
CalEPPC NEWS

NEWSLETTER OF THE CALIFORNIA EXOTIC PEST PLANT COUNCIL

VOLUME 3 • NUMBER 4

FALL 95



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In California, the exotic pest plant Tree-of-heaven (*Ailanthus altissima*), a native of eastern China, is a common sight.
See story page 4.

Photo by Sally Davis

Who We Are

CalEPPC NEWS is published quarterly by the California Exotic Pest Plant Council, a non-profit organization. The objects of the organization are to:

- provide a focus for issues and concerns regarding exotic pest plants in California;
- facilitate communication and the exchange of information regarding all aspects of exotic pest plant control and management;
- provide a forum where all interested parties may participate in meetings and share in the benefits from the information generated by this council;
- promote public understanding regarding exotic pest plants and their control;
- serve as an advisory council regarding funding, research, management and control of exotic pest plants;
- facilitate action campaigns to monitor and control exotic pest plants in California; and
- review incipient and potential pest plant management problems and activities and provide relevant information to interested parties.

Newsletter Submissions

Letters to the Editor, notices, articles of all types, volunteer workday schedules, photographs, and line drawings are welcome and may be submitted directly to the editor at the address to the right. We invite you to utilize *CalEPPC NEWS* as a forum for describing your project, asking for help, or bringing new issues or developments to the forefront. Electronic submission is gratefully accepted in PC-formatted 3.5" or 5.25" disks utilizing WordPerfect or Microsoft Word. Please enclose a letter quality hard copy with your disk. Copy for the Winter 1996 edition is due with the editor by January 15, 1996.

NOTE:

At-large board member Charles Turner will be leaving California at the end of December for a possible six-year stint in the land Down Under. As the annual CalEPPC election process has just been conducted, the CalEPPC board voted, at their bi-monthly meeting in October, for his position to be filled by Steve Harris.

CalEPPC 1995 Officers and Board Members

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President's Message

Carla Bossard, president

As those of you who were there already know, the CalEPPC Symposium '95 was a very successful forum which facilitated information exchange about multiple aspects of exotic pest plant problems. Since I was not on the symposium committee this year, I could, to a greater extent than in previous years, experience it as an attendee, and consequently I offer the following observations.

Randy Westbrooks led off an excellent set of speakers by clearly delineating the new USDA APHIS weed policy and regulatory strategies aimed at preventing further introduction and spread of exotic pest plants. Presentations elucidated fire and water impacts on exotic infestations; biological control options; new academic, volunteer, and government groups involved with exotics management; and reports on the ecology and management of five exotic pest plant species. The crowd of 260+ attendees enthusiastically listened to and questioned the speakers through late afternoons on Friday and Saturday. The fact that the speakers were more tempting to attendees than the beautiful Pacific Ocean coastal views surrounding them at Asilomar is a great accolade to the speakers.

The poster presentations were equally enlightening and well done with much "hot off the press" information. After a sunset tour of Asilomar dune restoration Friday, a very stimulating set of discussions took place Saturday evening pertaining to the control of individual exotic species. The concerns and insights shared at these discussions by other weed warriors fresh from the field are often, for me, the most useful information of all. The notes from these discussions will be published in the Winter *CalEPPC News*.

In breaks between speakers, and during early morning and late night hours, meetings were held by members of the boards of Pacific Northwest EPPC, Tennessee EPPC, Florida EPPC, and California EPPC to launch the process of forming the National Association of Exotic Pest Plant Councils (NAEPPC) and to determine its goals and operational details. A Memorandum of Understanding: The Asilomar Accord was signed by the Presidents of the four EPPCs to be ratified by the respective boards of directors. As elucidated on page 12, this collaboration will improve our ability to act on exotic plant issues of national scope.

The field trips on Sunday gave attendees the opportunity to personally experience some of the habitats and exotic plant problems which exist along the Central California coast. It was a pleasant conclusion to a very worthwhile two and one-half day symposium. All those involved in CalEPPC Symposium '95 should feel very satisfied that it was a job well done.

We are left with a year to apply what we learned and a pleasant anticipation of CalEPPC Symposium '96 in San Diego, October 4-6, 1996.

Carla



Ailanthus altissima (Miller) Swingle: Its Biology and Recent History

John C. Hunter

Department of Environmental Horticulture, University of California, Davis

A*ilanthus altissima*, best known as the "Tree-of-Heaven," and a native to eastern China, is a pernicious urban weed throughout the northern hemisphere. In China, its true nature has been known for millennia; an early Chinese saying refers to spoiled children as 'good-for-nothing *Ailanthus* sprouts' (Hu 1979). A comparable understanding of *Ailanthus*' horticultural shortcomings was slow to develop in Europe and America; too slow to prevent the species widespread naturalization.

It was a misunderstanding that precipitated the initial introduction of *Ailanthus* to Europe and later to the United States (Hu 1979). In the 1740's, Pierre d'Incarville, a French priest moonlighting as a botanist and industrial spy, tried to steal seeds of *Rhus verniciflua*, from whose fruits lacquer is obtained for the production of polished woodenware. The seeds arrived safely in France with a glowing description of the plant's value. Unfortunately, the seeds were not of *Rhus verniciflua* but of *Ailanthus altissima*, whose tropical look, rapid growth, and tolerance of urban life led to its planting throughout Europe and the United States during the nineteenth century (Hu 1979). Nurseries carried *Ailanthus* and it was planted widely in public spaces. Frederick Law Olmsted planned an *Ailanthus* grove for Central Park (Newton 1986). In California, up into the 1890's, *Ailanthus* was sold in Sacramento and grown for planting in Golden Gate Park (McClintock 1981). As its familiarity increased its popularity declined, and by the mid-twentieth century *Ailanthus* had attained a worldwide reputation as a messy, weak-wooded, sucker-sprouting pest. However, before it was all but banned from horticulture, *Ailanthus* had become widely naturalized as a species of ruderal habitats. Today in California, thickets of *Ailanthus* are a common sight.

These thickets of small trees are created by the prolific production of shoots from wide-ranging roots, with new shoots sprouting up to 15 meters away from the nearest existing stem (personal observation). When these shoots first emerge their growth is rapid. I have observed new sprouts increase in height up to one meter per year and more rapid height increases are possible; when *Ailanthus* trees are cut, the resulting sprouts can reach up to four meters the first year (Brown and Brown 1972, Miller 1990). For sprouts in favorable settings, rapid growth continues beyond the first couple of years. For shaded sprouts, however, height increase drops to several centimeters per year (Hunter - unpublished data).

