

CalEPPC NEWS

NEWSLETTER OF THE CALIFORNIA EXOTIC PEST PLANT COUNCIL

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A California Department of Fish and Game employee shows an uprooted specimen of perennial pepperweed (*Lepidium latifolium*) at Grizzly Island Wildlife Area, Solano County. See story, Page 4.

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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 below. 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 for WordPerfect or Microsoft Word, or ASCII text files. Please enclose a letter quality hard copy with your disk. Copy for the Fall 1994 issue is due with the editor by October 15, 1994.

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(Agricultural Pests or Potential)*

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President's Message

Global Change

John Randall, president

Global Change. For many, the mention of this subject brings to mind increasing CO₂ concentrations; alteration of the climate worldwide with an emphasis on warming trends; decreasing stratospheric ozone levels and resultant increases in ultraviolet radiation at the earth's surface. Few of us think about the impacts of invasions by non-native plants and animals in this context. But biological invasions have had, and will likely continue to have, greater impacts on the world's biota than any of these other factors for the next several decades or so. We may be all too aware of the ravages of yellow starthistle, tamarisk, and pampasgrass in California, but there are also North American muskrats in central and western Europe, South American golden snails ravaging rice crops from the Philippines to Malaysia, and Australia eucalypts and acacias running rampant in South Africa's tynbos.

Biological Invasions as Global Change was the theme of a meeting organized by the Aspen Global Change Institute which I attended in late August. Not surprisingly, many of the people there remarked that they had been heavily influenced by Charles Elton's 1958 book, *The Ecology of Invasions by Animals and Plants*. Elton laid out the issue neatly in his first chapter, stating "...we are living in a period of the world's history when the mingling of thousands of kinds of organisms from different parts of the world is setting up terrific dislocations in nature...The larger ecological explosions can...often be traced to a breakdown in the isolation of the continents and islands built up during the early and middle parts of the Tertiary period."¹

Others had noted the magnitude and nature of these changes as early as the mid-1800s. Charles Darwin commented on the spectacle of hundreds of square miles of the pampa of Argentina and Chile rendered impenetrable to horse or human by an invasion of wild artichoke or *Cardo de Castillo*.² Likewise, Frederick Law Olmstead filed a report on the need for protection of Yosemite in 1865, noting that, unless actions were taken, its vegetation would likely be pushed out by common weeds from Europe, as had happened "...in large districts of the Atlantic States."³

Clearly we have been in the midst of a vast, biological upheaval since regular contact was established between the Old and New Worlds; upheaval involving the movement and mixing of species that has not occurred on earth for tens, perhaps hundreds of millions of years. The upheaval continues, and its end is not in sight. It is clear, however, that there have been, and will be 'winners' and 'losers.' Some species have spread and become established over vast areas following their introduction by humans, while others have been struck down by competitors, predators, parasites, or diseases introduced by humans. The list of losses brought on in this way is long, and frankly, depressing. But it is not a reason to give up hope.

The consensus at the Global Change meeting is that there is much we can do, both to control invasions that have already occurred, and to slow the rate of new invasions. All of the nearly 30 participants expressed enthusiasm for the work of groups such as CalEPPC, and the hope that we continue to expand and multiply. The group was unified in the conviction that the most effective way to put a brake on this upheaval will be to work to prevent the entry of new invaders and to implement programs designed to identify and quickly eliminate infestations by new species before they become widespread. This will clearly require cooperation and participation from a public that has become aware of the threats posed by invasions. For this reason, the importance of education and of well designed, high-profile control projects was stressed.

CalEPPC has worked to address some of these needs thus far, and we have an enthusiastic, involved membership. But of course, we hope to do more, and so we encourage you to inform us in of your work. Write a brief description of your studies, control project, education program, or efforts to change policies for the better, and submit it to our newsletter editor, Sally Davis. If not currently involved in a project, please accept our invitation to join one of our working groups or to form one of your own. We won't be able to completely stop the global changes brought on by invasions, but we may be able to slow the rate of those changes, and save many of the species and landscapes that mean so much to us.

¹Elton, C.S. 1958. *The Ecology of Invasions by Animals and Plants*. Methuen and Co. Ltd., London.

²Darwin, C. 1962 (reprint). *The Voyage of the Beagle*. Doubleday, Garden City, NY.

