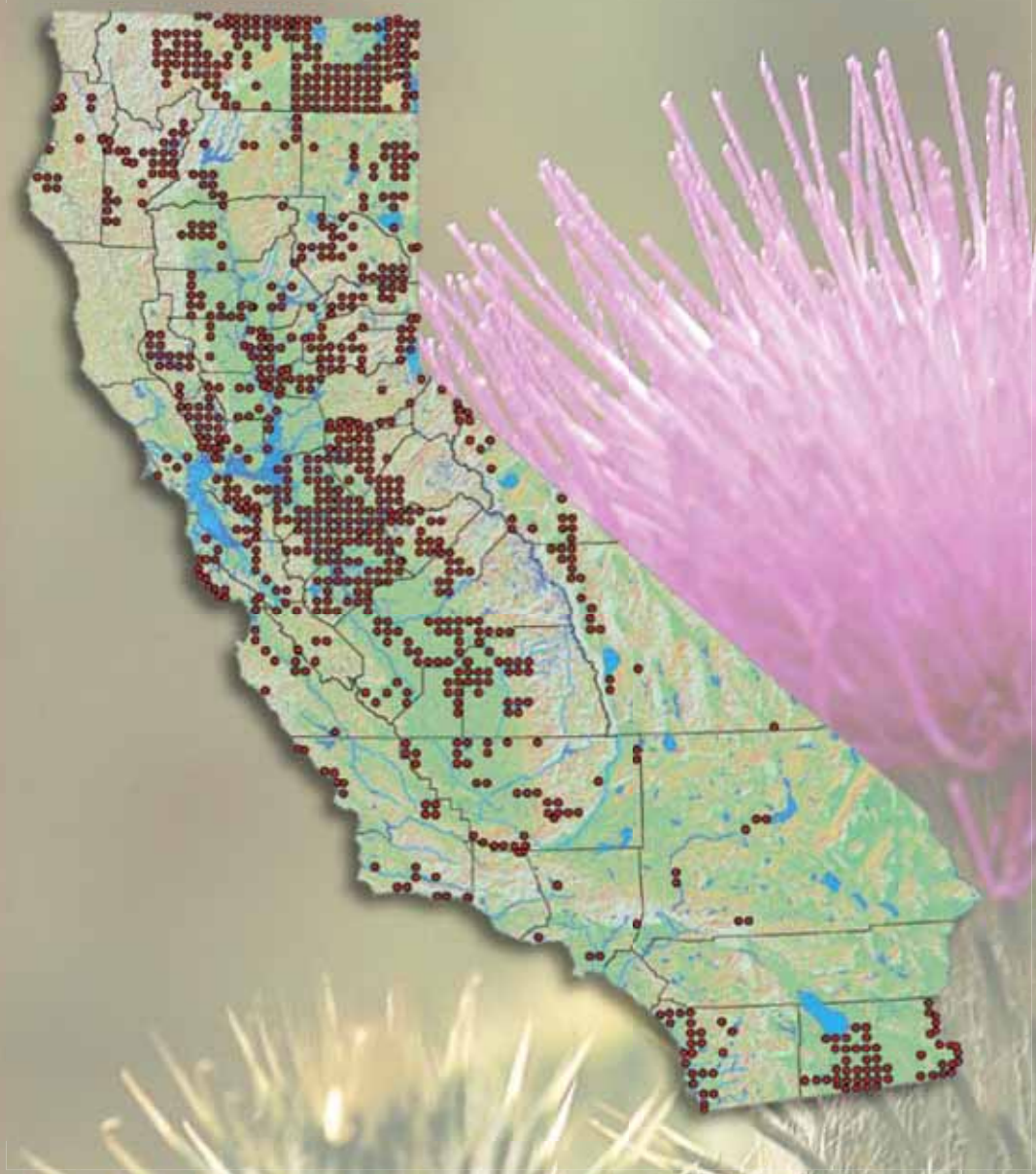
Noxious Weed Management Area Support Program

Integrated Pest Control Branch California Department of Food and Agriculture



Weed Management Area Project Sites

Final Report on the SB 1740 (Legislative Year 2000) Funding Program

Cover map by Colleen Murphy -Vierra, California Department of Food and Agriculture
Locations of Weed Management Area Noxious Weed Control Projects across California

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Noxious Weed Management Area Support Program

July 2006

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Integrated Pest Control Branch

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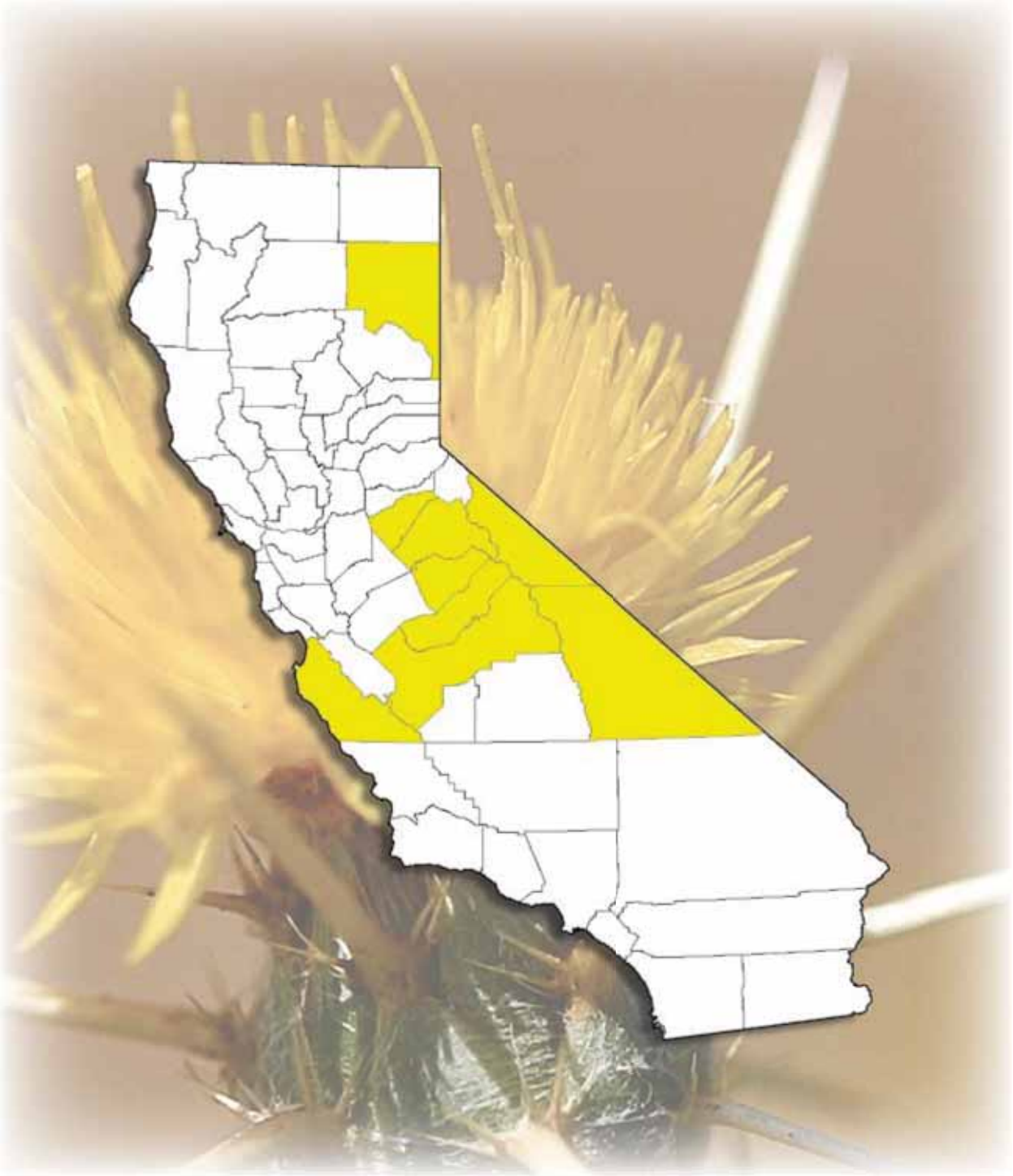
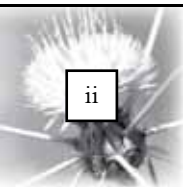
Executive Summary



Map of counties covered by Weed Management Areas as of 1997, new Weed Management Areas in yellow

Background photo yellow starthistle, Centaurea solstitialis, *by David Kratville*



Highlights for the Weed Management Area Program include:

- The eradication of 2,015 populations of high priority weed infestations.
- The treatment of more than 128,421 acres of high priority weed infestations.
- The receiving of $7,025,187 in matching funds from outside grant funding and the contribution of in-kind donations and services by Weed Management Areas (WMAs) valuing $9,109,946 (3:1).
- The distribution of $5.4 million to 45 WMAs covering 57 counties (AB 1168 and SB 1740).
- The development of new local partnerships between public agencies, private landowners, agriculturalists and conservationists, with outreach programs reaching 88,803 people.
- Attendance by 6,781 people at regular weed management meetings throughout the state.

Noxious and invasive weeds threaten the beneficial uses of our land, they jeopardize the safety of our citizenry due to their extreme flammability, and they destroy California's unique environment and rich biodiversity. Because of increased weed spread and a lack of funds at the county level, landowners and agencies have been losing economic and biological resources to the spread of noxious weeds, especially in rural parts of California.

Weed Management Areas are dynamic groups of local land managers and public agencies, which have banded together to be more cooperative, strategic, and active in battling the weed invasion spreading across our landscape like an explosion in slow motion. WMAs are a unique and crucial infrastructure because:

- They are organized at the local level and can address local issues;
- They foster collaboration between the public and private sector;
- They emphasize education and prevention;
- They bring in matching resources (often federal) at a ratio of three matching dollars to every state dollar funded;
- They are partners in all statewide weed eradication programs;
- They are meant to complement, not supplant, the California Department of Food and Agriculture's (CDFA) core weed management programs.

This final report presents a summary of the implementation of Assembly Bill 1168, Frusetta (Chapter 961, Statutes of 1999) and Senate Bill 1740, Leslie (Chapter 315 Statutes of 2000). Both of these bills authorized the Noxious Weed Management Fund within the CDFA and the WMA Support Program to administer the allocation of the funding.

These two pieces of legislation have provided new hope to landowners and public land holding agencies that have been losing economic and biological resources to the spread of noxious weeds. The bills have provided a total of $5.4 million over a period of six years to local public and private partnerships to form local WMAs

and aggressively control high priority weed infestations. WMAs have created a mechanism for landowners, land managers (private, city, county, state and federal), special districts, and the public to combine their actions to control noxious weed problems, which they hold in common. These are partnerships for a better environment.