Initially, growth is concentrated upward along a single axis and branching is rare. Even when browsed or cut most stems continue to grow with a single main trunk. Damage, however, often does give rise to a plentitude of root sprouts, as described by Bailey (1930). Once branching begins, the branches diverge at wide angles and a broad dome-shaped crown develops. The tree typically reaches heights of 10-20 meters in California (Miller 1990; personal observation). In some eastern states, it occasionally

reaches 30 meters with a trunk up to three meters in diameter (Illick 1925; Newton 1986).

Ailanthus shoots typically have a short life span of 30-50 years. However, older ages are possible; the centerpiece of the gardens at Long Island's Sherrewogue Estate is an *Ailanthus* planted before the Civil War (Newton 1986). Although *Ailanthus* trunks are generally short-lived, the production of multiple trunks from root sprouts allows one individual to occupy a considerable area for a prolonged period of time.

Most stems become reproductive at 10-20 years, but I have seen a two-year sprout produce fruits, and even seedlings occasionally flower in their first year (Feret 1973). As a rule, trees produce either only male flowers or only female flowers (dioecious). Some references describe *Ailanthus altissima* as producing both bisexual and unisexual flowers on one tree, and it appears that bisexual flowers do exist on some individuals (Bailey 1949; Feret 1973; Heywood 1978;). Nonetheless, most individuals are unisexual, and I have not observed functionally bisexual flowers on any *Ailanthus* in California.

The female flowers have two to five carpels, each of which can mature into a winged fruit containing a single light seed (average mass 0.04 g; Little 1974). These flowers are in terminal inflorescences. Trees may produce up to several hundred inflorescences per year. The number varies considerably from year to year and some years a tree may fail to produce inflorescences. One tree in Martinez that I examined produced 150, 183, 219, 439, and 56 inflorescences respectively from 1988 to 1992. At maturity, an inflorescence contains hundreds of seeds. Therefore, trees produce up to 10^6 seeds per year with each dispersed independently.

The fruits mature in late summer and are dispersed throughout the fall, winter, and even during the following spring. The last fruits to disperse, those which overwintered on the tree, still contain viable seed which will germinate readily in moist soil. (I got 30% seedling emergence from such seed in Sacramento). Overall, most *Ailanthus* seed are viable, and once exposed to several weeks of cold temperatures, will germinate if moist (Little 1974).

True seedlings are distinguishable from root sprouts. They are smaller, thinner-stemmed, have trifoliate leaves, and round green cotyledons below the first leaves. Sprouts, in contrast, have a cluster of leaves with variable numbers of leaflets, and are often yellow-green in color. Furthermore, a seedling pinched from the ground will reveal thin branching roots, whereas a yanked-up sprout will be firmly connected to a thick, rope-like root.

In California, the only true seedlings I have seen are the ones I have grown, and a few in planter boxes and other spots of

irrigated landscaping. *Ailanthus* seedlings are considered shade-intolerant (Grime 1965), are heavily browsed (Deam 1932; personal observation), and in California's upland habitats their establishment may be water limited. I suspect seedling establishment is relatively infrequent in natural habitats and that the presence of *Ailanthus* in our landscape relies heavily upon the ability of individuals to persist through production of successive root sprouts.



In forests, however, *Ailanthus* seems unable to dominate stands through the production of root sprouts. In the East Bay Area, I examined a mixed evergreen forest containing *Ailanthus*. Sprouts of the *Ailanthus* trees had very slow growth in the understory and were heavily browsed. Almost no sprouts reached the canopy. As a consequence, individuals were generally represented by a single stem rather than the dozens of stems typically found in open habitats. Without the ability to successfully recruit new stems from root sprouts, *Ailanthus* cannot compete in these forests - its stems are far shorter-lived than those of the other species, and its seedlings are intolerant of shade.

Limited competitive abilities, infrequent seedling establishment, and a reliance on root sprouts for persistence hardly seems the description of a fearsome invasive exotic. Nonetheless, it may be an accurate description of *Ailanthus altissima*. Wherever it has naturalized, with the possible exception of the southeastern United States, it has remained a species of disturbed, semi-natural and ruderal habitats (Brizicky 1962; Kowarik 1983; Miller 1990).

Of course, under human influence, much vegetation experiences severe or frequent disturbance. In addition, vegetation in some habitats (riparian areas, sand dunes) "naturally" experiences substantial disturbance.

Though widely distributed at lower elevations (<1250 m) in Mediterranean California (McClintock 1993), *Ailanthus* has had limited success in invading California's natural habitats. It is most abundant in the ruderal environments of urban areas and roadsides, and is often present in riparian habitats, particularly those of agricultural and urban landscapes. In other habitats, it is infrequently present and rarely dominant. In California, outside of frequently disturbed habitats, *Ailanthus altissima* perhaps should be considered only potentially invasive, and also potentially eradicable.

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CaIEPPC ELECTION RESULTS!

Officers and board members who were elected for the 1996 calendar year:

President	Carla Bossard
Vice president	Ann Howald
Treasurer	Mike Pitcairn
Secretary	Mike Kelly

Board Members whose term expires December 1997:

Sally Davis
Nelroy Jackson
Jeff Lovich

Thanks for voting and staying involved!

CalEPPC Symposium '95

CalEPPC Symposium '95, held October 6-8, 1995 was a resounding success! Over 250 participants gathered at the Asilomar Conference Center to learn more about the control of exotic pest plants. Fire and water were the prominent themes of this year's symposium; the role of fire in invasions and control efforts, and the ecology and control of invasions in aquatic and wetland habitats. The keynote speaker was Dr. Randy Westbrooks, whose talk focused on federal regulatory efforts to minimize the introduction and impact of exotic pest plants in the United States.

Abstracts of the California Exotic Pest Plant Symposium '95 October 6-8, 1995, Asilomar

Federal Regulatory Efforts to Minimize the Introduction and Impacts of Exotic Pest Plants in the United States

Randy G. Westbrooks, Regulatory Weed Specialist, USDA APHIS PPQ, Oxford, NC

In recent years, there have been increased concerns about the effects of harmful non-indigenous species on natural, managed, and agricultural ecosystems in the United States. At the heart of this problem is the homogenization of biogeographical realms that have evolved in geographic and genetic isolation since the breakup of the supercontinent Pangea 180 million years ago. The present world movement of species beyond their native ranges by humans is an unprecedented ecological event in the history of life on earth.