³Olmstead, F.L. 1865. *Preliminary Report Upon the Yosemite and Big Tree Grove*. pp 488-516. In: V.P. Ranney (ed) 1990. *The Papers of Frederick Law Olmstead V The California Frontier 1863-1865*. John Hopkins University Press, Baltimore.

Perennial Pepperweed: A Threat to Wildland Areas

BY JOEL TRUMBO

Environmental Specialist, California Department of Fish and Game

At 84,000 acres, the Suisun Marsh is the largest, contiguous estuarine marsh in the United States. Formed where the Pacific Ocean tides meet the Sacramento and San Joaquin Rivers, the marsh is home to almost 250,000 million wintering waterfowl, tule elk, and dozens of other native plant and animal species. The endangered salt marsh harvest mouse makes its home in the dense growth of pickleweed found along the tidal reaches. Two rare bird species, the California clapper rail and the California black rail, can occasionally be glimpsed as they hide along the cover provided by tules and other wetland vegetation.

Unfortunately, the Suisun Marsh can also list at least one unwanted species among its residents. Perennial pepperweed (*Lepidium latifolium*) probably arrived in the Suisun Marsh during a period of intensive agricultural development that began just after the turn of the century and continued until just a few decades ago. A native of Europe, perennial pepperweed may have come to the United States in a bag of sugar beet seed. After its arrival, the weed made a gradual advance into the agricultural areas of the marsh. Intensive farming activities may have kept it in check for the first few decades. During the 1950's Suisun Marsh farmers, frustrated by their inability to prevent the intrusion of salt water into their fields, sold many of their parcels to the State of California for use as wildlife refuges. Private duck clubs were also established. This further increased the amount of land that was returned to wildlife use. It was during this period, when nature was supposedly allowed to return to its desired course, that pepperweed made its move. Unchecked by frequent cultivations and crop competition, the pepperweed population expanded at the expense of the recovering native plants. Today, this invasive exotic has overrun large acreage of prime wildlife habitat in the Suisun Marsh.

Unfortunately, perennial pepperweed's spread into agricultural and wildland areas has not been restricted to the Suisun Marsh. It has invaded tens of thousands of acres throughout the western United States. Where it grows, no other plant species can make a stand, and most wildlife species fail to thrive. Growing almost 3 feet high, the weed leaves behind tall woody stems; the reminders of last season's rapacious growth. But it isn't what's above ground that holds the greatest threat; pepperweed plants develop large, extensive root systems. Regrowth from the root system begins in late winter. Flowering takes place in early summer; it is during this season that large areas are covered with the weed's heavy growth of white flowers.

This prolific flowering gives perennial pepperweed its common nickname "tall whitetop."

There are several reasons why perennial pepperweed has proven to be such a difficult species to control. First, like other invasive exotics, it is a consummate opportunist. Many have tried to burn or cultivate the weed out of existence only to find that it is the first species to reappear. Once it gets a headstart, it has no real competition. Second, it produces large amounts of seed and reproduces asexually. Cultivation brings its long-lived seed up into the soil's germination zone. Additionally, cultivation causes a proliferation of asexual transplants. Pepperweed also appears to be allelopathic. Other plants that germinate nearby are killed by a substance exuded by the plant roots. Finally, its waxy leaf surface repels many herbicide formulations.

The rapid spread of perennial pepperweed poses a significant threat to wildland areas throughout the western United States. Its ability to tolerate a wide variety of environmental conditions has made pepperweed a serious problem in regions with moderate climates like Suisun Marsh, and in harsh weather areas like the Modoc Plateau. Outside of California, pepperweed has proven to be a formidable foe for ranchers and natural resource managers along the Humboldt and lower Truckee Rivers in western Nevada.

While pepperweed's rapid spread in wildland areas is obvious to even casual observers, the weed's most serious impacts are much less apparent. As the weed spreads, it crowds out vegetation that is critical to the survival of wildlife populations. In the Suisun Marsh, perennial pepperweed competes with pickleweed which supports populations of the endangered salt marsh harvest mouse.

The weed's tall stature and dense growth pattern make it unsuitable for use by waterfowl as nesting cover. If threatened or endangered plants are in the path of pepperweed's spread, they too will come out on the losing end; no match for the weed's vigorous growth and allelopathic abilities. Loss of habitat is unquestionably the most serious threat to native wildlife populations; it matters little if the threat comes in the form of urban development, water diversion or invasion by exotic plant species.

