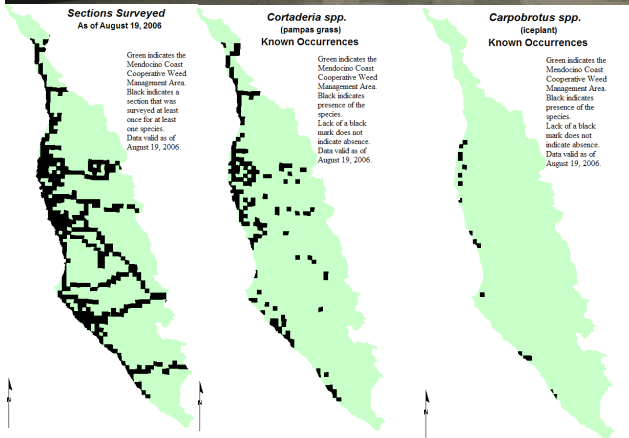
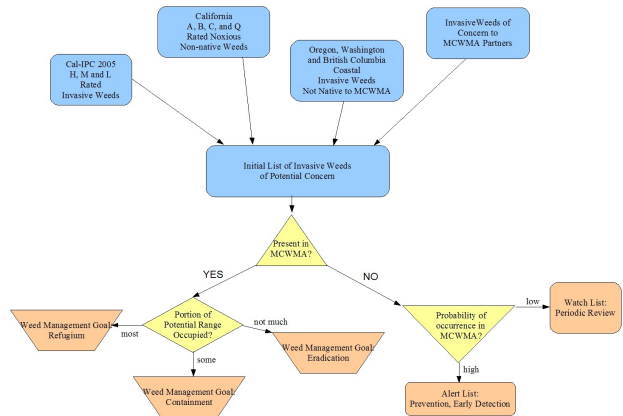


FINAL REPORT: Mendocino Coast Cooperative Weed Management Area

#2005-0004-034

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01/21/07



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0 Executive Summary

This document represents the Final Report on the Pulling Together Initiative Project #2005-0004-034, the Mendocino Coast Cooperative Weed Management Area. This project was funded by the [National Fish and Wildlife Foundation](#), with matching contributions from many Partners and Associates, as listed in the [Acknowledgements](#). The project consists of four components: Administrative, Education and Outreach, Information Management and Projects. Taken together, the activities carried out in these components form an Integrated Weed Management Approach that addresses prioritization of target species and treatment sites according to land management goals, thorough understanding of target species and treatment options, minimization of impacts to non-target organisms and adaptive management based on monitoring and evaluation of treatment results.

- The [Administrative](#) component of the project includes the task of preparing a Memorandum of Understanding between the Partners of the MCWMA, a Mission Statement, and the 2006 Strategic Plan as well as initiation of a long-term planning process.
- The [Education and Outreach](#) component of the project includes the tasks of developing educational materials, creating a website, holding community meetings and conducting outreach and presentations.
- The [Information Management](#) component of the project includes the tasks of compiling of existing weed distribution data, identifying gaps in the existing information, developing protocols for data collection, gathering data to fill identified gaps and disseminating the resulting collections of information.
- The [Projects](#) component of the project includes planning and implementing weed treatment projects, and monitoring and evaluating the outcome.

This document contains four sections:

- the [Introduction](#) section provides background information and states the project objectives;
- the [Project Output](#) section provides details of the project activities and deliverables of each project component;
- the [Conclusion](#) contains a brief closing statement, the acknowledgements and a list of hyperlinks for all attachments.

1 Introduction

The Mendocino Coast Cooperative Weed Management Area Pulling Together Initiative (PTI) project initiated a cooperative weed management area partnership and program for the 1,000 square miles of coastal watersheds of Mendocino and northern Sonoma Counties in California.

The conservation needs addressed by this project are the treatment and control of invasive species from specific sites within coastal watersheds, especially those that have been prioritized as threats to sensitive habitats, and private and public lands that provide wildlife habitat and migratory corridors.

Coastal watersheds in Mendocino and Sonoma Counties have experienced 150 years of agriculture, timber harvesting, and rural and urban development, which has resulted in increased vehicle traffic, soil disturbance, and alteration of ecosystem processes. With the introduction of invasive non-native plants (weeds) and increased opportunities for seed dispersal, widespread infestations have occurred in these watersheds. Weeds present ecological and economic threats to these watersheds, and the wildlife, human and plant communities that rely on functional ecosystems. These impacts range from alteration of ecosystem processes (such as soil chemistry, nutrient cycles, hydrology, sediment deposition, erosion, and wildfire frequency), degradation or elimination of natural habitat and vegetation types, displacement of native plants and animals, support of non-native animals, fungi, or microbes, and alteration of gene pools through hybridization with native species. These impacts equate to economic losses for private and public lands such as degradation of forestry and fisheries resources, access, utility, recreation and aesthetics.

The Mendocino Coast Cooperative Weed Management Area (WMA) is defined as the coastal area of Mendocino and Sonoma Counties between (but not including) the Russian and Eel River watersheds. Prior to the PTI project, no single agency or organization along the Mendocino and Sonoma coast has developed a landscape-level and inter-jurisdictional management approach for control of invasive non-native plants.

The primary species targeted by this project are jubatagrass (*Cortaderia jubata*), Scotch broom (*Cytisus scoparius*), French broom (*Genista monspessulana*), gorse (*Ulex europaeus*) and European beachgrass (*Ammophila arenaria*). These species are identified by the California Invasive Plant Council as high-impact ecological threats, and are listed as noxious under the California Agricultural Code. There is strong anecdotal evidence that abundance and extent of these species is rapidly increasing and literature that cites exponential increases with many invasive species; however, detailed information has been lacking for the WMA. Initiation of a control program for these species now, rather than later, is imperative to limit the spread and increasing areas of infestations. Therefore a cooperative partnership for the WMA has been initiated with the initial objectives for this project identified as:

- A. develop and implement a Strategic Plan and long-term management plan for the WMA;
- B. develop education and public outreach programs to increase community awareness and involvement in the WMA partnership;
- C. conduct surveys, mapping and monitoring of weed distributions within the WMA;
- D. treat weed infestations on specific and prioritized sites within the WMA.

2 Project Output

A) Administrative

The Administrative component of the project includes the task of preparing a Memorandum of Understanding between the Partners of the MCWMA, a Mission Statement, and the 2006 Strategic Plan as well as initiation of a long-term planning process.