In response to this growing problem, USDA APHIS has developed a new weed policy to address the problem of exotic pest plants in the United States. Areas covered under the new policy include: 1) *regulation of all types of weeds* (weed species that threaten biodiversity of natural ecosystems, and sustainability of managed and agricultural ecosystems); 2) *use of risk assessment* to list and de-list Federal Noxious Weeds (FNW); 3) *exclusion of exotic weeds* that are absent from or of limited distribution within the United States; 4) *interstate regulation of listed FNWs*; 5) *early detection and assessment of incipient infestations* of foreign weeds in the United States; 6) *eradication of designated infestations* that meet certain scientific criteria; 7) *control of designated weeds* through cost sharing; and 8) *a federal coordination role* to facilitate communication and cooperation among relevant public agencies and others. An implementation plan based on the policy is now being developed to guide administrators and others who are responsible for implementing the agency weed program.

Regulatory strategies for developing and implementing an effective program to prevent further introduction and spread of exotic pest plants include: 1) *weed prevention in foreign production areas* (production of weed-free commodities); 2) *pre-clearance of high risk commodities at ports of export* (prior to shipment to the United States); 3) *exclusion at ports of entry* (inspection of high risk imported commodities; treatment of contaminated commodities); 4) *detection, assessment and containment of incipient infestations in the United States*; 5) *eradication of incipient infestations* based on scientific criteria; and 6) *biological control* of widespread infesta-

tions that cannot be eradicated or controlled by other means.

Currently, federal and/or state projects are underway to eradicate 15 Federal Noxious Weeds from localized sites within the United States. APHIS is also involved in efforts to develop effective biological control programs for spotted and diffuse knapweed (*Centaurea maculosa* and *C. diffusa*), leafy spurge (*Euphorbia esula* L.), and purple loosestrife (*Lythrum salicaria*).

Biologically Based Technologies for Pest Control

Elizabeth A. Chomesky, U. S. Congress, Office of Technology Assessment

Pest management in the United States is changing. A growing emphasis is on reducing the reliance on conventional pesticides. At the same time, the number of pests requiring new control methods is rising, in part because of the continuing emergence of new threats from non-indigenous species. The result is that those who seek to manage pests have an acute need for more pest control options.

The Office of Technology Assessment has just completed an assessment that examines the current and potential future role of biologically-based technologies in meeting this need. The report covers technologies ranging from enhanced biological control of pests by their natural enemies to commercial formulations of microbial pesticides. Today, such approaches have joined the mainstream and are the methods of choice for certain significant and widespread pests. They could be used more widely, however. What happens next will depend largely on the federal government through its diverse roles in research, technology transfer, plant protection, land management, and pesticide policy.

Fire Ecology of Exotic Grasses in the California Desert

Richard A. Minnich, UC Riverside Dept. Of Earth Sciences

Abnormally heavy precipitation between 1978-85 and 1991-95 and the invasion of exotic annuals from the Mediterranean basin and Middle East have increased fire hazard in desert scrub in the Mojave and Sonoran Deserts. Studies indicate that some members of the creosote bush scrub community (*Larrea tridentata*, *Ambrosia dumosa*, *Coleogyne ramosissima*, *Opuntia acanthocarpa*, and *O. echinocarpa*) have low tolerance to burning, weakly developed adaptations to fire, and are subject to longstanding changes in the structure and species composition. Post-fire succession is dominated by short-lived species with high growth rates and high

reproductive capacities including *Encelia farinosa*, *E. actonii*, *Hymenoclea salsola*, *Salazaria mexicana*, *Viguiera deltoidea*, *Happlopappus cooperi* and *Salvia mojaviensis*. These shrubs commonly grow along washes, sandy sites, and steep slopes subject to recurrent fluvial and aeolian disturbances. Microphyllous woodland species, *Olneya tesota*, *Cercidium floridum*, *Prosopis juliflora*, and *Dalea spinosa* are all strong resprouters and seem unaffected by fire. Such sprouting behavior may be a generalized adaptation to flash flood disturbances which are recurrent along washes and alluvial fans.

Before the invasion of exotics, fire occurred periodically in Joshua tree woodland and blackbrush scrub because the semi-arid climate supports sub-continuous cover of native fuels including *Hilaria rigida*, *Stipa speciosa*, and *Coleogyne ramosissima*. The most important desert exotic, *Bromus rubens*, was first reported in the deserts during the 1930s. It was not abundant in the 1950s, but had developed dense stands by 1978.

B. rubens has since been joined by *Schismus barbatus* and *Brassica tournefortii*. Fire incidence with high rainfall is manifested in spurts of rapid growth and fuel accumulation which increase short-term regional fire probability. Fuel build-up over long succession times is diminished by dieback of the ground layer as a consequence of drought. Dead fuels may also be shredded by wind action and blown away. Saltation of fuels may break down undecomposed litter into nonflammable size particles. The recent outbreak of fires may be an ephemeral event in desert scrub ecology because burning is phased with a rare period of unusually heavy precipitation. Alternatively, the higher build-up of flashy exotic fuels than formerly provided by native annuals may increase rates of burning and directional species changes in desert scrub in California.

Overview of Biological Invasions in California Riparian Areas and Wetlands

Tom Dudley, UC Berkeley Dept. of Integrative Biology

California has more threatened or endangered species of plants and animals than any other continental state, with over half of protected animal species and possibly a similar number of plants associated with aquatic or riparian habitats. Such wetland ecosystems are focal habitats in the majority of areas designated for protection of natural resources, including wilderness areas, national forests, state and national parks, and private or institutional ecological reserves. Efforts to protect these ecosystems are jeopardized by invasion of non-indigenous species, yet there has been no comprehensive analysis of what species are involved and where.

We conducted a survey of over 50 protected 'natural areas' in six biogeographical provinces of California to determine what species were considered problems by resource managers and what was being done to combat these invaders. Over 77 plant taxa and 70 animal taxa were identified from interviews and tabulated with respect to their current distributions and the degree of threat they pose to native species and/or ecosystems processes. Costs of damage and control were exceedingly difficult to assess, but are

certainly in the tens of millions of dollars statewide, with lack of management funds being a critical concern in all areas. This compilation is available to managers and other interested people to assist in developing strategies to protect wetland ecosystems and to generate concern before problems expand further.