Concern over pepperweed's encroachment into prime wildlife habitat has given the California Department of Fish and Game plenty of incentive to develop a control method. As with any vegetation management program, several options were considered. Burning and discing had

already been attempted without success. Manual control methods would be futile because of the large affected area and pepperweed's rapid spread. Biological control options are presently nonexistent and the prospects for control using insect or disease organisms are doubtful. Perennial pepperweed belongs to the Cruciferae family which includes broccoli and cauliflower. Biological control organisms that would be effective on pepperweed may be just as happy living off of the weed's row crop cousins.

Chemical methods appeared to offer the greatest potential for an effective control program. Several parameters were established in the early stages of the program. First, control, rather than eradication, would have to be the goal. Pepperweed's presence at the California Department of Fish and Game's Grizzly Island Wildlife Area, located within the Suisun Marsh, was far too widespread to offer any real hope of total eradication. Additionally, the wildlife area is surrounded by a seemingly limitless seed source from nearby populations on private lands. The control program would have to focus on critical sites that needed to be protected (i.e. waterfowl nesting areas, or isolated patches within the pickleweed habitat of the salt marsh harvest mouse). Second, the herbicide products chosen would have to have minimal effects on nontarget wildlife and plants. Finally, the chemicals that would be used would have to be relatively non-persistent in the environment.

Herbicide trials have been conducted at the Grizzly Island Wildlife Area. Four commercial herbicide formulations; Garlon 3A® (triclopyr), Garlon 4® (triclopyr), Roundup® (glyphosate), and Telar® (chlorsulfuron), were tested at the Grizzly Island facility during 1992 and 1993. All applications were made during the spring and summer.

While Roundup® provided modest control, the nonselective nature of the material created a bare ground situation that led to a vicious return of the problem species. After that experience, it was quickly decided that a broadleaf-specific compound would be a necessity. Using a selective compound would leave grass species, many of them natives, unharmed. This would provide some competition for the pepperweed after its inevitable post-treatment rebound. Both of the Garlon® formulations provided good control using label rates with minimal effects on grass species. Telar® (with a 1 qt/100 gallons non-ionic surfactant tank mix) provided excellent control with practically no effect on grass species. The Telar® plots were in a particularly thick growth of pepperweed. Thirteen months after treatment, the Telar® plots, even at the below-label rate of 0.25 oz/acre, were virtually free of pepperweed and were thick with beneficial grass species.

The Grizzly Island plots were small squares surrounded by seemingly limitless source of reinfestation. While little

doubt remains that Telar® kills pepperweed, the prospects for complete control at Grizzly Island, or at any other locale where this weed has taken over, are unknown. The treated plots will be expanded to 5 - 20 acres during 1994. Hopefully, the beneficial grasses will hold their own and prevent reinfestation.

The lesson to be learned from all of this should be apparent to all readers; the spread of perennial pepperweed is a serious threat to native vegetation and wildlife populations. Be on the lookout for this exotic invader and eradicate small populations before you've got "whitetop" everywhere you look.

Characteristics of Noxious Weeds: The Ultimate Biological Pollutant

Source Unknown

1. Native plant communities are often permanently changed.
2. Many wildlife species are adversely affected, both directly and indirectly.
3. Their appearance can be deceptively attractive and desirable.
4. Only a few ounces of the pollutant can regenerate tons of itself in only months.
5. Their spread is predominantly by almost invisible means; their seeds.
6. The pollutant is spread by wildlife, livestock, recreationists, wind, water, vehicles, and other equipment.
7. The initial contamination and propagation are inconspicuous, noticed only by experts.
8. Increased erosion, increased fire hazard, and reduced water quality are a direct result of infestations.
9. New varieties continue to appear.
10. The general public is largely unaware of the potential and actual damage attributable to the pollutant.
11. It has the ability to lie dormant and undetected underground for years, then reappear and spread.
12. The land manager's ability to manage for biodiversity and ecosystem health is thwarted and often totally blocked.
13. Threatened and endangered plants are especially vulnerable.
14. Contact can be toxic, painful, and injurious to humans.
15. The effects of the pollutant are often not apparent until the spread is already out of control.

