



NOXIOUS TIMES

A quarterly publication of the California Interagency Noxious Weed Coordinating Committee

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New Federal Weed Legislation Introduced Senate Bill 3222: Harmful Non-Native Weed Control Act of 2000



Senator Craig

On October 19th, Senators Craig (R-Idaho) and Daschle (D-South Dakota) introduced Senate Bill 3222, the Harmful Non-Native Weed Control Act of 2000. Both Senators submitted statements for the record. Other original co-sponsors include Senators Baucus (D-Montana), Burns (R-Montana), Crapo (R-Idaho), Johnson (D-South Dakota), and Gordon Smith (R-Oregon). The bill creates a federal program in the Department of Interior to provide funding for weed management entities to control or eradicate harmful, non-native weeds on public and private land. This bill potentially represents a large increase in the amount of federal dollars currently devoted to fighting weeds. This effort is a compilation of hard work from The Nature Conservancy, National Cattlemen's Beef Association, and the Public Lands Council. The direction of the activity in the bill is consistent with the "partnering" concept and formation of weed management areas, which have been gaining momentum, due to the national invasive weed species effort. The legislation was presented to stimulate discussion. The bill will be refined over this winter, and an improved bill introduced later in the year.



Questions about the legislation can be directed to Myra Hyde at the National Cattlemen's Beef Association, (202) 347-0228 or Jeff Eisenberg, a Senior Policy Advisor for Agriculture with The Nature Conservancy, (703) 247-3675.



Senator Daschle

Weed Awareness Week on Capitol Hill

February 26-30, 2001. For more information contact Lori Williams, Executive Director of the National Invasive Species Council, (202) 208-6336, email: invasivespecies@doi.gov

UC Riverside: Botanical and Related Pest Management Programs

BY: JODIE HOLT, PROFESSOR OF PLANT PHYSIOLOGY, UC RIVERSIDE



hat began as a citrus experiment station in 1907 has evolved into one of the nation's most dynamic campuses. It was formally established as a UC campus in 1954 and offers 95 undergraduate majors and 45 minors; 45 master's and four teaching credential programs; and 38 Ph.D. programs. While smaller than many of the other UC campuses with a combined enrollment of 13,063 students, it has several important research centers, including the Center for Environmental Research and Technology and the Citrus Research Center. The following are some of the programs and research projects dealing with invasive non-native weeds and the protection of endangered native plants.

Center for Conservation Biology (currently underway)

The Center for Conservation Biology's mission is to assist in the conservation and restoration of species and ecosystems by facilitating the collection, evaluation, and dissemination of scientific information. The UCR Center for Conservation Biology will proactively identify new research priorities in conservation biology and inaugurate new research programs. It will also develop research programs in response to existing needs in conservation biology.

Michael F. Allen—Director, Center for Conservation Biology

Performs research on regulation of community and ecosystem processes by soil organisms with special emphasis on mycorrhizal fungi, global climate change dynamics and structure of undisturbed areas.

Botanic Gardens

The UCR Botanic Gardens are comprised of two parts: the overall campus landscaping and a plant museum with live specimens. The landscaped area around the campus buildings demonstrates the use of a wide assortment of plants, which grow well in the inland area of Southern California. Completing the picture is the 39-acre living plant museum with more than 3,500 plant species from around the world for visitors and researchers to see and study. The Gardens were established primarily for teaching purposes and serve to provide a wide assortment of plant materials for courses such as anthropology, art, biology, ecology, entomology, morphology, ornamental horticulture, plant pathology, photography, and taxonomy. The Gardens also provide plant materials for researching, testing and exhibiting plant species introduced from all parts of the world.

Herbarium

The UCR Herbarium, with its collection of dried plants, is a clearinghouse for information regarding plant species distribution in the field.

The UCR Herbarium is an active correspondent to the California Native Plant Society (CNPS). The CNPS publishes a document every three to five years that lists endangered or threatened plants. Placement of a plant upon the CNPS list is a crucial first step to alert concerned parties about the condition of imperiled species. The UCR Herbarium's role in assisting the CNPS is a vital contribution to the CNPS, which has only one paid employee and is dependent on volunteer contributions. UCR Herbarium records include 85,000 specimens from all of the southwestern U.S. and Mexico, and provide a database from which to defend arguments for preserving vulnerable species. Records of approximately 200 species have been substantially augmented through Herbarium efforts. More than a dozen new species have been added to the inventory and this work has led to their inclusion or nomination for candidate status for federal listing by the United States Fish and Wildlife Service. The special focus of the Herbarium is Riverside and San Bernardino counties.

Department of Biology

John Rotenberry—Professor of Biology and Campus Director of the University of California Natural Reserve System

Performs research on community ecology and conservation biology, particularly on how environmental factors interact to determine species diversity and community composition, and how the relative importance of those factors varies.

Department of Botany and Plant Sciences

Edith B. Allen—Associate Professor of Ecology and Associate Cooperative Extension Natural Resources Specialist

Performs research on the effects of invasive species on native vegetation, weed competition and succession, mycorrhizal fungi, effects of urbanization and agriculture on native ecosystems, and restoration ecology.

Ian Gillespie—Graduate student

Performs research on the ecology and restoration of the rare species *Erodium macrophyllum* (a native, endemic geranium) following weed invasion.

Concepcion Sigüenza—Graduate student

Researches soil microbial changes in coastal sage scrub and invasive weeds on a nitrogen deposition gradient.

Abby Sirulnik—Graduate student

Researches the effects of nitrogen deposition in Mediterranean shrublands following weed invasion.

Jodie S. Holt—Professor of Plant Physiology
Performs research on the ecology and physiology of weedy and invasive plant species in wildlands and agricultural ecosystems; selection, distribution, and fitness of herbicide resistant weeds.

Joseph Decruyenaere—Recent M.S. Graduate
Thesis title—Seasonal and Site Effects on the Vegetative Reproduction and Demography of *Arundo donax* L. (Poaceae)

Jenjit Khudamrongsawat—Graduate Student
Performs research on genetic diversity in *Arundo donax* (giant reed) and its relationship to habitat type.

Lauren Quinn—Graduate Student
Performs research on environmental correlates of community invasibility to *Arundo donax* (giant reed).

Virginia White—Graduate Student
Performs research on the ecology and physiology of *Cynara cardunculus* (artichoke thistle).

Department of Earth Sciences

Richard Minnich—Professor of Earth Science
Performs research on the fire ecology of southern California, Baja California, and temperate Mexico; exotic plant invasions, climate change.

Thomas A. Scott—Adjunct Assistant Professor and Cooperative Extension Natural Resources Specialist

Performs research on wildlife conservation in fragmented and altered landscapes, including studies of wildlife movement, habitat use, and population biology in oak woodland, sage scrub, and riparian habitats.

Department of Entomology Insectary and Quarantine Facilities

The Department of Entomology's Insectary and Quarantine Facilities, where foreign insect and mite predators and parasites are confined for study before propagation and release in California and the United States, was established in 1923. This complex of facilities supports integrated pest management (IPM) and biological control research, and includes the Insectary, Quarantine Facility, Insect Preparation Facility, eight specialized greenhouses, a lathhouse, and storage. The Quarantine Facility is one of 14 approved biological control quarantine facilities in the U.S. and the oldest non-federal facility in the nation. The facility is used to screen and study foreign biological material before release and primarily serves the western United States. ❖

For more information contact Jodie S. Holt at Botany and Plant Sciences Department, University of California, Riverside, CA 92521 jodie.holt@ucr.edu <http://www.ucr.edu>

Grazing Weeds and Toxins – A Viable Control Alternative?

BY: WOLFGANG PITTROFF

RUMINANT SYSTEMS LABORATORY, UC DAVIS

Grazing is recognized as one of several tools available for the control of yellow starthistle. Success with grazing has been reported in many areas when conducted under the right parameters (see article by Craig Thomsen on opposite page). The use of goats for yellow starthistle control is becoming more prevalent across the state (look for an article on goats and grazing in our next issue). In the following article, Dr. Pittroff of the UC Davis Ruminant Systems Laboratory, brings to light some precautionary considerations about the use of intensive grazing as a weed control tool.

There has been an increased interest in the use of grazing as a control tool. The CAST (Council for Agricultural Science and Technology) report is an informative assessment of the invasive weed situation, but it does not elaborate on the use of grazing as a weed management tool. Since grazing has been cited as a factor in the establishment of many invasive weeds, in particular invasive grasses, it is widely discredited as a control tool. However, as with any control option, the manner in which grazing is conducted, determines the result.

The scientific literature focuses on the effects of grazing on abundance and persistence of invasive weeds, and on comparisons between different types of grazing animals in their effectiveness on the targeted weed species. It is well known that the aggressiveness of many invasive weeds depends in no small measure on their ability to deter grazing. They accomplish this by either producing so-called plant secondary

compounds (PSC), which are essentially toxic substances, or certain physical attributes, such as thorns or spines, or a combination of the two. Different species of grazing animals, in turn, have developed means to cope with these deterrents. Unfortunately, next to nothing is known about how animals deal with plant toxins. For example, yellow starthistle (*Centaurea solstitialis*) is neuro-toxic to horses but not to ruminants. However, the precise mechanism causing the disease is unclear. Yellow starthistle contains several lactones of the sesquiterpene type (these compounds are typical for the Asteraceae plant family in general). Apparently, ruminants do not absorb large enough quantities to develop the toxic symptoms. This suggests that the microbial populations in their fore-stomachs could play a role in the detoxification of yellow starthistle PSCs. This example indicates two conclusions: (1) ruminants, due to their specific digestive physiology, have the potential to be excellent weed control agents, and (2) since it is not understood how ruminants deal with most toxic plants, we cannot increase their consumption of noxious weeds.