This has been an action-oriented program focusing on on-the-ground control. Although mapping, planning, and education are critical to the long-term success of the WMAs, these activities are secondary with respect to attacking high-priority weed infestations now. The program was set up to achieve permanent and lasting results, therefore projects are carried out with clear objectives and are monitored. The CDFA implements an intensive program to coordinate, train, and evaluate WMAs throughout the state. The CDFA Statewide WMA Coordinator works with CDFA district personnel to provide training in control methodology, monitoring, strategic planning, mapping, and weed education.

The CDFA has ensured that WMAs are not a set of individual county programs, but instead linked networks of highly effective groups, working in cooperation to solve a rapidly spreading, statewide problem, which does not recognize borders, fences, or political boundaries. The CDFA WMA Support Program has provided individualized trainings, hosted seven statewide annual workshops, and established 107 financial contracts. To ensure accountability, the CDFA conducted thorough WMA field project reviews for each WMA in the state.

By legislative mandate this report also provides a general overview of CDFA's core noxious, invasive weed programs, which includes the Noxious Weed Eradication Program, Hydrilla Program, and the Biological Control Program. These programs are complementary to the activities of the WMA programs and are involved at all levels of WMA activities. These noxious weed programs are conducted in cooperation with the county agricultural commissioners, federal, and state agencies as well as with various entities such as private agricultural organizations and resource conservation groups. The noxious weed programs are a part of the Department's overall pest prevention system, which includes pest exclusion, detection, eradication/suppression, and education. Through careful planning, successful collaboration, and technological advancements, the CDFA and its many partners have made significant progress in the fight against selected high-priority noxious weeds at a statewide level.

Arundo was successfully eradicated from the Tequesquita Slough watershed in San Benito County. Here, fire crews from the California Department of Forestry remove arundo, which is being cut by chainsaws. The cut arundo is being loaded by hand into a County Public Works dump truck, where it will be moved to a nearby field and burned. *Photographer: Ron Ross, San Benito County Weed Management Area*

Introduction

Map of counties covered by Weed Management Areas as of 1998, new Weed Management Areas in yellow
Background photo scarlet wisteria, Sesbania punicea, *by Bob Case*

Background

Weeds are found virtually everywhere in our landscape; they grow in our yards, they line roads and waterways, and they thrive in wide-open spaces. Yet most people are unaware of the danger some weeds can pose to our natural environment.

Harmful, or noxious, weeds act as biological pollutants. They can hinder the beneficial uses of land, jeopardize the safety of humans and property due to their extreme flammability, harm animals that encounter them, and destroy the rich and unique biodiversity upon which California prides itself. Due to lack of funds at the county level, especially in rural parts of the state, landowners and agencies have been losing economic and biological resources to the spread of noxious weeds.

In recognition of this growing threat, two pieces of legislation passed that appropriated funds to create and support local organizations, called Weed Management Areas (WMAs), which can effectively reduce or eliminate the spread of invasive and noxious weeds. Noxious weeds do not respect ownership, geographic, or jurisdictional boundaries. Weeds such as yellow starthistle occur in almost every county in California (Appendix 1). The artificial boundaries that would normally reduce the effectiveness of control efforts can be eliminated through cooperation. The success of one landowner controlling the spread of noxious weeds is, in the long run, dependent on the success of adjacent landowners.

The goals and accomplishments of coordinated noxious weed management are to:

- Protect and enhance the biodiversity of California ecosystems;
- Decrease the costs of roadside, park, and waterway maintenance;
- Reduce fire hazard and fire control costs in the state; and
- Maintain production capability of cropland and rangeland.

WMAs practice integrated weed management, which involves the use of the best available control techniques to limit the impact and spread of target weeds. Selection of control methods is determined by the group. The selection is based on environmental factors, the extent and nature of the weed infestation, the objectives for the land, effectiveness of the control techniques, and economics.

With the support provided by Assembly Bill 1168 and Senate Bill 1740, the number of countywide WMAs in California has grown from seven in early 1997 to 45 in 2005 covering the entire state (Appendix 2). Most of these WMAs are formed at a county or multi-county level to offer the best coordination with the Agricultural Commissioner, Resource Conservation Districts, and other organizations.

A steering committee and a chairperson voluntarily govern a WMA, which acts in partnership with state or county government agencies. Integrated weed management typically includes strategies for:

- Awareness and education;
- Early detection and prevention of noxious weeds;
- Use of all available tools to reduce or eliminate the spread of noxious weeds (mechanical, biological control agents, herbicides and cultural and management practices); and
- Restoration of weed-impacted or vulnerable lands.

The California Department of Food and Agriculture (CDFA) is responsible for protecting the state's citizenry against invasive and destructive pests, including noxious weeds. The CDFA's approach to pest prevention is comprised of four components:

Exclusion: Keep a pest from entering the state.

Detection and Identification: Find the pest population while it is still small.

Eradication or Control: Eliminate the pest or reduce its spread.

Education: Inform the public so they will act to keep the state free of pests.

Understanding Noxious Weeds

Described by some as an "explosion in slow motion," noxious weeds are a serious environmental threat requiring vigilant management.

Imagine acres of hillside where range animals are unable to graze because dense, spiny weeds can injure their mouths and eyes. Or consider a weed whose root system steals groundwater from native plants, upsetting the natural ecosystem and displacing sensitive habitat. Then there are the thousands of acres of dry weeds whose extreme flammability poses a fire hazard to buildings and wilderness. These are just a few of the ill effects of noxious weeds.

Examples of Noxious Weeds

Yellow starthistle, which is among the most persistent noxious weeds in California, covers an estimated 12 million acres across the state. The dense, matted growth of this weed displaces native species and forage plants, reducing biodiversity and habitat for rare species. Range animals will not eat the plant once spines begin to develop, and it is toxic to horses. The starthistle's deep taproot depletes moisture in the lower layers of the soil and this competition for deep water hinders the establishment of oak seedlings, which are dwindling in California's grasslands.

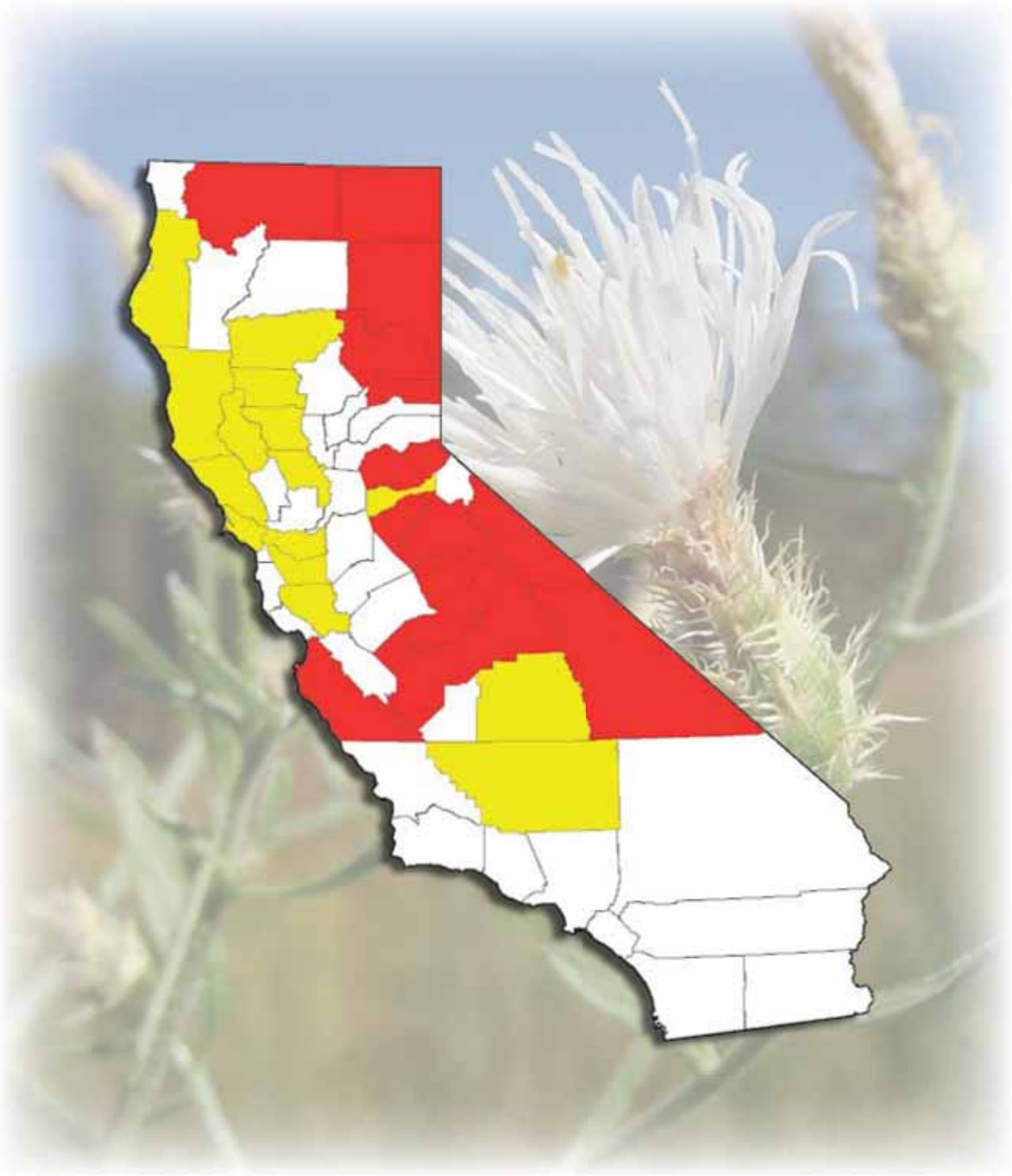
Perennial peppercress, or pepperweed, grows back each year from a deep, rambling root system. Its dense, tall growth and thick thatch of dead stems from previous seasons choke out nearly all other plants in a stand. It has encroached on rare plants in Suisun Marsh, and its invasion of pickleweed marshes is threatening sensitive animals and birds.

Dalmatian toadflax can form large colonies that compete against grasses, winter annuals, and shallow-rooted perennials for soil moisture. Areas without toadflax may produce over two times as much grass as infested plots. Its root system can penetrate more than six feet deep and 11 feet outward, and root fragments can start new plants. Seed production is dramatic; plants can produce up to 500,000 seeds that can remain viable for up to 10 years.

Hydrilla is considered one of the top aquatic weed problems in the world. It can quickly take over lakes and streams, crowding out native plants and animals, while reducing available water storage and movement. Its rapid growth and ease of spread by boats makes early detection and eradication critical.

Weed Spray Crew member treating arundo regrowth in San Francisquito Canyon after the Copper Hill Fire.

Program Description



Map of counties covered by Weed Management Areas as of 1999, new Weed Management Areas in yellow

Background photo diffuse knapweed, Centaurea diffusa, *by Kevin Martyn*

Weed Management Areas

Because noxious weeds frequently overlap geographic or jurisdictional boundaries, there is strong need for collaborative management. In 1999, Governor Gray Davis approved Assembly Bill 1168 (Frusetta), establishing Weed Management Areas (WMAs) as a way to encourage active, cost-effective partnerships in the fight against noxious weeds.