Slow-Motion Explosion: The Exponential Spread of Exotic Species

BY DAVID SCHNEIDER

Originally published in *WHOLE EARTH REVIEW*, SUMMER 1994

Given the sorts of problems facing the planet and its inhabitants these days, weeds might not seem like a big deal. Ozone depletion, global warming, over-population, toxic wastes, nuclear weapons - these are the big issues, equivalent perhaps to self-inflicted strangulation or gunshot wounds to the body of the earth. By comparison, the movements of alien species of plants, animals, and microbes hardly seem worthy of notice. But they are much more like tooth decay (or, some would say, cancer), developing slowly over a long period of time. One day they emerge as a crisis - painful and expensive and potentially insoluble. Untreated, they threaten and then destroy entire systems.

What is a non-indigenous species, and what exactly makes it "invasive?"

Plants and animals are assumed to have a place of origin, a locus in which they fit as part of an ecological web. When a species wanders beyond the bounds of its original system and finds residence in another ecosystem, it is regarded as "non-native."

If the second system is similar to the first, an alien species may adapt well to conditions in its new home, and compete successfully with native species for available resources. In fact, non-native species often have a distinct advantage over natives, in that they don't have predators in the new system.

The theory runs that plants and animals not only evolve in a particular system, they *coevolve* in that system with other species. In an uncontaminated ecosystem, as elsewhere, there is no such thing as a free lunch; more importantly, in such a system, every species literally *is* another species' lunch. When a species is introduced into a new system, however, there may not be anything eating it for a while. Without predation to keep it in check, the new species may multiply rapidly and overrun the locals.

Because ecology is complex and interconnected, the alterations invasive species make to a system are not always obvious, nor are they predictable. Beyond changing the look and sounds of an area, alien species can fundamentally alter the supply of resources and the movement of the elements. Plants that drink a lot of water, like the Eurasian salt cedar or tamarisk (*Tamarisk chinensis*) which absorbs about 200 gallons per day, can seriously draw down the water table, eliminating ponds and streams, as well as the insects and animals that depend upon them. Such plants can bring up and deposit new sets of chemicals on the surface of the soil, thus fundamentally changing its composition. The very shape of the land can

be radically altered by new courses of erosion resulting from exotic vegetation. The established natural patterns of fire - its frequency and ferocity - are also redirected by the dominance of a new type of vegetation, as dramatically demonstrated by the role of the Australian eucalyptus in the Oakland Hills inferno of 1992.

Right now every American state in the contiguous forty-eight suffers a problem with invasive species of plants and animals. The discussion of "suffering" is from a purely human perspective at this point, and what it really means is that invasive species are costing people a lot of money - so much money, in fact, that the federal government has taken notice of the problem, and issued a rather grim report through its Office of Technology Assessment (OTA). The report, *Harmful Non-Indigenous Species in the United States*, conservatively estimates that the US economy has lost billions of dollars.

Information is still sketchy, but it is widely agreed the costs will only rise. "A worst-case scenario for fifteen potential high-impact non-indigenous species (NIS) puts forth another \$134 billion in future economic losses. The figures represent only a part of the total documented and possible costs - they do not include a large number of species known to be costly but for which little or no economic data were available, e.g., non-indigenous agricultural weeds. Nor do they account for intangible, non-market impacts."

Some non-native species are famous: the Africanized "killer bees" (*Apis mellifera scutellata*), now entering the US southwest; kudzu (*Pueraria lobata*), strangling hill and dale from Florida to Pennsylvania; the zebra mussel (*Dreissena polymorpha*), clogging waterways in and around the Great Lakes (and as a result of the great floods of 1993, the upper Mississippi River as well). Problems surrounding treatment of the "med-fly" (Mediterranean fruit fly, *Ceratitis capitata*) are even thought to have forced a California governor from office.

Other alien species are less well known, but equally devastating. A ranching family in southern Oregon, for instance, abandoned a 10,000 acre spread recently because the land had become infested with leafy spurge (*Euphorbia esula*). A particularly vigorous weed - it can germinate from eight feet below the ground - leafy spurge can make cultivation of land impossible. It is noxious to livestock, and no one yet knows with certainty how to get rid of it. Some early results of experiments with biological control seem promising, but these will take some time to develop.