Current findings on grazing as a weed control method are essentially descriptive and circumstantial. It should be pointed out that the term 'unpalatable' very frequently describes a plant that contains toxic compounds. Animals may consume these plants only in quantities not exceeding their detoxification capacity – which is unknown in most cases. A comprehensive review by Foley et al. (1999) commented extensively on this knowledge deficiency, and its effects on both vegetation and animal management. While studies investigating the effects of herbivore species, stocking rate, or season of grazing on invasive weeds are valuable and provide useful information for weed managers, the effective use of grazing animals as weed control

agents requires a science-based management protocol. The notion that weeds (or fire fuel, for that matter) simply provide cheap forage for domestic ruminants is as widespread as it is badly mistaken. Domestic ruminants may be the most effective long-term control agent for weeds, if combined with judicious applications of herbicides and mechanical clearing. But when they eat weeds they also consume toxins that negatively impact their production, performance, and well-being. By understanding the physiology of weed toxins in herbivores, we can develop management practices that maximize the effectiveness of this biological control agent.

Management options include timing of grazing in relation to levels of toxins in the target plants, the use of nutritive and non-nutritive supplements, and the combination of herbivore species with complementary detoxification abilities. This research is currently the focus of Pittroff's laboratory, but this work is still in its beginnings. However, Pittroff predicts that domestic ruminants will become a key tool in the vegetation management of the future, once the appropriate management protocol is developed. ❖

References:

- Invasive Plant Species. CAST Issue Paper 13. 2000. Council for Agricultural Science and Technology, Ames, Iowa.
- Foley, W.J., G.R. Iason, and C. McArthur. 1999. Role of plant secondary metabolites in the nutritional ecology of mammalian herbivores: how far have we come in 25 years? In: Jung, H.J.G. and G.C. Fahey (Eds): 1999. Nutritional Ecology of Herbivores. American Society of Animal Science, Champaign. p. 130-209
- DiTomaso, J.M. 2000. Invasive weeds in rangelands: Species, impacts and management. Weed Science 48:255-265

For more information contact Wolfgang Pittroff at (530) 752-5362 or wpittroff@ucdavis.edu



Yellow starthistle
Photo by: Jack Kelly Clark

A Call for Prescribed Grazing Contacts:

In the next issue of the Noxious Times, we will feature an article focused on the professional use of prescribed grazing for weed control. We will be interviewing and sharing the contact information of people who make a living by prescribing grazing and bringing their animals onto land to manage vegetation with a focus on weeds. We would also like to develop a resource list for people or agencies who help livestock owners by using their own animals for weed control as part of vegetation management.

Any information you can share towards this effort is appreciated!

Please contact:
Rosie Yacoub 1220 N St. Room A-357 Sacramento, CA
95814 phone: (916) 654-0768, email: ryacoub@cdfa.ca.gov

Yellow Starthistle Responses to Livestock Grazing

BY: CRAIG D. THOMSEN

RANGE ECOLOGIST, UC DAVIS

In 1987, a series of multi-year experiments were established with Dr. Bill Williams, Professor Emeritus, UC Davis, to examine the effects of livestock grazing (cattle, sheep and goats) on yellow starthistle (*Centaurea solstitialis*) infestations in annual

grasslands. An initial assumption was that "heavy" grazing, due to decreased plant competition, would lead to greater amounts of yellow starthistle on infested lands compared to "light" or no grazing. However, once it became clear that livestock readily consume yellow starthistle in pre-spiny stages, it was hypothesized that well-timed defoliation

would suppress yellow starthistle relative to ungrazed controls.

To test this, experiments were established in Tehama, Colusa, Solano, and Yolo counties with cattle, sheep, and goats, to compare the timing of yellow starthistle defoliation at specific growth stages. For statistical purposes, a randomized complete block experimental design was used with the following treatments: 1) grazing during yellow starthistle's rosette stage of growth (mid March to early May), 2) grazing during yellow starthistle's bolting, pre-spiny stage (late May to early July), and 3) controls with no grazing. A rotational grazing approach was used with high stocking rates and short grazing periods, and repeated the grazing events one to three times. Results were monitored by comparing yellow starthistle flowerhead densities among treatments, as a measure of reproductive output.

Results revealed that livestock grazing in annual grasslands can either increase or decrease yellow starthistle stands, depending on when grazing occurs. Grazing during rosette stages led to an increase in yellow starthistle, whereas those that were timed to yellow starthistle's bolting, pre-spiny stages

decreased yellow starthistle seed output, plant height, and canopy size compared to ungrazed controls.

Yellow starthistle was favored by grazing during rosette stages because plant competition was reduced, and starthistle's ability to regrow far exceeds other associated annual plants. This resilience is due to its deep taproot, late-season phenology and growing points that occur below the bite of an animal. Grazing during starthistle's rosette stage is typical in cismontane California. Producers utilize the available winter and spring forage and then remove their livestock in May or June as grass production drops. Unfortunately, this pattern of grazing contributes to the dense yellow starthistle stands that occur in dryland pastures and rangeland.

Grazing during yellow starthistle's bolting, pre-spiny stage reduced infestations because: 1) yellow starthistle was still very palatable and animals preferentially grazed the later-maturing yellow starthistle over the early-maturing dried annual vegetation; 2) higher ambient air temperatures and lower soil moisture were less conducive to starthistle recovery; and 3) later grazing allowed associated plants to compete for light against yellow starthistle during winter and spring. Plant competition pushes yellow starthistle's growing points upward on the stem, resulting in a higher branching pattern (Benefield et. al. 1999). Defoliation by grazers is then more likely to occur below growing points, resulting in less regrowth.

Although yellow starthistle can be toxic to horses (Cordy 1978) it is an acceptable forage for ruminants. Crude protein levels were measured as high as 13% in the bolting stage. This is during a period when forage quality and quantity from annual grasses is dropping off rapidly, and animals usually relish the pre-spiny, green herbage.

Where there is an option to defer grazing until later growth stages, land managers can use livestock as a tool to suppress yellow starthistle infestations. The type of animal is less important than timing. The availability of ruminants, size of infestation, and other site factors will generally determine the suitability of one

type of animal over the other. The effectiveness and number of grazings required are dependent on site factors including timing, rainfall patterns and soil moisture, competition from other plants, and the branching pattern of the starthistle.

It is important to recognize that properly timed grazing suppresses, but does not eradicate yellow starthistle infestations. Although properly timed grazing reduces seed output, a sufficient amount of seed production usually occurs to replenish the seedbank. Therefore, management with livestock alone requires that grazing be used on an annual basis. In addition to managing yellow starthistle, the research demonstrated that controlled livestock grazing can be a useful management tool for enhancing floristic diversity in annual grasslands, because it reduces thatch levels and "releases" low-statured dicots, including native wildflowers. ❖

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Additional Resources

- Thomsen, C.D., W. A. Williams, P. Vayssières, 1996. Yellow starthistle management with grazing, mowing, and competitive plantings. In, J.E. Lovich, J. Randall, and M.D. Kelly (eds.). *Proceedings of the California Exotic Plant Council Symposium*. Vol.2:1996. pp. 65-71.
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- Thomsen, C.D., W.A. Williams, M.R. George, W.B. McHenry, F.L. Bell, and R.S. Knight 1989. Managing yellow starthistle on rangeland. *Calif. Agric.* 43(5):4-6.

For more information refer to the articles above or contact Craig at (530) 752-8810 or email: cdthomsen@ucdavis.edu.

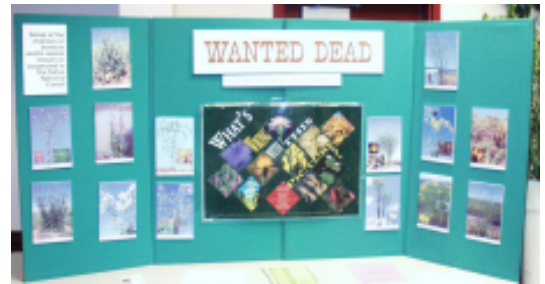
WEED MANAGEMENT A

Since the first county-based California Weed Management Area (WMA* *see page 9*) was established in 1994, there has been an incredible increase in visibility and interest in establishing WMAs in the state of California. Currently, 42 WMAs exist, of which at least 13 started in the year 2000. WMA coverage in the Noxious Times will be reflecting their importance with this inauguration of four pages dedicated to updates on these local weed working groups.

The debut appearance of this new segment is dedicated to a review of the 2nd Annual Statewide WMA Meeting that was held on October 24, 2000, in Woodland, CA. By reviewing some of the presentations and accomplishments of the annual meeting, we hope to illustrate the essence of WMAs and highlight topics that are commonly addressed in these groups. The following articles will touch on: accomplishments of the meeting, weed education and awareness, strategic planning, the latest information on funding available through Senate Bill 1740, weed control programs, and yellow starthistle mapping.