WMAs are cooperative, local organizations that bring together all interested landowners, land managers (private, city, county, state, and federal), and other stakeholders for the purpose of combining their weed control efforts and expertise.

Geographically, the WMAs are formed at the county or multi-county level in order to ensure the most effective coordination with the local agricultural commissioner, resource conservation district, and other partners.

The overarching goals of coordinated noxious weed management are to protect biodiversity, safeguard species, maintain land productivity, reduce fire risks, improve fish and wildlife habitat, and decrease maintenance costs of roadsides, parks and waterways.

WMAs are meant to complement, not supplant, the California Department of Food and Agriculture's (CDFA) core weed management programs. WMAs, which are governed voluntarily by a chairperson or steering committee, are responsible for collaborative, on the ground control efforts.

The CDFA does not oversee the day-to-day activities of the WMAs. Instead, it fosters the creation of WMAs; provides technical assistance for grant writing, outreach, strategic planning and implementation; offers cost-share financial assistance; and ensures the efficacious use of these state funds.

Cost sharing is a major component of WMA partnerships. Cost-share funding helps initiate weed management pilot programs and supplements existing budgets of local weed management collaborations.

Although mapping, planning, and education are critical to the long-term success of WMAs, these activities are secondary to attacking high-priority weed infestations now. A variety of methods from the weed control "toolbox" are employed for this purpose, including hand removal, biological control, mowing, grazing, chemical control, and controlled burning.

Accomplishments

Highlights for the 2000 – 2004 WMA program include:

- The eradication of 2,015 populations of high priority weed infestations;
- The treatment of more than 128,421 acres of high priority weed infestations;
- The receiving of $7,025,187 in matching funds from outside grant funding and the contribution of in-kind donations and services by WMAs valuing $9,109,946 (3:1);
- The distribution of $5.6 million to 45 WMAs covering 57 counties (AB 1168 & SB 1740);
- The development of new local partnerships between public agencies, private landowners, agriculturalists and conservationists, with outreach programs reaching 88,803 people; and
- Attendance by 6,781 people at regular weed management meetings throughout the state.

Mapping and Inventory

The strategic approach to regional noxious weed management requires accurate information on where target weeds grow. Computer-based mapping is crucial for strategic planning, project monitoring and outreach. For this reason, CDFA provides WMAs with guidance and training in weed survey and mapping.

The CDFA staff have conducted weed mapping seminars as well as one-on-one trainings across the state on Global Positioning System (GPS) and Geographic Information System (GIS). Many of the WMAs have acquired GPS receivers to precisely locate weed infestations in rural areas and transfer the data to GIS computers. The CDFA has also taken the lead in the formation of the California Weed Mapping Steering Committee, which is comprised of the California Department of Fish and Game, University of California, California Department of Pesticide Regulation, United States Department of Agriculture (USDA), seven county agriculture departments and many WMAs. The Committee develops mapping standards, offers training, and identifies data gaps and resources.

The CDFA, along with the California Department of Transportation, County Agricultural Commissioners Office, and local WMAs, has also formed a cooperative yellow starthistle (YST) mapping and assessment project

on the west slope of the Sierra Nevada. This project has resulted in the mapping of YST at a high level of resolution and an eastern boundary of starthistle spread, called the "no spread line," has been established. Immediately west of this boundary, a containment zone has been determined and key outlier populations have been identified. The eradication and control of YST in these areas is a high priority among WMAs.

Outreach and Education

A successful weed control program requires widespread awareness of the problem among landowners and citizenry. On-the-ground control efforts must work in conjunction with vigorous education and awareness campaigns. So far, an estimated 129,000 landowners and citizens have been directly involved in noxious and invasive weed education events statewide.

The CDFA enhances these awareness campaigns by helping weed management groups distribute outreach materials across the state. A website at www.cdfa.ca.gov/weedhome was established to catalog existing outreach materials and to avoid duplicated efforts.

Selected outreach materials include:

Flyers and Brochures: Over 20 WMAs have created a noxious weed brochure that highlights the main priority weeds for their county.

County Methodology Handbooks: The Contra Costa/Alameda WMA created a 30-page YST control handbook for private landowners.

Expo Displays: Professional and eye-catching Expo displays produced by over 10 WMAs present information about weed identification, the harmful impact of weeds, and mitigation efforts.

Public Weed Workshops: Public workshops, which can be technical in nature for treatment methodology, can also focus on the impacts of noxious weeds.

Weed Awareness Week: Many WMAs invite their communities to participate in personal guided tours to give people a first-hand look at weed impacts.

Print Media Campaigns: Hundreds of newspaper and magazine articles feature showcased weeds and WMAs across the state.

Public Library Resources Center: Collections of weed resource materials, including books and videos, and a weed section at the local library for the benefit of the community.

Caltrans assisting with the control of pampas grass, **Cortaderia selloana,** *on Elings Park during. This project was funded by the Southern California Wetlands Recovery Project and by the County of Santa Barbara's Coastal Resource Enhancement Fund.*

Success Stories

Map of counties covered by Weed Management Areas as of late 1999, new Weed Management Areas in yellow

Background photo gorse, Ulex europea, *by David Kratville*

County-by-County Highlights of Weed Management

Alameda/Contra Costa

In the past four years, the cooperative Alameda/Contra Costa Weed Management Area (WMA) has leveraged cost-share State funding, volunteer work, and work performed by agencies. One major cost-share accomplishment was working with 23 growers and land managers to treat a total of 7,914 net acres of yellow starthistle (YST) in four watershed areas. In a similar cost share with eight land managers, 190 net acres of purple starthistle was treated. An extensive three-year program was partially funded through the WMA to reduce noxious weeds on a 20 acre firebreak area in the Berkeley Hills. Lastly, a notable on-the-ground accomplishment was the first-time discovery of purple loosestrife in the two county region, a direct result of outreach done through the WMA. The infestation was caught at a very early stage with about one-quarter net acres found in tidal marshland and approximately 200 plants widely spaced about eight miles of creek bottomland. The County Departments of Agriculture and Flood Control have aggressively treated these plants and seedlings for two years in the hope of eradication.

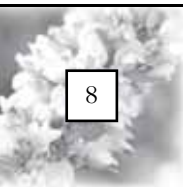
The WMA's outreach accomplishments include the development of a 12-page, full color YST booklet that includes a treatment decision-tree and information on biological controls. The WMA also developed an eight-page coloring/activity book on noxious weeds, and partners have held numerous grower and agency workshops on noxious weed identity and mapping. Each year a noxious weed display and awareness booth has been put up at the two County Fairs. The WMA held a six-hour YST workshop/field trip with about 100 grower and agency attendees. The workshop was taped and has been aired several times since then on local cable television.

Alpine

The Alpine County (CA)/Upper Carson River Watershed (NV) is a bi-state WMA dedicated to working cooperatively across state boundaries to prevent the spread of invasive weed species and to eradicate known weed infestations. Highlights of activities from 2001 to 2004 include: 1) weed group partners treated 140 acres and 20 miles of roadside annually to eradicate YST. YST is still eradicable in Alpine County; 2) mapped and treated invasive weeds on 1,800 miles of secondary and primary roads in Alpine County and 4,000 acres of public lands; 3) coordinated efforts to eradicate diffuse knapweed in the Gardnerville, Nevada area, including a gravel materials facility and the surrounding properties, which was instrumental in stopping the spread of diffuse knapweed into California via construction materials; and 4) conducted workshops and sent direct mailings to reach 1,980 people regarding invasive weed identification and control.

Butte

The Butte County WMA (BCWMA), founded in 1999, coordinates efforts between multiple jurisdictional entities involved in overlapping weed control projects. Most control and eradication efforts have concentrated on prioritized noxious species, which are documented in the strategic control plan. The Butte County program promotes community education, focusing on noxious weed issues. As a result, BCWMA utilizes a Geographic Information System (GIS) digital weed mapping system, which was implemented by the Agricultural Commissioner's Office. A GIS digital map and database was created for all the recorded, rated weeds in the county, consolidating the historical and current weed database, and a Global Positioning System (GPS) confirmation survey was conducted and integrated into this GIS database. The Agricultural Commissioner's staff continues to improve their knowledge and utilization of the systems, applying them to related pest management issues. Also, a WMA noxious weed public information brochure was developed and biocontrol efforts have been well publicized throughout the county.



By 2003, using Senate Bill (SB) 1740 funding, the County Agricultural Department had established a cooperative organization among members that could pool resources, explore funding possibilities and respond to weed control issues in the County, which were not covered under state eradication programs. Since then, 37 industrial, government, public, and private entities have cooperated in seven ongoing noxious weed control projects. Many additional weed control programs have developed as spin-offs from the SB 1740 projects. The County Agricultural Departments' administration of the grant projects, fiscal support, pursuit of additional funding, and solicitation of participants has been the binding force that has held the BCWMA together. Through the Department's efforts, industrial and residential Land Development projects have integrated weed control programs and new chemical and biocontrol projects have participation and support from adjacent jurisdictional entities. Weed control projects and local resources are being integrated on a level never experienced in the county before.

Calaveras/Tuolumne

Calaveras County and Tuolumne County form the cooperative Central Sierra Partnership Against Weeds (CSPAW). The WMA has had a successful four years promoting the control of YST and raising the awareness of the threat of other exotic invasive plants. Over 10,000 acres of rangeland infested with YST has been controlled using the monies provided by SB 1740 as incentive. Residents were able to actually see the YST populations diminishing in specific areas of the county, due to the countywide roadside program. This portion of the work plan impacted the largest number of residents in Tuolumne County, prompting individual landowners to take action on their own land.

At least 2,000 "Dirty Dozen" invasive plant brochures have been handed out at CSPAW meetings, workshops and events, and "Invasive Plant" presentations were made for several homeowner associations representing a large portion of Calaveras County. Subsequently, requests for pesticide permits increased and the public became more aware of the importance of timing an application, early weed identification, and the importance of land management to prevent future noxious weed infestations. Through the public education process, the WMA has found eight additional A-rated and B-rated weed sites, and successfully has had noxious weeds listed as a criteria for California Environmental Quality Act documents and other environmental analysis in the County. Language is being pursued to make the control of noxious weeds and cleaning of equipment on new development a mitigating measure when a building permit is obtained at the county level. The momentum created and the infrastructure built by SB 1740 must remain, as many new relationships are now established and our farmers, ranchers, homeowners and agencies are working together to make a difference in the war on invasive plants.