On public lands as well, where the business at hand is neither agriculture nor industry, but preservation and recreation, invasive species cost money. Everglades National Park spent \$16,500 an acre eliminating Brazilian pepper (*Schinus terebinthifolius*) from a 60-acre site, and *Melaluca quinquenervia*, an invasive Australian tree, is spreading there at an average of 41 acres per day.¹

The Bureau of Land Management estimates that it loses 2,300 acres per day to weeds on BLM land alone. In a real way, such invasions corrode the very reasons for having park lands.

Compounding the invasive species problem is the quality and quantity of information on the subject. The OTA report counts at least twenty federal agencies dealing with some part of the NIS problem. But at the federal level (and this is true as well at the state level) communication between agencies is incomplete, and reaction is disorganized. For one thing, plants and animals do not recognize human-imposed borders or agency divisions. States' standards for importation of species may vary widely, and enforcement of such laws as do exist is spotty at best.

In summary, no coordinated legislative response to the problem yet exists, and the governmental efforts that are in place are admittedly ineffectual. Even the formation of grassroots (no pun intended) citizen's groups lags behind.

At this writing, only five or so states can boast groups like CalEPPC.

HISTORY

Given the current dismal state of affairs, one might reasonably ask how things got this way. Plant and animal species have traveled the globe from their beginnings, colonizing whatever territory they could, but it was not an easy business. Natural barriers isolated ecosystems from one another, and created highly specific local conditions. Currents of wind and water, the shifting of land masses, and vast cyclic migrations have for the most of the world's history been all the transportation there was for living forms. The advent of human beings has accelerated the process of invasion enormously and selectively.

As humans themselves have spread out over the planet they've tended to take with them the plants and animals they knew and loved - principally, species of economic value. The current problems with invasive species in the US can be traced largely to their importation by European and Asian immigrants over the past 400 to 500 years. A particular set of weeds, the plantains (*Plantago*) were called "White Man's Footstep" by Native Americans

because the weeds so directly followed habitation of land by Europeans.

Not all imports have been bad news: wheat, soybeans, and cattle are often cited as examples of successful species translocation (although, when considering more than simple dollar amounts, the benevolence of their impact is highly questionable).

Sometimes a species brought in escapes its original confines - jumps the fence, so to speak, and multiplies. Pesky garden snails are a good example, established repeatedly in this country by people who had only culinary plans in mind. Starlings, a pervasive bird here, were supposedly brought to New York by an adventurous entrepreneur for a Shakespeare festival near the turn of the century. The legend is that the man wanted on hand all the birds the bard had mentioned. After the festival, the starlings took off and multiplied. In fact, several attempts to introduce the birds into the US were made, but the story is instructive; starlings now inhabit every part of the country and have forced native species out of their habitat.

It is the same with plants. An overwhelming number of species now considered to be dangerous noxious weeds have been available in seed catalogues, and continue to be. For instance, Scotch broom (*Cytisus scoparius*), runs rampant on the coast of California and is classified by concerned folks as one of the most important wildland weeds to control, yet you can still buy it cheaply at almost any nursery.

An impressive range of unintentional, or accidental, vectors for species movement also exists. In the days before extruded PVC peanuts, excelsior, or even wadded-up newspaper, people often packed their possessions in plant matter. When a traveler later unpacked and tossed the padding out back to rot, durable seeds would be free to travel on. Seeds also traveled well in the hooves, hairs, hides and stomachs of large animals like horses and cattle, creatures that were themselves frequently transported long distances. Stowaway rodents and reptiles found their way to US shores on ships, then disembarked and spread out. With increased globalization of trade and transport today, the problem is ever more serious.

But even with dozens of alien species running loose, an invasion is not a foregone conclusion. The pressures of coevolution under a particular set of geologic and climatic conditions produce ecosystems that are delicately balanced, yet often (though not always) tough and resistant to intrusion. For a truly successful species invasion, a degraded ecosystem is best.

Clearing land for urban, suburban or agricultural development, harvesting large tracts of forest for timber, heavy and repetitive grazing, monocultural crop rotation, cumulative use of fertilizers and pesticides, the damming of streams, fire suppression - any of these would qualify as

¹D'Antonio, Carla & Dudley, Tom L., "Alien Species," *Pacific Discovery*, Summer 1993, Volume 46, #3.

damaging to an ecosystem, and would leave such a system impaired, vulnerable to attack.