Meeting Overview

The day-long 2nd Annual Statewide Weed Management Area Meeting, held at the Heidrick Ag History Center in Woodland, CA, resulted in 94 registered attendees from 47 different counties. This was quite an increase in scale from the 1st annual meeting which had about 30 attendees and lasted 3 hours. The meeting consisted of presentations, panelled question/answer discussions, and working groups. The agenda can be reviewed on the WMA website (<http://pi.cdfa.ca.gov/wma/>). Specific topics touched on weed mapping,



weed education, planning, funding, control projects, and group leadership. It also brought together different WMAs in an effort for even larger collaboration in what were called

“Geographical Breakout Groups” (see article below). There was a large poster and display session that presented a collection of WMA educational materials in an effort to encourage groups to “Steal With Pride” educational material ideas from other WMAs, and save time in their own outreach efforts. We encourage you to take a look at the materials posted on the WMA website and contact Jenny Drewitz jdrewitz@cdfa.ca.gov or Steve Schoenig sschoenig@cdfa.ca.gov for further information.

WMA Geographical Breakout Groups

A geographical breakout group is a cluster of Weed Management Areas that band together for a higher level of cooperation in weed issues. There is often a lot of overlap in the types of projects that WMAs develop; thus these larger groups can assist WMAs in developing contacts and in the sharing of materials. For CDFA, geographical groups help facilitate training and information sharing on a regional scale. This reduces the need to travel to all 38 individual WMAs. The larger geographical groups help the California Department of Food and Agriculture (CDFA) circulate information and hold training sessions throughout the state in a more efficient manner.

In the Northeastern section of the state, Lassen, Plumas-Sierra, Siskiyou, and Modoc WMAs have been meeting annually for two years to report on projects and obtain helpful advice. CDFA has tried to share this technique with other WMAs by assigning all WMAs to a specific geographical group. Geographical breakout groups were encouraged at the 1st Annual Statewide WMA Meeting in 1999. As a result, all counties have been designated to a geographical group regardless of whether they have a WMA or not. This allows for all counties to have a list of contacts in their “neighborhood” that they can call on with questions regarding starting, joining, or maintaining a WMA.

At the 2nd Annual Statewide WMA Meeting these groups met for a second time. Groups identified mentors, welcomed non-WMA representatives, shared ongoing projects, brainstormed projects that could be collaborated on (educational brochures, mapping data, funding resources), and set future meeting dates (*see Upcoming Events on back page*).



WMA Statewide Meeting Highlights

Education

The Lassen County Swat Team (Weed Management Area) has been busy educating teachers about noxious and invasive weeds. Two members of the group, Carolyn Gibbs, a botanist with the Bureau of Land Management and Debbie Falkowski, an environmental education curriculum specialist, worked persistently over the past summer to gather information and materials to pass out to educators at an Agriculture in the Classroom Conference in Modesto. Materials included: articles, brochures, WMA and Agricultural Commissioner's contact lists, a key websites list, and classroom activities. Materials were gathered into special bags that displayed the winning picture from an elementary school contest the WMA sponsored. Over 350 bags of information were passed out to educators at an impressive booth set-up at the conference. Before bags were passed out, educators were asked to fill out a survey. The survey asked questions pertaining to the

educators' current knowledge about and interest in weeds. Survey results were compiled and recently sent to County Ag Commissioners' offices. Hopefully this information will be useful in both inviting local educators to your WMA group discussions and in fielding calls that you may receive from area teachers. The conference also included roundtable presentations. The SWAT Team's presentations included discussions about the threat of noxious weeds, hands on identification, and tips on how teachers could incorporate weeds into their classroom curricula.

Beyond general education, community action is a vital second step in tackling the problem. The concept, 'think globally, act locally' is very important in teaching educators and teachers about noxious and invasive species. Teachers can help their students learn about the problem, as well as help them to understand that the

introduction of invasive species is an issue they can do something about. Weed Management Area groups can involve teachers and youth in pulling weeds, planting native plants, and conducting research. Student energy and interest are powerful tools in the fight against weeds. The Lassen County SWAT Team will continue their efforts locally in getting students of all ages involved with WMA projects.



If your WMA is interested in educating youth, please contact Carolyn Gibbs carol_gibbs@ca.blm.gov, Debbie Falkowski propolis@psln.com, or Carri Benefield cbenefield@cdfa.ca.gov. *Funding for the Lassen SWAT Project was possible with a War on Weeds mini-grant.*

SB 1740 Update

As described in the Fall 2000 issue of the Noxious Times, Senate Bill 1740 adds \$5 million to the Noxious Weed Management Account in the California Department of Food and Agriculture (CDFA) General Fund. \$4,250,000 has been allocated for the implementation of Integrated Weed Management Plans by county based Weed Management Areas. \$1,417,000 is available this fiscal year (2000-2001). The request for proposals has been released. Deadlines are specified on page 13 of this issue. *For more information contact Jenny Drewitz jdrewitz@cdfa.ca.gov or Steve Schoenig sschoenig@cdfa.ca.gov, at California Department of Food and Agriculture, Integrated Pest Control, (916) 654-0768*

Tips on Strategic Planning

BY STACY CARLSEN

Strategic planning is a continuous and systematic process where guiding members of an organization make decisions about its future, develop the necessary procedures and operations to achieve that future, and determine how success is to be measured. Strategic planning can be complex, challenging, and messy. However, the results are a management tool that helps groups focus energy:

1. in a disciplined manner
2. towards a common goal
3. allowing for continuous assessment and adjustment of direction.

Strategic planning allows for efficient execution of tasks and reduces duplication of effort. A strategic plan is a way to control the outcome as opposed to the outcome controlling you. The strategic planning process raises questions, tests assumptions, examines the present and the future. It is about making fundamental decisions and

actions. Important considerations include two main concepts: 1) management (the role of the public, leadership, communication, and planning and preparation) and implementation (direction, implementation/action, and performance evaluation/reporting). Each of these elements defines strategic planning and a successful program.

I. Management

The role of the public As with any governmentally funded program, service to the public is at the heart of the funding. The public is an entity that will assess the products, services, and processes that the group supplies. Therefore, their perspective is fundamental to the program, but is often slightly different than the perspective of those in management or most likely on the planning committee. Great care should be taken while recruiting public representation, surveying and educating local residents to get an accurate

continued on page 15...

WEED MANAGEMENT

El Dorado Noxious Weed Management Area: Weed Control with Private Landowners

BY: WENDY WEST, AGRICULTURAL BIOLOGIST, EL DORADO DEPT. OF AG.



Pest Control Advisor discussing YST control with landowner

With the renewed emphasis on weed control and eradication in California, private landowners have become a key partner in a variety of weed control projects. The El Dorado County Noxious Weed Management Area (WMA) implemented several projects in 2000, including the Site Advisor Program and the Aerial Herbicide Treatment Program for control of yellow starthistle. In working with private landowners, the most important element is "ownership" of the project. Landowners must contribute to the project in some tangible form (cost share or action) to insure the long-term success of the weed control/eradication activity.

Site Advisor Program

As part of both the WMA educational and weed control efforts, a Site Advisor was contracted to meet with landowners at their property to discuss yellow starthistle control methods. The goal of the program was to promote a wide variety of control options, including mowing, grazing, herbicides, and hand pulling. A process for documenting the success of the program was also a key element in planning the project.

The first stage of the program was contacting the licensed Pest Control Advisors (PCA) in the county and outlining the specifications of the contract. Criteria included a knowledge of integrated pest management, including revegetation, and specific professional and auto insurance requirements. After choosing the PCA, the contract process was initiated and the program was advertised in local newspapers and a press release was issued. The documentation system was designed and

included landowner contact information as well as control recommendations and telephone follow-up by the PCA (after the 2001 control season). The follow-up portion of the process is key in documenting the success of the program and encouraging action by the landowner.

At the conclusion of the 2000 Site Advisor program, 28 properties were evaluated, with 42 property owners attending educational sessions (some property owners invited neighbors!). Recommendations for control were written for 1,053 acres on properties ranging from 1 to 563 acres in size. The follow-up surveys will be completed in June 2001 by the PCA. The program was well received by the community and will be extended during the 2001 program year.

Aerial Application of Herbicide to Control YST



Aerial application of herbicide

A cost-share program for the aerial application of Transline™ for the control of yellow starthistle (YST) was completed in April 2000. Five area ranchers participated in the 50:50 cost share (herbicide and helicopter costs) with 710 total acres treated. Each ranch was encouraged to choose key areas for treatment to maximize the benefit of the application. Areas chosen for treatment included calving meadows, isolated pasture infestations, bull pastures and heavy vehicle use areas. Treated acres ranged from 60 to

300 acres per ranch.

One of the most important steps in the beginning of the project was visiting the ranches with a Pest Control Advisor, so that each rancher had an opportunity to discuss herbicide applications. Because ranchers are generally less familiar with spraying, many of their concerns and questions were answered during the site visit. Each ranch was then issued a written recommendation by the PCA and a pesticide use permit by the agriculture department. The helicopter schedule (completing all five ranches in one day) was coordinated by the agriculture department to simplify the process. Each ranch was billed directly by the aerial applicator, based on GPS information generated during the treatment. The ranchers then invoiced the Noxious Weed Management Fund (Assembly Bill 1168), administered by the county agriculture commissioner, for the 50% reimbursement.