Colusa/Glenn/Tehama

This cooperative tri-county WMA enjoyed numerous accomplishments over the last year. To start, the WMA produced and distributed their "Dirty Dozen" informative brochures. Subsequently, the WMA reduced noxious weed populations in a major watershed area, and eradicated two A-rated weed populations. Additionally, crews greatly reduced arundo and tamarisk in several creek sites, removed weeds from a pioneer cemetery, introduced native vegetation, and greatly increased community involvement for further enhancement of this historic resource. The WMA provided additional outreach programs that stimulated the community and raised awareness of the necessity of weed management. Also in 2004, the WMA initiated a YST cost share program, which vastly increased the landowners' interest in reducing the YST populations. In order to expand public awareness of the program, WMA personnel introduced high school students to the concept that there are invasive weeds in their local ecosystem that are damaging to native plants and animals. Facing budget constraints, the WMA sought out and applied for grants and additional funding. Lastly, and likely the most important, the tri-county WMA has successfully built new partnerships with other agencies to curtail the spread of invasive vegetation throughout the northern Sacramento Valley.

El Dorado

The El Dorado County Noxious Weed Management Group was formed in 1998 to coordinate activities necessary for the prevention, control and eradication of invasive weeds. Over 25 landowners and managers, agencies, and organizations have consistently participated in implementing control and educational projects over

the past four years. Highlights of the 2001 through 2004 activities include: 1) 13,000 acres of YST were treated; 2) cooperative efforts continued to eradicate spotted knapweed on 50 acres in the Cleveland Fire Area; 3) noxious weed infestations on 7,100 miles of primary and secondary roads were surveyed and treated; 4) the WMA informed 5,900 members of the general public at workshops and events with information on invasive weed identification, how to prevent weeds from spreading, and the threats to agriculture, wildlife, water quality and biodiversity associated with invasive plant species; and 5) SB 1740 funds were matched with $580,000 in-kind and new grant contributions.

Humboldt/Del Norte

The Humboldt/Del Norte WMA's primary goal is to enhance the effectiveness of existing weed management programs and advance good land stewardship practices, public awareness, integrated pest management, and the knowledge and skills necessary to mange invasive weeds. A major accomplishment in 2004 was the revision of their Memorandum of Understanding (MOU) to include Del Norte County, which was previously not in a WMA. Other non-profit organizations and large, private landowners have also become members of the MOU creating a more diverse and cooperative WMA. The WMA continued its four major education projects: California Weed Awareness Week, the Humboldt County Fair Weed Booth, and two biannual meetings, where guest speakers give presentations on weed control, removal methods, and mapping techniques.

Imperial

Through the Imperial County WMA, local agencies have cooperated on weed surveys and control, and public education programs have been initiated. Previously there was no funding for these programs, so survey and eradication of non-A-rated noxious weed infestations were "hit and miss," and mapping was non-existent. Many weed infestations have now been located, GPS-ed, mapped, and either controlled or eradicated. Other agencies are now showing an interest in joining the WMA to pool resources and work toward common weed control goals; however, at this time the WMA is not as active as it has been in previous years due to lack of funding and personnel.

Inyo/Mono

During the last five years, the Eastern Sierra WMA (ESWMA) has been able to manage and eradicate weed populations more efficiently and cooperatively than members could have done alone. Over 50,000 acres have been treated and almost all weed populations are now under control. Weeds at several sites have been eradicated, and many previously unknown sites have been found during survey efforts, which will help save resources in the future. The many public outreach efforts that were conducted will ensure that the public is aware of noxious weeds, and help foster public support for the ESWMA. Priority species, which have been targeted, include saltcedar, perennial pepperweed, halogeton, Scotch thistle, Canada thistle, spotted knapweed, Russian knapweed, and YST. Eradication and control of these species has helped to protect the local agricultural industry and the local native ecosystem.

Kern

The Kern WMA is a partnership of diverse stakeholders with the common goal of reducing noxious weed infestations and the damage they can cause in the county. The Kern WMA works to reach its goal by: 1) educating the public on the problems associated with noxious weeds, their prevention, and control; 2) providing a coordinated approach to identifying infestations; and 3) developing an integrated response to quickly control and eradicate those weeds. Over the last four years the Kern WMA has used SB 1740 and Assembly Bill (AB) 1168 funds to identify and treat 1,440 acres of noxious weeds. Kern WMA cooperators spent an additional $425,000 in the form of in-kind dollars, hours, and services to educate the public, identify and map infestations, and treat an additional 5,375 acres of noxious weeds. The Kern WMA has effectively reduced, and even eradicated, many weed populations throughout the county. Finally, the Kern WMA's successful weed control programs have encouraged other landowners and managers to become more actively involved.

Kings

The Kings Partnership Against Weeds (KPAW) used SB 1740 funds to purchase the needed chemicals and provide some of the labor to control weeds of concern in Kings County and the state. Most of the expenditures went toward inventory and mapping A-rated weeds and

other high priority weeds in the county. A recent goal that has surfaced since the inception of KPAW is for the WMA to protect the waterways of the county and prevent them from becoming the source of dissemination of weeds.

Education is one of the best tools in preventing the further spread of noxious and invasive weeds, locating previously unknown and remote weed populations, and rallying support for controlling and eradicating infested sites. A brochure highlighting weeds of concern for Kings County was published and distributed in 2001 and power point presentations were prepared for KPAW members to give various to groups and organizations.

Lake

The goals of the Lake County WMA (LCWMA) include: inventorying and eradicating non-native invasive weeds in Lake County (most notably, Arundo donax and Tamarix sp.); educating and informing the public on issues that accompany invasive weeds; and working cooperatively with a diverse group of public, private, and tribal agencies and groups to accomplish these goals.

Highlights include: extensive inventory and mapping activities; initiation of an eradication and monitoring program aimed at the above-mentioned species; use of GPS technology and field data sheets to map and quantify over 400 infestations; treatment of 44 of those sites (biomass removal and chemical stump treatments) before the funding for such work was exhausted; and an Invasive Plant School at the Konocti Harbor Resort and Spa with nearly 100 attendees receiving valuable information on a wide array of topics.

Lassen

The Lassen WMA (Lassen S.W.A.T.) focuses on preventing, controlling, and eradicating noxious weeds. Prevention activities include public outreach and education events, which takes place annually through the county fair booth, an annual continuing education agricultural class conducted at the college, and guest lectures/talks given periodically throughout the season when outreach opportunities arise. Control and eradication are accomplished through coordinated efforts of the WMA's participants. Noxious weed sites are inventoried, tracked, and the information is shared among each agency and private entity involved.

The majority of the funds utilized by SB 1740 were directed toward the treatment of Scotch thistle in the Dixie Valley Project Area. With these funds, the WMA was able to provide the start-up resources needed to implement a long-term goal of containment.

Los Angeles

In the five years the Los Angeles County WMA has been in existence, its partners have been involved with the direct suppression of spotted knapweed, YST, arundo, Geraldton carnation spurge, perennial pepperweed, and hoary cress. The WMA has also been a source for speakers on invasive weed issues at seminars, training classes and other public outreach settings. A children's book explaining the importance of invasive weeds has also been developed and distributed. Most important has been the creation of a resource "pool" for all of the participants in the WMA so that each member of the group can most often answer any weed management problem encountered. This provides a unique opportunity for many different groups to interact and become a great source of knowledge for one another.

Marin/Sonoma

Their motto is "We put the 'we' in weed management." The Marin/Sonoma WMA's accomplishments include: 1) a newly redesigned brochure reaching over 5,000 people; 2) a "Don't Plant a Pest" power point presentation designed and presented to all nurseries in both counties; 3) the gain of more Sonoma County participation; 4) the hiring of an intern to continue the mapping of target weed species; 5) education workshops and field days conducted for 300 people; and 6) hand removal of purple starthistles and distaff thistles on approximately 150 acres of rangeland where chemicals cannot be used.

The goals of the Marin/Sonoma WMA are to manage noxious and invasive non-native weeds by: enhancing the effectiveness of existing weed management programs; increasing public awareness; advancing the knowledge and skills of good land stewardship practices; and improving Integrated Pest Management methods.

Some highlights include: the hand pulling removal of purple starthistle and distaff thistle with a crew; the mapping of five invasive weed species along all Caltrans right-of-ways within WMA to aid in future management decisions; the mapping of purple starthistle and distaff

thistle on all roads within the WMA; the mapping of Ehrharta erecta populations; an ice plant hand pulling workshop; creation of a WMA poster for the Cal-IPC conference; the beginnings of a redesign for a new weed brochure. Each of these actions have benefited the greater community by educating community members on invasive weed identification and control methods.

Mariposa/Madera/Fresno

The Sierra-San Joaquin Noxious Weed Alliance (WMA for Mariposa, Madera, and Fresno Counties) consists of over 20 agencies and groups successfully coordinating weed management since 1998. An average of 800 acres of noxious weeds were controlled each year from 2001-2004 with SB1740 funds. At least 35 small, new infestations were eradicated (including 5 A-rated spotted knapweed and 2 B-rated perennial pepperweed sites). The WMA printed and distributed over 10,000 color publications. All three counties extensively inventoried and mapped yellow starthistle (YST) and other weeds, leading to control along roads and on key properties. Mariposa County treated a total of 990 acres of YST over 64 properties, resulting in a 94 percent decrease in emerged plants. Over 368 miles (1220 acres) of roads were treated for YST and Iberian starthistle was reduced on 70 parcels along Piney Creek. Each year about 30 acres of invasive weeds (including spotted knapweed) were controlled in Yosemite National Park. Madera County control efforts included the treatment of YST and Italian thistle along an average of 35 acres of county roads annually, and control of an average of 40 acres of private property each year through the cost share program. SB1740 funds allowed Caltrans to treat Italian thistle and YST along state Highway 41. Fresno County successfully reduced infestations of A-rated rush skeletonweed by 90% over three years; and eradicated a 10 acre infestation of B-rated purple starthistle. In 2002, treatment began for YST control on county roads in the eastern foothills and in western Fresno County, and continued through 2004. YST is 99% controlled in the treatment areas. Caltrans cooperated with the county in controlling YST along Highways 168, 180, and 198. A 41 acre cost-share program to reduce YST in the foothills of eastern Fresno County treated 40 acres annually on 26 private parcels. Two eastern populations of spotted knapweed were detected and are under eradication in partnership with the US Forest Service and Southern California Edison Company.

Mendocino Coast

The Mendocino Coast Cooperative Weed Management Area (MCWMA) was formed in 2005 after SB 1740 funding had sunset. This WMA covers the coastal area between and exclusive of the Russian River and Eel River

An herbicide applicator treats Canada thistle in the Carson Iceberg Wilderness Area with the US Forest Service in 2004.
Photographer: Marian Chambers.

watersheds. The National Fish and Wildlife Foundation (NFWF) approved a grant for planning, mapping, and pilot management projects in the MCWMA in the 2005 Pulling Together Initiative Program. The success of their proposal was due in part to the information gained from the NFWF reviewer's presentation at the CDFA sponsored statewide WMA meeting in 2004, where the importance of quantifying results was emphasized.