WHAT CAN BE DONE

The OTA report and articles like this one are part of a dawning consciousness of the problems invasive species pose. One of the most important things to do, painful though it may be, is to increase awareness. This is because problems with NIS exist on so many levels, involve so many agencies, and so many kinds of jurisdictions, that blanket recommendations have little practical value. Quick understanding and a massive, widespread response offer what hope there is in working with invasive species.

This is not to say that legislative involvement is of no use. Governments at the federal, state, county, and local levels need explicit policies with regard to the movement, sale, and propagation of alien species. The policies that are already in place - screening of imports at borders, for instance - need to be tightened considerably. The OTA report acknowledges that although some laws are on the books, the gaps in the legal nets are more impressive.

It is in tackling the actual problems of present-day invading species that the questions get truly prickly. The basic approach is to go out there, hunt them down, kill them, and make sure they don't come back. This is not always possible, and realistic workers often aim at simple containment. But as anyone knows who's volunteered under the inspiring flag of habitat restoration, you spend a lot of time killing things. It can feel a bit like biological racism; "This doesn't belong here. It should stay in its own place." When the physical work begins, the issues become even more poignant; squads of hunters fanning out to erase a population of feral pigs (as has been done with great success of some of California's Channel Islands, for instance) pits the habitat people against the animal rights people. And pigs are one thing, but what about deer? Or wild goats? Or cats?

In the plant realm, the questions are usually mostly practical - *how* to kill, rather than *if*. The use of herbicides triggered one of the hottest discussions of the 1993 CalEPPC symposium. Many of the participants - inveterate plant people - had, only a few years ago, fought the herbicide industry tooth and nail, on principle. Now lots of these same people just want better, safer chemicals. Not a universally adopted solution by any means, herbicides still present what one participant called "a cure better than the disease."

Biological control of invasive species offers seductive prospects for cleaning up ecological messes, but it's also very tricky, usually involving the importation of another (potentially invasive) species. The testing and cross-checking that must be done before releasing one species to

eradicate a second make the process time-consuming and expensive.

There are always the manual methods - pulling weeds and chopping trees. Teams form constantly around the country to rid an area of this or that invader. If the work is slow, it's still social and satisfying to participants, and ultimately quite effective. Without the cooperation of local people, few legislative or technological efforts can succeed.

Although this piece has focused mostly on the US, and mostly on the consequences of invasive species for humans, the problem can be seen from much broader perspectives. As invasive species move around the world, forcing less hardy natives to extinction, the world's gene pool is diminished. The full arguments for preserving biodiversity are outside the scope of this piece, and have already been made by several brilliant scientists, E. O. Wilson most notably. The point is that, with a reduced number of species, any system is more vulnerable to change - a climate change, for instance, or a change in the composition of the atmosphere.

In grappling with invasive species, it's important to remember that the plants and animals have done nothing wrong; they're simply carrying out their biological imperatives, using humans and human folly to spread, as they have used other methods in the past. It is we humans who have meddled most aggressively here, and as the plants and animals go silently to extinction, we must also face the drastic consequences.

Books:

Ecological Imperialism: The Biological Expansion of Europe, 900-1900. A. W. Crosby. 1986. Cambridge University Press.

The Ecology of Biological Invasions of North American and Hawaii. H.A. Mooney & J.A. Drake, Eds. 1986. Springer-Verlag, New York.

Harmful Non-Indigenous Species in the United States: U. S. Congress, Office of Technology Assessment. 1993. US Government Printing Office.

Weeds and What They Tell. Ehrenfried E. Pfeiffer. 1950. Bio-dynamic Farming & Gardening Association.

NOTICE

The CalEPPC board is seeking to develop handouts on a series of species based on general ecology, possible control research projects, or other articles. We would like to publish these articles in the newsletter and copy them as handouts (i.e., gorse, Arundo, brooms, mustards, German ivy, where to purchase special equipment, etc.) The CalEPPC board requests volunteers to work on this issue.