Project documentation included monitoring percent cover of YST in control and treated areas. Excellent control (90-100%) was achieved. The treatment areas will be evaluated in March 2001 to determine the type of follow-up treatment that will be required during the next growing season. All ranchers were very pleased with treatment results and commented that range production had increase significantly, especially in pastures that cattle would no longer even enter due to the YST infestations.

Both private landowner weed control programs, made possible by AB 1168, were well received by the public. All participants felt that they had an active role in controlling yellow starthistle and that program funding was a welcomed addition to the existing weed education and control efforts in El Dorado County. ❖

For more information contact Wendy West at (530) 621-5526 or email her at wendyw@atasteofeldorado.com

ENT AREA Update

Cooperative Yellow Starthistle Mapping Project

The Sierra Nevada Cooperative Yellow Starthistle Mapping and Assessment Project (YSTMAP) wrapped up its second season this fall. In 1999, CDFA and CalTRANS had coordinated efforts to map the occurrence of yellow starthistle (YST) on the state highway system in the Sierra Nevada. This year, many agencies contributed inventory efforts to create a picture of the extent of YST in the Sierra Nevada. The Weed Management Areas made this project possible by bringing together the agencies that gathered the data for this project.

The goals of YSTMAP are to:

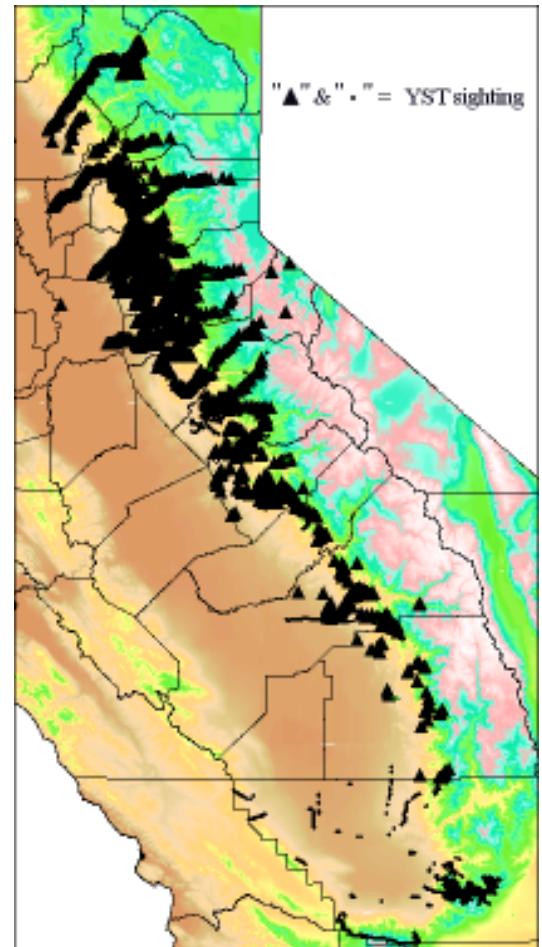
1. Determine the eastern edge of YST in the Sierra Nevada
2. Determine the area in the Sierra Nevada where YST is limited to outlier infestations
3. Determine a containment area in the Sierra Nevada where YST could reasonably be eradicated

The idea behind the project is to use the mapping data to focus control work on YST where it is relatively rare to keep it from becoming well established.

Mapping conducted this year shows the extent of YST in the Sierra Nevada (see map). Along some of the Highways, like 80, 50, and 88, YST occurs very far east and as high as 8,000 feet in elevation. In the southern part of the range, YST rarely occurs above 2,000 feet. Many smaller, isolated infestations of YST (outliers) have been identified. As the Weed Management Areas in the Sierra Nevada prioritize the control work that they will spend their AB 1740 funds on, they should use the data to define a containment area to determine where to start work on yellow starthistle. Some of the locations that were included in the data this year were also treated this year, so work towards control of YST in the area is already underway.

The mapping and assessment of YST in the Sierra Nevada is really more of a process than a product. The current mapping of YST does not contain every location that exists in the Sierra Nevada. For example, relatively little work was done on private land. As time goes on, work that Weed Management Areas do with private landowners will expand the scope of the inventory. Also, some of the current inventory data is not adequate to inform on-the-ground decision making because it doesn't include the size of the infestations. Without that data, you can not assess the cost of control or whether the infestation would be easy to control manually. Future inventory work should be refined to include that information.

From here, the Weed Management Areas can continue to maintain and refine the inventory of YST, and use the model of centralizing weed inventories in an area to prioritize control work on other weed species, as well as continue to stop the spread of yellow starthistle. ❖



*Weed Management Areas (WMAs) are local organizations that bring together landowners and managers (private, city, county, State, and Federal) in a county, multi-county, or other geographical area for the purpose of coordinating and combining action and expertise in combating common invasive weed species. The WMA functions under the authority of a mutually developed memorandum of understanding (MOU) and is subject to statutory and regulatory weed control requirements. A WMA may be voluntarily governed by a chairperson or a steering committee. To date, groups in California have been initiated by either the leadership of the County Agricultural Commissioner's Office or a Federal Agency employee. WMAs are unique because they attempt to address agricultural (regulatory) weeds and "wildland" weeds under one local umbrella of organization. It is hoped that participation will extend from all agencies and private organizations. WMAs have: printed weed I.D./control brochures, organized weed education events, written and obtained grants, coordinated demonstrations plots, instituted joint eradication and mapping projects, as well as many other creative and effective outreach and weed management projects.

Profile

Integrated Management of Invasive Species in the

Regulatory and Land Management Activities

The U.S. Department of the Interior-Fish and Wildlife Service is the principal federal agency responsible for conserving, protecting, and enhancing fish, wildlife, and plant populations and their habitats. This effort involves migratory birds, endangered species, certain marine mammals, and some freshwater- and anadromous- fish. The Service also chairs the Aquatic Nuisance Species Task Force and is a member of the Technical Advisory Group for the Biological Control of Weeds (TAGBCW), chaired by the U.S. Department of Agriculture-Animal and Plant Health Inspection Service. Our role on TAGBCW, along with other representatives, is to evaluate weed biological control organisms being proposed for release into the U.S. and

their effect on invasive species, fish, wildlife, and endangered species from a regulatory and land management viewpoint. The Fish and Wildlife Service has a dual function: 1) regulatory (for example, Endangered Species Act, Migratory Bird Treaty Act, Lacey Act, Black Bass Act, and Fish and Wildlife Coordination Act) and 2) land management (for example, National Wildlife Refuge System Improvement Act and Federal Noxious Weed Act). Other offices such as ecological services, fishery assistance, and law enforcement have no direct land management duties; their regulatory and assistance role provides guidance, information, and legal recommendations to private, local, county, state, and federal partners concerning fish, wildlife, and plants on other private or public lands—not directly managed by the U.S. Fish and Wildlife Service.

Land management occurs on the national wildlife refuge system and the national fish hatchery system. Refuge lands are dedicated to the management of fish, wildlife, and plants. Fish hatcheries raise and provide eggs and fish for use on federal lands, including military bases, national forests, and Native American tribal lands. Hatcheries also have a key role in the recovery of threatened/endangered fish and other aquatic organisms. The Service is managed through the Washington Office (see: offices.fws.gov/orgcht.html) and 7 regional offices (see: www.fws.gov/where/regfield.html). In the Pacific Region (Region 1), California, Guam, Hawaii, Idaho, Nevada, Oregon, and Washington activities of the Fish and Wildlife Service are managed by a regional office located in Portland, OR. For U.S. Fish and Wildlife Service programs in California and Nevada, a California/Nevada Operations Office in Sacramento, CA provides direct support and leadership to field stations since its establishment effective Oct. 1, 1997 (Fig. 1).

Weeds and Invasive Species Impact Fish, Wildlife, Plants, and their Habitats on National Wildlife Refuges

Weeds and invasive species are alien to specific ecosystems and impact native species. Native species may also interfere with intended fish, wildlife, and plant management on national wildlife refuges.

NOXIOUS WEEDS HAVE A STATE- AND FEDERAL- LEGAL DEFINITION AND REQUIRE MANAGEMENT ACTION BECAUSE OF THEIR DAMAGE TO FISH, WILDLIFE, PLANTS, AGRICULTURAL CROPS, LIVESTOCK, OR OTHER HUMAN-DESIRED ACTIVITY.