The MCWMA used the models of other existing WMAs in California and elsewhere to guide its formation. The MCWMA will initiate a baseline weed inventory and formulate a long-term management plan with community input before initiating extensive on-the-ground projects. Also, the Mendocino Coast WMA launched a webpage through the CDFA website to raise awareness for weed issues and weed control projects in our County. The baseline assessment and public meetings to gather community input began in October 2005.

Modoc

In Modoc County, SB 1740 funding has reduced the spread of noxious weeds, increased landowner awareness, and aided in economic stability in the greater agricultural community. In the past four years the WMA has successfully sponsored yearly noxious weed workshops focusing on area weeds such as YST, perennial pepperweed, and knapweed species. The WMA also has been involved with the ongoing control and eradication program for Scotch thistle as well as the weeds listed above.

Through SB 1740 funding, the Modoc WMA was able to survey and identify noxious weed sites on 1,900 acres in Surprise Valley and was able to complete a GIS map indicating noxious weed sites in Modoc County. This GIS map is unique as it is the culmination of collaboration between various agencies, resulting in a compilation of data on one map.

Monterey

The Monterey County War on Weeds Partnership (MCWOWP) received its last SB 1740 funding in 2003. In 2004 the MCWOWP continued to focus on the creation of a countywide weed ordinance. Toward this effort, a survey was sent to 211 public and private landowners and operators inquiring about their cost of managing invasive/noxious weeds on an annual basis. The data from the returned surveys was compiled and will be used to support the countywide weed ordinance as well as other efforts such as grant funding proposals, and will serve to increase the overall knowledge of the county's state of weed control. Individual members continue to be active within their respective groups, and finding new and hopefully consistent funding sources has been identified as a goal for the future.

Nevada/Placer

With SB 1740 and AB 1168 funding, the WMA supported outreach efforts by the Placer Nature Center, Meadow Vista Arboretum, Natural Resource Conservation Service, and U.C. Farm Advisor. The WMA outreach display board was shown at major events in the County. The YST Site Advisor and Cost Share programs were completed with dozens of sites evaluated and treated, as grass roots and interagency efforts evolved in the last five years. The WMA assisted in the formation of the Lake Tahoe Basin Weed Coordinating Group, the Dry Creek Watershed Red Sesbania Control Project and are currently supporting a new weed group in Roseville.

Noxious weeds were surveyed, treated, and eradicated along roadsides, in landfills, campgrounds, and in the Lake Tahoe area. The WMA encouraged community involvement by organizing weed pull days and helping homeowners groups develop weed management programs. The Placer County Agriculture Department treated spotted knapweed, tall whitetop, and YST along county roads and state highways in an effort to prevent spread to other sites in the region. WMA crews also helped CDFA disburse biocontrol agents for YST. WMA personnel coordinated Interstate 80 and Bear Valley surveys with neighboring Nevada County to share resources and increase efficiency, assisting Nevada County in their efforts to eradicate musk thistle and Scotch thistle. Additionally, El Dorado County and CDFA provided survey, mapping, and organizational assistance.

Due to Highway 80 being the main east/west interstate freeway, both Nevada and Placer counties are subject to the introduction and infestation of many invasive weeds. This Integrated Weed Management Plan is based on a systems approach, which includes education, prevention, and then control by biological control, physical or mechanical methods, or herbicide use.

While they had funding, $32,439.15 of the $46,763 state funding went to a partnership with State Parks to control invasive weeds on four different projects. Last year, they scheduled two projects that used mechanical

removal of weeds and had 15 volunteers at Boca Hill this year to pull musk thistle. They checked on the 16 landowners who treated Transline™ on 235.5 acres of YST and found good results, and educated another 30 landowners on the proper timing of applications to have effective control of YST. These efforts have shown that a truly integrated pest management approach has been taken to control invasive weeds within Nevada County. Nevada County staff continued their eradication efforts on spotted knapweed, tall whitetop and YST along State highways. Musk thistle and Scotch thistle were treated on sites where chemical control was allowed. They have used GPS to map all sites.

This WMA worked with a steering committee for the control and eradication of musk thistle along the Truckee River, and submitted to the National Fish and Wildlife Foundation, for that end, a grant in the amount of $21,661. The grant was not successful but they did receive $1,500 in-kind money from Tahoe Truckee Sanitation District to control the musk thistle invading their property. This paid for 10 days of hand pulling work from work release crews.

Plumas/Sierra

Plumas/Sierra Counties WMA (Plumas/Sierra WEEDS) unites a broad and diverse group of people from federal, state, county, and private sectors committed to controlling and eradicating non-native invasive weeds. All methods of weed control have been used including selective herbicides, hand pulling, and biological control. Through these efforts, the noxious weeds YST and Scotch broom have been noticeably reduced on county roadsides and private land. Less common but highly damaging weeds, such as leafy spurge, have been controlled and will be eradicated in the future with continued and sustained effort. The highly invasive perennial pepperweed is currently being controlled on agricultural farmland throughout the management area. Additionally, Plumas/Sierra WEEDS has made progress on increasing the public's awareness of noxious weeds through seminars, workshops for local landowners, public outreach at county fairs and local press releases.

Sacramento

The Sacramento WMA's goals are to: maintain and increase the profitability and value of cropland and rangeland; to maximize the effectiveness of vegetation management along roadsides, in waterways, in parks, and in natural areas; to reduce the fire hazard that results from the buildup of weeds; and to protect and enhance the native biodiversity of Sacramento County.

The Sacramento WMA mapped areas in the county for target weeds using existing GPS equipment, inventorying and monitoring YST infestations. The WMA, in cooperation with the El Dorado County WMA, conducted YST local eradication/control in the 100-acre portion of Merten Ranch. Also, the WMA participated in an "Adopt-an-Acre" program and provided tools and support for restoration of native plants in the Effie Yeaw Nature Center. The WMA also supported the efforts of the American River Parkway Foundation, the California Native Plant Society, and the Weed Warriors of the American River Parkway to remove exotic invasive species in the parkway.

San Benito

In 2001, the San Benito County WMA performed an extensive survey inventorying the county's noxious weeds. The results were analyzed by the WMA using GIS software supplied by SB 1740 funding, and in 2002, control work was initiated on certain noxious weeds at various locations in the county. Control work has continued each year to either eradicate or to stop the spread of these weeds into uninfested parts of the county.

On the education front, a weed identification book was developed by the WMA in 2001. Over 200 copies were printed and distributed to ranchers, land managers, utilities, rural landowners and various agencies that had land management responsibilities. Also in 2001, the WMA sponsored a weed workshop that was well attended by the public. This education seminar has

continued to be an annual event. In 2004, the WMA introduced its own website: sanbenitoweeds.org. This site assists landowners in identifying and controlling invasive weeds on their property.

San Bernardino

In 2002, SB 1740 provided the funding vital for the coordination and formation of the Mojave Weed Management Area. The Mojave Desert Resource Conservation District (RCD) provides a program coordinator, and the coalition now consists of 20 federal and state natural resource agencies, as well as local government agencies and nonprofit organizations such as

Quail Unlimited and The Nature Conservancy. With the initial funding, partner contributions, and local volunteers, the Mojave WMA was able to cooperate with a private landowner and implement a saltcedar control project in a vital riparian habitat area at the Mojave River Narrows. A second project was implemented in the Bureau of Land Management's Johnson Valley OHV area to evaluate the effectiveness of manual and herbicide control methods for Sahara mustard, a rapidly expanding invasive annual weed in the Mojave Desert.

The impact of invasive weeds, especially saltcedar, on restoration of riparian habitat and protection of water resources is a primary concern for our WMA. The success of initial projects funded by SB 1740 provided the basis for subsequent funding opportunities. Grants for invasive weed planning, mapping, and control have been awarded by the Center for Invasive Plant Management, the Resources Legacy Fund Foundation, and the State Water Resources Control Board (Proposition 13 - Watershed Protection Program). With the Proposition 13 grant, the Mojave WMA through the Mojave Desert RCD, is mapping invasive weeds along the first 50 miles of the Mojave River and implementing an extensive education and outreach program for the riverside landowners.

San Diego

The San Diego WMA (SDWMA) consists of a diverse mixture of property owners, regulatory agencies, environmental organizations, and land management agencies banded together for the common purpose of controlling invasive weeds in San Diego County. Monitoring of reports presented at stakeholder meetings ensure that adaptive management and integrated control strategies are used. Current SDWMA control efforts target perennial pepperweed, YST, and purple loosestrife and have led to the complete eradication of six of the two dozen pepperweed infestations throughout the County.

The increased coordination and efficiency of various member agencies brought about through the interagency communication fostered by the SDWMA was instrumental in helping the SDWMA to obtain six years of grant funding totaling $315,000 to help control our largest 300 acre pepperweed infestation. SDWMA funding provided through the CDFA has covered education, mapping, and control.

San Francisco

The San Francisco WMA (SFWMA) was formally recognized by CDFA in 2005. The SFWMA began meeting in response to SB 1740, although it was not formally established in time to take advantage of funding from the bill. The group now has 10 signatories to its MOU, including city, state, and federal agencies. The steering committee of the SFWMA has implemented several projects including a website, www.sfwma.org, and a countywide priority weed list, available online. The SFWMA is slowly working on the following additional projects, all through limited in kind donations of MOU signatories: 1) creating a comprehensive online photo album for weed identification by managers and the public; 2) creating an educational weed brochure, The San Francisco Six, to be produced and printed by the beginning of 2006; 3) organizing disparate city agencies to tackle invasive weeds at a rich natural area under multi-jurisdictional ownership; and 4) exploring creation of a countywide weed GIS.

San Joaquin/Stanislaus/Merced

The three county WMA encompasses Merced, Stanislaus, and San Joaquin counties. Since its inception in 2000, most of the WMA's efforts have focused on a single invasive weed common to all three counties, YST. The WMA allows coordinated member efforts on this weed. YST projects funded or sponsored through the WMA provide educational outreach on control methods, mapping infestations along county roadsides, and increased control activities on both private and public lands. In addition to continued efforts on controlling YST, the WMA is seeking funding to coordinate multiple public agency (CalTrans, CA State Parks, United States Fish and Wildlife Services) and private landowner invasive weed control efforts to protect the 170,000 acre Grasslands Ecological Area in Merced County. Targeted invasive weeds include perennial pepperweed, YST, water hyacinth, Russian thistle, saltcedar, poison hemlock, milk thistle, black mustard, and prickly lettuce.

San Luis Obispo

During the past five years, the San Luis Obispo County WMA has made significant achievements in two primary areas of concern: 1) educating local agriculturalists and the general public about the problems caused by noxious weeds, and 2) prioritizing, mapping, and control of the County's

worst weed invaders. In one of the earliest projects, the WMA's partners produced a comprehensive, full-color brochure describing the worst weeds found in San Luis Obispo County. They later developed a highly successful weed education website, and have received positive feedback on both the website's design and educational content. The WMA developed a mapping protocol that enabled them to complete a GIS database for 10 of the County's most troublesome weeds. Most importantly, the WMA identified YST and arundo as the two highest priority weeds, developed a regional control strategy for both of them, and implemented extensive control measures in the most critical areas of the County.