Tamarisk Advancing in Baja California

BY MIKE KELLY

Friends of Los Peñasquitos Canyon Preserve, San Diego

My friends and I love camping in Baja California, Mexico, and often visit remote areas. Having bashed tamarisk in San Diego and elsewhere, I'm attuned to watching for it on trips. In the last few years I've been noting the many locations it can be found south of the US border, particularly in the northern half of the Baja peninsula, called Baja California Norte.

It can now be found spanning the breadth of the peninsula, from the Sea of Cortés to the Pacific Ocean. As you drive south from Mexicali to San Felipe, tamarisk is everywhere there is wet soil. This is also the case as you travel from Tijuana south to Punta Blanca (~ 62K south of Cataviña); every drainage is populated by tamarisk.

This ubiquitous weed can also be found inland, particularly in the Laguna Salada area, southwest of Mexicali. This "salty lake" is very similar to California's Salton Sea; both were formed by overflows from the Colorado River. Tamarisk is the most common plant in the Laguna Salada, not surprising since it is salt tolerant.

Since the Laguna stretches more than 60 miles south through the heart of the peninsula, it is probably the seed source for the spread of this invasive weed into both year-round and ephemeral streams cascading down from the Sierra de Juarez into the Laguna. These streams support a rich diversity of plant and animal life, much of which is endemic to Baja, in a series of palm canyons. Unfortunately, tamarisk is appearing in more and more of these canyons. In the fall of 1993, we found tamarisk in the high valleys of the Sierra de Juarez, some 4,500 feet above the Laguna Salada, where it is just beginning to appear in these upper drainages. Of course, it can be expected to outcompete most of the native species and replace this rich diversity with a much reduced variety of plants and the wildlife that depend on them -- where it doesn't establish a monoculture.

On a trip in the summer of 1994, three hundred plus miles south on the Pacific Coast, I found new populations of tamarisk thriving on ephemeral water sources, often just seeps, in remote areas. We were traveling off-road between the small inland village of Cataviña and the almost deserted coastline of this part of Baja. Like much of Baja, this is a desert region where water sources are often few and far between, and are vital for the native plants and wildlife in these areas. These are often the only water sources for the cattle being run by the small ranchers and *ejidos* scattered about. As we have seen in our own deserts, tamarisk is quite capable of drying up these

ephemeral sources with catastrophic impacts on the native biota. I expect, in 2-3 years, to find tamarisk and no surface water in these same areas.

Although tamarisk infestations are heavy in many drainages, I have yet to see the type of monoculture we see in some of the U.S. southwest, such as along the Colorado River. I have no doubt that this will happen.

Another invasive exotic that is spreading is *Arundo donax*, giant reed. This is to be seen in some of the same drainages, as well as near many a hut or small house in coastal areas. In some areas it is still being cut by the people and used, which has probably acted as a control upon its spread. As Mexico shifts increasingly to modern building materials and methods, we can expect to see the use of *Arundo* drop off, and the plant expand explosively in a number of drainages.

As in the US, tamarisk is unlikely to be controlled outside some of our parks by any method other than bio-control. Does anyone have up-to-date information on the underfunded bio-control work reportedly underway on tamarisk? Please share it with us if you have it.

Editor's Note: I can collaborate Mike's gloomy testimony on the advance of tamarisk and *Arundo* into Baja California. In April and May of this year, I noticed that the invasive exotic population is almost halfway down the peninsula - a distance of over 800 miles. The tamarisk is still relatively immature in the streambeds of Baja; 5 - 10 feet tall.

I noted in my 1994 Baja journal that "...travelling through the Santa Tomas Valley (at K 58), the only vegetation in some areas of the streambed appears to be tamarisk. Where willow and cottonwood grow, tamarisk is invading. In 10 years the stream will be choked solid with tamarisk. What a shame that this beautiful stream, with its stately sycamore (now declining), will soon be filled with exotic tamarisk."

Proceedings of the ***Arundo donax*** Workshop, held November 1993, in Ontario, CA are now available for purchase. Please send a check or money order for \$15.00 for each copy, payable to Riverside County Park District. Mail to Paul Frandsen, P.O. Box 3507, Riverside, CA 92519-3507.

What YOU Can Do to Prevent Pampasgrass From Taking Over The Environment

BY QUENTIN GRIFFITHS
Pampasgrass Working Group Chair

Pampasgrass is rapidly invading every known natural habitat along the coast, crowding out native vegetation, and threatening to transform the landscape from Oregon to Southern California.

