. I do not doubt that it will be an officially banned substance in the near future. The risk of use is too great.

Sincerely,
Dennis Belom MD

Holly Morrison

From: SunWizardCreations <sunwizardcreations@sbcglobal.net>
Sent: Tuesday, April 18, 2017 5:53 PM
To: Board of Directors
Subject: Roundup

We are appalled by the notion that our board of directors would actually seriously consider the use of such a toxic chemical that will wind up in our drinking water. Are you people nuts? We didn't elect you to poison our environment. Its bad enough that Trump is trying to eliminate the EPA. Why not just buy or rent some goats from a local farm? We'd rather see the so called invasive weeds live than put our health at risk. What problem do the weeds present, anyway? Surely there are better, more natural solutions than what has been proposed. We're sure that you all know how to do research on the web.

Dharma Funder
Errol Specter

Holly Morrison

From: JOJOBNH@aol.com
Sent: Wednesday, April 19, 2017 12:36 PM
To: Board of Directors
Subject: Broom and Acacia Management Plan

To Whom It May Concern-

Using Round Up or any other pesticide, let alone a Monsanto product, to control weeds in a watershed area, is the most ridiculous, and ignorant proposal, in these days and times, imaginable. Monsanto is to agriculture what the tobacco companies were to lung health !!

The overwhelming information available, on the hazardous effects of Round Up, to the ground, water, animals, and environment is something that clearly needs to be researched by those of you considering this.

Please pursue a less toxic, more environmental friendly method of weed abatement

Sincerely
Joanna McVay
Ben Lomond Ca

Holly Morrison

From: Bryan Largay <Bryan.largay@landtrustsantacruz.org>
Sent: Tuesday, April 25, 2017 2:31 PM
To: Board of Directors
Subject: Best management practices and staff expertise

Dear Trustees of the San Lorenzo Valley Water District,

This note is in regard to the proposed management of invasive plants on water district property. The sandhills in question are full of precious rare and endangered species, some of which have just a few hundred acres of habitat anywhere in the world. They will be lost without good stewardship.

I sent an earlier version of this letter, unsolicited, to staff. I received the guidance that it should be sent directly to the board. This draft is slightly revised, though unchanged in core content.

As a lifelong environmentalist whose career is dedicated to watershed restoration, it deeply saddens me to see the divisiveness in our community between two groups of people who all love nature. It is important that we appreciate both the passion and the professionalism that each group brings to the table. It is essential that we show each other respect. It is appropriate that we show each other kindness.

I have a graduate degree in hydrologic sciences from UC Davis, where I studied toxicology, environmental organic chemistry, water quality, and soil science. My graduate work investigated the interaction between runoff pollution, wetlands and a sandy aquifer. I have dedicated my career to the nature of the Monterey Bay region, working to restore wetlands and watersheds at the local Resource Conservation Districts, the Elkhorn Slough National Estuarine Research Reserve, and the Land Trust of Santa Cruz County.

I strongly urge the SLVWD Board to shield District staff from political pressure from the concerned and caring environmentalists in our community. I urge the Board to direct staff to determine the most efficient and least hazardous integrated pest management approach to conserving biodiversity on the Olympia Wellfield. This is a decision to be made by technical staff, not politics.

Further, herbicides are a standard tool used around the world by conservation organizations and agencies responsible for preserving biodiversity for over 30 years. Consistent with the California Invasive Plan Council's Policy on Integrated Weed Management, District staff will evaluate (or have already evaluated) the risk to non-target organisms, water quality, air quality, soil quality, worker safety and the health and safety of watershed residents. After such evaluation, it is likely that they will conclude (or have already concluded) that glyphosate, triclopyr or other herbicides are an appropriate tool to include in an integrated pest management approach to protect biodiversity. Both of these examples exhibit low toxicity to organisms other than plants, and the proposed approach of painting on the compound greatly limits impacts to non-target plants.

Lastly, as someone highly skeptical of the safety of crops genetically engineered to produce their own insecticides, I encourage the District to source glyphosate used in management from manufacturers other than Monsanto.

Kind regards,
Bryan Largay

Bryan Largay

Holly Morrison

From: no1alecia@cruzio.com
Sent: Wednesday, April 26, 2017 8:31 PM
To: Board of Directors
Cc: no1alecia@cruzio.com; Brian Lee
Subject: Water Company Property?
Attachments: untitled-[2]

Importance: High

Is this the area that you are proposing to eliminate the broom from?? and keep our drinking water chemical-free and clean??

This happened on Wed. 4/26/2017!

Please let me know.

Thank you,

Lilian Morgan

----- Original Message -----

Subject: Warning!

From: "Nextdoor Lompico Canyon" <reply@u1423722.wl.sendgrid.net> Date:

Wed, 26 April, 2017 3:08 pm

To: no1alecia@cruzio.com

sunshine nelson from Lompico Canyon said:

Warning!

To those of you who walk your dogs or yourself along the tracks by Olympia Watershed, today when I was out with my dogs Agri-Chem was spraying god knows what. They wouldn't tell me what it was, so I suspect it was NOT Chanel #5! Might be a good idea to stay away from this area for awhile!

Shared Apr 26 in General to 36 neighborhoods General

To view, reply or thank sunshine, visit:

https://nextdoor.com/news_feed/?post=49132427&s=pe?lc=11&ct=bSmdrQw5DQtiBwRTJ6sQaY4RgIyaWlckQrkfj6L-_vCfF2PYNq5dNfkoSMDBwCd-

You can also reply by email or use Nextdoor Mobile.

iPhone:

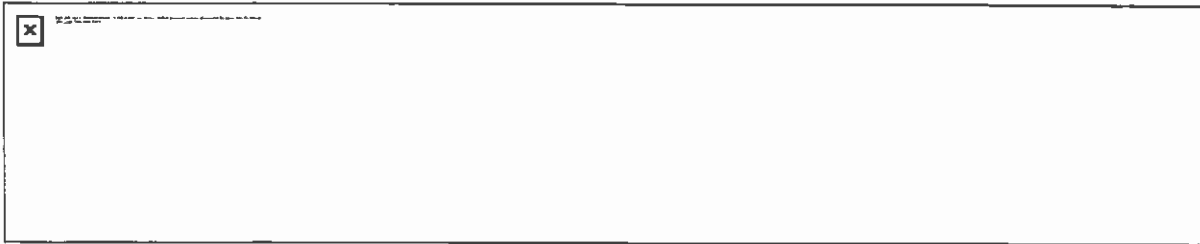
https://nextdoor.com/download/ios/?lc=2&ct=bSmdrQw5DQtiBwRTJ6sQaY4RgIyaWlckQrkfj6L-_vCfF2PYNq5dNfkoSMDBwCd-

Android:

https://nextdoor.com/download/android/?lc=3&ct=bSmdrQw5DQtiBwRTJ6sQaY4RgIyaWlckQrkfj6L-_vCfF2PYNq5dNfkoSMDBwCd-

Holly Morrison

From: Susana De Anda & Laurel Firestone, Co-Executive Directors
<info@communitywatercenter.org>
Sent: Monday, April 24, 2017 10:23 AM
To: Board of Directors
Subject: Everyone deserves safe drinking water



Dear Randall,

Everyone deserves safe and affordable drinking water.

But each year, a million Californians—well more than the population of Flint, Michigan—are impacted by unsafe drinking water. [1]

California has always been a leader, and we have high standards in almost every area of public life. **It's time we caught up on drinking water.**

Tell the state legislature to support safe and affordable drinking water for all Californians.

Children are especially at risk. Drinking water with contaminants like arsenic and nitrate can cause rashes, miscarriages, and cancer. Some schools are having to spend their limited school budget on bottled water, just so that students can get an education without getting sick.

The lack of state funding for water system operation and maintenance expenses has left hundreds of small, low-income communities facing a **terrible decision: raise rates to unaffordable levels, or leave the water untreated and unsafe?**

Holly Morrison

From: Toni Norton <lompicotoni@gmail.com>
Sent: Monday, April 24, 2017 4:32 PM
To: Board of Directors
Subject: Scientific American article regarding Round-up

Greetings to the Environmental Committee

I thought you'd be interested in reading this article regarding Round-up. As I'm sure you're aware, Scientific American is extremely well known, published in many languages and very well respected in the science community.

