

# **INTEGRATED PEST MANAGEMENT PLAN**

## **for the**

### **CONTRA COSTA COUNTY AGRICULTURE DEPARTMENT**

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#### **I. PROGRAM GOALS FOR PEST MANAGEMENT**

The Department manages weed and vertebrate populations in the County that threaten the environment, the food supply, infrastructure, and/or the health of people, endangered species and wildlife. In California, County Agriculture Departments are the first line of defense against invasive species. With invasive species, the damage may not be suddenly catastrophic, but rather incremental and therefore less obvious, although no less damaging in the long run.

Management goals differ depending on the particular pest, its status, and the extent of the infestation.

1. Exclusion: This is a method of keeping a pest out of California. It can also be used for pests of limited distribution to keep them from artificially spreading into new areas of the state on plant material, soil or artifacts. Exclusion is accomplished through enforcement of quarantines and inspection of plant and other shipments that may facilitate movement of a pest.
2. Detection: Early detection of a newly establishing pest is essential to facilitating eradication or control of the pest.

3. Rapid response: The management decision for eradication or control attempts must be evaluated quickly. This is especially critical with species that have more than one generation per year, those that have the ability to spread quickly, and with invasive weed species that are nearing the seed production stage of their annual life cycle.
4. Control: This is a general suppression of the pest or suppression within an area to an economically feasible level or to a level that is acceptable for a particular use.
5. Containment: This is confining an infestation within an existing area; treatments may be carried out at the leading edges of the infestation and/or satellite infestations may be eradicated to prevent continuing spread.
6. Eradication: This is complete elimination of the target pest in a specified area.

### **Three Primary Areas of Pest Management**

The main mission of the County Department of Agriculture is to protect and promote agriculture and to protect the environment. The Department is involved in pest management in three primary areas. The first is the department's mandate to eradicate or control certain introduced exotic insects and diseases that are new to California or previously not known to occur in Contra Costa County. These insects and diseases pose a serious threat to commercial and backyard agriculture as well as to the environment of the State and have been designated as such by the United States Department of Agriculture (USDA) and/or the California Department of Food and Agriculture (CDFA).

The second area of pest management focuses on the suppression or elimination of specific invasive noxious weeds that have potential to cause serious harm to agriculture, native environments and urban areas. These noxious weeds have also been designated as such by USDA and/or CDFA.

The third is long-term prevention or suppression of certain vertebrate pests that are harming or have the potential to harm property including crops, livestock, levees that protect agricultural land, residences and businesses; and infrastructure including roads, railroad rights of way, levees and domestic water storage dams.

All three areas involve pests that are a direct threat to public health and safety, the health of our native habitat and environment, or have the potential to cause serious economic harm. Our pest management programs target pests while incorporating sound biological and environmental decisions. An IPM approach is used and techniques are selected based on their ability to provide the effective control and/or eradication that is required by our programs while also considering the department's limited fiscal resources.

IPM techniques include encouraging naturally occurring biological control; introduction of new biological control organisms that have been approved by USDA and CDFA; mechanical control; use of alternate plant species or varieties that resist pests; adoption of cultivation, pruning, fertilization, or irrigation practices that reduce pest problems; modification of habitat to make it incompatible with pest development; selecting pesticides with a lower toxicity to humans and non-target organisms and using focused application techniques for pesticides in order to minimize pesticide use and damage to non-target species or the environment. Educating the public about the benefits of preventing the introduction and movement of exotic pests is also a very important aspect of IPM and what our department does.

## **II. SITES UNDER MANAGEMENT**

Sites include both public and private lands in the County, including East Bay Regional Park District lands, Mt. Diablo State Park, John Muir National Park, city open space areas, some refinery open space areas, Dow Wetlands, CalTrans right-of-way, railroad rights-of-way, homeowners' open space areas, ranchers' and growers' lands, Contra Costa Water District, critical infrastructure areas including earthen dams, levees, railroad beds and some county roadways, and private plant nurseries. In addition, the Department daily inspects one FedEx, one OnTrac and four UPS facilities that are within the county for parcels that may contain pest-risk prohibited plant material or exotic pests.