To better represent the nature and extent of problem invasions into wetlands, I describe several relationships that may determine susceptibility of habitats to invasion, including elevation, climate, and modification of natural disturbance regimes. Characteristics of problem invaders and 'invasion complexes' (suites of interacting invading species) and important research directions are also discussed.

Use of Fire to Control French Broom

David Boyd, State Park Resource Ecologist, Marin District

Inexpensive and effective methods of controlling large populations of exotic plants are desperately needed. In 1994, a project to control French broom using fire was initiated at a wildland/urban intermix location at Mt. Tamalpais State Park, Marin County, California. To date, two large stands of broom have been cut and the dried stems broadcast burned in place. This burning successfully killed all mature plants, eliminating their ability to re-sprout.

French broom produces long-lived seeds and seed bank elimination must be an important element of any control strategy. The project area was a grassland prior to burning of this flammable plant community. To achieve this result, grass seed was sown on one of the sites from which mature plants had been removed and the resulting fuel was prescribed burned in the summer of 1995. This treatment resulted in the death of most of the targeted French broom seedlings. Periodic prescribed burns must take place until seed bank depletion is complete.

This project provides an example of the use of fire as an inexpensive and practical method of controlling an important exotic plant species. The implications of using fire in a wildland urban intermix location are also significant.

Use of Fire and Cutting to Control Yellow Starthistle (Preliminary Results of a Yellow Starthistle Control Experiment)

John Rusmore, Department of Environmental Horticulture, UC Davis

Seven combinations of winter burning, spring cutting, and summer cutting were applied to seven plots containing yellow starthistle (*Centaurea solstitialis*) at Indian Grinding Rocks State Park, Amador County, California. No summer burning was included in the trials since burning at that time would conflict with the park's major event of the year. From the results of the initial plots, three replicate plots were initiated containing seven treatments and a control assigned randomly within each plot. Although the replicate plots have been in use for less than a year, the results are quite different than the original non-replicated plots. While the first plots indicated that a winter flaming was almost as effective a control of yellow starthistle as any of the other combinations, the new plots are showing that a spring cutting may be the preferred method of managing yellow starthistle at Indian Grinding Rock

State Park. Numbers and cover of yellow starthistle were reduced by 90% following a single spring cutting in June 1995. However, reduction of native *Clarkia* and *Elymus* are possible consequences of this control method. Longer term study will clarify this and other effects.

Cheatgrass and Wildfires in the Intermountain West

James A. Young and Robert R. Blank, USDA Agriculture Research Service, Reno, Nevada

Cheatgrass (*Bromus tectorum* L.) has revolutionized most aspects of the ecology of sagebrush (*Artemisia* sp.) ecosystems in the Intermountain area between the Sierra-Cascades and Rocky Mountains. There are about 7.6 million hectares (19 million acres) of sagebrush characterized plant communities in Nevada. In the past three decades, cheatgrass dominance of these landscapes has increased from less than 1% to near 25%. Cheatgrass truncates plant succession by out-competing the seedlings of native plant species for soil moisture. Cheatgrass accelerates the frequency of catastrophic stand renewal processes by increasing the extent and number of wildfires. Native grass species do not mature, and readily burn until late August or September. Cheatgrass matures in late June to early July. The abundance of fine-textured, densely-growing cheatgrass herbage increases the chance of ignition and the rate of spread of wildfires. Early season wildfires are harmful to several native species that would normally benefit from natural wildfires.

Cheatgrass is native to central and southwestern Asia. It has followed agriculture around the world. It probably was introduced to the western United States as a contaminant of cereal grains. This annual is not a highly successful species in the annual dominated grasslands of cismontane California. Cheatgrass can be a winter annual or germinate and establish in the spring. It has the potential for tremendous seed production and builds large seedbanks of seeds with acquired dormancy.

Cheatgrass can invade native sagebrush/bunchgrass plant communities in high ecological condition. It never dominates such communities, apparently exploiting environmental potential that no native species evolved to use. Cheatgrass can out-compete native perennial grass seedlings. Plant breeders have not been able to improve native grass cultivars because they have never identified competitive genotypes that can compete with cheatgrass. The best biological suppression option currently available is to use non-invasive forms of exotic wheatgrasses (*Agropyron* sp.) to control cheatgrass until competitive natives are found or seedling weed control techniques are enhanced.

Exotic Plant Considerations in Wake of Wildland Fire Sandy Morey, CA Department of Fish and Game, Natural Heritage Division, Plant Conservation Program

In recent years, many areas of California have been devastated by wildfires, and the issues of public safety, property protection, and ecosystem integrity have been elevated in both the public policy and resource management arenas. In the Spring of 1994, the Board of Forestry and the Fish and Game Commission adopted the *Interim Joint Policy on Pre-fire, During Fire, and Post-*

fire Activities and Wildlife Habitat. This policy directed the Departments of Fish and Game (DFG) and Forestry and Fire Protection (CDF) to coordinate and cooperate on all issues dealing with fire ecology and wildland fire management. Since that time DFG has: 1) developed and released its *Policies and Procedures for Response to Fires in Wildlands*; 2) become an active member of CDF's Incident Command System Response to Wildland Fires; 3) participated in the review of CDF's Vegetation Management and Emergency Watershed Protection Programs; 4) facilitated the drafting of state-wide guidelines on post-fire monitoring of vegetation and wildlife response; and 5) served as a member on the California Fire Strategies Committee.

Exotic plant species pose special risks to ecosystems affected by wildland fire and prescribed burning, a fire management tool. Some of those risks include elimination of native plant species due to premature reburning, invasion of exotic flora due to ecological character(s) of a particular fire, reduction or elimination of native flora due to competition with exotic flora, and ecological disturbance caused by use of artificial seeding following a fire. As part of DFG's effort to improve the fire management in California ecosystems, it has developed and adopted the following policy on seeding following a fire to reduce erosion control:

Seeding is appropriate only if the following criteria are met: 1) *there is clear, scientific evidence that a given seeding mix will more effectively establish ground cover than the remaining, viable seeds in the natural seedbank, and 2) seeding has been demonstrated to be an effective restoration technique in relation to that specific incident's conditions (i.e. slope, soil type, soil and duff damage, etc.).* DFG believes that seeding may be appropriate in areas where fire suppression activity has removed or destroyed the natural seedbank (i.e. bulldozing). DFG acknowledges that when human safety is an issue downstream, and seeding would protect human safety by better stabilizing the watershed, seeding is appropriate.

