Session B: Industrial and Aquatics
Moderator: Chuck Synold, Target Specialty Products

Situation Report on the Invasion of California by Non-Native Plant Species

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Non-crop areas represent the majority of the land surface of the state, with forestlands, rangelands, and scrublands totaling 70% of the surface area of California. Wetlands, riparian areas, and water surfaces make up an additional 8%. Thus, the threat of invasive species in California's wildland can be significant.

Of the more than 1100 non-native species that are naturalized in California, the vast majority of them (81%) are in non-agricultural areas. Among this large number only about 16% are considered significant problems. Though some species are well established and recognizable, including yellow starthistle (*Centaurea solstitialis*), Russian thistle (*Salsola tragus*), perennial pepperweed (*Lepidium latifolium*), and medusahead (*Taeniatherum caput-medusae*), others are just beginning to expand their range and become more troublesome. Among these species, often referred to as Red Alert species, include stinkwort (*Dittrichia graveolens*), rattlebush (*Sesbania punicea*) which is also known as scarlet wisteria tree, onionweed (*Asphodelus fistulosus*), Geraldton carnationweed (*Euphorbia terracina*), and perennial veldtgrass (*Ehrharta calycina*).

Stinkwort is an erect, fall-flowering, aromatic annual with sticky glandular-hairy foliage and flower heads that consist of short yellow ray flowers and yellow to reddish disk flowers. Stinkwort is native to Europe and is related to the cudweeds (*Gnaphalium* spp.), but more closely resembles plants in the tarweed group (*Holocarpha, Hemizonia*). Stinkwort is not included in most California floras, and inhabits disturbed places, roadsides, pastures, fields, riparian woodlands, levees, washes, and margins of tidal marshes primarily in the San Francisco Bay region, especially the southern portion. It is also found sporadically in San Diego and near Sacramento and is expanding its range very rapidly.

Rattlebush is a deciduous shrub or small tree with even-pinnate compound leaves and red to orange-red pea-like flowers. It is grown as an ornamental in many countries, but has escaped cultivation and invaded riparian areas and other moist habitats in South Africa, the southern U.S., particularly Georgia and Florida, and California. Foliage, flowers, and especially immature seeds contain sesbanimides and saponins and are toxic to humans and animals when ingested. A dose of less than 0.1% of body weight in seeds ingested over a period of days can be lethal to livestock. Rattlebush was introduced from South America and is found in California in the southern Sacramento Valley, San Joaquin Valley, and southern North Coast Ranges.

Onionweed is native to southern Europe, but in California is a troublesome annual or short-lived perennial with thick tuber-like stem bases, slender grass-like leaves. Unlike onions, it lacks the characteristic onion or garlic scent when crushed. In pastures and on rangeland, onionweed is avoided by livestock and can develop dense populations that exclude grasses and other desirable forage species. It is a government-listed noxious weed in Australia, where it is most problematic on pastureland in the southern areas. It is found primarily along the South Coast and southern San Joaquin Valley in fields, pastures, roadsides, coastal dunes, agronomic crops, and other disturbed places, especially those with sparse vegetation.

Geraldton carnationweed is an uncommon, but potentially noxious perennial or biennial. It often forms dense patches and inhabits disturbed areas, including disturbed grasslands, coastal

bluffs, dunes, salt marsh, riparian areas, and oak woodlands in the South Coast. It was only recently introduced from southern Europe and the Mediterranean.

Perennial veldtgrass is a densely tufted cool season perennial. Although it is native to South Africa, it was imported to California from Australia in the late 1920's as a potential forage grass and was later utilized for erosion control. Since then, it has escaped cultivation in some areas and is rapidly invading dunes and scrublands along the Central Coast. It is found in coastal habitats from central to southern California, including dunes, scrub, chaparral, live oak woodlands, disturbed grasslands, roadsides, and other disturbed places, typically on sandy, well-drained soils.