## **III. DECISION MAKING PROCESS/ENDANGERED SPECIES**

**The following factors influence pest management actions:**

1. Action priorities, including<sup>1</sup>:
  - Pest ratings from (CDFA), and potential for agricultural/environmental damage from the pest
  - Potential for harm to critical infrastructure or other property damage
  - Human health or environmental risk from the management technique
  - Health risk created by the pest
  - Efficacy of control method
  - Fundamental priorities associated with the IPM philosophy
  - Seeking new methods or materials that may be more efficacious while retaining low toxicity properties
2. Available resources
  - Available departmental staffing
  - Available staff augmentation (may include contractors or volunteers)
  - Available equipment and materials

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<sup>1</sup> Action priorities not necessarily listed in order of importance

<sup>2</sup>Assuring that the requirements of California Code of Regulations §6618, Environmental Considerations, are met

3. Actions are tied to specific stages of plant development or other strategic “windows of opportunity” determined by the biology of target species. Consideration is given to infestation densities that will affect whether spot treatment or area treatment is necessary.
4. Actions with potential to affect threatened or endangered plants or animals are modified to meet legal restrictions. This involves researching the requirements of the Endangered Species Act and all applicable endangered species injunctions to assure that we are in complete compliance when using herbicides or rodenticides of concern or other control methods.
5. Actions may also be modified by our Biologists on site considering local conditions<sup>2</sup>, including:
  - Steep slopes
  - Weather including rain, wind and high heat
  - Proximity to hydrologic features
  - Concern for worker safety
  - Issues arising from land owners, land managers, or other local interests

### **Pest Prevention**

The department expends a great amount of resources on pest exclusion and early pest detection. In an attempt to keep invasive species out of Contra Costa and California. Daily, inspections are conducted by our staff at parcel carrier facilities including FedEx, OnTrac and the UPS facilities. Our department also has two USDA/CDFA funded canine teams that perform similar inspections in Contra Costa as well as eleven other counties in the greater Bay Area. Staff inspect all incoming plant shipments from areas of pest risk, such as shipments from the southeastern U.S. and from glassy-wing sharpshooter infested areas in southern California; shipments of winery grapes from European grape vine moth infested counties, to name a few. And in cooperation with California CDFA Border Stations household goods shipments destined to Contra Costa County from gypsy moth and Japanese beetle infested areas of the eastern U.S.

The Department also expends considerable resources on pest detection activities in an effort to discover new pests or pest infestations at the earliest possible stage. Much of this is done through exotic insect pest trapping using pheromone and other insect attractant lures. Staff is trained to recognize and monitor for exotic pests of concern through visual survey, and through contact with the public, growers, ranchers, plant nurseries and the pest control industry. To enhance our suveillance, we regularly interact with various agencies including cities; state, regional and federal parklands; and UC Cooperative Extension Service, Master Gardeners

### **Action Levels for Specific Pest Species**

Action levels are linked to pest ratings. The following are CDFA rating definitions and policy:

**“A” rated pest** is a pest of known economic or environmental detriment and is either not known to be established in California or is present in a limited distribution that allows for the possibility of eradication or successful containment. If found entering or established in the state, A-rated

pests are subject to state (or commissioner when acting as a state agent) enforced action involving eradication, quarantine regulation, containment, rejection, or other holding action.

**“B” rated pest** is a pest of known economic or environmental detriment and if present in California, is of limited distribution and is subject to action taken at the discretion of the County Agricultural Commissioner.

**“Q” rated pest is a pest that is suspected will cause economic or environmental detriment and is not known to be present in California. These pests are treated as temporary “A” rating with the same actions as “A” rated pests until the threat is assessed and a permanent rating is established.**

**“C” rated pest** is a pest of known economic or environmental detriment and, if present in California, is usually widespread. Action is taken when these are found in nurseries or at the discretion of the County Agricultural Commissioner when found outside of nurseries.

Our action level for “A” and for “Q” rated insects, nematodes, diseases, and noxious weeds is the presence of the species. Even a single individual or infestation site will trigger action with the intent of delimitation of the infestation and eradication.