MOA

A memorandum of agreement (MOA) for formation of the MCWMA was completed in November, 2005 with extensive contributions from the Partners, attached. This document is available from our website at mcwma.org/documents_released/MOA/, as well as the accompanying map, mcwma.org/maps/MCWMAbound_map.pdf.

Nine founding partners signed the agreement in early 2006:

- [California Native Plant Society, Dorothy King Young Chapter;](#)
- [California Department of Parks and Recreation, Mendocino District;](#)
- [U.S. Bureau of Land Management, Ukiah Field Office;](#)
- [Mendocino County Department of Agriculture;](#)
- [Mendocino County Resource Conservation District;](#)
- [The Mendocino Land Trust;](#)
- [California Department of Fish and Game, Region 3;](#)
- [California Department of Forestry and Fire Protection, Jackson Demonstration State Forest;](#)
- [Caltrans District 1.](#)

Because of outreach associated with the community meetings, one additional member was added later in the year: [Anderson Valley Nursery](#).

Thus, the deliverable of creating an MOA for the MCWMA has been satisfactorily completed. The indicator given in the grant proposal for support of the MCWMA was the number of signatories to the MOA; the project target was 10 signatories, which was achieved. In addition to signing the MOA, all partners have been active, providing in-kind support and technical advice for the MCWMA activities.

Mission Statement

The MCWMA mission statement, “to prevent and minimize harm from invasive plants cooperatively through integrated pest management,” was adopted in January, 2006. This statement is displayed prominently on the home page of the MCWMA website, mcwma.org and is used to open the Strategic Plan, discussed in the next section. Thus, the deliverable of developing a mission statement for the MCWMA has been satisfactorily completed.

Strategic Plan

The MCWMA 2006 Strategic Plan was initially drafted in January, 2006, underwent extensive revision, and was finalized in June, 2006. A copy is attached to the report and it is also available from the website at mcwma.org/pages_html/documents_working_2007/Strategic_Plan/. The Executive Summary is reproduced here, with working hyperlinks to the online Plan:

“[Invasive](#) plants collectively constitute a serious liability for the future of both the coastal ecology and the regional economy. Long-term [weed](#)-management strategies must be aligned with land management goals in order to gain the voluntary cooperation of stakeholders. The MCWMA 2006 Strategic Plan arises from the land management goals of its partners and stakeholders, and is based on the principles of trust, unified action, informed decisions, and adaptive, [integrated pest management](#) (IPM). The Strategic Plan contains four elements: Education, Information Management, Projects, and

Administration.

This planning document consists of four sections and appendices. In the [first section](#), the mission, geographic scope, problem, goals, principles and approach are introduced. In the [second section](#), the MCWMA program structure and priorities are described. In the [third section](#), the goals, principles and objectives of each program element are stated. The [fourth section](#) contains references and other relevant resources. The [Appendix](#) to the plan contains definitions of terms.”

Each workgroup and committee drafted goals, principles and objectives for a 5-year period. Overall, it was a useful endeavor which helped to focus the efforts of the workgroups towards long-term objectives, and guided the selection of the demonstration project site as well as identifying priorities for developing future projects. Thus, the deliverable of creating an MCWMA Strategic Plan has been satisfactorily completed.

Draft Long-Term Management Plan

Two 2-hour meetings of the Planning Committee were held to initiate the development of a Long-Term Weed Management Plan for the MCWMA. It was determined that the complete area served by the MCWMA is too diverse in land management goals and ecosystem types to be incorporated into a single Plan. Therefore it was determined to create a Long-Term Weed Management Plan for the MCWMA Highways 1 & 20 Demonstration Site as an example from which to build other Plans tailored to specific areas of concern.

An outline was approved based on materials distributed in a [course on Invasive Plant Management](#) offered by the [Center for Invasive Plant Management](#) at Montana State University that had been completed by the coordinator. This outline provides a sequence to follow in generating a long-term management plan, beginning with determining land-management goals, setting weed-management objectives based on those goals, gathering information, setting priorities, specifying management practices and providing for an adaptive management process for plan revision.

As of January 2007, the data-gathering step was partially completed. The draft Plan and attachments are available from the website, mcwma.org/pages_html/documents_working_2007/Demo_LTMP/, and a copy is attached. Thus, the deliverable of initiating the development of an MCWMA Long-Term Management Plan has been satisfactorily completed.

WMA Annual Report

This document will stand in lieu of the WMA Annual Report for 2006, as the NFWF PTI grant was the only project implemented in the MCWMA in 2006. The report outline will be used as a template for future WMA Annual Reports. Thus, the deliverable of completing the WMA 2006 Annual Report has been satisfactorily completed.

Targets

On the proposal, several indicators were put forward as representative of the level of participation of MCWMA partners in the implementation of the project. The targets were:

- 17 steering committee meetings;
- 2 Long-Term Planning meetings held;
- 2000 hours worked by coordinator and staff.

The actual effort was:

- 23 meetings, including general/steering committee (5), planning committee (10), education/outreach workgroup (3), information management workgroup (5), financial committee (1), projects workgroup (4);
- 2 two-hour planning committee meetings devoted to development of the Long-Term Management Plan;
- 4865 hours worked, including coordinator (1360), interns (324), and partners (3181).

Thus the deliverable for participation has been successfully completed.

B) Education & Outreach

The Education and Outreach component of the project includes the tasks of developing educational materials, creating a website, holding community meetings and conducting outreach and presentations.