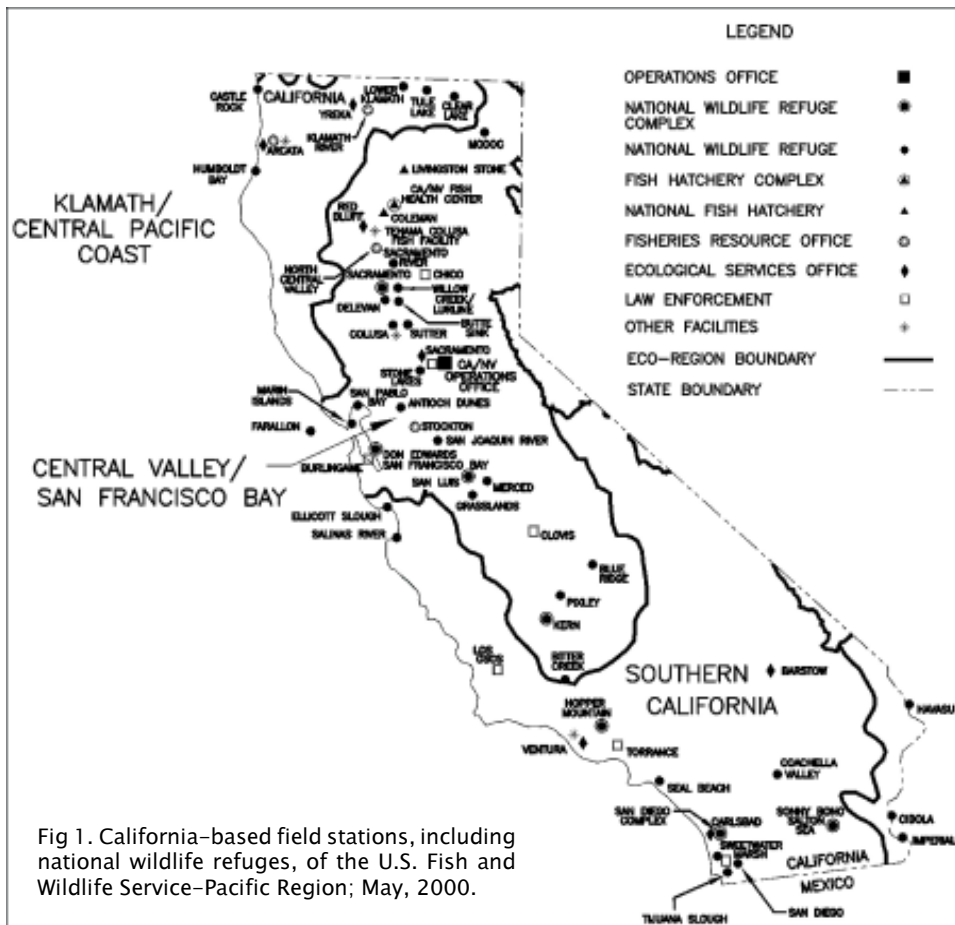


Fig 1. California-based field stations, including national wildlife refuges, of the U.S. Fish and Wildlife Service-Pacific Region; May, 2000.

ent Focusing on Weeds and U.S. Fish and Wildlife Service



Pest organisms degrade or interfere with healthy populations of fish, wildlife, and plants or their habitats. Some native species; such as reed canarygrass, *Phalaris arundinacea*; and cattail, *Typha* spp.; grow too dense and impact desired vegetation:water ratios on management units. Other plants; for example, smooth cordgrass, *Spartina alterniflora*; are native to Atlantic and Gulf Coast systems, but are alien to the Pacific Coast. Other species (including giant salvinia, *Salvinia molesta*; purple loosestrife, *Lythrum salicaria*; perennial pepperweed, *Lepidium latifolium*; saltcedar, *Tamarix ramosissima*; and yellow starthistle, *Centaurea solstitialis*) are native to other continents, but they are present in western North American—degrading fish,

wildlife, and plant habitats.

Fish, wildlife, and plant management are the highest priority of refuges, and day-to-day management is focused on them. Foreign and domestic plants also impact other uses on the national wildlife refuge system. Yellow starthistle, perennial pepperweed, and saltcedar reduce habitat quality needed for certain wildlife-oriented public uses on refuges. Priority public uses mechanical (mowing and tilling) and physical methods (prescribed burning, flooding, and grazing), or a combination of these methods. The vulnerability of the pest and the habitat niche of the target organism are part of the management decision process. The use of the above tools may be appropriate in one location, but their use at another site may trigger non-target consequences. Regional integrated pest and weed management coordinators, regional nonindigenous species coordinators, and a national integrated pest management coordinator assist national wildlife refuge- and national fish hatchery-managers, as well as others, in collaborative management efforts on weeds and invasive species (see sidebar: U. S. Fish and Wildlife Service – IPM and NIS Coordinators).



The National Wildlife Refuge System is the world's largest and most diverse collection of lands managed for fish, wildlife, and plants by the U.S. Fish and Wildlife Service. Refuges are located in each of the 50 states and the territories. In California, a vast collection of refuges occurs from the northern Klamath Basin Refuges on the Oregon/California border to the southern San Diego Refuges on the California/Baja California Norte border.

(hunting, fishing, wildlife observation, photography, environmental education, and interpretation) can occur on specific refuge units if such uses do not materially interfere with or detract from the specific refuge's objectives, or the objectives of the national wildlife refuge system. High quality habitat supports public use just as such habitat is essential for healthy populations of fish, wildlife, and plants.

Refuge managers conduct integrated management of weeds and invasive species using biological control (insects and other predators), chemical (pesticides),

Specific National Wildlife Refuges Use Aggressive Integrated Management

Modoc Refuge

Scotch thistle, *Onopordum acanthium*, is an invader of grasslands and edges at Modoc National Wildlife Refuge, near Alturas, CA. Refuge staff are currently collaborating with county and state weed management efforts to manage scotch thistle through a regime of herbicide applications and native plant competition. The California Department of Food and Agriculture, Oregon Department of Agriculture, and Modoc Refuge collaborated on a 3-year scotch thistle field evaluation project, first started in 1997. CDFA, ODA, and the U.S. Fish and Wildlife Service-Refuges (Portland, OR) provided \$50,000;

Continued on next page...

U.S. Fish and Wildlife Service – IPM and NIS Coordinators, Region 1

Pacific Region (Region 1)

(CA, GU, HI, ID, NV, OR, WA, Pacific Islands)

**Scott M. Stenquist, Regional IPM/
Weed Coord.

E-mail: Scott_Stenquist@fws.gov

Tom O'Brien, Chief of Contaminant
Prevention Branch

E-mail: Thomas_OBrien@fws.gov

Dennis R. Lassuy, Regional NIS Coord.

E-mail: Denny_Lassuy@fws.gov

California/Nevada Operations Office

S. Kim Webb, Assist. Regional NIS
Coord. (CA/NV)

E-mail: Kim_Webb@fws.gov

National Office (Arlington, VA)

**Elaine Snyder-Conn, National IPM
Coord. and Representative to USDA-
TAGBCW

E-mail: Elaine_Snyder-Conn@fws.gov

Mike Ielmini, Invasive Species
Coordinator

E-mail: Mike_Ielmini@fws.gov

Mike Higgins, Aquatic Entomologist

E-mail: Mike_Higgins@fws.gov

** Indicates the Region's designated
Integrated Pest Management (IPM)
Coordinator

NIS = Regional Nonindigenous
Species Coordinators

USDA-TAGBCW = U.S. Department
of Agriculture, Technical Advisory
Group for the Biological Control of
Weeds

\$30,000; and \$5,000 (respectively) in FY 1996 for this effort to determine density levels of viable scotch thistle seed in the soil, monitor seedling recruitment and mortality, and determine the number of seeds produced in scotch thistle seedheads.

Humboldt Bay Refuges

Ice plant, *Carpobrotus edulis* and *C. edulis* x *C. chilensis*, is a succulent invasive plant impacting sand dune systems on the Lanphere Dunes Unit, Humboldt Bay National Wildlife Refuge. The sand dune system, which is important habitat for the Humboldt Bay wallflower, *Erysimum menziesii eurekaense*, and beach layia, *Layia camosa*, benefitted from the manual removal of ice plant on 87.4 acres. The California Conservation Corps, California Department of Forestry's High Rock Conservation Camp, Nature Conservancy staff, other volunteers, and refuge staff concentrated on this project during 1995-2000; some 4,680 person-hours were involved in this effort. English ivy, *Hedera helix*, is a climbing invader smothering both herbaceous woody plants and eventually killing trees in refuge habitats adjacent to the dunes. English ivy roots, rhizomes, and plants were hand-removed over the ground; ivy on the trees was managed by girdling ivy stems at the base of each tree which saved personnel the effort of removing stems and plants from their aerial growth into the tree canopy. Since ivy resprouts vigorously after the first manual control, follow-up removal or girdling was needed to combat the resprouting effort approximately 6-months after the first effort. Nearby, Castle Rock National Wildlife Refuge is an important stop for migratory birds.

Sacramento Refuges

The Sacramento Complex includes Sacramento River, Butte Sink, Sacramento, Colusa, and Sutter National Wildlife Refuges. Yellow starthistle and perennial pepperweed are two invaders that complicate habitat management and public use management on these stations. Biological controls are being used against yellow starthistle along with mowing. Perennial pepperweed management provides additional challenges because biological controls are not yet available for this plant. Root buds produce new plants, and the semi-woody stems on older plants interfere

with wiping/wicking of herbicides when the plant is adjacent to water. Pepperweed and red river gum, *Eucalyptus camaldulensis*, management includes the use of triclopyr herbicide.

Stone Lakes Refuge

Just south of Sacramento, CA, the Stone Lakes National Wildlife Refuge is converting upland habitats and former grape vineyard areas back to productive wetland and grassland systems. Precise grassland management includes a grazing system which removes weed biomass while encouraging grass growth. Wetland habitats are being managed to reduce water hyacinth, *Eichhornia crassipes*, while promoting native aquatic plants through partnerships with the California Department of Boating and Waterways, California Department of Food and Agriculture, and local groups. Mechanical cutting and herbicides form the basis of the integrated pest management methods on water hyacinth. Perennial pepperweed, an invasive species especially in riparian zones, is also a long-term management challenge.