San Mateo

Since its inception, the San Mateo County WMA has successfully administered over $100,000 in grants covering a wide range of projects. Projects in 2004 included the publication of a weed identification and mapping field guide, giving a workshop on weed identification, control and mapping, and assisting with the removal of YST, wooly distaff thistle, and eucalyptus. The control of eucalyptus in Edgewood County Park will allow the land to go back to its natural state, which supports the survival of the bay checkerspot butterfly, a threatened species. Also, the control of YST and wooly distaff thistle helped bring pasturelands back into use.

The eradication of Brachypodium sylvaticum (slender false brome) in the Woodside area of San Mateo County has become a primary focus of our efforts. The local infestation is the only known population of slender false brome in California, and this invasive plant threatens regional Redwood forest habitats.

Santa Barbara

The Santa Barbara County WMA (SBCWMA) has gained solid commitment from its members toward the common goal of managing noxious weeds, resulting in monetary savings, new alliances, increased public awareness and inter-agency cooperation. A major accomplishment of the SBCWMA over the past four years has been the increase in funding and activity for noxious weed control. Prior to the formation of the SBCWMA, no money was budgeted for weed control. Since then, including SB 1740 funds, the WMA has received over $275,000 to control weeds such as pampas grass, YST, and arundo in rangeland and riparian habitat. The local Agricultural Commissioner created a position specifically for the SBCWMA, and has made significant in-kind contributions to the effort. The WMA received cash contributions from ranchers in the YST cost share program of over $6,000. WMA partners have conducted four annual seminars attended by over 250 people, contributing a cash total of over $10,000 to attend.

Santa Clara

During 2001 through 2004, Santa Clara County WMA (SCCWMA) weed control projects eliminated and controlled populations of barbed goatgrass, French broom, purple starthistle and YST on over 5,500 acres of public and private lands in the County. Control projects included a cost-share involving the treatment of a 1,100-acre infestation of YST in the Mount Hamilton Range. Two projects targeted at newly-detected invasive species in Santa Clara County Dittrichia graveolens and barbed goatgrass, Aegilops triuncialis, countywide distribution of biological control insects that attack YST, and introduction of a fungus that infects YST to a site in Morgan Hill. In addition to on-the-ground control efforts, the SCCWMA promoted the use of integrated strategies to manage weeds through the development and distribution of educational media and a variety of meetings and technical workshops.

Santa Cruz

Santa Cruz WMA projects included development and distribution of educational materials, and mechanical and chemical control of weeds on public and private land. Most of the tasks were cost-share projects, and included volunteer hours by WMA members. Two pamphlets were developed, printed, and distributed. The first was a full color pamphlet on YST management and control and the second was "A Plague of Plants," which focuses on identification and control of invasive weeds of local concern. YST and spiny cocklebur were chemically controlled on private ranchland. Mechanical control was utilized in the following three projects: 1) control of 90 percent of the English ivy infesting nine acres of redwood forest at Henry Cowell State Park; 2) control of 90 percent of the French broom, pampas grass, and jubata grass along 18 miles of Pacific Highway 1; and 3) control of 60 percent of the invasive species on 160 acres of Coast Dairies property, including hemlock, purple starthistle, French broom, and pampas grass.

Shasta

Since its inception in 2001, the Shasta County WMA (SCWMA) has educated the public on the problems associated with noxious weeds and coordinated several projects for control and eventual eradication of noxious and/or invasive weeds in Shasta County. The SCWMA has created a series of posters highlighting noxious weeds in the county, including "Terrible Thistles," "Big Bad Brooms," and "Nasty Knapweeds." Over 1,800 posters have been printed and distributed to increase awareness of these invasive species.

The first eradication project, initiated in 2001, focused on the control of broom species along the right-of-way of Highway 299 at Cove Road. The original five-acre infestation has received follow-up treatments on resprouts on an annual basis and continues to be retreated at county expense. The Cove Road project is a model for the control of broom species. Additional broom removal projects were located along Highway 299 at Ridge Road and adjacent to Whiskeytown National Recreation Area. Other eradication projects included the removal and subsequent treatment of Sesbania punicea at five locations in the county. The original one-acre net infestation had only one resprout detected in the last two years. Additional Sesbania infestations have been located and treated along the Churn Creek drainage near Kids Kingdom, along Interstate 5, the Sacramento River Trail, and Honeybee Road. Perennial pepperweed treatments in the McArthur Swamp are continuing, in cooperation with the Shasta County Department of Agriculture, Pacific Gas & Electric, other private landowners, and the Natural Resource Conservation Service. Surveys indicate that the main infestation has decreased in size from approximately 1,200 to less than 450 acres, but additional satellite populations continue to be detected.

Siskiyou

SB 1740 funds served as a catalyst to enhance the cooperation of all people involved and the rewards have been remarkable. One of the most important accomplishments was the formation of a proactive partnership among a diverse cross section of the county's population. Agencies and people of the general population have met the challenge of invasive weeds with passion, and continued funding will help ensure continued progress.

The WMA has been effective in eradication, monitoring and detection of noxious weeds. Siskiyou has also developed a substantial GIS program to map weed infestations and share that information with the state and other agencies resulting in a major reduction in spotted squarrose and diffuse knapweed populations in the western part of the County and significant reduction of pepperweed in the eastern part of the County.

Solano

The Solano County WMA consists of landowners, managers, and agencies working cooperatively to develop and implement an ecological and integrated approach for the control of noxious weeds throughout the County. The WMA has an effective cost-share program as well as several demonstration sites that highlight four different methods for controlling the weeds of most concern within the County.

The WMA has provided education to the public by demonstrating weed control processes and proper re-vegetation techniques to combat new and emergent plant pests. The WMA has also developed a method for mapping and identifying lead edges of known invasive species in an effort to control and isolate localized populations more effectively. Through a grant with the National Fish and Wildlife Foundation, the WMA is currently mapping YST within Solano County and is training volunteers to obtain GIS data for the purpose of information sharing within the County.

Trinity

The goals for the Trinity County Weed Management Cooperative (TCWMC) include: 1) eradication of diffuse and spotted knapweed in the county; 2) eradication of plumeless thistle; and 3) control of Marlahan mustard, Dalmatian toadflax, and hoary cress. This WMA has distributed and tracked biocontrol agents for YST and knapweed, and conducts educational programs that offer both general and specific information on noxious weeds. Their overall goal is to raise awareness of the environmental threats posed by invasive species.

Partnerships have been fostered with the RCD, Bureau of Land Management, United States Forest Services, Caltrans, University of California Cooperative Extension, CDFA, and other interested collaborators, both public and private. This past year GPS technology was used for mapping, and knapweeds, Marlahan mustard, toadflax, and plumeless thistle were all treated. The group also

conducted monitoring activities at former infestation sites, published brochures and pamphlets, and held workshops. Also, the group has received cooperative grants.

In 2004, the TCWMC conducted manual, mechanical, and cultural treatments of weed populations in 10 separate locations in the county. Species treated included plumeless thistle, spotted knapweed, diffuse knapweed, hoary cress, and dyers' road. Trinity has mapped and entered this population data into three separate GIS databases. The WMA has published six articles on weeds, held two radio symposia, conducted two YST workshops, and manned public outreach booths at the county fair and the annual Salmon Festival.

Tulare

The benefits and contributions of the Tulare WMA include: 1) brochure development and distribution (2001 through 2002); 2) two newsletters that have been distributed to 350 plus people about YST and the WMA; 3) a poster session presentation about the WMA at the Society of Range Management International meeting; 4) a presentation about the WMA and weed issues to the Tulare County Board of Supervisors; 5) three field days with an attendance of 30 to 35 people per field day; 6) a demonstration of equipment used by the WMA at the Statewide WMA meeting; 7) Range Weed Field Day with an attendance of 75 people; 8) tamarisk mapping and removal at the Tulare Lake Basin (2003 through 2004); 9) baseline mapping of arundo stands in the Kaweah Watershed (2003); 10) development of a Weed Display (2004); and 11) a booth at the Make a Difference Day (2003).

Yolo

The Yolo County WMA's major accomplishments for the last five years include: 1) reducing YST 99 percent on five acres of county roadsides with herbicides and revegetating with native grasses; 2) reducing perennial pepperweed 99 percent at Grasslands Park; 3) mapping and initiating a control project for arundo along Chickahominy Slough; 4) successfully controlling weeds without chemicals at the Native American Tending and Gathering Garden at the Cache Creek Nature Preserve; 5) initiating a neighborhood weed eradication effort lead by a local landowner; 6) improving relationships among roadside vegetation management entities reducing cost and increasing efficiency of roadside weed control; 7) developing and displaying a WMA display and brochure; and 8) providing two project tours for local representatives and agencies with over 45 participants each year.

Yuba/Sutter

The mission of the Yuba/Sutter WMA is to cooperate and coordinate activities for the prevention and control of noxious weeds with an emphasis on exclusion, detection, eradication, and suppression. Mapping, using GIS, shows the distribution of noxious weed pests and has been shared with the CDFA and the Sutter County Board of Supervisors. Control and eradication efforts concentrated on the CDFA plant pest target list and included other weed species of local economic importance. Controlling or eradicating aquatic noxious weeds, a high priority in Northern California due to concerns over an imminent Bay Delta infestation, has been hampered by the cost-prohibitive Central Valley Regional Water Quality Control Board's National Pollutant Discharge Elimination System permitting process.

The Yuba/Sutter WMA has and continues to emphasize educational outreach to adults and children. As part of our education outreach, the Yuba/Sutter WMA published two brochures, the "Yuba/Sutter WMA's Dirty Dozen" and the "Aquatic Weed Alert." Our educational outreach included teacher packets for local schools. The teacher packets incorporated weed posters and brochures, weed identification handbooks and videos. Weed brochures were distributed and weed posters were displayed at public libraries. The Yuba/Sutter Cooperative Extension Master Gardeners handed out weed information and spoke about the importance of noxious weed control at various community events. This outreach will continues as long as current supplies last.

Although initially there were matching county/state funds, effective noxious weed control and educational outreach has been limited due to the lack of additional state and federal resources. A recent example of one highly successful noxious weed control project in Sutter County involved 23 acres of uncultivated railroad/county right-of-way. An estimated 75 percent control has been made but the lack of adequate weed management funding will negate our success.