Materials

1. MCWMA Information Sheet: In preparation for the community meetings, described in further detail below, a 2-page written document was prepared for the purpose of explaining the concept of a Cooperative Weed Management Area and the role of integrated pest management in the MCWMA. This information sheet is available from the website at mcwma.org/documents/InfoSheet_2006_02_27.doc, and a copy is attached to this report. The MCWMA Information Sheet was distributed by mail with announcements of the community meetings, and was made available at all MCWMA presentations. A precise number of copies distributed was not tracked, but may be estimated to be in the hundreds.
2. Community Input Questionnaire: This form was used during the community meetings to guide input concerning the relative importance of the impacts of invasive weeds. The questionnaire is available from the website at mcwma.org/documents/impact_form_2006_03_14.pdf, and a copy is attached. The results of this informal survey are discussed in greater detail in the Community Meetings section below.
3. Distribution of Materials Developed by Other Organizations: To most effectively use the limited resources available for invasive weed management, the MCWMA did not independently develop educational materials when a suitable item was already available. Three brochures were found to be especially effective in this regard:
 - a. “[Biological Pollution](#)”, developed by [Cal-IPC](#), provides a compelling introduction to the impacts of invasive weeds in California. This brochure was distributed by mail with announcements of the community meeting, and was a popular item at presentations. It may be estimated that several hundreds of these brochures were distributed.
 - b. “Exotic Invasive Plants of the Navarro River Watershed” was released by the [Navarro Watershed Working Group](#) (NWWG) midway through the project period. The Navarro River lies within the MCWMA, and NWWG is an active associate of the MCWMA partnership. The information and the species shown in the brochure are highly

representative of the MCWMA as a whole. The MCWMA provided assistance in the development of the brochure by providing photographs. The author of the text of the brochure, Ken Montgomery of Anderson Valley Nursery, is also a partner of the MCWMA. NWWG has provided more than a hundred of these brochures to the MCWMA for distribution at presentations. We have found it an especially useful and popular material at school presentations, as students were familiar with many of the species shown.

- c. “[Don't Plant a Pest](#),” San Francisco Bay Area, developed by [Cal-IPC](#), suggests alternatives to invasive plants in landscaping. The Mendocino Coast climate is sufficiently similar to the climate of the San Francisco Bay area that the suggested alternatives are also applicable in our area.

Website

The MCWMA website, mcwma.org, has been successfully developed and published. The website design was developed and approved in July, 2005. A copy of the design proposal is attached to this report and is also available from the website at mcwma.org/pages_html/documents_working_2007/Website_Design/Website_Proposal.doc. In the design process, the purpose and audience of the website were considered as drivers for the website content and style. The website has been developed progressively. As of January 2007, almost all components have the site from the original proposal are published and functioning. The one exception is the “Invasive Plant Impacts” page, which appears as a stub.

User feedback. Feedback from users has not been formally solicited. Therefore, the feedback received is probably biased, but has been quite positive. The website is used by the MCWMA Partners to keep abreast of the efforts of the workgroups they participate in as well as other workgroups. Agency staff and the public have used the site to research weed management and learn of MCWMA events. The Navarro Watershed Working Group obtained weed images from the MCWMA website for use in their brochure, “Exotic Invasive Plants of the Navarro River Watershed.”

Web-ranking. Reciprocal links have been established with a number of the partners, giving the site a web-ranking that is sufficiently high to be accessible with search engines such as Google. A search for “mendocino weed” brings up the MCWMA Home Page as the third-ranked site, after a cannabis site and a California Invasive Plant Council site, while a search for “mendocino invasive” lists the MCWMA home page as the first-ranked site.

Other web-host services. The webserver is used by the MCWMA Partners as an ftp site to exchange large files, including photographic images and GIS layers. The MCWMA mailing lists are maintained as “mailman” listservs, including an announcement list used to distribute the electronic newsletter, and separate lists for the partners, workgroups and committees. MySQL databases have been implemented on the webserver to manage the data from the roadside surveys, and online forms for data entry from these surveys are under development. Additional databases, including a calendar of events, a database of weed treatment information and a database of references to weed impact information, are planned.

Statistics: The usage statistics of the MCWMA website as reported by the webhost for 2006 are:

- Unique Visitors: 44
- Number of Visits: 131
- Pages: 1637

- Hits: 2316
- Bandwidth: 16MB

Thus, the deliverable of creating a website as been successfully completed.

Community Meetings

Community meetings were held in 5 widely separated geographical areas during the early stages of the project (October 2005-March 2006) for the purposes of gathering public input and recruiting volunteers. The meeting format was adapted from community meetings held by the Mendocino Firesafe Council in its Community Hazard Assessment, and included:

- an overview of Weed Management Areas and background of the MCWMA;
- an introduction to common weeds of the area, using samples collected locally;
- distribution of a questionnaire about priorities of impacts from invasive plants;
- demonstration of the roadside survey weed protocol and collection of reports of weed occurrences;
- a brainstorm session to identify problems, issues and solutions.

The results of the meetings have been compiled into tables available from the website mcwma.org/pages_html/documents_working_2007/Public_Meetings/pbm_results_2007_01_23.xls; copies are attached to this report. In general, the level of attendance did not meet expectations, although extensive publicity was carried out prior to each meeting. However, people who did attend the meetings had a high level of interest in managing invasive weeds, and provided extensive input. This input was reflected in the Strategic Plan and the selection of the demonstration project site.

In summary, the community meetings resulted in:

- 64 participants, of which 33 provided contact information;
- 28 impact questionnaires completed;
- 23 weed occurrence forms completed;
- 118 comments received; issues (47), solutions (71);
- 7 cooperative actions defined, of which 6 have been completed.

A decision was made to adapt the outreach strategy to focus efforts on specific organizations and issues, rather than geographical areas. Presentations and other outreach efforts, described in the following sections, were integrated into activities of other organizations in order to reach members that did not have a high level of interest in invasive weeds and thus would be unlikely to attend a meeting having weeds as its sole focus.

Outreach Activities

The following presentations, meetings and directed outreach activities were conducting by MCWMA staff, partners and guests during the project period:

1. Environmental Potluck: in March 2006, Peter Warner, State Park ecologist, gave a slide presentation on invasive plants at the Annual Environmental Potluck, attended by approximately 50 members of the sponsoring organizations (California Native Plant Society, Mendocino Land Trust, Mendocino Area Parks Association and Audubon Society). Brochures were distributed.