Although there is very little information on the control of these newly expanding invasives, information on the biology, ecology and management of many other invasives is available in a number of sources. The California Exotic Pest Plant Council (CalEPPC) book entitled "Invasive Plants of California's Wildland" (caleppc.org) provides not only biological and historical information, but also control options. The new publication of "Aquatic and Riparian Weeds of the West" serves as a source of information for the identification of 175 species associated with aquatic sites. Internet sources of information are also available on invasive species biology and management. Perhaps the most useful are the CDFA Encycloweedia website (pi.cdfa.ca.gov/weedinfo), the CalEPPC website (caleppc.org) which includes the entire "Invasive Plants of California's Wildland" book in electronic form, The Nature Conservancy Wildland Invasive Species website (tncweeds.ucdavis.edu/esadocs.html), and the Weed Research and Information Center website (wric.ucdavis.edu).

Other new developments pertinent to invasive plants in California include the addition of eight new species to the California Department of Food and Agriculture state Noxious Weed List. These new additions are Malta starthistle (tocalote) (*Centaurea melitensis*), Spanish broom (*Spartium junceum*), giant reed (*Arundo donax*), Cape ivy (*Delairea odorata*), jubatagrass (*Cortaderia jubata*), saltcedar and tamarisk species (*Tamarix* spp.), tree-of-heaven (*Ailanthus altissima*), and bull thistle (*Cirsium vulgare*). All have been placed in the C list. In addition, CalEPPC has developed a new criteria for evaluating established invasive plant species through a series of questions associated with the impacts, invasive potential and distribution of each species. This will ultimately lead to the publication of a new scientifically defensible list of "Invasive Non-Native Plants that Threaten Wildlands" which should be completed in late 2003 or early 2004. The list will rank species by categories that include High, Moderate, Low invasiveness, with a Red Alert subsection within High and Moderate categories.

Despite the increase in funding opportunities expected at the federal level with the passage of Senate Bill 198, CDFA has been required to cut their weed management budget by about $1,500,000. Consequently, the status of California Weed Management Areas is not certain in the next couple of years. Despite these cuts, CDFA is moving forward with the development of the California Weed Action Plan which should be completed in late 2003.

In other developments over the past couple of years, some new herbicides targeting invasive plant species have been registered in California. In the late 1990s, clopyralid became available primarily for the control of yellow starthistle. Around the same time, imazapyr was registered in the state for control of many invasive woody species. In 2003, chlorsulfuron will be registered for use in rangelands. This will provide a very effective solution for the control of perennial pepperweed and other invasive broadleaf species. In 2004, it is expected that imazapic will be registered for use in California. This is likely to play a key role in the control of noxious annual grasses.

Biological control programs for invasive plants continues with most of the effort concentrating on yellow starthistle, Cape ivy and *Tamarix* spp. The release of a pathogen for yellow starthistle control was approved for the 2003 season. This rust species, *Puccinia jaceae*, will be tested in trials by USDA and CDFA scientists and is hoped to provide an additional stress on yellow starthistle that will reduce its aggressiveness and spread. Several insects are currently under quarantine for the potential control of Cape ivy. These include a leaf-feeding moth (*Diota rostrata*), gall forming fly (*Parafreutreta regalis*), and leaf mining and stem boring moth (*Acrolepia* new species). Results look promising, particularly with the leaf-feeding moth. It has been two years since the release of the saltcedar leaf beetle (*Diorhabda elongata*). Initially it was released under cages, but in 2002, the cages were removed and the beetles were allowed to spread on their own. At one site in Lovelock, Nevada, the beetles have been very effecting in defoliating a large patch of saltcedar. It is not known whether this will continue to prove successful in subsequent years, but scientists are closely monitoring the site.

Many positive changes have occurred in recent years in education, control, and funding efforts on invasive plants in California. These efforts are expected to continue as the impact of invasive plants becomes a higher priority at the federal, state, and county level.