<https://www.scientificamerican.com/article/weed-whacking-herbicide-p/>

Thanks.

Sincerely,

Toni Norton

Holly Morrison

From: Jennifer Gómez <jagomez173@gmail.com>
Sent: Thursday, April 27, 2017 9:42 AM
To: Board of Directors
Subject: Fwd: Volunteer weed management trainings in the Bay Area

Good morning,

I regret I could not be at the special meeting yesterday in Boulder Creek regarding the broom management plan. I sincerely hope that the SLVWD's plan to remove french broom will not be delayed or derailed due to the recent negative press regarding the use of herbicide. I would like to commend you all on your commitment to controlling invasive species within and adjacent to the fragile and unique sandhill communities and to the endangered and endemic species that are found there. We must all be good stewards of these biological resources so that they will continue to exist for future generations.

I also regret the irresponsible and incomplete reporting in the Press Banner on this issue, and particularly the letter that was written by Rick Moran, who sits on your environmental committee. I urge you to replace him as soon as possible with a citizen member who has some level of professional environmental credentials. Failing this, please send him to the attached training opportunity. It is free and should be of use to him.

Respectfully,
Jenni Gomez

----- Forwarded message -----

From: California Invasive Plant Council <info@cal-ipc.org>
Date: Thu, Apr 27, 2017 at 9:01 AM
Subject: Volunteer weed management trainings in the Bay Area
To: jagomez173@gmail.com

Having trouble viewing this email? [Click here](#)



East Bay

June 3, Oakland

North Bay

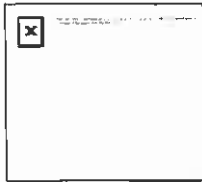
June 17, Mill Valley

South Bay

June 24, San Jose

Peninsula

July 15, Portola Valley



Weed Management Trainings for Volunteers

[Click here to register](#)

The **California Invasive Plant Council** is a nonprofit organization working to protect the state's environment and economy from invasive plants. Cal-IPC coordinates regional conservation, trains land stewards, and advocates for science-based public policy. More at www.cal-ipc.org.

Cal-IPC is partnering with agencies and watershed groups to hold four weed management trainings for volunteer stewards around the San Francisco Bay Area this summer. Local experts will provide **practical information** on the biology and management of invasive plants, with discussion groups to explore specifics on topics of interest.

In the afternoons, join an **optional field trip** to a local restoration site, or participate in a workshop on using your smart phone to map weed populations using Calflora Observer.

Volunteers are a critical component of the stewardship workforce. Our goal is not only to provide training, but also to help build a network that strengthens our collective efforts. **Please help spread the word!**

The events are free of charge, but we ask that you **register online**. Thanks, we look forward to seeing you at the trainings!

California Invasive Plant Council, 1442-A Walnut St. #462, Berkeley, CA 94709

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Sent by info@cal-ipc.org in collaboration with



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Holly Morrison

From: Karen Holl <karen.d.holl@gmail.com>
Sent: Thursday, April 27, 2017 8:04 PM
To: Board of Directors
Subject: scientific support for SLVWD Olympia Wellfield site management plan

Dear San Lorenzo Valley Water District Board of Directors,

I am writing in support of the San Lorenzo Valley Water District Plan to control Silver Wattle (*Acacia dealbata*), French Broom (*Genista monspessulana*), and Portuguese Broom (*Cytisus striatus*) at the Olympia Wellfield site. As a restoration ecologist with over 20 years of experience studying and teaching about restoring coastal California ecosystems I can attest that the methods proposed in the plan constitute the best management practices to balance the need to remove these invasive woody species with conserving the sensitive Santa Cruz sandhills habitat.

The Santa Cruz sandhills are a unique plant community restricted to the Zayante sand soils of the Santa Cruz mountains. They host a number of rare species of both plants and animals that only live in this particular habitat. Two of these insect species Mount Hermon June Beetle (*Polyphylla barbata*) and Zayante Band-Winged Grasshopper (*Trimerotropis infantilis*) are protected by the federal endangered species act. These species are threatened due to the conversion of sandhills for housing and sand mining, as well as the invasive plant species such as broom and acacia.

Removing these invasive woody species is a challenge to do without further damaging the habitat.

The SLVWD plan to remove broom and acacia provides a well-justified mix of approaches that recognizes the constraints of the ecosystem. Small invasive woody species will be removed using manual methods in order to minimize herbicide use. Large plants will be controlled by cutting the stems and applying glyphosate directly to the outside of the stems by individuals with a Qualified Pesticide Applicator License and Personal Protective Equipment. This method is widely used by land managers to successfully control broom and acacia while minimizing herbicide use (Holloran et al. 2004). It is mandatory to apply some herbicide to prevent resprouting of these woody species and painting a 50% solution on the stems means that a minimal amount is used and there is no contact with non-target organisms. Moreover, there are restrictions in the plan that glyphosate will not be applied if rain is forecast within 24 hours so that there is plenty of time for the herbicide to be absorbed by the plants. The areas have all been mapped in detail to select the method that minimizes herbicide use in a given location that is still effective in controlling broom or acacia.

Some people opposed to the project have suggested that the 19,000 large stems could be removed manually. This is neither feasible nor legally permissible. Because of the federal protection of the endangered insect species, the US Fish and Wildlife Service will not allow physical removal in these habitats which would cause considerable soil disturbance which would negatively affect the June Beetle larvae, as well as the native plant

seed bank. Moreover, it would be extremely challenging and cause considerable damage to this habitat to manually remove the large stems.

Concerns have been raised about the use of glyphosate since it was recently listed as Group 2a carcinogen in California, which means it is probably carcinogenic to humans. In evaluating the effect of chemicals, however, it is important to consider the concentration and extent of exposure. Many things to which most humans are exposed on a regular basis, such as red meat, soot, and very hot beverages are listed as List 2a probable carcinogens (www.cancer.org/cancer/cancer-causes/general-info/known-and-probable-human-carcinogens.html). By applying a small amount of glyphosate directly to the stems the SLVWD plan aims to minimize any potential impacts to humans and other non-target organisms.

As an expert in restoration ecology, I consider this plan to take a judicious approach to the need to protect the sensitive sandhills habitat and the humans who live in the San Lorenzo Valley.

Karen Holl, Ph.D.

Felton, CA

holl-lab.com



April 25, 2017

San Lorenzo Valley Water District
13060 Highway 9
Boulder Creek, CA 95006
ATTN: Jen Michelsen, Environmental Programs Manager
Environmental Committee
Board of Directors

RE: PLAN TO CONTROL INVASIVE BROOMS AND ACACIA AT OLYMPIA
WELLFIELD

Dear Environmental Committee, and Members of the Board,

During preparation of the plan to control invasive species at the Olympia Wellfield, I consulted a couple of times with the United States Fish & Wildlife Service (USFWS). Initially, the plan called for pulling plants as a major management tool. In response to comments from USFWS, the next draft plan followed their guidance. There was to be: a) no soil disturbance deeper than 6", and b) no herbicide application when rain is forecast within 24 hours.

Recently the USFWS changed the requirement, and soil disturbance is now limited to a depth of 1 to 2". This places several potential management tools off limits.