2. Anderson Valley Wildflower Show: in April 2006, MCWMA staff set up a table including a trifold-panel display (image available on MCWMA website, mcwma.org/images/displays/trifold_display_roadside_survey.JPG, and attached to this report) of invasive weed images, roadside survey information, weed specimens, including a 15-foot *Arundo donax* bouquet, and brochures. Attendance at the show is estimated as 200.
3. Farmer's Market: in July 2006, MCWMA staff manned a table, with brochures, weed specimens and tools, at 5 coastal Farmer's Markets in conjunction with National Invasive Weed Awareness Week, reaching an audience of around 100 residents and visiting tourists.
4. Caspar Community Meeting: in July 2006, MCWMA staff presented a draft Gorse Containment Program based on monetary incentives at the Caspar Community Meeting. The project description, as presented at this meeting, is available on the MCWMA website, mcwma.org/pages_html/documents/gorse_containment_update.rtf, mcwma.org/maps/gorse_in_caspar2.jpg, and a copy is attached to this report. Attendance was about 30. As a result of this meeting, the Caspar Community adopted a resolution requesting assistance from the Mendocino County Department of Agriculture in gorse control, expressed support of the MCWMA Gorse Containment Program and committed volunteer support in gorse removal on public lands in Caspar (mcwma.org/pages_html/documents/Send2CDFEA/Attachments/gorse_res.pdf, copy attached).
5. Boonville Apple Fest: in September 2006, MCWMA displayed the tri-fold panel and brochures at a table shared with the Navarro Watershed Working Group at the weekend festival. Attendance at the festival as a whole was several hundreds, with perhaps 100 of these viewing the display.
6. Integrated Weed Management Seminar: in December 2006, Prof. Carla Bossard of St. Mary's College and Ken Moore of the Santa Cruz Wildlands Restoration Team presented a joint seminar, with titles "What can the biology of invasive species teach us about controlling them?" and "Flaming: a Weed Control Tool in Wildlands". A flyer, mcwma.org/documents/Bossard_Moore_2006_12_4.pdf, was made available on the website and posted by the MCWMA partners (a copy is attached.) Attendance was 25.
7. Presentations in Schools: in December 2006, presentations were given at Mendocino and Point Arena High Schools to an Environmental Science and an Honors Biology class, resp., with attendance of around 40 students (combined). A PowerPoint presentation developed by Cal-IPC, "Invasive Plants in California: Why Should We Care?," was shown, local weed specimens were passed around, brochures were distributed and discussed, and questions were fielded. Students were in general interested in the topic and some expressed interest in participating in invasive weed removal as a class project or community service.
8. Newsletters: four electronic newsletters were distributed in the period February to July 2006, presenting the calendar of upcoming events, introducing new components of the website and announcing invasive plant news items. The newsletter is received by the "associates" mailing list, which has 81 subscribers. The newsletters are available on the website, mcwma.org/pages_html/about_us/index.shtml, and copies are attached to this report.
9. Directed Outreach Efforts:
 - partner invitations (mailing with follow-up phone calls) to about 100 commercial establishments and non-profit organizations within the MCWMA whose interests are affected by invasive weeds, included an invitation letter and response form (mcwma.org/pages_html/documents_working_2007/Partner_Outreach/, sample

attached), the MCWMA information sheet, the MOA, brochures and a community meeting flyer;

- the California Conservation Corps was successfully recruited for participation in the volunteer work-weekend in September 2006;
- Walt Decker, retired forester and MCWMA associate, made an outreach appearance at the Registered Foresters breakfast and received input on online resources of interest to professional foresters;
- outreach (mailing with follow-up phone call) regarding development of a landscape alternatives brochure for the North Coast region : a letter of invitation, packet of materials and questionnaire was mailed in January 2007 to fourteen commercial nurseries and garden shops operating within the MCWMA (sample letter and questionnaire available from the website, mcwma.org/pages_html/documents_working_2007/Landscape_Alternatives/, and copies attached.) Results are still being received, and will be compiled and utilized in the materials development effort lead by the Inland Mendocino Cooperative Weed Management Area.

Targets

In the proposal, indicators of the success of the education and outreach effort were identified to be the number of community meetings and presentations held, the attendance at such meetings and presentations, and the number of materials distributed. The following targets were proposed:

- 5 community meetings held;
- 200 attendees at community meetings;
- 5000 brochures distributed (by mail);
- 2000 questionnaires distributed;
- 200 questionnaires returned;
- 10 educational presentations given;
- 100 individual outreach contacts;
- 500 attendees at presentations.

Actual values of the indicators at the end of the project were:

- 6 community meetings held;
- 100 attendees at community meetings;
- around 500-1000 brochures and information sheets distributed (in person or directed mailing);
- 150 questionnaires distributed;
- 27 questionnaires returned;
- 10 educational presentations given;
- 115 individual outreach contacts, including mailed invitations and follow-up phone calls;
- about 500 attendees at presentations and events that the MCWMA sponsored or participated in.

The target of 200 attendees at community meetings was not met due to a lower-than-expected turnout at these events. It is our judgment that the approach was executed as well as could be expected, but is simply less effective than we expected. The outreach approach was adapted in order to achieve the desired effect by other means, in particular, by directed outreach to interested organizations and individuals.

The original target of 5000 brochures was derived based on a general mailing, where it is expected that a large percent of the recipients discard the materials as junk mail. This strategy was modified in favor of a directed mailing and in-person distribution, where materials are sent or given only to individuals who are likely to look at them. While it is difficult to compare these methods directly, the MCWMA partners and staff made the judgment that a targeted distribution approach would be just as effective while reducing waste. Thus, we submit that the deliverable of outreach for the purpose of raising public awareness of invasive weeds, recruiting volunteers for MCWMA activities and obtaining community input regarding weed issues has been successfully completed.

C) Information Management

The Information Management component of the project includes the tasks of compiling of existing weed distribution data, identifying gaps in the existing information, developing protocols for data collection, gathering data to fill identified gaps and disseminating the resulting collections of information.

Distribution Data Compilation

At the beginning of the project, in June 2005, compilation of existing invasive weed distribution information was initiated. This is an ongoing process – as new surveys are performed, the compilation is expanded. As of January 30, 2007, the following data has been compiled:

1. Abreu, M. A. (2003) *Boardwalk project site; coastal bluff scrub flora survey; non-native species*. Mendocino Botanical Gardens.
2. Circuit Rider Productions, Inc. (2005) Big River Preliminary Plan: Resource Assessment and Recommendations [Online]. Big River Project Area, Mendocino County, California, April 2005. Prepared for the Mendocino Land Trust, California State Coastal Conservancy and California Department of Parks and Recreation. Available from World Wide Web: <http://www.mendocinolandtrust.org/?Big_River>About_the_Program:Planning_at_Big_River> [Accessed January 29 2007].
3. Scherer, D. (2003) *Hearn State Park plant list* [Online]. California Native Plant Society, Dorothy King Young Chapter. Available from World Wide Web: <<http://www.dkycnps.org/plant%20lists/hearn%20gulch%20plantlist.html>> [Accessed January 24 2007].
4. Scherer, D., and Rutemoeller, B. (2000) *Fort Ross State Park plant list* [Online]. California Native Plant Society, Dorothy King Young Chapter. Available from World Wide Web: <<http://www.dkycnps.org/plant%20lists/fort%20ross%20plantlist%20august%202000.htm>> [Accessed January 24 2007].
5. Scholars, T., Gardner, A., Bogue, C., Mahaffey, E., Weg, L., and Benesci, N. (2005?) *Plant identification list for the Point Cabrillo Preserve*. Point Cabrillo Preserve.
6. Sholars, T. (2003a) *Jughandle State Reserve plant list* [Online]. California Native Plant Society, Dorothy King Young Chapter. Available from World Wide Web: <<http://www.dkycnps.org/plant%20lists/jughandle%20plantlist%20november%202003.html>> [Accessed January 24 2007].

7. Sholars, T. (2006) *MacKerricher State Park plant list* [Online]. California Native Plant Society, Dorothy King Young Chapter. Available from World Wide Web: <<http://www.dkycnps.org/plant%20lists/mackerricher%20plantlist%20november%202003.html>> [Accessed January 24 2007].
8. Sholars, T. (2002) *Pomo Bluffs botanical field survey*. Fort Bragg, California: Fort Bragg Community Development Department.
9. Sholars, T. (2003b) *Russian Gulch State Park plant list* [Online]. California Native Plant Society, Dorothy King Young Chapter. Available from World Wide Web: <<http://www.dkycnps.org/plant%20lists/russian%20gulch%20plantlist%20november%202003.html>> [Accessed January 24 2007].
10. Sholars, T. (2003c) *Van Damme State Park plant list* [Online]. California Native Plant Society, Dorothy King Young Chapter. Available from World Wide Web: <<http://www.dkycnps.org/plant%20lists/van%20damme%20alphabetical%20plantlist%20nov%202003.html>> [Accessed January 24 2007].
11. Smith, G. L., and Wheeler, C. R. (1992) *A flora of the vascular plants of Mendocino County, California; reprinted from the Wassmann Journal of Biology 48/49, 1-387 (1990-1)*. San Francisco, California: The University of San Francisco.
12. Snyder, G. B. (2000) *A flora of the vascular plants of the Sea Ranch* [Online]. Sea Ranch Association. Available from World Wide Web: <<http://www.tsra.org/PlantList.htm>> [Accessed January 24 2007].
13. Stone, J., and Stone, M. (2005) *Inspection 2004/2005; Mendocino County State Parks*. California Department of Parks and Recreation.
14. Warner, P. (2002) *Salt Point State Park plant list* [Online]. California Native Plant Society, Dorothy King Young Chapter. Available from World Wide Web: <<http://www.dkycnps.org/plant%20lists/saltpointstatepark%20species%20list.html>> [Accessed January 24 2007].

Although much weed distribution information is available, little has previously been digitized into GIS layers and so this information is not easily integrated. At present, the compiled information is stored as electronic or hardcopy lists and maps. In this form it is useful for validation of weed occurrence observations and planning at a fine scale. As landowners (principally public agencies) digitize their weed distribution information, these GIS layers will be incorporated into an integrated electronic weed distribution database. The first steps towards implementing this integrated database have been carried out for the roadside survey data, described below.

Experts Mapping Meeting

A mapping protocol was developed in September 2005 to capture weed distribution knowledge from botanists and foresters familiar with the area. This set of professionals will be referred to in this section as the “experts.” A form was developed in order to capture many characteristics of weed infestations. Locations are marked by hand on intermediate-scale maps (1 mile to the inch), using different colored pencils and stickers to indicate species. Characteristics associated with each marked infestation are recorded on datasheets (forms and instructions available on the website,

mcwma.org/documents_released/expert_mapping/, copy attached.)

The experts mapping meeting was held in October, 2005 – seven experts were in attendance. Jackson Demonstration State Forest staff provided ten 24” x 36” maps displaying different regions of the MCWMA. Eight common weed species were specified for mapping, but the experts were encouraged to note other species that had not been identified on the form, and so six additional species were mapped. A total of 141 weed occurrences were identified in this manner. Each occurrence included: observer, date, species, location and size of infestation, accuracy of location and size information, vegetation community and disturbance regime.

The contents of the datasheets were recorded in a spreadsheet, and the maps were professionally scanned into JPG format for use as base layers in GIS (all available on the website, mcwma.org/documents_released/expert_mapping/, mcwma.org/maps/expert_weed_scans/, one reduced map attached as an example).

In evaluating this mapping procedure, we found that the procedure was advantageous to the experts as it required a minimal amount of their time to record the information. There are, however, several drawbacks to the approach that were identified. The time lag between observation and recording of the data increases the potential for inaccurate locations. Graphical indication of location leads to difficulty in integrating with other GIS data, as it is time-consuming to digitize the raster images of the hand-drawn polygons into vector polygon layers and the conversion has the potential to introduce errors. Further, the procedure was too complicated for most lay observers to manage. Therefore this procedure is only recommended for use by experts for mapping a relatively small number of occurrences.

The results of the experts mapping meeting expanded the available weed distribution information considerably. However, it was apparent from the overall extent of the available distribution information that a comprehensive coarse-scale survey was needed to establish the pattern of distribution of common weeds within the MCWMA. This observation led us to conduct the roadside weed survey, described in the next section.

Roadside Survey

The protocol for the roadside weed survey was developed and extensively tested in February-March 2006. This simplified survey form only captures the observer(s), date, species and location referenced to one-mile segments of roads or trails. The intention is that volunteer and student surveyors would require minimal training to use the form and would be able to cover large distances quickly. A portion of the website, mcwma.org/pages_html/involved/index.shtml#Survey, was devoted to encouraging volunteer participation in the roadside survey as well as providing instruction and weed identification information for hired surveyors (copies of representative webpages are attached.)

The survey was implemented in April, May and July of 2006. Most of the surveying was performed by two interns, Dan Young and Hayley Ross, with additional surveys in late summer by aides Kip Athan and Martin Brown, and data entry performed by intern Helen Sinor. Statistics of this survey period are:

- 92 datasheets filled;
- 68 roads surveyed;

- 541 road segments surveyed, about 30% of the public roads within the MCWMA;
- 2086 weed occurrences recorded;
- 140 hours by interns on surveying and data entry.