The weeder alien, better called Jubata, or Andean Grass (*Cortaderia jubata*) becomes a huge plant, and can be recognized by its feathery, pinkish or creamy plumes, and its razor-sharp, drooping grassy leaves. Each clump produces millions of minute seeds that are readily scattered by the wind, by children, or by thoughtless adults. After the plumes go to seed, the plants become shabby, highly flammable, tangled masses.

The true Pampasgrass (*C. selloana*), has more recently demonstrated here and "down-under" the same weedy characteristics. Its flower plumes remain white (except for color varieties) and are about the same height as its leaves, whereas Jubata's plumes extend well above the leaves.

WHAT TO DO as an individual or volunteer group.
(Wear gloves, long sleeves, and long pants.)

1. **Young Plants:** Dig or pull them out, using a small Pulaski tool (mattock) if needed.
2. **Plumes:** Cut them well down the stalk, BEFORE they open in mid-July, and carefully put them in a paper bag and burn them in the fireplace, or place in sturdy plastic bags, tied securely, to be taken to the landfill.
3. **Established Clumps** (after removing plumes):
 - A. Chop the clumps with a Pulaski tool and flat sharpened shovel, making sure to get all of the crown and root-ball. Rootlets can remain. A large chainsaw or weedeater with a rotary blade makes disposing of big plants more manageable. Tie the leaves in bundles for composting or other disposal.

OR

B. Spray the leaves completely with glyphosate (Roundup®) at the rate of 3 or 4 ounces of the concentrate per gallon of water. More dilute forms, such as Kleen-Up® can be used on small infestations in at least two applications. Spray in May or June when the leaves still contain moisture, and before the seed heads emerge. If working near water, substitute the aquatic herbicide Rodeo®. READ THE LABEL PRECAUTIONS of all herbicides and use the recommended dosage. Roundup® can cause skin irritation, so don't spray in windy weather, and promptly wash areas not protected by clothing. A sticker-spreader additive will economize and enhance Roundup's effectiveness.

OR

C. A bulldozer or backhoe may be justified to remove a sizable infestation, if there is no threat of erosion.

If you need assistance, please contact: Quentin Griffiths, Box 766, Inverness, CA 94937, 415.669.7295

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Our membership continues to grow!
CalEPPC warmly welcomes the following people who have joined in July and August:

David Amme	Marguerite DiGiorgio	Louise Lacey	Andrea Pickart
Jerry Asher	Peter Forster	Karen Leone	Tom Scott
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Susan A. Cochrane	John P. Kelly	Mary Pfeiffer	

Upcoming Meetings

- **September 30 - October 1, 1994 Sacramento, California**
CalEPPC Symposium '94 to be held at the Hyatt Regency Sacramento at Capitol Park. **Registration:** contact Sally Davis, 805.927.0881. **Posters:** contact Mike Parker at (w) 510.792.0222 or (h) 510.795.6766.
- **October 17 - 22 1994 West Palm Beach, Florida**
1994 Natural Areas Conference to be held at the Palm Beach Gardens Marriott. The 21st annual conference will be hosted by the South Florida Water Management District. For information, contact Bill Helfferich at 407.687.6637.
- **October 28 1994 Davis, California**
TNC, NPS, and several agencies will sponsor *California Conference on Ecosystem Management* in late October. For exact dates and more information, contact David Diaz, 415.705.1891.

1995 Calendar Year Dues

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Join CalEPPC Today!

If you would like to join CalEPPC, please remit your dues using the form provided below. All members will receive the CalEPPC Newsletter, be eligible to join CalEPPC working groups, be invited to the annual meeting, and participate in selecting future board members. Your personal involvement and financial support are the key to success. Additional contributions by present members are welcomed!

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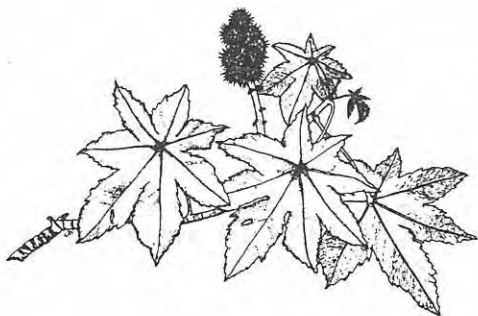
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