Kern Refuges

As with other Central Valley national wildlife refuges, the availability, timing, and quality of freshwater influences the productivity of native wetlands and the presence of invasive plant species at Kern and Pixley Refuges. Fire, tillage, mowing, and glyphosate herbicide are management efforts targeting cattail, and hardstem bulrush, *Scirpus acutus*, when these plants form massive monocultures. The objective of emergent plant management is to increase the open-water and plant edge effect for fish and wildlife. Saltcedar is an invading species in several upland areas on this refuge complex; a series of management thrusts, including cut-stump herbicide (triclopyr) application to saltcedar, reduces the impact of this non-native species to wildlife habitat, including the endangered Tipton kangaroo rat, *Dipodomys nitratooides nitratooides*; San Joaquin kit fox, *Vulpes macrotis mutica*; and blunt-nosed leopard lizard, *Gambelia silus*.

Klamath Basin Refuges

In northern California at Tule Lake and
Continued on page 16...

Invasive Species Inventory and Risk Assessment Team-Fulfilling the Promise: The National Wildlife Refuge System

Team members are coordinating strategies for aquatic and terrestrial species that pose a risk and threat to the refuge system. Problem and invasive species management is part of the wildlife and habitat effort on the national wildlife refuge system.

Wildlife and Habitat Recommendation

WH-7: Review and revise existing policies to strengthen support and action for problem and invasive species management that is biologically justified and consistent with ecosystem and (National Wildlife Refuge) System priorities.

For More Information Contact: Sam Johnson, R-1 Representative Invasive Species Team (WH-7), U.S. Fish and Wildlife Service, Klamath Basin National Wildlife Refuges (530) 667-2231, sam_johnson@fws.gov.

The National Wildlife Refuge System celebrates the 100th anniversary in 2003; the "blue goose" is the official symbol of the NWRS. The NWR System is a promise to preserve wildlife and habitat for the benefit of all Americans.



Caltrans/CDFFA meet to Discuss Control of Noxious Weeds on State Highways

September 15, 2000 - Sacramento

On September 15, 2000 Mr. Larry Orcutt (Division Chief) and Ms. Sheree Edwards from Caltrans' Maintenance Division met with the California Department of Food and Agriculture (CDFFA) to discuss opportunities for collaboration and program enhancements for the control of noxious weeds on state highway right-of-ways. Nate Dechoretz (Acting Branch Chief), Steve Schoenig, and Ross O'Connell, all from the Integrated Pest Control Branch, represented CDFFA.

Mr. Dechoretz touched on the dissatisfaction by many interests with the continuing spread of noxious weeds, such as the invasion of yellow starthistle from along state highways on to private lands. He also acknowledged the increasing pressures of Caltrans to reduce herbicide applications and shift to alternative methods, such as mowing and preventative mechanical designs. It was agreed by all that given this squeeze between difficult management objectives, the Caltrans program needs review and refinement. Mr. Dechoretz emphasized that there is currently good cooperation with CDFFA staff on Caltrans right-of-ways for the control of A-rated weeds

Mr. Orcutt strongly emphasized the willingness of the Caltrans Maintenance Program to work more closely with CDFFA, the Ag Commissioners, and other concerned groups to help shape a strategy that ensures their limited resources are being used in a manner that provides maximum benefit to the economy and natural environment of California. He and Ms. Edwards felt that a joint effort with Local Weed Management Areas throughout the state is the best way progress can be made. He also welcomed the input from other agencies and interest groups in helping Caltrans reassess their Vegetation

Control Plan to more directly address the issue of noxious weed spread.

Mr. Schoenig, Ms. Edwards and Mike Boitano (Amador County Ag. Commissioner) will follow up on this meeting by facilitating the implementation of a series of short and long term goals.

Short term goals:

- Caltrans Maintenance Program will ensure that District maintenance personnel are aware of the importance of participating in Local Weed Management Areas throughout the state.
- Caltrans Maintenance Program will make the information available to CDFFA on where (by District) herbicides were applied in 1999 & 2000 (when available), to see if there is a marked difference due to reduction in use. In addition, a report on herbicide use for noxious weeds will be made available.
- CDFFA will attend a Caltrans' Maintenance Division Chiefs meeting in November to present the Weed Management Area Program and to discuss a strategic approach to noxious weed control – specifically the Yellow Starthistle Collaborative Mapping Project.
- CDFFA will assist Caltrans in organizing a Weed Management Science and Technical Advisory Team to review and provide recommendations for the coming year.
- Caltrans Maintenance Program will coordinate efforts and information among the staff in different programs throughout the department who are dealing with noxious and invasive weed issues.

- Both CDFFA and Caltrans will study the Washington State Plan for Vegetation Management and evaluate it as a model plan.

Long term goals:

- Caltrans and CDFFA will develop an inventory of prioritized noxious weeds on state highways. Remote sensing of roadside weeds will be investigated.
- Caltrans will re-evaluate and augment their Vegetation Management Plan to specifically address noxious and invasive weeds.
- CDFFA and Caltrans will draft an MOU to delineate specific roles and responsibilities in a collaborative program to manage noxious weeds on state highways.
- Explore the development of a statewide strategic plan that meets the goals of the two departments. ❖

SB 1740 Proposal Deadline

Proposals, hereafter called Integrated Weed Management (IWM) Plans, can be submitted by county-based WMAs anytime after December 1, 2000. IWM Plans should be submitted on a mailed floppy disk, post-marked by February 9, 2001 to:

Jenny Drewitz
CDFFA -Integrated Pest Control
1220 N Street, Room A-357
Sacramento, CA 95814

or
electronically (via email as an attached Word or Word Perfect file) to: jdrewitz@cdfa.ca.gov

Late IWM Plans will be disqualified unless prior arrangements have been made with CDFFA.

CDFA Biologist Profile: Robin Breckenridge

Born in Sacramento and raised in Carmichael, California, Robin Breckenridge is a third-generation California native. Fourth in a family of five girls, she remembers spending every possible minute out-of-doors as a child. She collected everything from bird nests to lizards, polliwogs to rocks, while her sisters were enjoying dolls, dancing lessons, and music lessons. The first birthday gift she remembers was an ant farm; the next a set of snap-together, paint-by-number, Junior Audubon bird models. All of her free time was spent on her grandfather's Polled-Hereford cattle ranch in Northern California, or with her nearest neighbor, naturalist Effie Yeaw. By the time Robin was in second or third grade she knew she wanted to work with plants and animals as an adult.

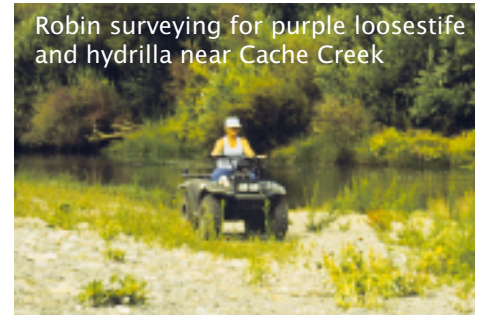
Both of Robin's parents were educators. Her mother was a dean and professor at American River College, while her father was a member of the California Dairy Advisory Board (the old Dairy Council of CDFA) and a night-school instructor at Sacramento City College. They sent her to nature camps, Audubon events, YMCA skin-diving/SCUBA classes, etc. and totally supported her plans. By the time she was in junior high Robin was working in the science/biology lab as an assistant to the instructor, and planning on a career as a naturalist/field biologist.

Following high school in Carmichael, Robin earned an AA-degree in General Biology from American River College, married, and had a daughter. She completed a BS-degree in Zoology at the University of California, Davis while working as a mechanic for the local Hunt-Wesson cannery and a CETA employee at the

Sacramento Junior Museum and Science Center. The following year she received a Probe Internship position with Steinhart Aquarium in San Francisco. The work at Steinhart was a dream come true, but Robin was reluctant to raise her daughter in the city and returned to the Carmichael area. She began work in the farm industry, driving harvesters and bank-out wagons for a custom harvesting company. The work was exciting but seasonal, so she began testing for State and Federal employment positions.

Robin's career with CDFA began in 1979 when she was hired as a technician. When the Mediterranean fruit fly projects began in 1980 she spent the next three years working on emergency projects, and became a field biologist with the old Control & Eradication Unit. Most of the years in C & E were spent on rodent-control projects with some beginning work in weed control and management. Following five years with C & E, Robin became an Associate Detection biologist with Pest Detection & Emergency Projects, where she worked with 14 counties on all types of weed and animal detection for the next four or five years. When PDEP detection biologists and C & E control biologists combined in to the new Integrated Pest Control Unit she became the Sacramento West District Biologist. She remains in that position today and enjoys the close working relationship she has with the district's nine County Agriculture Commissioner's and their field personnel. She has had amazing cooperation and success on this District's noxious weed and exotic species projects and feels lucky to have been able to contribute.

When Robin looks back at her career with CDFA, the past twenty years have brought many changes in the workload and emphasis. However, the district biologists still work closely together to reduce the possible loss of land, crop, and economic gain for their local agricultural producers in the constant fight against detrimental species: insect, disease, or noxious weed. Robin has seen all of the state's noxious weed populations reduced to minimal acreages or complete eradication in this District, and has trained numerous young biologists during many years of California Weed Tours and seminars. Working with these enthusiastic



Robin surveying for purple loosestife and hydrilla near Cache Creek

young weed science personnel has kept her interested and on her toes. With the backing and support of the administrative staff the IPC program is accomplishing great things in weed management these days.