Alien Cordgrasses in Pacific Estuaries

Donald R. Strong, UC Bodega Marine Laboratory, Bodega Bay, California

Open intertidal mud without vegetation is a hallmark of Pacific estuaries, in contrast to Atlantic and Gulf Coast estuaries where vast stands of monocots prevail. The openness of intertidal mud is crucial to shore birds, some marine mammals, fish, and invertebrates, as well as flood control, recreation, navigation, and the esthetics of our Pacific estuaries. Atlantic cordgrass (*Spartina* spp.) Have been inadvertently and purposefully introduced to several Pacific estuaries where they have spread, covered a large fraction of previously open mud, and caused economic harm to navigation and fisheries. The longer term threats of these invasion include loss of precious foraging areas of shore birds and larval fish as well as wholesale sediment accumulation and severe channelization.

Smooth cordgrass (*Spartina alterniflora*) is among the most aggressive of these intertidal plants; it is dense and tall with thick, solid turfs of roots. In San Francisco Bay smooth cordgrass has spread since the early 1970s from its introduction point to many sites in the south bay. Clogging the Alameda Flood Control

Channel, it is now the object of an expensive aerial herbicide spraying campaign. The long term threats to birds, fish, and water management from smooth cordgrass are enormous. A special threat in the bay is to the non-invasive California cordgrass (*Spartina foliosa*) which remains high on the intertidal gradient and is the habitat of the rare California clapper rail and salt marsh harvest mouse, both endangered species. Smooth cordgrass overgrows California cordgrass and probably hybridizes with it.

The hopeful aspect of the likely alien cordgrass invasions of Pacific estuaries is that young, small colonies are conspicuous and can be killed with the legal herbicide Rodeo® or removed by hand. Herbicide is the only known effective control measure for larger colonies and invasions that have spread. Objections to the use of herbicides against alien cordgrasses have to be reconciled with the habitat loss that will result if this sole effective control measure is not used.

Ecology and Biological Suppression of Perennial Pepperweed (*Lepidium latifolium* L.)

James A. Young, Debra E. Palmquist, Robert R. Blank and Charles E. Turner, USDA, Agricultural Research Service, Reno, Nevada and Western Research Center, Albany, California

Perennial pepperweed (*Lepidium latifolium* L.) is now found in abundance in all western states except Arizona. This exotic was accidentally introduced to California early in the 20th Century. In portions of the San Francisco Bay, this creeping rooted perennial has greatly reduced biological diversity in salt marshes. In the intermountain region, large areas of critical riparian habitat have been invaded by this pest.

California and the other western states have been victimized by successive waves of exotic weeds. What are the consequences of one more? The spread of perennial pepperweed has been relatively recent and is currently rapidly expanding its range. What can we learn about the mode of exploitation and colonization of exotic weeds by understanding the ecology of perennial pepperweed? Such studies are especially appropriate when you consider this native of southeastern Europe and southwestern Asia spread across northern Europe at the same time rapid population expansion was occurring in North America. Are factors such as subtle climate change or atmospheric gas concentrations influencing the spread of this species?

We do not really understand the biology of weed invasion, even considering the more scientifically exotic aspects such as climate change. The spread of perennial pepperweed has partially occurred in a biological near-vacuum in degraded riparian and wetland habitats. This is a common thread in the invasion of many exotics. Perennial pepperweed has encountered other colonizing exotics such as quackweed [*Elytrigia repens* (L.) Nevski] while invading degraded riparian habitats, and often has virtually eliminated the competing weed.

Obviously, biological suppression of this pest is not going to be easy. It is impossible unless we develop an in-depth understanding of the biology of the species.

Salt Cedar, Revegetation and Riparian Ecosystems in the Southwest

Bertin W. Anderson, Revegetation and Wildlife Management Center, Blythe, California

Riparian habitats throughout the arid southwest have been dramatically disrupted throughout this century. Anthropogenic activities such as clearing for agriculture, grazing, and construction of hydroelectric dams have played no small role in the destruction of this habitat type. These and other activities have rendered much of the area formerly suitable for native trees currently ecologically unsuitable for these species.

Revegetation with standard procedures leads to habitats with less value for birds than the salt cedar they replaced. Procedures with intensive revegetation can lead to development of habitats supporting significantly more birds than salt cedar. Even though the intensive methods show promise, caution must be exercised in clearing or killing large stands of salt cedar because 60-80% of the area may be unsuitable for re-establishment of native tree species.

Volunteers and Long-term Community Support for Effective Pest Plant Control

Ken Moore and Grey, Wildlands Restoration Team, Aptos, California

Historically, the most successful element of Integrated Pest Management is cultural, mechanical pest control. Volunteer programs offer a cost-effective method of mechanical pest plant control on public lands. For these programs to be successful they must be designed, managed, and maintained correctly. Volunteer program management is a new field and is therefore unfamiliar to many land managers. Programs in the central coast area of California offer good examples of volunteers successfully controlling many serious pest plants. These species include French broom (*Genista monspessulana*), Pampas grass (*Cortaderia jubata*), English ivy (*Hedera helix*), and iceplant (*Carpobrotus edulis*). Additional benefits concomitant with pest plant control are equally important, presenting cumulative effects of volunteer programs that should give them primary significance in the management of many natural areas of California.

A Test of Removal/Control Techniques for French Broom

CalEPPC Broom Control Working Group

French broom (*Genista monspessulana*) is an invasive leguminous shrub that displaces native vegetation and colonizes forestry lands after harvest, preventing regrowth of economically valuable tree species in northern California. Research done on related species and the little information known about the ecological characteristics of French broom indicate in order to remove mature shrubs and prevent reinfestation some combination of techniques is necessary.

The French Broom Control Working Group of CalEPPC developed a field experiment sited at Jackson Demonstration State Forest near Fort Bragg, California in which the efficacy of a variety of different treatment combinations were examined with the following two goals: 1) to rigorously assess a variety of treatment combinations regarding effects on the seed bank, seedling germina-

tion, mature broom mortality, and re-establishment of non-broom vegetation, and 2) to determine the person-hours required for each treatment combination. The treatment combinations were as follows:

1. French broom pulled using weed wrenches. Broom removed from the site. Emerging seedlings weed whipped in late June 1994 and 1995 (pull/remove).