TOOLS TO MANAGE MATURE PLANTS

- Hand pulling. Experienced broom pullers know that uprooting plants disturbs more than shallow soil. A knee-high plant that has not yet flowered typically has a root that is longer than the above-ground portion of the plant.
- Goats. Can goats be trained to avoid pulling up roots or eating rare plants? What about soil and water inputs from manure and urine? How would goats be protected from predators and/or poachers?
- Steam. This idea has potential merit. Topics that need to be addressed are cost, logistics, and whether the heat from steam treatment would penetrate more than 1 to 2" and harm larvae of the Mt. Hermon June Beetle (MHJB).
- Cutting below ground. This can be done effectively within the surface 6" of the soil, but not within a limitation of 1-2". An excavation of a few inches is needed to create access for hand tools to cut the tap root and the main side roots. See Figure 3 of the draft plan.
- Cut stump treatment. This involves cutting plants and then applying glyphosate to the cut surface of the **cambium only**. Glyphosate was selected over Triclopyr 4e because Triclopyr is known to migrate into groundwater. I recognize the special circumstances of the site being a wellfield that supplies water to District customers. It may not be clear to some that after a one-

time cut-stump treatment removes adult plants in a given square foot or meter, all first-year seedlings that appear can be managed in a timely manner by shallow hoeing or thermal weeding, and no further chemical treatment is called for within that footprint area. I estimate that the amount of glyphosate that would be needed to initially treat plants is 0.2 to 0.5 ml per plant, depending on the diameter of the cut trunk – **divided by two** for a 50% solution.

TOOLS TO MANAGE SMALL SEEDLINGS THAT EMERGE AFTER THE MATURE PLANTS ARE GONE

- Hoeing. Hoeing is effective at 6” or less, and with care can even be limited to 2” or less, so there is no problem with hoeing small first-year seedlings if done in a timely manner,
- Thermal weeding. Dense carpets of small seedlings can be wilted by a quick pass with controlled heat.

The most recent version of the plan is still in the draft stage. It was prepared when the USFWS allowed soil disturbance to a maximum depth of 6”, and is now outdated.

In light of the current restrictions on tools to control the invasive woody plants, I respectfully withdraw my participation with the Broom/Acacia Management Plan.

I live on the edge of the Sandhills and have been professionally involved in their ecology and restoration for over 25 years. I put many more hours into the first two drafts of this plan than were anticipated.

I have neither the time nor the thick skin it would take to be an apologist for Monsanto in a highly charged atmosphere. I totally disapprove of many of Monsanto’s business practices. I believe in only tightly limited use of herbicide as a tool of last resort for vegetation management, and only as a supplement to non-chemical control.

I hope others can work together and create a legal and practical approach to controlling broom and acacia at the Wellfield. It will be an ecological tragedy if the District’s unique Sandhills & Sand Parkland habitat and rare plants are doomed to be destroyed by invasive species because of administrative restrictions.

Sincerely,

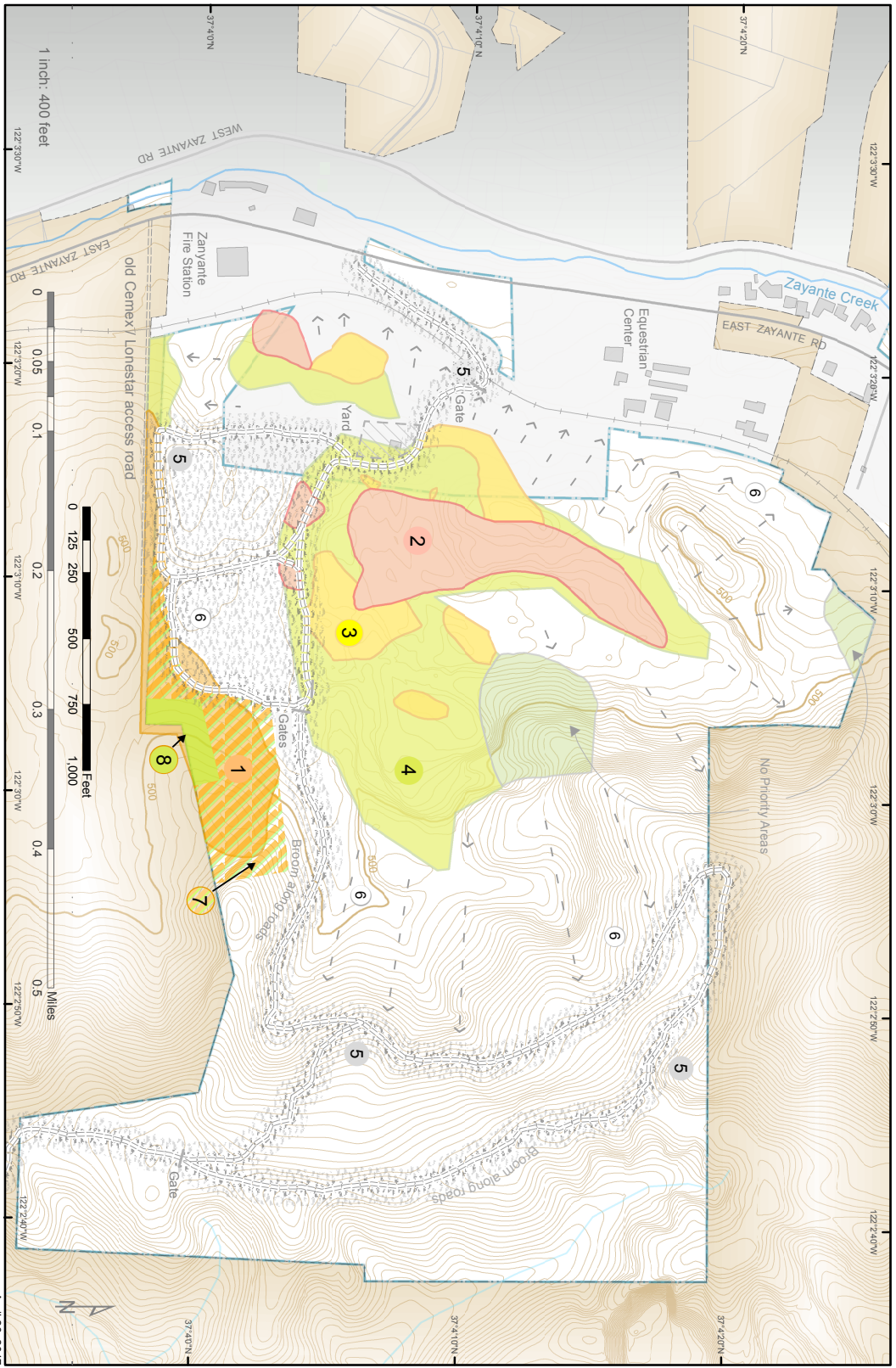


Suzanne Schettler
Principal, Greening Associates



Priority Areas For Controlling Acacias And Brooms

Olympia Watershed Property - San Lorenzo Valley Water District



April 26, 2017

Density of Specialty Plants

- 1 Highest
- 2 Second Highest
- 3 Third Highest
- 4 Other Sand and Parkland Sites
- 5 Roadsides
- 6 Expansion Areas

Alternative Mitigation Options

- 7 Proposed New Habitat Set Aside
- 8 Mayer Easement

Location

Red Shaded Show Sand Parkland Sites

Brown Shaded Areas Outside SLVWD Boundary

Un-Shaded Areas Show Parcels of SLVWD Ownership

**PLAN TO CONTROL INVASIVE BROOMS AND ACACIA
AT THE
OLYMPIA WELLFIELD
SAN LORENZO VALLEY WATER DISTRICT**

1. INTRODUCTION AND BACKGROUND

The Olympia Wellfield comprises 180 acres, much of which was mined for gravel and fine quality sand for about 30 years starting in 1937. The quarry operation closed before the Surface Mining and Reclamation Act took effect in 1976. No reclamation was required or performed, although several species of non-native conifers were planted to improve the appearance of denuded areas. For another three decades, there was no vegetation management of the site and during this time invasive non-native species colonized large portions of the property.

Although it was much degraded and fragmented by mining, and damaged by the spread of invasive woody plants, the site still retained a unique assemblage of plant species – ranging from common species to rare/endangered species, as well as local endemic forms of relatively widespread plants. This unique assemblage has been termed Sand Specialty plants (R. Morgan 1983). Of the 83 Sand Specialty plants identified by Morgan, 56 occur on the Wellfield property as mapped in 2011 (S. Schettler 2011).