The typical rate of surveying was 10 miles per hour for a team of 2. One hour of data entry was required for every two hours of surveying. The total cost of the survey, not including the time spent developing the protocol was about \$3000, or roughly \$5 per mile. This approach is a cost-effective approach to surveying for common, easily recognized weeds along roadsides.

The survey results were compiled in a spreadsheet and converted to a database of presence-only observations based on PLS sections. The database may be viewed from the website, mcwma.org/php/roads_database/index.php; online data entry is possible for authorized users (see [mcwma.org/pages_html/documents_working_2007/Roadside_Survey/] for a screen-capture of the user-interface, copy attached.) A GIS layer for PLS sections associated with the database of observations was used to create maps of the distribution of each species, or taxon. The results are displayed on the website, mcwma.org/pages_html/management/IM_workgroup/all_maps.shtml, and copies are attached.

Other Survey Protocols

In addition to the expert and roadside survey protocols, other survey protocols were developed, to varying levels of specificity. The MCWMA has adopted a three-protocol system, including:

1. the coarse-scale Roadside presence-only survey discussed above, done for weeds at approximately a 1-mile resolution throughout the WMA;
2. a medium-resolution protocol, termed “Reconnaissance-level,” appropriate to volunteers for mapping individual weed infestations at a scale and resolution appropriate for property and landscape-level prioritization and planning (protocol available from the website, mcwma.org/pages_html/documents/MCWMA-IM-reconnaissance_2007_01_25.pdf and copy attached);
3. a professional-level site-specific survey for characterizing weed populations at the level needed by agencies and landowners to support environmental documentation and site-specific remediation (guidelines available from the website, mcwma.org/pages_html/documents/MCWMA_Baseline_Guidelines_2006_06_07.html and copy attached).

Further, sensitive-species survey guidelines, mcwma.org/pages_html/documents/MCWMA-IM-sensitive-species_2006_06_13.doc, and monitoring guidelines, mcwma.org/pages_html/documents/MCWMA_Monitoring_Guidelines_2006_06_07.html, were developed.

Targets

In the proposal, indicators of the success of the weed information management effort were identified to be number of database records, size of GIS layers and miles of roads surveyed. The proposed target

values of the indicators were:

- 1000 database records for target species observations;
- 1 MB GIS map layers of species distribution;
- 200 miles of roads surveyed.

Actual indicator levels achieved in this project are:

- 2227 database records for invasive weed observations;
- 2.5MB Excel spreadsheet for observation data, (only 404KB as MySQL database on the webserver);
- 1.8MB GIS layers of species distributions;
- 541 miles of roads surveyed.

The achieved levels of collected weed distribution information exceeded the targets set in the proposal. Further, online delivery of the observation data in tabular and graphic form was implemented as well as online data entry. Thus, the project achieved results considerably above the requirements of the deliverable for collecting and presenting weed distribution information.

D) Projects

The projects component of the project includes planning and implementing weed treatment projects, and monitoring and evaluating the outcome.

Weed Debris Disposal Guidelines

While developing treatment plans for the demonstration project, we found a lack of references on best management practices for disposal of weed debris. To fill this gap, we created guidelines appropriate to the local conditions, which are available on the website, mcwma.org/pages_html/documents/Disposal_Options_2006_04_05.rtf, and a copy attached.

Project Selection Checklist and Review Process

To assist in planning, selecting and evaluating cooperative weed management projects, an electronic form was developed, available on the website, mcwma.org/pages_html/documents/MCWMA-PR-Checklist_2006_06_06.doc, copy attached. Four projects were evaluated in April, 2006 and one project, the Highways 1 & 20 Demonstration Project, was selected for implementation under this program. Weed Management Area partners and associates also contributed to the overall weed removal activities within the MCWMA through ongoing efforts. These projects are described in the following sections.

Demonstration Project at Highways 1 & 20

1. Pampas Grass Removal, May 2006: a California Conservation Corps crew of 11-13 workers was contracted for three days of work to manually remove pampas grass (*Cortaderia jubata*) from the site. The Fort Bragg Caltrans crew assisted with weed debris removal. The total hours devoted to this activity was 434 hours at a cost of nearly \$9000 to Caltrans. The area treated was about 0.25 gross acres. The per unit cost of this approach is thus \$36,000 per gross acre. Although this appears to be an exorbitant per unit rate, this was the only treatment method available, because Caltrans does not use herbicide in Mendocino County. Mechanical removal

was not feasible because of the steep slope and traffic safety concerns. Unfavorable site conditions including rocky soil, lack of soil moisture and a site history of many years of mowing and resprouting contributed to a requirement of greater effort than would otherwise be expected. This demonstration provides a reasonable upper bound to the per unit cost of manual removal of pampas grass.

2. Seed Collection, Summer 2006: permission was obtained from the landowners of the adjacent Hare Creek Village lot to gather native plants from the site, including perennial grass seed and rhizomes of Douglas iris (*Iris douglasii*). The lot is slated for development, so this was considered a native plant salvage operation. A College of the Redwoods student was hired as an intern to gather seed during the summer months, with an effort of 45 hours. The iris harvest was conducted during the October volunteer work event, discussed below.
3. Herbaceous Weed Removal and Revegetation, October 2006: a work weekend was held on October 21-22, 2006. The publicity flyer, showing before and after images from the May pampas grass removal, is available from the website, mcwma.org/documents/%20flyer_2006_10_21.pdf, and a copy is attached. Iceplant (*Carpobrotus edulis*) and weedy herbs and grasses were removed from a roughly 100 m² patch of slope. Hundreds of Douglas iris rhizomes were harvested and planted on the lower part of the slope, while 30 donated manzanita (*Arctostaphylos uva-ursi*) shrubs were installed in the upper part. An assortment of native plants donated by CNPS were placed in some of the bare areas left from the removal of pampas grass in the spring. Seven volunteers participated on Saturday, while a California Conservation Corps crew of 8 boosted the attendance to 12 on Sunday. A total of 76 hours of volunteer effort was expended.
4. Maintenance. Wild radish (*Raphanus spp.*) has germinated in profusion in places where the soil was disturbed by the manual treatments described above. Volunteers (0.5 hours), interns (1.25 hours) and paid CCC crews have weeded the sites, and plans are being formulated to mulch the site to discourage further weed growth.
5. Future. A Long-term Management Plan is under development for the demonstration site to ensure that weed treatments are consistent with the land management goals of an attractive, low-maintenance, non-invasive landscape.