2. Broom pulled using weed wrenches. Broom left on the block, dried, then burned September 1993. Any seedlings flushed to germinate, weed whipped in late June 1994 and 1995 (pull/burn).

3. Broom pulled using weed wrenches. Broom left on the block as a mulch (pull/leave).

4. 30% triclopyr in 70% penevator oil applied on each French broom stem of 0.5 cm or more in the block using low volume basal bark method (squirt 1 ml of the herbicide on the stem at 5 cm above ground level using a hand applicator). Broom allowed to stand for four weeks so herbicide had maximum impact. When dead, broom was cut and removed from the block. Glyphosate applied on seedlings which germinated by late June 1994 and 1995 (herbicide/cut/remove).

5. Triclopyr applied to broom, and broom cut as in No. 4 above. Broom burned September 1993. Glyphosate applied on seedlings flushed to germinate by late June 1994, reapplied 1995 (herbicide/cut/burn).

6. Triclopyr applied to broom and broom cut as in No. 4 above. Cut broom left on the blocks as a mulch (herbicide/cut/leave).

7. No changes made to blocks (control).

Each of the seven treatments was applied to five replicate 7 m X 7 m blocks. Measurements of number of seedlings and mature broom plants, seed bank size, resprouting, and percent cover were made in three randomly located 1 m X 1 m permanent plots within each block.

After two years the results are as follows:

1) The herbicide/cut/burn treatment plots have no mature broom, significantly fewer seedlings, and a significantly smaller seedbank than any other treatment or control plots.

2) Mulching with dead broom does not significantly reduce numbers of seedlings germinating, and makes it almost impossible to treat seedlings effectively with weed whips or glyphosate, resulting in much resprouting of treated seedlings.

3) The pull/burn plots have significantly larger seed banks than herbicide/cut/burn plots, and pull/burn seeds banks extend 3 cm deeper than they did before treatment.

4) The pull/remove and herbicide/cut/remove plots have significantly larger seed banks than the burned plots, but significantly smaller seedbanks than the control plots.

War on German Ivy; Good News from the Front

Carla Bossard and Carrie Benefield, St. Mary's College of California, Biology Department, Moraga, California

In the past 15 years, German ivy (*Senecio mikanioides* Walp.), an exotic vine native to South Africa, has become a major pest plant in coastal regions the full length of California covering native

biological communities. It thrives in the San Francisco fog belt and is a major concern in the Golden Gate National Recreation Area (GGNRA).

A field trial examining three chemical control methods and solarization was carried out from May 1994 until September 1995 in the Presidio, GGNRA, in an attempt to find an effective, economically viable removal method for German ivy. The site was partially tree-shaded with sandy loam soil and >85% ground cover of German ivy. Initial treatments were: 1) low volume application of 25% triclopyr, ester base, in 75% Hasten oil, applied at 320 liters/hectare in a low volume trickle on stems in strips 15-20 cm apart (LVT); 2) vegetation weed whipped prior to low volume application of 25% triclopyr, ester base, in 75% Hasten oil, applied at 320 liters/hectare in a low volume trickle on stems in strips 15-20 cm apart (WWT); 3) 0.5% triclopyr, 0.5% glyphosate, 0.1% silicone surfactant, and water, foliage sprayed over entire vegetation at 640 liters/hectare (LCFS); 4) vegetation covered by clear plastic staked at ground level (solarized); and 5) controls.

Each treatment was applied to three 12 m X 12 m blocks on the two-hectare research site. Measurements: (dry weight biomass, water content, and pH of the soil) were taken in four 50 cm X 50 cm randomly located plots within each block one week prior to treatment applications in June 1995, and compared to measurements taken post-treatment. Biomass samples were divided into above-ground and below-ground samples and then into dead and healthy tissue. The distance between the nearest above-ground portion of 10 randomly chosen German ivy stolons in each experimental plot and the furthest distance in which rhizome tissue associated with it was killed was recorded.

On one-year post-initial treatments there was a significant reduction in the biomass of WWT and LCFS treated blocks compared to controls, but no significant difference between controls and LVT or solarized blocks. The LCFS treatment blocks showed the greatest reduction in biomass of German ivy. A second treatment with 0.5% triclopyr, 0.5% glyphosate, 0.1% silicone surfactant, and water at 640 liters/hectare was applied to the LCFS blocks in June 1995. Biomass sampling in September 1995 showed zero biomass of German ivy in the re-treated blocks, while the control blocks had a mean of 196.8 g/m². Underground rhizomes died back 30-45 cm in the LCFS, 20-40 cm in the WWT, and 10-25 cm in the LVT treatments with no underground dieback observable in the controls.

The appropriately timed application of a low concentration combination of triclopyr and glyphosate with the addition of a silicone surfactant was an effective means of eradicating German ivy from the treated blocks within two growing seasons.

Update: Federal Interagency Committee for Management of Noxious and Exotic Weeds (FICMNEW)

Nelroy Jackson, Monsanto Company, Corona, California

A Memorandum of Understanding (MOU) was signed by 17 land-holding federal agencies in 1994. The purpose is to work cooperatively to accomplish an ecological and integrated approach to the management of noxious and exotic weeds on federal lands and provide technical assistance on private lands. The federal

agencies propose to work together within the scope of their respective authorities toward a common goal of achieving sustainable, healthy ecosystems that meet the needs of society. This committee will coordinate a federal government approach which includes the development of agency needs and will make recommendations to departmental leadership on research, technology transfer, and management actions. There are two co-chairs of FICMNEW; one each from the Departments of Interior and Agriculture.

Goals of the California Department of Food and Agriculture's Integrated Pest Control Noxious Weed Control Coordination Plan

Gerald H. Miller, Associate Agriculture Biologist, Integrated Pest Control Branch

The California Department of Food and Agriculture has established an Associate Biologist position that is responsible for organizing, implementing, and coordinating within the Integrated Pest Control Branch the exotic pest plant prevention, control, and eradication programs with cooperating federal, state, county, private agencies, and interest affiliated groups. Through the utilization of G.P.S. received and GIS, exotic pest plant locations will be recorded, maintained, and displayed in databases that will provide for map-based spatial analysis of the pest plant abundance and control activities. The data collected will assist in the development of coordinated action plans that deal with multi-agency programs to control or eradicate noxious weeds. It will also be used to publicize, through presentations and papers, the problems caused by exotic noxious pest plants and the benefits achieved by controlling those invasive pests, and progress toward eradication.