The San Lorenzo Valley Water District (District) began to remove Silver Wattle (*Acacia dealbata*) trees in 2000 in an effort to restore habitat for the Sand Specialty plants. Most of the Sand Specialty plants are relatively small herbaceous plants that require full sun and are easily shaded out by invasive trees and shrubs. Tens of thousands of Silver Wattle, French Broom (*Genista monspessulana*), and Portuguese Broom (*Cytisus striatus*) plants were removed during the decade that followed, restoring sunny conditions to the lower-growing native Sandhills plants. A hiatus in control resulted in stands of the two Broom species becoming re-established, as well as scattered young Acacia plants.

The current status of the Brooms is that the large majority are mature and are producing seed; perhaps 90% of them are now too large to be eliminated by uprooting them. French Broom is widespread at the Wellfield; Portuguese Broom is less so. Young Acacias are sparsely but widely scattered.

The site also supports two federally Endangered animals, Mount Hermon June Beetle (*Polyphylla barbata*) and Zayante Band-Winged Grasshopper (*Trimerotropis infantilis*). Animals receive stronger protection under the federal Endangered Species Act than plants. “Take” of a listed animal is prohibited unless a Habitat Conservation Plan (HCP) has been approved and an Incidental Take permit has been issued consistent with Section 10(a)(1)(B) of the Endangered Species Act. “Take” is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. The permit also must prevent harm to breeding, feeding, or sheltering by the covered species. **This plan describes vegetation control methods that will avoid take of the listed insects and thus avoid the need for a federal permit.**

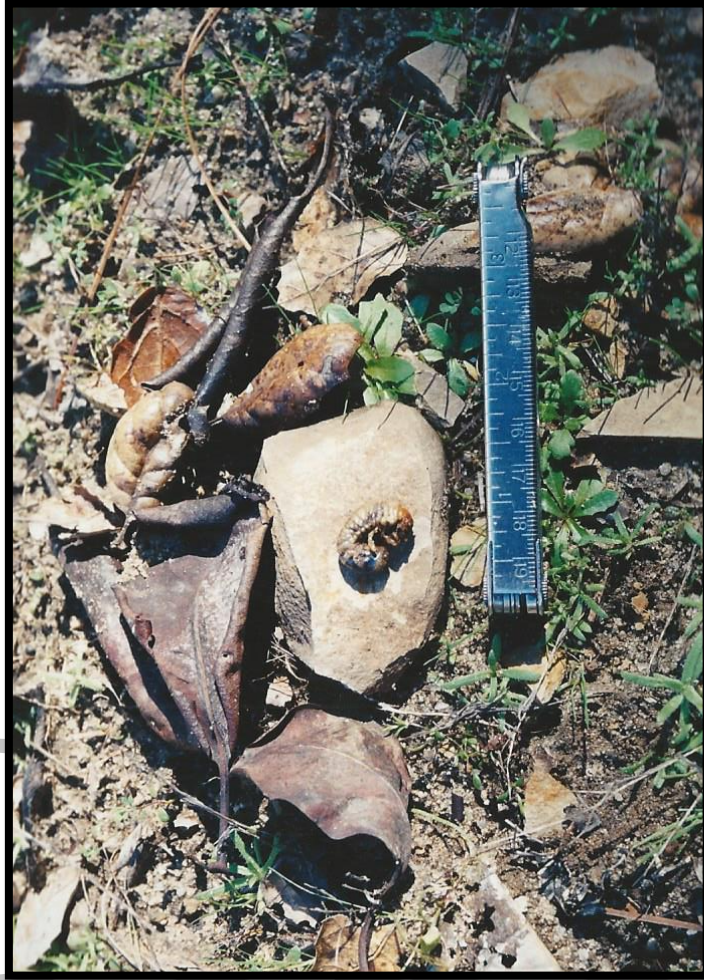


FIGURE 1. *Polyphylla* larvae are large, as grubs go. This one is Mt. Hermon June Beetle or a sibling species. Photo by S. Schettler.



FIGURE 2. The Zayante Band-winged Grasshopper is well camouflaged against the Zayante sand. It is small – males are about 1/2" long, females closer to an inch. The lower hind legs (not visible here) are blue-gray. Photo by S. Schettler.

2. CONTROL METHODS

Four vegetation treatments will be used to control Brooms and Acacias at the Wellfield : pulling or hoeing, cutting below ground, cut stump treatment, and thermal weeding. These methods are customized to avoid harming ground-dwelling insects.

2.1. SMALL PLANTS: PULLING OR HOEING

The simplest way to eliminate unwanted small plants is to either pull them by hand or to hoe them. Uprooting is particularly suitable for French Broom, which is typically shallow-rooted. Because of the high temperature of the Sandhills substrate, larvae of the June Beetle are presumed to occur only at depths greater than 6” (C. Mitcham [USFWS] pers. comm. 2016), where the sand is cool compared to the surface. In order to avoid harming larvae of the June Beetle, uprooting will be limited to plants with roots less than 6” deep. Hoeing will not disturb soil deeper than 6”.

Specialized weed-removal tools such as the Weed Wrench or the Extractigator® are unlikely to be used at the Wellfield because they are designed for plants with roots deeper than 6”.

2.2. CUTTING BELOW GROUND

Broom plants up to about 1” in diameter at the base can be cut below the ground surface. A bowl 2-5” deep is excavated around the base of the plant, exposing the root. A hand mattock is useful for this first stage. Then the shallower roots are cut; hand clippers can do this part of the job. Levering the stem by hand may be needed to expose the first few inches of the taproot while the upper part of the root system is cut with loppers. Cutting tools must be kept away from the sand surface to prevent dulling them. To complete the process, loose sand is filled back in over the remainder of the root system. Deprived of light and their photosynthetic green stems, brooms do not re-sprout as they do when cut above the ground surface.

Figure 3 shows French Broom plants treated by cutting below ground. A good worker can permanently eliminate 50 to 60 plants per hour with this method.

Some recalcitrant plants may be “frilled” within the upper part of the taproot. Downward cuts are made all around the upper part of the taproot to cut off the flow of moisture and nutrients between the root and the photosynthetic parts of the plant (Figure 4).



FIGURE 3. French Broom plants that have been cut below ground.



FIGURE 4. French Broom taproots that have been "frilled" to cut off circulation between the roots and the photosynthetic green stems.

2.3. CUT AND APPLY SYSTEMIC HERBICIDE – CUT STUMP METHOD

This technique is applicable for plants of the invasive woody species addressed in this plan whose roots are deeper than 6 inches, and is highly effective. The plant is cut a short distance above the base of the stem or trunk, so that the cutting tool is not dulled by working in sand. Immediately – within one minute – a 50% solution of glyphosate is applied to the cambium, the living tissue just inside the bark, at the edge of the cut stump.

Use of glyphosate is controversial and every effort is being made to avoid and minimize it at the Wellfield. Some of its breakdown products may be moderately harmful while others are modestly beneficial. The cut stump method will only be appropriate for the initial treatment in a given area, where it is used for the removal of older plants too large and too deep-rooted to be addressed by mechanical methods (and only in the upper 6” of the soil profile). After the initial control, no chemical treatments will be needed. Glyphosate will be used within an Integrated Pest Management (IPM) policy. Over time, when other herbicides that are equally effective but less potentially harmful are developed, they will be adopted into the control program for invasive Brooms and Acacia at the Olympia Wellfield.

Triclopyr 4e is an alternative systemic herbicide that will not be used at the Wellfield because it is known to migrate into ground water.



FIGURE 5. Larger plants require the cut stump treatment. The stump of this Portuguese Broom is almost a foot across.

Persons who apply herbicides must hold a Qualified Pesticide (QPA) Applicator License and use appropriate Personal Protective Equipment (PPE). The licensee can work side by side with non-licensed personnel who cut and stack the vegetation. The California Department of Pesticide Regulation maintains a list of QPA Licensees.

Cut stump treatments will not be conducted when rain is forecast within the next 24 hours.