From being one of the bad guys using poisons to "kill" the environment, the CDFA is now a partner in a massive effort to reclaim California's native environment and reduce loss of agricultural lands and crops. The Department has reduced its project use of pesticides by huge percentages, incorporated a wide variety of biocontrol options, GPS/GIS mapping equipment, more efficient chemical delivery systems, manual removal techniques, and a concentration on early detection; CDFA has become one of the good guys. Robin hopes to remain a capable participant in this massive effort for many years to come.

Robin's advice to any weed science person entering this career field would be to keep your eyes and ears open when in the field. Really *look* at your locations and terrain and *think* when searching out infestations and solutions. Most noxious weed and vertebrate infestations had a very simple introduction. With a bit of investigation and knowledge of local wind and water movement, grazing practices, and wildlife populations, you will find the source. Respect your professional associates, producers, and farm laborers. They know an amazing amount of information about their lands and the history of their farms, and if you approach them as a partner in their land management they will aid you in any way they can. Enjoy your career choice. Instead of canoeing rivers, climbing mountains, surveying remote locations, and working in an amazing variety of situations, you could be working on a manufacturing line or in any similar job with little to no variety or chance for personal initiative. ❖

Robin Breckenridge and Claire Gallagher surveying for purple loosestife



Remote Sensing Workshop Report

BY: TRISH FOSCHI

The ASPRS (American Society for Photogrammetry & Remote Sensing) Northern California Region, the California Department of Food and Agriculture, Bio-Geo-Recon, and the Information Center for the Environment at UC Davis co-sponsored a 2-day conference on Remote Sensing for Mapping, Monitoring, and Investigating Invasive Plant Species. The conference was held September 25-26, 2000 at UC Davis. The first day was devoted to an introduction and overview of remote sensing presented by Clyde Spencer of Bio-Geo-Recon and to a brief demonstration of image-processing software presented by Trish Foschi of San Francisco State University. The second day featured 8 papers on a variety of applications and technical methods, and two posters were also on display. The final program, abstracts, and power point presentations are online at http://online.sfsu.edu/~asprs/regl_news.html, and more papers will be added as they are received. The conference ended with a lively panel discussion on the future and practicality of technology, and on research and funding needs.

There were over 120 participants representing some 50 government agencies (city, county, state, and federal), various organizations, private companies, and universities. The speakers came from as far away as Colorado and Idaho, and the audience came from as far away as Colorado, Oregon, Idaho, and Utah. By all reports, the conference was a great success.

Three important and unexpected things also came out of the conference:

1. a request for an annual conference on this theme
2. a list-serve for people interested in the subject (see below)
3. a good deal of interest in developing a Northern California or California Consortium to share data and resources

An e-mail list-serve called "weeds-remote" has been created for the purpose of connecting people who have an interest in the development and application of remote sensing technologies and invasive weeds. It is primarily targeted to researchers, industry, agency staff, and weed control project coordinators to streamline communication. To subscribe, send an e-mail message to listproc@ucdavis.edu. In the message body, type: "subscribe weeds-remote <first name> <last name>". The list address is weeds-remote@ucdavis.edu. For more information contact Marc Horney at (530) 865-1154 or email: mrhorney@ucdavis.edu ❖

Strat. Planning *continued from page 7...*
vision of what the public can get out of the program, and obtaining public support.

Leadership Planning leaders should focus on being clear, consistent, and visible. They must present the strategic plan to the public and participating members, reward leaders at all levels of organization, and encourage participation and innovation. Remember that the more empowerment that you provide, the more accomplished your group will become!

Communication This is the lifeblood to successful strategic planning. The nature of collaborative projects like those established by WMA's, require frequent and effective communication. Because several members will act as a directing body, they must function as a unit. Thus they must come to an agreement on several philosophical and logistical issues. This requires multidirectional dialogue among all stakeholders.

Planning and preparation An important part to planning is to thoughtfully establish who should be involved, the level of their involvement, and the allocation of specific tasks to the most appropriate individuals.

Those who will see the results of the projects and stakeholders must all be represented. Needed resources should be identified as well as who can provide them.

The expected outcome must be agreed upon and understood by all planning participants. Attainment of this outcome, or success, must be defined.

II. Implementation

Strategic direction The overall goal of a strategic plan is to develop organizational goals, objectives, and strategies by which the group plans to achieve its vision, mission and values. To be meaningful, a group must maintain strong leadership, including "organizational trust", allowing lead people to direct projects and delegate authority to members.

A meaningful facilitator may be necessary to help establish the organizational structure and lines of authority as part of the strategic planning process.

External partnering is essential for successful strategic planning. Gaining support from individuals or groups that may have only indirect interest in the WMA, is important. When external partners recognize the organization is legitimate and has leadership

they will offer support.

Implementation Successful implementation of a strategic plan is achieved by accomplishing objectives and empowering people by delegating focused tasks and expecting them to achieve results. Planning drives budgeting, providing a greater opportunity for achieving goals and objectives.

Performance evaluation and reporting The government does not see products, thus it is hard to evaluate. Activities must be tracked and effectiveness and public satisfaction must be measured. This allows for changes to be made to increase success. Performance can be measure by setting distinct goals and deadlines, evaluating results, conducting public surveys, and monitoring changes in financial support. ❖

Related Websites:

<http://pi.cdfa.ca.gov/wma/Meeting/Sample%20strategic%20plan.htm>

http://www.co.monterey.ca.us/ag/WMA/Bin/strategic_planning_information.htm

For more information, contact Stacy Carlsen, Ag Commissioner, Marin County at (415) 499-6700 or email at scarlsen@marin.org.

PROFILE *continued from page 12*

Lower Klamath National Wildlife Refuges, staff use geographic information system technology to map and monitor management efficacy on purple loosestrife. Purple loosestrife and two federal endangered fish (shortnose sucker, *Chasmistes brevirostris*, and Lost River sucker, *Deltistes luxatus*) are found in adjoining aquatic habitats. Herbicide management (glyphosate) and biological control insects (black margined loosestrife beetle, *Galerucella californiensis*; golden loosestrife beetle, *G. pusilla*) are used on the plant, improving marsh plant- and endangered species- habitats. Radio telemetry work combined with GIS effort have identified where the above suckers are concentrated by season and have been used to map the purple loosestrife infestation on Sump 1A, Tule Lake NWR. Other field work has detected that resident insects are also foraging on purple loosestrife. Such monitoring efforts define the effectiveness of invasive species management on the Klamath Basin Refuges.

At Lower Klamath Refuge, a mixture of herbicides (glyphosate and dicamba) were applied via a rope wick device on perennial pepperweed near water. Near the Discovery Marsh (Tule Lake Refuge), herbicide (glyphosate) spot treatment along with mowing and later planting of streambank wheatgrass, *Elymus lanceolatus psammophilus*, and thickspike wheatgrass, *Elymus lanceolatus lanceolatus*, provide competition to poison hemlock, *Conium maculatum*.

Refuge-owned farm equipment and heavy equipment travel between five stations (Tule Lake, Lower Klamath, Clear Lake, Bear Valley, Upper Klamath, and Klamath Forest Refuges); this operation no longer moves noxious weed seed or plant parts from site to site, thanks to an equipment wash station now installed and used at the Lower Klamath Refuge shop/maintenance facility.

Klamath Refuges staff serve on the Invasive Species Team (see sidebar: Invasive Species Inventory and Risk

Assessment Team).

San Francisco Bay Refuges

Seven refuges (Don Edwards San Francisco Bay, San Pablo Bay, Antioch Dunes, Salinas River, Ellicott Slough, Marin Islands, and Farallon National Wildlife Refuges) are at the heart of invasive species impacts in the vicinity of the San Francisco Bay Estuary. A recent report (Cohen, A.N. and J.T. Carlton. 1995. Nonindigenous Aquatic Species in a United States Estuary: A Case Study of the Biological Invasions of the San Francisco Bay and Delta. 293 pp. Available from: www.anstaskforce.gov/sfinvade.htm) noted that the estuary was the most invaded aquatic ecosystem in North America with some 212 introduced species. At San Pablo Bay Refuge, the Tasmanian eucalyptus, *E. globulus*, poses competition to native plant systems, valuable for wildlife habitat; cut-stump triclopyr ester management is being used. On D.E. San Francisco Bay Refuge at the south end of the Bay near Fremont, smooth cordgrass is impacting habitats in the system by competing with the native California cordgrass, *S. foliosa*; refuge managers are using several techniques including cutting and the glyphosate herbicide on smooth cordgrass. The plant also occurs on other lands, not owned by the U.S. Fish and Wildlife Service, in the San Francisco Bay Estuary and a collaborative partnership has developed between all of the agencies in the aggressive management of the non-native cordgrass.

The federal endangered Smith's blue butterfly, *Euphilotes enoptes smithi*, relies on the flowers of the Coast buckwheat, *Eriogonum latifolium*, to complete their life cycle; adult egg laying and larva feeding occur on this buckwheat, found on Salinas River and Antioch Dunes Refuges. Several competitive plants including ripgut brome, *Bromus diandrus*, are impacting endangered plant species (Antioch Dunes evening primrose, *Denothera deltoides howellii*; and Contra Costa wallflower, *E. capitatum angustatum*) at Antioch Dunes NWR. Refuge staff carefully remove the brome through spot application of sethoxydim herbicide to provide buckwheat plant habitat for the butterfly. Volunteer groups are active on

invasive species efforts at these refuges.