For More Information

Visit the following website to learn more about noxious weed management in California: CDFA Weed Eradication Program, www.cdfa.ca.gov/weedhome

Research Projects Funded by SB1740

Map of counties covered by Weed Management Areas as of 2000, new Weed Management Areas in yellow

Background photo squarrose knapweed, Centaurea squarrosa, *by Kevin Martyn*

Ten percent of the SB1740 funds ($500,000) were allocated for needs-based research. A request for proposals was announced to researchers and two selection panels evaluated and scored the proposals. One panel was made up of research scientists and evaluated the proposals for scientific rigor. The other panel was the Range Management Advisory Committee of the California Board of Foresty which scored the practical management needs addressed by the proposals.

Integrated management of medusahead and other noxious annual grasses and restoration of degraded grassland to native species – Joeseph M. DiTomaso, University of California, Davis

The two main objectives of this study are to 1) provide biological information that allows land managers to maximize medusahead control with properly timed prescribed burning and to 2) develop an effective strategy for restoration of degraded exotic annual dominated grasslands to an ecosystem with high native plant diversity and resistance to subsequent re-invasion by undesirable invasive species. Our results have shown that removing the thatch by either tillage or mowing in the fall can reduce the competitiveness of medusahead and provide better than 50 percent reduction the following year. Mid-spring sheep grazing can also reduce medusahead by greater than 80 percent. Since medusahead matures about two or more weeks later than most range species, timely controlled burns can provide selective and very effective control of the exposed seedheads. Integrated approaches can also be effective. For example, when thatch layers can be reduced by late season grazing, disking, mowing or burning, a fall application of the herbicide imazapic can give excellent control. Similarly, a combination of late spring prescribed burning followed by fall imazapic treatment is also very effective and may even provide complete control. The removal of medusahead in our research sites has led to the dramatic recovery of more desirable annual grasses and many native broadleaf species. These studies provide multiple effective strategies for the management of one of the worst invasive species in the western United States.

Resistance of restored Central Valley grassland communities to yellow starthistle (YST) invasion – Joeseph M. DiTomaso, University of California, Davis

The goal of this study is to understand how and why different types of communities vary in their resistance to YST. The information from this study will help land managers decide 1) if restored native grassland can reduce weed invasion compared to those dominated by exotic annual grasses, and 2) whether adding annual forbs to a revegetation planting mixture increases resource utilization and more effectively prevent YST establishment. Our findings showed that restoring plant community with a mix of early and late season native species could be useful for slowing the invasion of exotic species. The native perennial grass blue wildrye provided adequate competition to prevent establishment by YST for at least four years after establishment, whereas native annual did not. Plants from similar functional groups differ in their ability to compete and remain established within a community. Season of growth (i.e. late), growth type (i.e. grass leaves), growth habit (i.e. perennial), rooting structure (i.e. tap root) are some of the functional characteristics of plants that determine plant community diversity. Those plants that overlap the resource niches of YST, and thus are in the same functional group, were shown to have a much greater ability to compete with the noxious weed.

Economic losses from YST in California and applications to potential biological invasions – Mark E. Eiswerth, G. Cornelis van Kooten, Wayne S. Johnson, University of Nevada, Reno

The objectives of this research project were twofold. The first was to estimate the likely range of annual losses and economic costs in the agricultural sector due to the presence of YST (Centaurea solstitialis L., hereafter YST) in California. YST is the most widespread non-crop weed in California, resulting in potentially serious damage to forage on rangelands. The second project objective was

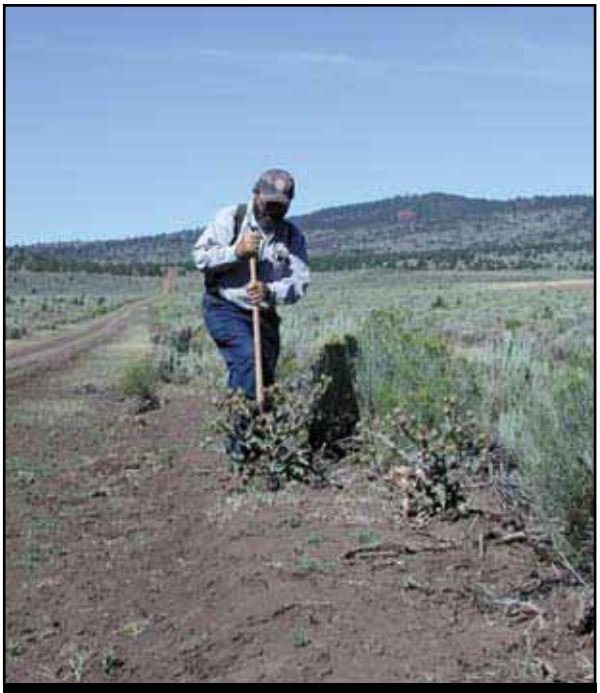
to use data on YST to develop a dynamic bioeconomic model that identifies optimal management strategies and levels for invasive weed species.

Results attained under the first objective included the following. A detailed survey was administered to California cattle ranchers to investigate YST infestation rates, loss of forage quantity and value, the magnitude of ongoing control efforts, and a host of other factors. The results were used to estimate countywide economic losses for three focus counties, as well as California statewide economic losses, due to YST. Total losses of livestock forage value due to YST on private land for the state of California were estimated (conservatively) at approximately $7 million per year, with ranchers' out-of-pocket expenditures on YST control amounting (conservatively) to at least $11 million per year. Together, these costs are the equivalent of 6.7 percent of the total annual harvested pasture value for the state. Therefore, while perhaps relatively small in the statewide agricultural production system, costs due to YST infestation seriously constrain the livestock grazing industry. In addition, it is important to remember that these estimates only reflect rancher out-of-pocket costs and forage losses and exclude other important lost economic values due to YST (e.g., public expenditures on YST management, water losses, losses in outdoor recreation activity, and lost ecosystem service flows such as soil retention and biodiversity).

Results attained under the second objective included the development of two bioeconomic models, both of which employed data collected from a YST expert judgment survey administered under the project. The first model applied fuzzy logic and stochastic dynamic programming to the context of YST management, and the results suggested that a mix of YST control strategies is optimal and total eradication is not economically feasible. The second modeling approach analyzed a decision support system that allows learning to take place. This approach compared three models of managing YST: (1) a stochastic dynamic programming model, (2) a learning model in which we learn from the experience of trying various YST control strategies over time, and (3) a learning model that also includes uncertain forage growth (e.g., due to uncertain weather from year to year) as well as penalties for repeated application of environmentally harmful weed control techniques. Results indicate that learning models may indeed be appropriate as decision support tools for invasive species management. Under both of the bioeconomic models, the choice of an optimal YST control strategy was seen to depend critically on the extent of the YST infestation and the initial productivity of the grazing land.

Prevention and management of Arundo donax in riparian ecosystems – Jodie S. Holt, University of California, Riverside

The goal of this research is to determine the site factors that promote giant reed invasion and use this information to develop methods of giant reed removal and site revegetation that will result in invasion-resistant communities. Experiments were conducted at UC Riverside and in



Weed spray crew employing mechanical weed control on Scotch thistle as part of our integrated pest management approach. *Photographer: Craig Hemphill*

the field to determine the (1) environmental factors that correlate with community invisibility, (2) environmental limits of giant reed establishment, and (3) plant community attributes that can limit giant reed establishment. Results will be tested in experiments that remove giant reed, revegetate with desirable species, and monitor for reinvasion. This research will facilitate development of ecologically sound, sustainable management strategies for giant reed and increase understanding of the ecological and physiological basis of invasion success.

Results of experiments in controlled environments suggest that giant reed establishment (ability to sprout and vigor of growth, used as an indicator of invasion success) may be highly dependent on site characteristics, in particular, the specific combination of temperature and moisture at that site. In an experiment to determine the environmental conditions that favor the lateral growth of giant reed rhizomes, rhizome expansion increased somewhat with nitrogen addition, but was not affected by light or competition. Results of both of these sets of experiments indicate that giant reed establishment and spread is likely site specific and seasonal. Field experiments where giant reed rhizomes were planted into artificially planted mixed native riparian communities suggest that plant community attributes are important in delaying or suppressing the invasion potential of giant reed. In particular, native species plots containing densely planted shrubs (Baccharis salicifolia, mulefat) were the most suppressive to giant reed establishment. These plots also had lowered soil moisture relative to the others, consistent with results of controlled environment experiments. Interestingly, where environmental factors in invaded riparian communities in southern California were compared with those of non-invaded communities, showed no consistent differences among sites. This suggests that giant reed does not alter environmental conditions to the detriment of natives, rather may displace native species largely by virtue of its large stature and competitive ability. These results reveal a potential for the use of mulefat or other vigorous native riparian shrubs in restoration following giant reed removal. An experiment is currently ongoing to test control levels of giant reed combined with replanting of native riparian species to determine what level of control is necessary to provide a microclimate suitable for reestablishment of native vegetation.

Biocontrol implications of the toxicology of YST in sheep project – Wolfgang Pittroff, University of California, Davis

Planned herbivory as a biocontrol method requires a science-based management protocol. Without the scientific underpinning of a precise understanding of the effects of toxic plants on animals employed in weed control, grazing cannot be developed into an effective tool. Thus, the study has the following objectives: 1) determine levels of ingestion of sesquiterpene lactones from YST (post-bolting) in sheep; 2) assess the pharmacokinetics of these substances in the GI tract and post-absorption of sheep; 3) investigate the effects of YST toxin ingestion on liver and kidney function in sheep; 4) assess potential residues of YST toxins or their metabolites in liver, kidney and muscle tissues; 5) develop a study design that can be applied to other invasive weeds in the future; and 6) contribute to the development of a science-based management protocol for the use of domestic livestock in vegetation management.

Enhancing YST biological control in the field – David F. Spencer, USDA-ARS, University of California, Davis

The proposed research will test the hypothesis that adding nitrogen to YST plants will increase population densities of insect biological control agents released in California ecosystems. If adding nitrogen to YST plants enhances growth and reproduction of Chaetorellia succinea and Eutstenopus villosus, then by fertilizing small plots in a an infested area it may be possible to "jump start" or enhance the build-up of population densities to a level that would have a greater impact on YST seed production than is currently observed.

Other Department Weed Abatement Programs

Map of counties covered by Weed Management Areas as of 2001, new Weed Management Areas in yellow
Background photo French broom, Genista monspessulanus, *by Bob Case*

Managing Noxious Weeds: Components of a Premier Program

Combating noxious weeds is an arduous task requiring cutting-edge detection and eradication practices and well-planned coordination among stakeholders. In spite of the inherent challenges of weed abatement, the California Department of Food and Agriculture's (CDFA) Integrated Pest Control Branch is making important progress.

The CDFA's core weed abatement programs (the Weed and Vertebrate Program, the Hydrilla Eradication Program, and the Biological Pest Control Program) are integrated with a network of localized abatement efforts in designated weed management areas (WMAs). Together these programs make up a comprehensive approach to weed management that has been highly effective.