Overview of Extension Non-Crop Weed Research in California

Joseph M. DiTomaso, University of California, Davis

Over the past few years, increased interest has focused on maintaining and restoring native plant biodiversity in non-crop areas. As a result, weed problems in rangeland, forests, wetlands, and natural habitats, particularly riparian areas and national or state park systems, have received more publicity. Included among the most important of these weed species are yellow starthistle (*Centaurea solstitialis*), giant reed (*Arundo donax*), salt cedar (*Tamarix* spp.), and most recently perennial pepperweed (*Lepidium latifolium*).

In this and the next year, my research program will focus on understanding various biological and ecological aspects of many of these weeds, and to use this to develop effective control strategies. For example, in collaboration with Marla Hastings (District Resource Ecologist in Sonoma County), we have shown that two consecutive burns in mid-summer (1993 and 1994) reduced yellow starthistle cover by 27% while increasing native plant biodiversity.

In Shasta County, I have demonstrated that hexazinone site preparation can lead to the economic establishment of a coniferous forest without jeopardizing long-term native plant biodiversity. I have also begun research efforts aimed at 1) controlling perennial pepperweed by determining the best timing for mowing; 2) understanding the phenology of yellow starthistle root development; 3) manipulating the timing of yellow starthistle reproduction to enable desirable vegetation to complete its reproductive cycle prior to employing chemical control options; and 4) investigating the reproductive biology and environmental requirements for germination and establishment of jubata and Pampas grass (*Cortaderia* spp.). These and other projects will require collaborative efforts with other state and county scientists.

California Partners in Weed Management

Jim Morrison, Bureau of Land Management

The California Department of Food and Agriculture, the California Agricultural Commissioners and Sealers Association, and the California Resources Agency have entered into an agreement with several federal agencies to coordinate and cooperate in the management of undesirable vegetation throughout California. One of the purposes for this Memorandum of Understanding between these agencies is driven by the 1990 Amendment to the Federal Noxious Weed Act which requires federal land management agencies to actively pursue management of undesirable plant species on federal lands, and to cooperate with the weed management agencies of the respective states.

The agreement identifies the basic responsibilities among the agencies for consultation, coordination, and cooperation in implementing an integrated pest management approach to undesirable plants. Considerations are to be given to all available methods of management including, but not limited to: educa-

tion, prevention, mechanical, biological, chemical, cultural, and a host of effective land management practices such as proper grazing management, reseeding with native species, preventative terms and conditions for land use permits, etc. The intent of this effort is to focus on minimizing the populations and effects of undesirable vegetation on rangelands, forestlands, and other wildlands throughout the state, as well as agricultural lands.

To date, participating federal agencies include the Bureau of Land Management, Forest Service, Animal Plant Health Inspection Service, Air Force, Army Corps of Engineers, Fish and Wildlife Service, Bureau of Indian Affairs, and the Bureau of Reclamation. These agencies, along with the above state agencies, plan to meet this fall and initiate strategies for implementing the agreement. Other agencies or organizations are encouraged to participate in this joint effort to combat weeds. For more information, call Jim Morrison 916.979.2830, Nate Dechoretz 916.654.0768, or Cheri Rohrer 415.705.1166.

Memorandum of Understanding: The Asilomar Accord

Parties: Florida EPPC, California EPPC, Pacific Northwest EPPC,
And Tennessee EPPC

Preamble

The issue of exotic pest plants in the management of natural areas deserves primary recognition. The four state/regional EPPCs are effective in their respective geographies. There is power in organization and cooperation, and there is strength in numbers. Some problems are uniquely national in scope. There is value in having a national association of Exotic Pest Plant Councils.

This Memorandum of Understanding (MOU) authorizes the formation of a national organization of EPPCs and establishes the rules under which the national organization will operate. This agreement shall be in effect until terminated by the member EPPC units.

Name

The name of the national group is the "National Association of Exotic Pest Plant Councils." The entity shall be referred to as NAEPPC in the rest of this MOU.

Goals

NAEPPC has seven goals (Pillars of Understanding) based on four issues of national importance and three areas of collaboration.

National Issues:

1. Improving the Federal Noxious Weed Act to include weeds of natural areas, and pertinent enabling legislation.
2. Increase Biological Control funding.
3. Promote good Weed Control by federal and other land management agencies and organizations using current technologies including mechanical and chemical methods.
4. Improve the methods of prevention of new infestations of exotic pest plants from importation into the United States and through interstate movement.

Areas of Collaboration:

5. Strategies for increasing membership of EPPC units.
6. Strategies for increasing funding.
7. Strategies for formation of new state or regional EPPC units.

Operation of NAEPPC

NAEPPC shall consist of a Board of Directors made up of two representatives from each EPPC unit. Representatives must be members of an EPPC unit, and at least one representative of each EPPC unit must be a Board Member of that EPPC unit. A quorum shall be a simple majority, with at least one representative from each EPPC unit. Decisions of the Board shall be made by simple majority vote, although consensus is preferable. An Ad Hoc alternate may be named by any EPPC unit whenever necessary. These provisions shall be reviewed after a total of six EPPC units exist.

The Board shall be run by a Coordinator, rotating for four years from each EPPC unit. The initial coordinator shall be from Florida, the second from California, the third from the Pacific Northwest, and the fourth from Tennessee. His or her principal duties shall be communication and organizing a national meeting. Most of NAEPPC's business shall be conducted by mail, telephone, fax and electronic mail. Once a year, a meeting of NAEPPC shall be held, preferably in conjunction with the Natural Areas Association Meeting held in Chicago, IL in 1996 and Portland, OR in 1997.

Interested parties may attend board meetings within the constraints of meeting space.

New EPPC Units

The four EPPC units support funding in the form of "seed money" for starting new EPPC units. Target geographical areas are the Midwest, Northeast, Mid-Atlantic, and Hawaii. We shall communicate and cooperate with each other regarding providing speakers, by-laws, and brochures to parties from potential new units.