San Luis Refuges

San Joaquin River, Merced, and San Luis National Wildlife Refuges plus the Grasslands Unit form the heart of this historic grassland and wetland habitat in California's Central Valley. A new area, Diablo Range National Wildlife Refuge, is being acquired as part of the San Luis Complex. While fish, wildlife, and plant habitats have been altered in the region, these refuges are proving that land management and water in the right combination can promote healthy, robust habitats for these species. Yellow starthistle, perennial pepperweed, and wild fennel, *Foeniculum vulgare*, integrated weed management efforts using well-timed mowing, water management, and herbicide application (triclopyr, chlorsulfuron, or glyphosate) reduce the competition from the weedy species to promote native plant establishment needed by fish, wildlife, and plants. Yellow starthistle biological controls also play a part in habitat management. Mowing management for poison hemlock, and wick/wipe application of glyphosate are taking place on San Joaquin River Refuge.

Hopper Mountain Refuges

These national wildlife refuges (Hopper Mountain, Blue Ridge, and Bitter Creek) provide one of many focus points for the California condor, *Gymnogyps californianus*, recovery program. These birds are the largest flying land birds in North America, weighing about 20 pounds with a wingspan of 9.5 feet. The goal of the California Condor Recovery Plan is to establish two geographically separate populations, one in California and the other in Arizona, each with 150 birds and at least 15 breeding pairs. The invasive yellow starthistle undermines habitats needed for mammal prey species that condors depend on for food, though the birds obviously fly great distances to find dead prey (carrion) both on and off of these refuges.

Another innovative approach to weed

management has been the development of the Kern Mountain Desert Weed Management Area, including Bitter Creek Refuge. A memorandum of understanding formalizes weed fighting efforts, establishes a coordinated effort, and provides for a fast response approach targeted to new weed populations, including tree-of-heaven (*Ailanthus altissima*), saltcedar, and yellow starthistle. This synergistic effort directs funding, equipment, and person-hours benefitting habitat in the weed management area and individual member organizations and parties.

San Diego Refuges

Seal Beach, San Diego, Sweetwater Marsh, Tijuana Slough, and Guadalupe-Nipomo Dunes National Wildlife Refuges are the focus of several invasive species management efforts designed to benefit fish, wildlife, and plants. At Sweetwater Marsh and Tijuana Slough Refuges, for example, giant reed, *Arundo donax*, is an Old World native species that is displacing plant habitats. The competitive giant reed grows quickly and resprouts rapidly after cutting and burning. Management of this plant depends on herbicide application, but other integrated weed management approaches may be ultimately available thanks to on-going work by the U.S. Department of Agriculture, Agricultural Research Service's Exotic and Invasive Plant Research Unit headquartered in Albany, CA. A recent investigative trip by USDA-ARS and partners to the Indian continent concentrated on searching for giant reed insect predators—important to future arundo integrated weed management efforts. In another approach, Team Arundo del Norte has combined private-, local-, county-, state-, and federal- partners to focus on the integrated approach to giant reed management, including research (see: www.ceres.ca.gov/tadn).

Other management associated with vernal pools; where certain soil characteristics capture rain water in the early winter rainy season which transform the dry pools into small wetlands—wet for only a brief period; provide habitat for the federal endangered San Diego fairy shrimp, *Branchinecta sandiegonensis*, on specific units of the San Diego Refuge. The vernal pools become wet for a limited

time and then dry; this sequence provides the necessary conditions for the shrimp's life cycle. Invasive vegetation, livestock trampling, and human caused site changes degrade the area in the vernal pool and the adjacent perimeter. Refuge managers are working to remove these impacts to vernal pool habitats. Land acquired Aug. 1, 2000 formally established the Guadalupe-Nipomo Dunes Refuge near Guadalupe; this refuge will protect dune habitats on the coast and manage exotic plants (including European beach grass and ice plant) impacting native dune plants.

Sonny Bono Salton Sea Refuges

Coachella Valley and S.B. Salton Sea National Wildlife Refuges form protected habitats for the federal endangered Coachella Valley fringe-toed lizard, *Uma inornata*, and wintering waterfowl, respectively. Lizard habitat requires free-moving sand conditions. Invasive plants interfere with the functioning sand system and the associated native plants. At other sites on the S.B. Salton Sea Refuge, the invasive saltcedar encroaches on native plant habitat important to this Sonoran Desert system. Managers employ several techniques including herbicide cut-stump treatment using triclopyr and replacing saltcedar with native plants (see: "Giving Native Plants a Management Green Thumb at Sonny Bono National Wildlife Refuge," *Noxious Times*, Summer, 2000).

Aquatic plants; most noticeably giant salvinia, a native of Brazil; have impacted S.B. Salton Sea Refuge wetlands and water delivery routes in this xeric environment. The endangered desert pupfish, *Cyprinodon macularius*, and Yuma clapper rail, *Rallus longirostris yumanensis*, habitats could be impacted by this floating aquatic. Through a series of management activities with partner organizations, the effort to reduce giant salvinia continues with physical, mechanical, and diquat herbicide efforts (see sidebar: Giant Salvinia Management Agreement Signed). ❖

This article was written by Scott M. Stenquist, the regional integrated pest and weed management coordinator, U.S. Fish and Wildlife Service, Pacific Region (NWRS-OPR), Portland, OR. For more information call (503) 231-6172 or email: scott_stenquist@fws.gov.

Giant Salvinia Management Agreement Signed- U.S. Fish and Wildlife Service Refuges and California Department of Food and Agriculture-Integrated Pest Control Branch

Giant salvinia, a floating aquatic plant native to southeastern Brazil, became established in an irrigation drain canal south of Blythe, California during Aug., 1999. The plant quickly moved to the Colorado River system and impacted water delivery systems in southern California and on the Sonny Bono Salton Sea National Wildlife Refuge at the south edge of Salton Sea.

Management agencies quickly became alarmed at the plant's ability to grow, reproduce, and alter aquatic systems. USFWS-National Wildlife Refuges-Operations (Portland, OR) and CDFA-Integrated Pest Control Branch-Plant Health and Pest Prevention Services (Sacramento, CA) signed a cooperative agreement in Nov., 1999 for giant salvinia integrated weed management survey and detection throughout California. The agreement included \$10,000 (FY 99 funding) from USFWS-Refuges to CDFA's giant salvinia program.

Resources and Publications:

Invasive Species in a Changing World. A new publication from Island Press, edited by Harold A. Mooney and Richard J. Hobbs. This new text elaborates on the relationship between global change and invasive species, as well as the social and economic impacts of invaders. Cost: \$30.00 paperback or \$55.00 hardcover plus shipping. To order by credit card call 1 800 828-1302 or visit www.islandpress.org

Nature Out of Place Biological Invasions in the Global Age. Written by Jason and Roy Van Driesche. This text highlights the history and consequences of species introductions, providing personalized examples of the significant ecological changes wrought by invaders. Available from Island Press for \$29.95 plus shipping, in hardcover only. See ordering information above.

New Website: www.weedfreefeed.com. This website is dedicated to educating and informing equestrian federal land users of the weed free requirements, important dates, where to buy feed, and how to recognize weeds along trails. Included is Certification for growers and contacts for questions and comments.

Roadside Use of Native Plants. Edited by Bonnie L. Harper-Lore and Maggie Wilson, this text was originally published by the U.S. Dept. of Transportation's Fed. Hwy Administration to promote the planting and care of native plants along highway right-of-ways. It provides managers of roadsides and adjacent lands with the information and background needed to make site-specific decisions about the use of plants along roadways. Currently available from Island Press for \$25.00 in paperback only. See ordering information above.

Upcoming Events:

January 8-10, 2001
53rd Annual Conference of the California Weed Science Society- Water, Weeds, and You!
 Doubletree Hotel & Convention Center, Monterey, CA
 Sessions cover home weed management, invasive aquatics, GPS/GIS issues, control methods for invasive species, current legislation and more. *For more information contact Wanda Graves at (510) 790-1252 or visit the website at www.cwss.org.*

January 16-18, 2001
22nd Annual Forest Vegetation Management Conference- Water, Aquatic Resources, and Vegetation Management
 Holiday Inn, 1900 Hilltop Drive, Redding, CA
 The conference is focused on improving water quality, and forest and watershed management. Registration fee is \$95 plus \$5 for lunch, due by December 31, 2000. *For more information contact Sherry Cooper at (530) 224-4902, email: shcooper@ucdavis.edu*

Geographical Breakout Group Meeting Dates:
 Sacramento Valley - **Feb 15, 2001**, Woodland, Heidrick Ag Center, 9:30 AM
 North East - **March 22, 2001**, Susanville, USFS Bldg

March 13-15, 2001
Western Society of Weed Science Meeting
 Coeur d'Alene Resort, Coeur d'Alene, ID
For more information see WSWs website: www.wsweedscience.org

March 15-16, 2001
International Knapweed Symposium
 Coeur d'Alene Resort, Coeur d'Alene, ID
 Topics to be discussed include integrated control, new approaches to management, biological control, and habitat restoration. Pre-registration deadline is January 1, 2001. *For more information visit the Symposium website: www.sidney.ars.uds.gov/knapweed*



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