European beachgrass treatment

State Park aides spent 550 hours manually removing European beachgrass at MacKerricher State Park in January and February, 2006. In the fall of 2006, an estimated 65 acres of beachgrass at Ten Mile Dunes was treated by burning. A follow-up herbicide treatment, to be applied to the regrowth in the 65-acre burned area, has been contracted, and is scheduled for February, 2007. In addition, about 6 acres of European beachgrass has been maintained manually over the past few years.

Other Weed Treatment Activities

1. Roadside control projects (Albion Ridge Broom Busters): Volunteer efforts of 42 hours resulted in the clearing of French and Scotch broom and jubatagrass in Albion along an estimated roadside distance of 6 miles (about 3 miles on either side).
2. Big River Stewards Program Activities: Big River Stewards is a program of the Mendocino

Land Trust, one of the MCWMA partners, to protect, restore and appreciate Big River State Park. Invasive Plant Removal Workdays accounted for the majority of Big River Stewards efforts over the project period, with 64 Stewards volunteering 239 hours removing non-native plants on nine weekend workdays. Sites treated ranged from Big River's High-Chute Ridge to the Laguna Marsh and Big River Beach, while invasive plants removed included broom, bush poppy, bull thistle, fennel, European beachgrass and jubata grass. Big River Stewards have removed broom, jubatagrass, and beachgrass from about 2 miles of roadside within State Parks, and an additional 1 acre off-road. During the Spring of 2006, planning began for the eventual operation of a native plant greenhouse, leading to two native plant propagation workshops held in cooperation with the Mendocino Coast Botanical Gardens and restoration gardener Mario Abreu.

3. Joan Curry Memorial Event: 4 volunteers contributed 17 hours of removal of iceplant and wild radish at the Mendocino Headlands in March 2006.
4. Noxious Weed Survey, Eradication and Biocontrol:
 - near Westport a Cape ivy site was sprayed and later surveyed for possible Biocontrol release (15 hours effort);
 - surveyed biddy-biddy (*Acaena novae-zelandiae*) site at Navarro River mouth with Peter Warner and State Inspector. Peter sprayed the site (8 hours);
 - collected tansy ragwort flea beetles (*Longitarsus jacobaeae*) in Del Norte County (10 hours), and released the beetles at 3 sites in the MCWMA (8 hours);
 - surveyed Scotch thistle (*Onopordum acanthium*) site in Albion, removed 30 rosettes, and conducted follow-up surveys (10 hours);
 - surveyed and removed of oblong spurge (*Euphorbia oblongata*) in Albion (8 hours);
 - surveyed and removed dalmatian toadflax (*Linaria dalmatica*) near Little River (14 hours);
 - surveyed Scotch thistle site in Boonville. No new plants found (2 hours);
 - surveyed known purple starthistle (*Centaurea calcitrapa*) site near Westport. No new weeds found (4 hours);
 - gorse removal on Hwy 20 near Fort Bragg (2 occasions, 2 hours total);
 - surveyed and sprayed giant salvinia (*Salvinia molesta*) north of Fort Bragg, conducted follow-up surveys (20 hours);
 - survey of oblong spurge site along the Garcia River (4 hours).

A total of 105 hours was expended on these activities,

5. Highway Corridor Gorse Removal: Caltrans contracted with the California Conservation Corps for 1088 hours of manual removal of gorse from the roadsides of Highway 1 in Caspar during December, 2005.
6. State Parks staff treated 2-3 acres of iceplant in the fall of 2006 at MacKerricher State Parks, and maintained 1/3 acre where iceplant had been removed prior to the project period. Effort was 18 hours.
7. State Parks contracted with the California Conservation Corps for the removal of about 5 acres of scattered Monterey cypresses and pines at Manchester State Park.
8. Broom and gorse removal at Jug Handle State Reserve totalled 1/4 acre.
9. Jackson Demonstration State Forest Staff manually cleared yellow star-thistle (*Centaurea solstitialis*) from 0.15 miles of roadside to a width of 50 feet with 7 hours effort in order to

establish cost-effectiveness estimates for this treatment method, generating 1 yard of debris.

10. Additional cooperative weed management projects for which statistics are unavailable are: Sea Ranch pampas grass control, Point Cabrillo Lighthouse Keepers weed removal, and Mendocino Coast Botanical Gardens coastal bluffs restoration.

Targets

In the proposal, indicators of the success of the weed treatment efforts were identified to be measures of hours worked, volunteers participating, area and roadside length treated and debris removed. The proposed target values of the indicators were:

- 10 treatment workdays;
- 750 total hours worked;
- 50 working volunteers;
- 150 volunteer hours worked;
- 5 participating school groups;
- 20 to 50 acres treated;
- 5 to 10 miles of roadsides treated;
- 10 yards of debris removed.

Actual indicator levels achieved in this project are:

- 14 treatment workdays;
- 2623 total hours worked;
- 80 working volunteers;
- 374 volunteer hours worked;
- 1 participating school group (College of the Redwoods);
- 74 acres treated;
- 8.2 miles of roadsides treated;
- 13 yards of debris removed from the Highways 1 & 20 demonstration site;
- 6 acres of previously-treated area maintained.

All target values were met or exceeded, except for the number of participating school groups. The Caltrans encroachment permit for Adopt-A-Highway projects does not allow workers under 18 years of age. Thus K-12 school groups were not able to participate in weed removal and planting at the Highways 1 & 20 Demonstration site. However, outreach to two high schools was conducted towards the end of the project, informing students of opportunities for conducting class projects and satisfying community service requirements through weed removal volunteer efforts in State Parks. We expect these outreach efforts to result in increased student participation in invasive plant management in the future.