2.4. THERMAL WEEDING

After a stand of French Broom is removed, abundant small seedlings typically appear from the seed bank, too dense and numerous to be managed by controlling individual plants. These young seedlings respond well to thermal weeding, sometimes referred to as “flaming”. Thermal weeding has long been used for weed control in agriculture.

A propane torch is passed over young French broom seedlings up to 20 cm in height. The heat does not cause the seedling to ignite but within a day the seedling is wilted and dead. This treatment is effective on a wide variety of unwanted plant species. There is an informative short video describing thermal weeding at https://youtu.be/_2BLHhCWgOE (Flame Cultivation for Weed Control). Additional materials concerning thermal weeding are at <https://ag.umass.edu/fact-sheets/flame-cultivation-for-weed-control>.

A common misconception is that flame equipment should “burn” or consume the weeds with fire during treatment. Thermal weed control is based on flash heating to rupture cell membranes within the weed, thus shutting down the plant’s capacity for photosynthesis. When applied correctly to young, vigorous green weeds with minimal dead material there should be very little, if any, smoke from the treated area (Smith, K. Western Farm Press. <http://westernfarmpress.com/another-look-thermal-technology-weed-control>).

As of 2016, there are currently no carpets of young Broom seedlings at the Wellfield. Thermal weeding may not be applicable but will be a backup control method if large numbers of Broom seedlings appear in the future after stands of adult Brooms have been removed. Modest numbers of seedlings may be controlled by hoeing.

Because of the obvious hazard of working with fire, the timing of flaming is critical. It is performed only when vegetation at the site is too wet to carry a fire; during a light rain is ideal. The aim is not to actually burn the seedlings, but to heat them enough to break their cell walls. The torch passes briefly over any given point, limiting impact to ground-dwelling organisms. No chemicals contaminate the site.

The Zayante Fire Department is adjacent to the Wellfield. As a courtesy and a safety measure, fire personnel should be contacted in person or by phone (831-335-5100) when flaming is to be carried out.

3. SPECIAL CASES

3.1 NO SOIL DISTURBANCE DEEPER THAN 6”

In order not to harm larvae of Mt. Hermon June Beetle (Figure 1), all soil disturbance will be limited to a maximum depth of 6 inches.

3.2 ZAYANTE BAND-WINGED GRASSHOPPER

Adult grasshoppers are mobile, although the Zayante Band-winged Grasshopper (ZBWG) also relies on camouflage to avoid danger (Figure 2). It visually blends in with the sand, and does not have particularly colorful flight wings as some grasshoppers do. Besides its small size compared to other grasshoppers, its most distinguishing trait is the crepitating sound when it flies, resembling the sound of a bug-zapper. The USFWS recommends that a) informal surveys for ZBWG be conducted concurrent with vegetation treatment and b) if a ZBWG is observed, work that may disturb the species would not take place (C. Mitcham [USFWS] pers. comm. 2016).

3.3 PORTUGUESE BROOM

Portuguese Broom plants produce prolific branches right at the soil level, which limits access for cutting tools. The lower branches need to be individually cut away in order to get at the main plant. Its roots also splay out in all directions immediately belowground. While the cut stump treatment is effective, it is sometimes simpler to remove modest-sized Portuguese Broom by cutting apart the root system one root at a time. A hand mattock is employed to expose roots to a maximum depth of 6" (so as not to harm June Beetle larvae) and then the individual roots are cut to release the upper portion of the plant for removal from the site.

3.4 ACACIA

The lateral roots of *Acacia dealbata* often produce new sprouts, even after the main trunk has been killed by a cut-stump treatment. The new shoots may be immediately adjacent to the stump or some distance away. A young plant may be either a seedling or a root sprout. To test, give the plant a few short sharp tugs. If it starts to come out, continue pulling to uproot it. If it doesn't start to come out, clear the duff and soil away from the base of the plant. Then cut the plant ¼" above the soil, maintaining a sharp edge on the cutting tool by keeping it free of ground contact, and apply 50% glyphosate to the cut surface.

3.5 NO HERBICIDE TREATMENT BEFORE RAIN

Cut stump treatments will not be conducted when rain is forecast within the next 24 hours.

4. TIMING OF WEED CONTROL

With the exception of thermal weeding, control methods may be implemented at any season. The best time of year to control mature Broom plants is March and April, when they are flowering and easy to spot but for the most part have not yet produced seed for the current year. Glyphosate can be applied in any season but may be most effective in the fall when the plant's reserves are depleted by the dry summer.

During late spring and summer it can become dangerously hot for personnel to work in the Sandhills, risking heat exhaustion or heat stroke. Radiant heat from the sun is reflected up from the white sand, and the heat of the sand itself can de-laminate boot soles (S. Schettler, pers. obs.).

There is a mildly effective natural ally in the campaign to eliminate French Broom. The larvae of Genista Broom Moth (*Uresiphita reversalis*) defoliate random plants, sometimes causing death.



FIGURE 6. Caterpillar (larva) of Genista Broom Moth with chewed foliage. Photo by C. Baughman.



FIGURE 7. French Broom plants killed by Genista Broom Moth caterpillars and/or gophers at the Wellfield

5. PRIORITY AREAS FOR CONTROLLING ACACIAS AND BROOMS GIS INPUT NEEDED HERE RE CONSERVATION EASEMENTS AND ROADS

The Sand Specialty Species were mapped in 2011 under an Educational Grant from the San Lorenzo Valley Water District to fill a data gap in developing the management plan for the Olympia Wellfield. That mapping forms the basis for prioritizing the locations to control Acacias and Brooms. See Figure 8. The priority ratings are based on several factors:

- Sites with greatest species richness of Sand Specialty plants
- Highest quality degraded sites, including locations of unique species occurrences
- Moderate quality degraded sites
- Remainder of areas mapped as Sand Parkland or Sand Parkland (Degraded)
- Areas along service roads
- Expansion areas outside the areas mapped as Sand Parkland or Sand Parkland (Degraded)
- Two mapped areas are designated as Priority 0. See the last paragraph of Section 5.7 below for discussion of these.

5.1. PRIORITY ZONE 1. SOUTHERN EDGE OF PROPERTY GIS INPUT NEEDED HERE RE SIZE OF EACH PRIORITY ZONE

The areas containing the highest species richness of Sand Specialty plant species (as many as 33 species per site, median 19 species) are located where there has been least disturbance of the ground in the past. These areas also have the lightest populations of invasive species. These are

the areas where it is ecologically most important, and least costly, to control Acacia and Brooms. The Priority 1 zone includes two habitat set-asides, the _____ acre Mayer easement that was established in _____ as mitigation for residential development; and 6.7 acres set aside as mitigation for replacement of the Probation Tank. Both of these impact sites are located in Sandhills habitat adjacent to the closed Kaiser Quarry. The Probation Tank set-aside has its own management plan and endowment, and some of the Probation Tank funds are planned to be applied to the overall control of Brooms and Acacia at the Wellfield. Because there have been various interpretations of where the southern property line actually lies and it has never been surveyed to an engineering standard, Priority Zone 1 includes locations north of the old Cemex/Lonestar access road parallel to the District's southern property line. This alignment does not match the existing fence lines but is readily identified in the field. The old road itself can function as a buffer between Cemex vegetation management and District management. Permission has been requested from Cemex to work on this far northern edge of their property and the request will be followed up.

5.2. PRIORITY ZONE 2. HIGHEST QUALITY DEGRADED SITES

These are areas containing 12 or more Sand Specialty plant species. These also include unique locations of species that are not found elsewhere on the Wellfield property.

5.3. PRIORITY ZONE 3. MODERATE QUALITY DEGRADED SITES

These areas contain 11 or fewer Sand Specialty plant species occurring in dense clusters.

5.4. PRIORITY ZONE 4. OTHER SAND PARKLAND SITES

Priority Zone 4 comprises the rest of the areas mapped as Sand Parkland or Sand Parkland (Degraded).