Weed and Vertebrate Program

The Weed and Vertebrate Program assists in detecting and eradicating high priority "A"-rated noxious weeds in the state. "A"-rated noxious weeds are those that have a limited distribution, pose a major threat to the state's economy or environment, and for which statewide exclusion and eradication efforts are likely to be successful.

Fifteen weeds have been eradicated from the state by this program and 26 are currently under eradication.

The program maintains a staff of biologists with expertise in planning, organizing, and implementing regulatory weed and vertebrate pest detection, eradication and suppression programs. The program also provides assistance and training to county agricultural commissioner personnel and others engaged in regulatory weed and vertebrate pest control activities.

Hydrilla Eradication Program

Hydrilla is a noxious aquatic weed. If this aquatic plant pest is not contained or eradicated, it can reduce water flow in canals and laterals by 90 percent or more. It can also block water conveyance structures and impede navigation through infested waters. At high levels of infestation, fishing becomes difficult through the mass of vegetation, and fish populations may become stunted.

Hydrilla can spread to other water bodies, costing millions of dollars annually in control and maintenance of the water. It spreads when plant parts or reproductive structures flow downstream or are spread from one body of water to another by human activity (for instance, hydrilla on boats and motors).

Hydrilla was initially detected in 1976 in a small reservoir in Marysville and eradicated in subsequent years. Since that first infestation, the CDFA has eradicated hydrilla from nine counties: Los Angeles, Monterey, Riverside, San Bernardino, San Diego, San Francisco, Santa Barbara, Sonoma and Sutter. Eight counties currently have infestations under eradication: Calaveras, Imperial, Lake, Madera, Mariposa, Shasta, Tulare and Yuba.

For more information on the successes of biological control, it can be found in the Hydrilla Program Annual Summary for 2002 on the website at:

www.cdfa.ca.gov/phpps/ipc/hydrilla/hydrilla_hp.htm

Biological Pest Control Program

Biological control is the use of natural enemies to reduce densities of insect pests and weeds. Each year in California, at least five new exotic insects, as well as additional noxious weed species, become established. Eradication of newly-established noxious and invasive species is not always feasible due to either the rapidly expanding distribution of the pest or constraints on the tools available for eradication. Many of these exotic invasive species cause significant economic damage to the agricultural industry of the state, as well as negatively impacting the urban and natural environments. When the use of chemical crop protectants is not practical, alternative treatment methods for noxious pest species must be employed to protect our agricultural economy and the urban and natural environment.

When successful, biological control provides a long-term sustainable solution to mitigate the economic impact of pests that are widely distributed. Establishment of natural enemies of weed pests can provide a permanent reduction in pest population densities and substantially reduce their economic impact.

Recent highlights from the CDFA Weed Biological Control Program include the squarrose knapweed project, the water hyacinth project, and the yellow starthistle (YST) project. Until recently, squarrose knapweed was the only knapweed in California that had no biocontrol agents. CDFA biologists found that insects known as agents on diffuse and spotted knapweed did more damage on squarrose knapweed than the other knapweed species. They are now releasing two species of seedhead weevils and one species of root feeding beetle on the noxious weed. Water hyacinth, originally from the Amazon, is now found in the San Francisco Bay, South Coast, the Sacramento/San Joaquin Delta, and the man-made waterways in the Central Valley. The CDFA biologists are using the water hyacinth's natural herbivore, the weevil Neochetina bruchi, to control populations of this plant. YST is one of the highest priority projects in the biocontrol program. CDFA biologists are establishing a rust, Puccinia jaceae var. solstitialis, that attacks the weed.

For more information on biological control:
www.cdfa.ca.gov.phpps/ipc/biocontrol/biocontrol_hp.htm

Noxious Weed Information Project

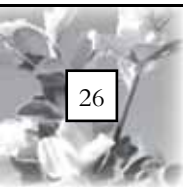
The Noxious Weed Information Project (NWIP) supports many weed control programs at CDFA, as well as cooperative weed programs throughout the state. NWIP uses information technology to provide management tools and communication vehicles for effective project management. The Department has established a database called the Noxious Weed Inventory and Control Database to keep track of all weed eradication projects. The NWIP also provides many maps and other graphics on an as-needed basis, ranging from rapid-response working maps to presentation posters. Such maps include known sites of various weeds in many counties, as well as special mapping projects. With the appearance of the glassy-winged sharpshooter and pink hibiscus mealybug, NWIP has become involved in mapping and data collection for both insects. NWIP provides technical support for surveying and information technology for the Branch.

NWIP is active in writing grants to obtain support. The program obtained a three-year $328,000 grant from the CalFed Sacramento Delta initiative to increase public awareness, survey, analyze, and initiate control and management of purple loosestrife in the area of the Delta. The program also obtained grants from the California Department of Transportation and the National Fish and Wildlife Foundation to survey YST populations in the Sierra Nevada. The goal of this project is to identify the leading edge of the infestation and provide a target of control activities.

NWIP has also taken on responsibilities for promoting awareness of noxious weed issues. One early responsibility was the development of an inventory of noxious weed control projects, contained in the Natural Resource Projects Inventory database www.ice.ucdavis.edu/nrpi. In conjunction with the database, NWIP produced a series of fact sheets on CDFA's rated weeds. NWIP has formatted them for publication on the World Wide Web. The newsletter, Noxious Times, has been published and distributed by NWIP. This newsletter is now sent to over 1,850 subscribers. The program also created a website for the Noxious Times www.cdfa.ca.gov/noxioustimes. NWIP has become a clearinghouse for WMAs by initiating a website at www.cdfa.ca.gov/wma. NWIP also organizes a statewide meeting to bring together representatives of WMAs and other meetings on weed education and awareness for weed managers.

Map of counties covered by Weed Management Areas as of 2005, new Weed Management Areas in yellow

Background photo bull thistle, Cirsium vulgare, *by David Kratville.*



Conclusions

The number of countywide weed management areas in California has grown from seven in early 1998 to 45 in 2005 that cover the entire state. There is participation by all 58 counties. As a result of Assembly Bill 1168 and Senate Bill 1740, cost-share funding weed management areas have increased weed control statewide, established multiple partnerships between public agencies, private landowners, environmentalists, increased public awareness, fostered the sharing of resources, and catalyzed weed management work across property lines and other geographical boundaries.

Yellow starthistle (YST), a noxious weed that exists on an estimated 10 million acres in California, has been a large local priority for weed management area control work. In the first year (Fiscal Year 1999/00), seven weed management areas successfully controlled approximately 5,000 acres of YST achieving an average of 70 percent next-year-reduction in YST vegetation cover as a result of the cost-share funding from the Legislature.

The Weed Management Area complements efforts of the California Department of Food and Agriculture pest prevention system to prevent new weed pests from entering the state, to eradicate incipient infestations, and to limit the spread of those that have become established.

Appendices

Appendix 1.

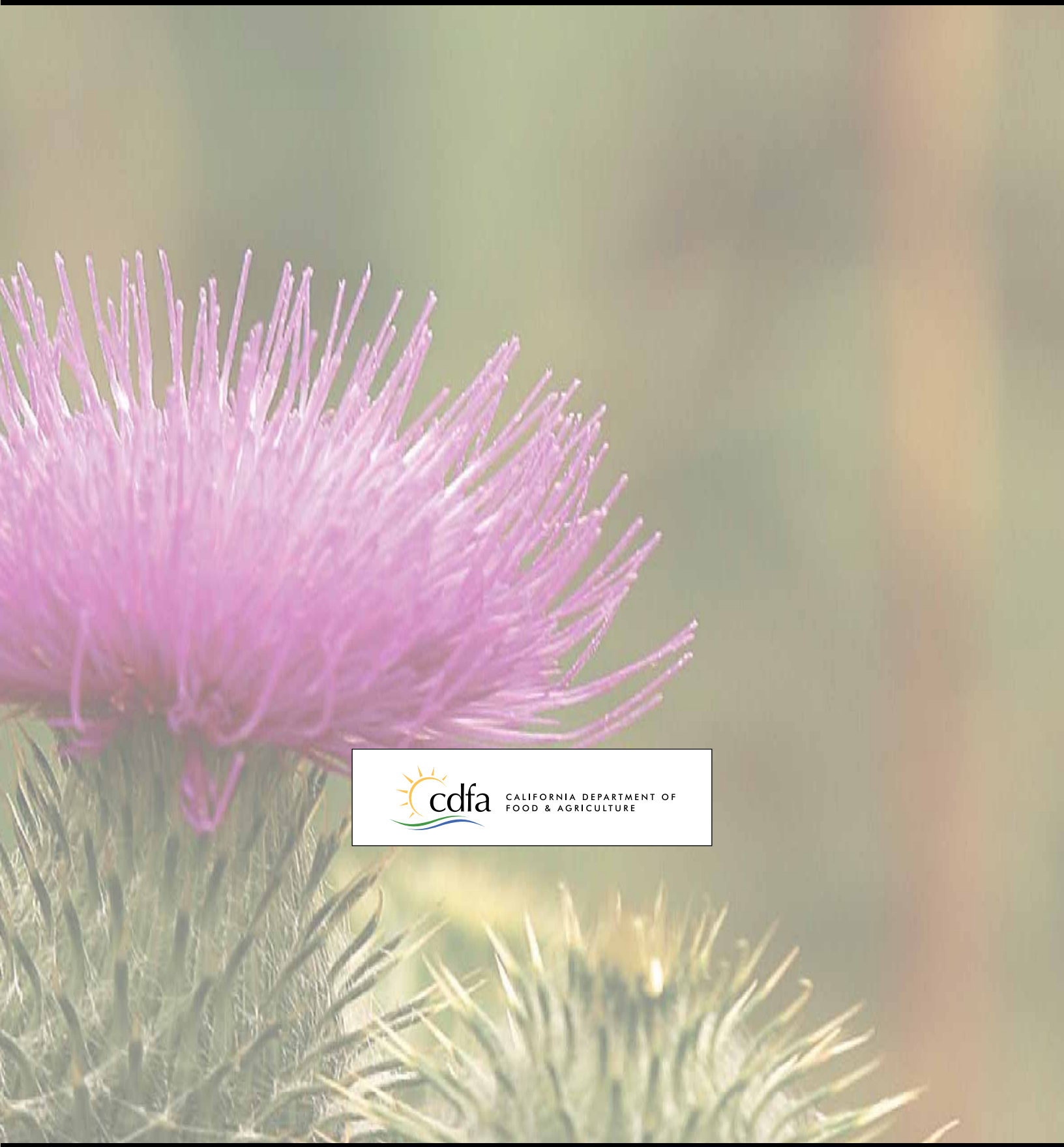
California Department of Food and Agriculture

Integrated Pest Control Branch - Noxious Weed Information Project

Appendix 2.

Weed Management Area Development in California

Each year, Lassen Special Weed Action Team (SWAT) displays a educational booth at the Lassen County Fair. It raises noxious weed awareness and helps with weed identification for fair attendees. *Photographer: Carol Gibbs*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