3 Conclusion

The implementation of the Pulling Together Initiative Project for the formation of the Mendocino Coast Cooperative Weed Management Area has resulted in an effective organization, with 3 workgroups, Education and Outreach, Information Management and Projects, which guide and assist with program components designed to prevent and reduce the impacts of invasive plants along the Mendocino Coast. The project produced significant results including increased community awareness of invasive species, increased knowledge of weed distribution, and initiation of weed removal projects. Further, the

development of Strategic and Long-Term Management Plans has provided a framework necessary for the MCWMA to obtain future funding for sustained operation as well as to guide those efforts to successful conclusions. The progress we have made so far would not have been possible without the contribution of the many professional and volunteer organizations and members of the community listed below, with apologies for any omissions.

Acknowledgments

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National Fish and Wildlife Foundation, the funding agency for this project;

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MCWMA Partners

We thank our partners for in-kind support and technical assistance provided by their staff.

- [California Native Plant Society, Dorothy King Young Chapter;](#)
- [California Department of Parks and Recreation, Mendocino District;](#)
- [U.S. Bureau of Land Management, Ukiah Field Office;](#)
- [Mendocino County Department of Agriculture;](#)
- [Mendocino County Resource Conservation District;](#)
- [The Mendocino Land Trust;](#)
- [California Department of Fish and Game, Region 3;](#)
- [California Department of Forestry and Fire Protection, Jackson Demonstration State Forest;](#)
- [Caltrans District 1;](#)
- [Anderson Valley Nursery.](#)

MCWMA Associates and Contributors:

- Caspar Community Center provided use of their facility for a community meeting and has hosted several follow-up meetings to discuss gorse management;
- Gualala Community Center provided use of their facility for a community meeting;
- Anderson Valley Volunteer Fire Department provided use of their facility for a community meeting;
- Navarro Watershed Working Group co-sponsored the Anderson Valley community meetings, donated copies of their invasive plant brochure and has contributed to weed mapping and management in the Navarro River basin;
- College of the Redwoods provided used of their facility for a community meeting and several MCWMA management meetings;
- Teresa Sholars, professor of biology at the College of the Redwoods, provided valuable technical advice;
- Peter Warner, State Parks ecologist, provided extensive assistance and leadership (Education

and Outreach Workgroup, Planning Committee Chair) to the MCWMA both in an official capacity with the California Department of Parks and Recreation and as a volunteer;

- Lynn Webb, forester with Jackson Demonstration State Forest, provided extensive assistance and leadership (Information Management Workgroup Chair) to the MCWMA both in an official capacity with the California Department of Forestry and Fire and as a volunteer;
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- Julie Verran, Independent Coast Observer reporter and MCWMA volunteer;
- Pat Chan, MCWMA volunteer;
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- Mario Abreu, Mendocino Coast Botanical Gardens gardener, for native plant propagation and weed mapping;
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- Art Morley, for volunteer weed removal in State Parks;
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Others

- [Center for Invasive Plant Management](#) Long-term Management Plan Template.
- [Cal-IPC](#) brochures and PowerPoint presentation.

Attachments

1. Memorandum of Agreement [mcwma.org/documents_released/MOA/]
2. MCWMA boundaries map [mcwma.org/maps/MCWMAbound_map.pdf]
3. MCWMA Strategic Plan
[mcwma.org/pages_html/documents_working_2007/Strategic_Plan/]
4. Draft Long-Term Management Plan, Highway 1 & 20 Demonstration Site
[mcwma.org/pages_html/documents_working_2007/Demo_LTMP/]
5. MCWMA Information Sheet [mcwma.org/documents/InfoSheet_2006_02_27.doc]
6. MCWMA Impact Questionnaire [mcwma.org/documents/impact_form_2006_03_14.pdf]
7. MCWMA Website Design Proposal
[mcwma.org/pages_html/documents_working_2007/Website_Design/Website_Proposal.doc]
8. Community Meeting Results
[mcwma.org/pages_html/documents_working_2007/Public_Meetings/pbm_results_2007_01_23.xls]
9. Trifold Weed Display (image)
[mcwma.org/images/displays/trifold_display_roadside_survey.JPG]
10. Gorse Containment Project Update
[mcwma.org/pages_html/documents/gorse_containment_update.rtf]
11. Caspar Gorse Distribution [mcwma.org/maps/gorse_in_caspar2.jpg]

12. Caspar Gorse Resolution
[mcwma.org/pages_html/documents/Send2CDFA/Attachments/gorse_res.pdf]
13. MCWMA Integrated Weed Management Seminar publicity flyer
[mcwma.org/documents/Bossard_Moore_2006_12_4.pdf]
14. MCWMA Online Newsletters [mcwma.org/pages_html/about_us/index.shtml]
15. MCWMA Partner Invitation
[mcwma.org/pages_html/documents_working_2007/Partner_Outreach/]
16. Nursery Outreach Letter and Landscape Alternatives Questionnaire
[mcwma.org/pages_html/documents_working_2007/Landscape_Alternatives/]
17. Expert Mapping Procedure, Forms and Results Spreadsheet
[mcwma.org/documents_released/expert_mapping/]
18. Expert Mapping Results – Maps [mcwma.org/maps/expert_weed_scans/]
19. Roadside Survey Webpage [mcwma.org/pages_html/involved/index.shtml#Survey]
20. Roadside Survey Online Database [mcwma.org/php/roads_database/index.php]
21. Roadside Survey Online Data Entry Form (image)
[mcwma.org/pages_html/documents_working_2007/Roadside_Survey/]
22. Roadside Survey Maps [mcwma.org/pages_html/management/IM_workgroup/all_maps.shtml]
23. Reconnaissance-level Survey Protocol
[mcwma.org/pages_html/documents/MCWMA-IM-reconnaissance_2007_01_25.pdf];
24. Pretreatment Survey Specifications
[mcwma.org/pages_html/documents/MCWMA_Baseline_Guidelines_2006_06_07.html];
25. Sensitive-Species Survey Specifications
[mcwma.org/pages_html/documents/MCWMA-IM-sensitive-species_2006_06_13.doc];
26. Monitoring Specifications
[mcwma.org/pages_html/documents/MCWMA_Monitoring_Guidelines_2006_06_07.html];
27. Weed Debris Disposal Guidelines
[mcwma.org/pages_html/documents/Disposal_Options_2006_04_05.rtf];
28. MCWMA Project Checklist
[mcwma.org/pages_html/documents/MCWMA-PR-Checklist_2006_06_06.doc];
29. Highway 1 & 20 Demonstration Site flyer, with before and after images of the May, 2006 pampas grass removal
[mcwma.org/documents/%20flyer_2006_10_21.pdf].