5.5. PRIORITY ZONE 5. ROADSIDES

This zone comprises all areas within 30 feet of service roads and other equipment access routes. It includes gated routes at lower elevations that formerly provided vehicle access and could potentially be used again in the future. There are two rationales for including roadsides as a priority: seeds of Brooms and Acacias are readily transported by tires of vehicles that routinely use the service roads; and the routes that are currently unused and gated will provide access for control work and for disposition of the plants removed. Re-opening these former access routes may require light blading, which will be limited to maximum 6" depth in order not to harm larvae of the Mt. Hermon June Beetle.

NOTES: Where a vehicle route passes through an area designated Priority Zone 1, 2, 3, or 4, that segment of the roadsides will be cleared of Brooms and Acacias at the same time as the rest of the adjacent Priority Zone. Also, the mapping of the roadsides is schematic rather than detailed; Brooms and Acacias are not uniformly present in some portions of the locations shown.

5.6. PRIORITY ZONE 6. EXPANSION AREAS

Over time, control of invasive Brooms and Acacias will be gradually expanded outward beyond Priority Zones 1 - 5. The increments will be planned in such a way that each increment can regularly receive follow-up treatment on an annual basis. Regular follow-up control is at least as important as initial removal, but on a per-acre basis is far less expensive than the initial removal or re-starting after a hiatus in control work. As with Priority Zone 5 (Roadsides) the mapping of the Expansion Areas is schematic rather than detailed; some areas may be inaccessible or contain no Brooms or Acacia.

After 4 or 5 years years of controlling Brooms and Acacia in Priority Zones 1-5, Priority Zone 6 (Expansion Areas) may be further broken down into secondary priority zones. The highest Priority Zone 6 areas will be bounded by the railroad tracks, the latitude between treatment areas B and C, and a line roughly from C_08 and G_11 on Figure 8. Aside from the old sediment ponds, levees, and heavily vegetated areas, the southwestern portion of the Wellfield property offers the greatest opportunity for restoring native Sandhills habitat.

Figure 8 is based on a detailed map of Sand Specialty Plants that was developed in 2011. It is generalized for this plan so as not to show the specific locations of sensitive Sand Specialty Plants. Director Chuck Baughman generously assisted with the preparation of Figure 8.

5.7. COMMENTS ON PRIORITIES

In addition to the ecological importance of managing invasive species at the relatively intact southern end of the District property, the Priority Zone 1 is also administratively important. It has been identified as Option 1 for off-site mitigation for the impacts of replacing the Probation Tank (J. McGraw 2015), since not all the impacts created by replacing the Probation Tank can be mitigated at the tank site.

The priority zones are not mutually exclusive when it comes to the timing of treatment. Because Zones 1 through 4 have the lightest population of Acacia and Brooms, they can all be treated simultaneously during the initial control work. Depending on the available budget, additional areas may be manageable in the first year.

There could be a “Priority 1A” designation: any single isolated Broom or Acacia plant that is observed far from others should be removed to forestall it founding a new population.

INSERT FIGURE 8. 11" x 17" MAP OF PRIORITY ZONES

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Two areas that would qualify as Priority 2 or 3 are *not* targeted for control of invasive Acacias and Brooms. One is at the remote north end of the SLVWD property, and is mostly on a neighboring parcel. The other is the large slope of drifted sand below the eastern highwall that supports Sand Specialty plants along with a widespread population of Childing Pink (*Petrorhagia prolifera*, formerly called *Tunica prolifera*). This is a non-native annual that is difficult to eradicate. During the course of mobilizing and demobilizing to work below the highwall, its seed would likely be spread to sites where it currently does not occur. A high number of the Sand Specialty plants are annuals and could be vulnerable to competition from a non-native annual if this species spreads to other locations.

6. DISPOSAL OF THE CUT/PULLED PLANTS

The cut or pulled plants will be piled for future disposal by District personnel. As much as feasible, the piles will be located outside the Priority zones – and preferably near a vehicle route where they can be picked up and moved to an offsite disposal area.

Burning large brush piles may heat soil under the piles to a temperature that is harmful to June Beetle larvae. (The females live their entire life cycle below ground.) To prevent harm to June Beetles, three disposal methods will be used:

Piles will be disposed of at an offsite facility;

Burn piles located in existing vegetation will be no higher than 3 feet, and will not be re-fueled for at least three days after they burn down; and/or

Piles will be moved to the District's onsite transfer facility / corporation yard and burned there.

Personnel with a water tank and pump will be present during any burning operation.

Different species controlled by different methods will initially be stacked separately so approximate numbers may be tallied at the end of each segment of work and recorded on the Daily Work Log (Appendices A-B). This is important information for budgeting the work in subsequent years. Once the different control methods have been tallied (Appendices A-C), the plants can be dragged on tarps to consolidated piles in central locations.

The smallest or sparsest plants need not be stacked and may be left on the ground where they were growing.

7. STEEP SLOPES

Some of the steep slopes included in the zones prioritized for control of Brooms and Acacia can be accessed on foot. Others will be accessed on ropes – but only by personnel with climbing experience. The cliff just north of the main east-west service road should not be accessed at all because it is crumbly; working on it would create damage to the slope and possibly to the service road, and it would be unduly hazardous and costly to work on.

There is a cliff on the northwest edge of the southwest pit that *should* be included in the removal of Acacia and Brooms. After a thick stand of Acacias was removed at the top of the hill, the

single small remnant population of Pussy Paws (*Calyptridium monospermum*) expanded dramatically and has moved down into the southwest pit. Refer to the aerial photo at Figure 9 for orientation. Other steep slopes will be evaluated on an individual basis for the feasibility of initial removal and ongoing follow-up. In some cases, cleaning up the steep slopes will provide sufficient benefit to the flatter areas below to justify working on them. In others, the weed control may have to be limited to ongoing removal on the flatter areas below unmanageable steep slopes.

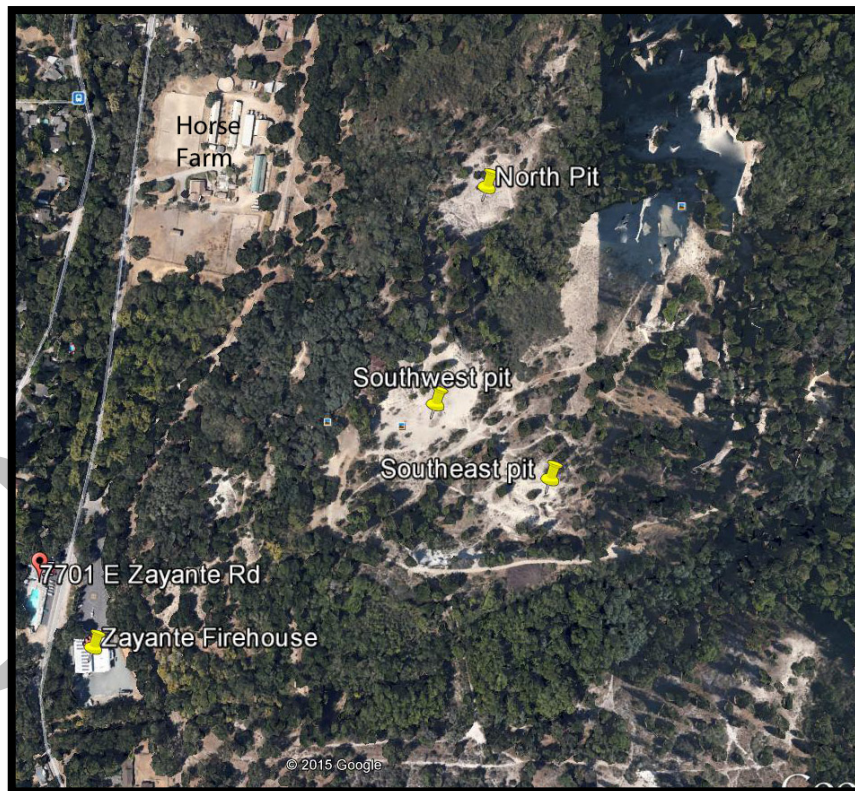


FIGURE 9. Overview of the quarried pits at the Olympia Wellfield.