Executive Secretary

NAEPPC agrees to the establishment of an Executive Secretary position in the Washington, DC area, with duties defined under a contract with NAEPPC.

Incorporation

Our goal is the incorporation of the National Association of Exotic Pest Plant Councils by January 1, 1997. A Facilitator shall work with the EPPC units to produce draft Articles of Incorporation and By-laws by January 1, 1996. A one-month turn-around response time is desirable.

Proviso

This Memorandum of Understanding (The Asilomar Accord) is signed this seventh day of October, 1995, with the knowledge that it must be ratified by the boards of all four EPPC units.

Dan Thayer, President FLEPPC
Carla Bossard, President CalEPPC

Brian Bowen, President TN-EPPC
Lou Whiteaker, President PNWEPPC

INSTITUTIONAL MEMBERS

CalEPPC would like to recognize the following institutional members who helped sponsor CalEPPC Symposium '95:

Regular Institutional Membership \$100

The Huntington Library

Contributing Institutional Membership \$250

Barrie Coate & Associates

DowElanco

Wilbur-Ellis Company

Patron Institutional Membership \$500

The Nature Conservancy

Sustaining Institutional Membership \$1,000

National Biological Service

California Native Plant Society

Monsanto Company

CONTRIBUTING MEMBERS

CalEPPC is pleased to welcome the following people who joined August through October 1995:

Joy Albertson	George Gioumouis	Michael Krebsbach	Dale Schmidt
Bertin Anderson	Mark Gray	Sally Krenn	Christine Schneider
Eva Armi	Rob Griffith	John Lafleur	Esther Schneider
Phyllis Ashmead	Phillip Gross	Vicki Lake	Steven Silvers
Charles Baccus	Larry Harris	Teresa LeBlanc	Steve Singer
John Beall	Jo Ellen Hathaway	Eric Love	Susan Sommers
Stephen Berger	Karen Haubensak	Ellen Mackey	Daniel Strait
Roland Bergthold	Kim Hayes	Jack Massera	Adrian Stroganoff
Jackie Bowland	Barbara Heinsch	Michael May	Jean Struthers
Linda Brodman	Beth Hendrickson	John McKinney	Ray Swartley
Joe Cannon	Lisa Herrinton	Irena Mendez	Vaughan Symonds
R. Anthony Chavez	Elly Hess	Dave Mitchell	Judi Tamasi
George Clark	Ken Himes	Marilyn Murphy	Tony Taylor
Ronilee Clark	Graciela Hinshaw	Dave Nelson	Donald Thomas
John Collins	V.L. Holland	Harry Oakes	Sara Timby
Gene Cooley	Jane Holte	Dennis Odion	Bonnie Turner
Bruce Cowan	Lacy Crider Holtzworth	Greg Otori	Pam Van Der Leeden
Carolyn Curtis	Paula Hubbard	Julie Osborn	Jeff Van Diepen
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William DeJager	Coralie Hull-Cobb	Jean Ouellette	George Waegill
Gabriel Delfre	Geary Hund	Brenda Ouwerkerk	Peter Waldburger
Joan Dorell-Canepa	John Hunter	Judith Peterson	Michael Wall
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John Ekhoff	Dana Kamada	Michelle Rasmussen	Donal Wilkinson
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Kelly Gallagher	Dylan Keon	Clifford Richer	Barbara Woyt
Mike Giacomini	Rob Klinger	Cheri Rohrer	David Wyllie
Jason Giessow	Tim Klukas	William Ryan	Vernal Yadon
Rick Gillespie	Lawrence Kobernus	Suzanne Schettler	James Young
Elfrid Gioumouis	Cathy Krause	Paula Schiffman	Daryl Zappe

Photos of Symposium '95

The editor and the board of directors are searching for photographs taken during Symposium '95. If possible, please donate copies of slides or prints to the editor so they may be used both in a scrapbook and in an upcoming issue of the newsletter.

Upcoming Meetings of Interest

January 12, 1996

The California Exotic Pest Plant Council Board of Directors will meet beginning at 10:00 at the NBS office in Palm Springs. All CalEPPC members are invited and encouraged to attend board meetings. For more information contact Jeff Lovich 619.251.4823.

January 16-18, 1996

Forest Vegetation Management Conference, "*Forest Vegetation Management, Before and After Catastrophic Wildfire*" will be held at the Red Lion Inn at Redding. For more information contact Scott Johnson 209.982.4337.

January 22-24, 1996

The 48th Annual California Weed Science Society Conference will be held at the Sacramento Red Lion Hotel. The theme for this conference is "*The Winds of Change: Seeds of Opportunity*." Contact Wanda Graves for further information, 510.790.1252.

April 16-18 1996

"*The Broom Symposium*" jointly sponsored by the California Exotic Pest Plant Council (CalEPPC), the Pacific Northwest Exotic Pest Plant Council (PNWEPPC), the Oregon Department of Agriculture, and the Washington State Weed Board will be held at Portland State University, Portland, Oregon. *The Broom Symposium* will gather together a broad range of persons with interest in broom control and mangement and present information on control techniques, and the biology and ecology of brooms. Attendees are encouraged to bring a poster or display that addresses the biology and/or management of Scotch, French, Spanish, or Portugese brooms. Contact Dennis Isaacson at 503.986.4621.

October 4-6, 1996

San Diego will be the site of *CalEPPC Symposium '96*. Mark your calendars and save this weekend for another exciting and fun event!

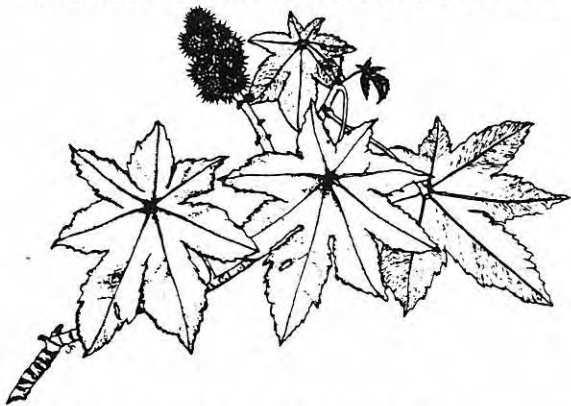
October 30 - November 3, 1996

SERCAL's *Fifth Annual Meeting* will be held in Yosemite National Park.

California Exotic Pest Plant Council
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