8. RECORD-KEEPING

A key component of this plan is a procedure to quantify, on an ongoing basis, the level of control effort and the results. The Management Plan for the Olympia Wellfield acknowledges that eradication of invasive exotic vegetation is not feasible without a continued and dedicated effort over decades. Seed of French Broom is known to remain viable in the soil for 40 years or more (K. Moore, pers. comm. 2016). It will be necessary to record daily reports of the invasive species work while onsite in order for the District to plan for, and budget for, continuing invasive species control. The California Department of Parks uses a daily work log which has been modified for the Olympia Wellfield site. Examples are shown at Appendices A - C.

A grid is superimposed on the field map, with grid segments numbered and lettered such that each block has an identification code. The identification code for the treatment block will be recorded, with a tag indicating the year of initial treatment. The latitude and longitude at or near

the center of each block will be recorded so that every block can be relocated and progress of the given block can be tracked over time; this central location will be photographed before work begins and used for future reference in the field. These records will facilitate planning and budgeting for each subsequent round of control work, and will be essential for monitoring progress over time.

The treatment methods for the three target invasive species differ, and the amount of labor required for each treatment varies. Therefore, separate records will be kept for French Broom, Portuguese Broom, and Silver Wattle Acacia. The exact number of plants need not be counted each day, rather they can be recorded in categories (1 to 10, 11 to 100, 101 to 1,000, 1,001 to 2,000, etc.).

9. SUCCESS CRITERIA

After a given treatment plot has initially received appropriate control methods (uprooting, cutting below ground, cut stump, thermal weeding), success criteria will apply. The initial success criterion after the first – and most extensive – treatment will be zero percent cover by the three target invasive species immediately following treatment. Subsequent treatments will also result in zero cover by the Brooms and Acacia at the completion of annual treatment.

The most significant measurement of cover will be made at the *beginning* of each annual treatment after the initial clearing, for comparison with the previous year. After the initial major treatment and first few years of follow-up, each treatment plot is expected to decrease in percent cover of Brooms and Acacias by 3% per year, and the cost of control will also decrease by 3% per year.

If at any time a given treatment block appears to be clear of Acacias and Brooms of all sizes, it will continue to be monitored annually on at least a reconnaissance basis. After 15 years of a clean slate it may be deemed to be free of these invasive woody plants. It will still be patrolled annually, because deer are known to widely disperse seed of Portuguese Broom in particular, which is present on nearby properties. However, at that point, minimal control work will be sufficient to keep the treated areas clean of invasive woody species.

10. MONITORING AND REPORTING

The detailed field map has a grid overlay, much like metropolitan street maps, so that every treatment area has a permanent address where progress can be tracked over time.

10.1. MONITORING

Monitoring will be performed twice a year, both before and after the control work.

In January - February, all the grid blocks that have been controlled in the past will be monitored and either the number or percent cover (Appendix E) of Brooms and Acacia present will be estimated. The population of plants present at the beginning of each year's work, and the size of plants to be controlled, is expected to decline over time. This pre-treatment monitoring will provide a continuing measurement for monitoring progress.

Every two weeks during the season of the removal work, there will be an inspection of each grid unit that has recently been treated. The purpose of this inspection will be to assess the effectiveness of the work. Immediately after treatment, a given area should contain zero Broom or Acacia plants. If there are any, the work crew will be called back to finish the work. New seedlings that may germinate after 100% effective treatment will be addressed the following year.

Each treated grid unit will be inspected at a reconnaissance level and at least one estimate of cover will be made for every grid unit. At approximately 2 acres apiece, the grid units may need to be sub-divided for monitoring purposes. Illustrations for estimating proportions of cover are shown at Appendix E. The identification code and year of initial treatment will be recorded for each treatment block.

All of the areas mapped as Sand Parkland or Sand Parkland (Degraded) will be walked annually to find any other invasive species that may appear over time. If they do appear, control methods will be developed for the additional species and they will be incorporated into the vegetation management program.

10.2. REPORTING

A written annual report will be submitted before Thanksgiving each year to the San Lorenzo Valley Water District's Environmental Programs Manager and to the U. S. Fish and Wildlife Service. A narrative will describe the work done, observations, and problems encountered. The Daily Work Log will be summarized on the Monitoring and Reporting Form (Appendix D). The data presented on the Monitoring and Reporting Form will provide cumulative records of the progress of controlling Brooms and Acacia. The total hours worked in each grid unit are expected to decrease dramatically after the initial treatment and to continue gradually decreasing each year.

Photographs will be included to illustrate the most successful sites, average sites, and particularly troublesome spots. The report will include recommendations for changes in invasive species management that may become appropriate over time.

11. REMEDIAL MEASURES

If the success criteria are not met in any year, that will be an indication that either the budget appears to be inadequate or the work has been sloppy. In the former case, the work plan and budget for the subsequent year will be adjusted to pull back from the lower priority treatment zones and temporarily concentrate the work effort on the higher priority areas. In the latter case, a staffing and/or supervision change will be made in order to achieve more effective control of Brooms and Acacia.

12. TIMELINE OF WORK UNDER THIS PLAN

Seed of French Broom remains viable in the soil and can germinate after more than 40 years (K. Moore, pers. comm. 2016). Therefore, this plan will be in effect for half a century after it is approved – or longer if Brooms or Acacia are still showing up from the seed bank.

13. ADAPTIVE MANAGEMENT

Given the long timeline of this plan, new weed control methods may be developed over time. Ways to reduce costs while retaining the effectiveness of the field work may also evolve. Appropriate revisions to this plan will be made upon agreement among the field contractor, District personnel, and the U.S. Fish and Wildlife Service. Any of the techniques described here may be modified or replaced within the limits recommended by the USFWS: there will no soil disturbance deeper than 6”, and no herbicide application when rain is forecast within the next 24 hours.

Over the timeline of this plan, new invasive species may appear. Tocalote (*Centaurea melitensis*) and Yellow Star Thistle (*C. solstitialis*) have been eliminated in the past but could reappear. See Figure 2-6 of the District’s Planning and Recommendations Report for the Olympia Watershed. Stinkwort (*Dittrichia graveolens*) is present at the Cemex property south of the Wellfield and has been spotted elsewhere in the neighborhood. The District’s property should periodically be patrolled for Stinkwort, particularly along the service roads because its sticky seeds are typically introduced to a new site by clinging to vehicles.

Adjustments may also be made for specific field conditions; for instance, the 30-foot clearance along vehicle routes may be widened or narrowed in some places. On the other hand, because seed of the Brooms is partially dispersed by gravity, some far-flung downslope locations may be less important for control than more central upslope areas.

14. COST

A comparison of the cost of control methods follows at Table 1. It is based on the key cost of the work: an estimate of person-hours needed to implement each technique for each target species. The amount of labor translates directly to the price of the control work and will vary according to the hourly cost of the labor involved. Each labor pool (Section 8.1) will charge different hourly fees for crew members, crew supervisor, chainsaw operator, and pesticide licensee. If, for example, the average pay per crew member is \$20 per hour, the initial cost for Priority Zones 1–4 alone will be \$ _____ excluding time to mobilize and demobilize. **GIS INPUT NEEDED HERE FOR INDIVIDUAL ACREAGES OF ZONES 1-4.** Costs for Zone 6 will be developed in the future based on the experience of working in Priority Zones 1-5.

The person-hours required for the work will be updated based on records of the initial work on each species at each work site (see Section 8 above), and then updated annually. With consistent follow-up, the cost of control will drop steadily and may eventually approach zero.

Estimated costs for the effective control methods can be translated from the person-hours in Table 1 based on conservative estimates of the current populations:

- Approximately 41,000 French Broom plants are currently present in the Sandhills areas of the Wellfield and along vehicle routes. Most of these are rooted more than 6” deep or larger than 1” diameter at the base and will require the cut stump treatment rather than uprooting.
- There are approximately 23,000 plants of Portuguese Broom, most of them rooted more than 6” deep and thus requiring the cut stump treatment rather than uprooting.
- Full-sized Acacia trees were removed in the past but there are approximately 1,000 young seedlings and root-sprouts in widely scattered locations.

It should be noted for planning purposes that a work day is functionally 6 hours when a half hour each is subtracted for mobilizing, demobilizing, rest breaks, and a lunch break.

Table 1 follows on the next page.

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TABLE 1. WORKLOAD COMPARISON OF CONTROL METHODS

ASSUMES A LARGE ENOUGH LABOR POOL
TO ADDRESS PRIORITY ZONES 1-4 IN THE FIRST YEAR

SPECIES	CONTROL METHOD	ESTIMATED NUMBER OF PLANTS*	APPROX. NO. PER PERSON-HOUR excludes mobilize/demobilize and breaks	TOTAL PERSON-HRS
French Broom seedlings <20 cm	thermal weeding	tbd after large plants are removed		
French Broom small plants w/ roots <6" deep	pull or hoe	1,000	100 per person-hour	10
French Broom plants up to 1" diameter at base	excavate a small bowl around the plant, cut stem below ground, cover with sand, stack plants	10,000	50 per person-hour	200
French Broom all sizes	cut, apply 50% glyphosate to cambium, stack	30,000	25 per person-hour	1,200
Portuguese Broom small plants	pull	400	20 per person-hour	20
Portuguese Broom medium plants	dismantle roots & stack plant	15,000	5 per person-hour	3,000
Portuguese Broom large plants	remove lower branches for access; then cut, apply 50% glyphosate to cambium, stack plant	8,000	5 per person-hour	1,600
Acacia test: seedling or root sprout?	if seedling: pull by hand	500	7 per person-hour; includes locating widely scattered small plants	70
	if root sprout: cut, apply 50% glyphosate to cut surface	500	6 per person-hour; includes locating widely scattered small plants	83
TOTAL PERSON-HOURS				6,183
*The estimated number of plants excludes Priority Zones 5 and 6, the roadsides and Expansion Areas, where the number of French Broom plants may be higher than anywhere else on the Wellfield.				
Bold print in Table 1 indicates the lowest cost treatments. Treatments for Acacias and for Portuguese Broom are more costly than for French Broom because of their re-sprouting growth habit and their structural form, respectively.				

There is some overlap and choice among treatments. When there is a choice, the lower cost control method will be selected.

GIS INPUT NEEDED HERE: ACREAGE FOR ZONES 1-4

HCP Language needs to be reworked for this document:

The District will set aside and manage 0.995 acres of high-quality sandhills habitat which supports the three covered species within the Olympia Wellfield—a 180-acre property owned by the District and managed for water supply and watershed protection. Of the 0.995 acres, 0.420 acres will be set aside to mitigate the permanent loss of 0.105 acres of habitat at a 4:1 ratio—this reflects the high quality of the habitat that will be lost in the tank replacement area. The remaining 0.575 acres will mitigate the temporary impacts of the project (0.2875 acres) at a 2:1 ratio. This lower ratio is appropriate, as the 0.196 acres of habitat that will be temporarily impacted in the tank replacement area will be restored, and the 0.092 acres in the staging area consists of a dirt road that is already highly degraded habitat.

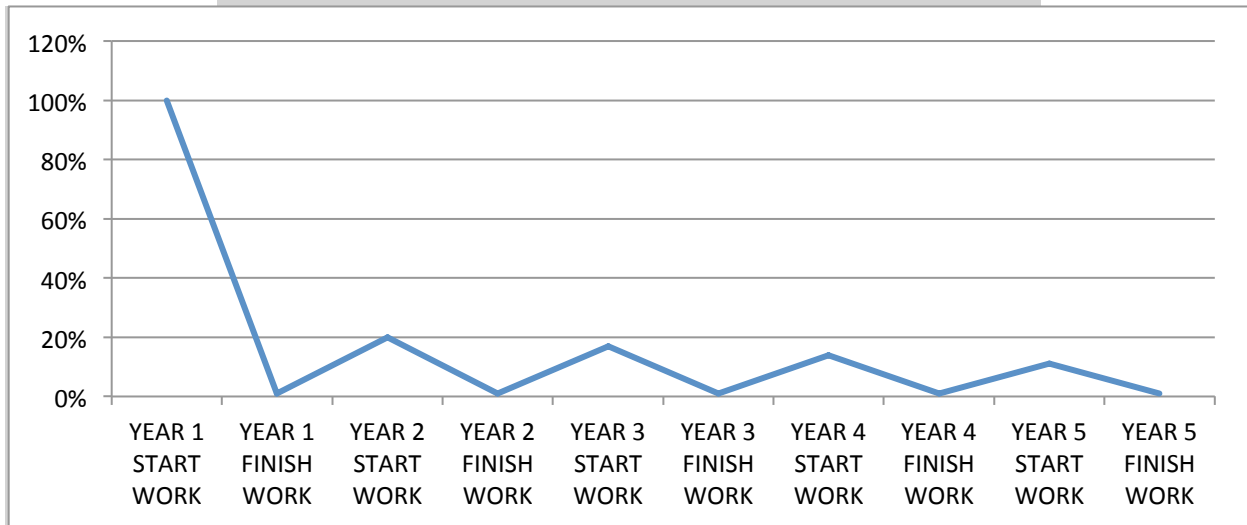
The 0.995 acres used as off-site mitigation for this project is part of a larger approximately 6.7-acre area of high quality, sand parkland habitat that the District will set aside and manage within the Olympia Wellfield (Figure 7). The set aside will be located on the southern portion of the property as illustrated in Figure 4.

Annual maintenance costs for control of invasive Brooms and Acacia will decline sharply after the initial removal of these invasive species. Since the initial control work will remove 100% of all Brooms and Acacia in any priority zone, the labor cost starting at year 2 will only involve hand-pulling, flaming, and/or hoeing of small seedlings that emerge from the seed bank. The amount of work needed after the first few years should be less than 20% of the initial control work – and it should temporarily result in zero Brooms and Acacias each year. After a few years, when follow-up control decreases germination from the seed bank, a graph of the labor would resemble a sawtooth pattern that starts from 20% and returns to zero each year. Later years of control would start from decreasing amounts of labor and gradually decline to 17%, 14%, 11% and so on. The following graph schematically illustrates how the workload would decrease over time, abruptly at first and then more gradually as the seed bank begins to diminish. One hundred percent represents a full and effective initial treatment of a given site, (resulting in zero Broom or Acacia present at the completion of a treatment) which may vary by site depending on density of the target species.

SCHEMATIC TREND: DECLINING WORKLOAD BY SITE

The following graph shows how the control work will change over time. The X axis represents 100% of all the work necessary in a given year, regardless of whether there are 100 or 10,000 Brooms or Acacias present. After dropping temporarily to zero by the end of the first round of control work, new seedlings will appear at approximately 15% of the original number and again drop temporarily to zero. Each year, small seedlings will continue to appear, but the workload will be approximately 3% lighter each year.

DECLINING WORKLOAD WITH CONSISTENT CONTROL



Over time, the cost for each site will flatten out. The eventual annual cost will not be zero, but it will be a *pittance* in comparison to the initial control work.

For comparison, consider the consequence of missing a management year.

TREND IN WORKLOAD WITH A MISSED YEAR



If Year 2 (starting at 20%) is missed, it would take eight more years to catch up to where Year 2 was under the continuous control scenario – a major setback in progress.

A sequential second missed “gap year” would likely produce enough growth of these two legume genera to require a re-boot to 60% of the original workload.

A missed year may occur at other times, with worse results as new seedlings continue to emerge from the seed bank.

Grant funding may be available for initial removal of Brooms and Acacia under such programs as the federal Partners for Wildlife program. However, funders are unlikely to support ongoing maintenance. The decades of follow-up maintenance work must be funded by annual District budgets or by an endowment.

15. RECOMMENDATION

It is recommended that, as soon as possible the District should

- Investigate potential grant funding, and
- Resume the control of invasive woody species at the Olympia Wellfield.

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APPENDICES

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