Our action level for “B” rated organisms is dependent on all factors listed above. The primary considerations are potential harm to the environment and agriculture, the extent of the infestation within an area or the county, what control tools are available and whether we have the resources to either eradicate or effectively manage the invasive species to stop spread with the tools that are available.

“C” rated pests are generally not treated or managed by our department. Exceptions are pampas/jubata grass and ground squirrels in limited areas. We made the decision to treat pampas/jubata grass on CalTrans rights of way because the right of way is a conduit for infestations to spread into wild land, rangeland and regional parks within our county.

Control, management or eradication methods and tools are assessed based on acceptable levels of effectiveness, resources, And goals involved with the specific species. Consideration is also given to no treatment, mechanical and cultural methods, biological control methods, live trapping in the case of ground squirrels and chemical methods.

### **Ground Squirrel Treatment Decisions**

Ground squirrel infestations that risk damage to critical infrastructure including levees, railroad beds, earthen dams, high risk roadways and certain other areas, or pose a human health risk from plague or other zoonotic diseases are treated. These areas are visually assessed and prebaited with untreated grain to determine levels of activity and acceptance of bait prior to the use of treated grain bait. The treatments provide a buffer area free of significant squirrel numbers next to the area that requires protection. Any feeding activity on the pre-bait grain is cause for buffer treatment in that area. The treatment is applied in a band either by hand or using a vehicle-mounted mechanical spreader, and is applied only where there is squirrel activity. The treatment band is calibrated to deliver the label rate and is typically 10' to 15' wide (4'-6' along levees). The bait can draw ground squirrels in from up to about 100 yards, which creates a wider buffer area that is relatively free of squirrel activity. In areas of particular sensitivity we use bait stations to achieve the same buffer. The treatment is not intended to extend beyond the desired buffer and no treatments are applied in areas that do not have activity. An exception to this would be a treatment related to a zoonotic disease occurrence such as bubonic plague that would involve total area treatments where the disease threat is present.

#### **IV. ENVIRONMENTAL STEWARDSHIP**

Protection of the environment is a top priority for the department. The control of noxious weeds is designed to protect the aesthetics of open space areas, including park land, and to protect native plants and wildlife. Impacts from invasive species are considered by the U. S. Fish and Wildlife Service as the second leading cause of species being added to the federal list of threatened and endangered species.

While managing the control of invasive species in Contra Costa County, the Department takes care to avoid unintentional impacts, where possible, to sensitive native plants and animals. The County is currently investigating newer technologies, including use of geographic information systems (GIS) and regional sensitive species data bases to further support our efforts at environmental stewardship. In addition, the IPM philosophy advocates the use of tools of least harm that are both effective and compatible with other non-target resources to accomplish the goals intended for each species and situation.

Our staff, as well as any contractors or volunteers, are trained annually on environmental awareness and best management practices (BMPs) to reduce the risk of weeds spreading from one area to another by vehicles and on worker clothing. BMPs include precautions such as not driving equipment through weed infested areas, and making sure that clothing and equipment are checked before moving from one work site to another.

The Endangered Species Act and court injunctions are reviewed by the Department to assure that we are in compliance. Staff is trained on endangered species recognition and other aspects necessary for compliance with all requirements.

## V. SHORT- AND LONG-RANGE PLANS FOR MANAGEMENT

**Short Range:** We will continue our high levels of exclusion inspection designed to keep new invasive pests out of Contra Costa and will maintain our high standard of pest detection trapping and vigilance for early detection. We partner with CDFA and USDA on these programs.

**Noxious weed program:** We will continue treating and monitoring all historically treated properties and treat new properties as our resources allow in order to maintain eradication or management goals. Treatment includes nonchemical mechanical control and chemical control as appropriate. We research and experiment with less toxic chemical alternatives as new technology develops. We continually assess the efficacy and costs of non chemical control methods.

**Ground squirrels:** We will treat buffer areas that are infested to protect critical infrastructure and other limited areas of property or to protect human health from risk of plague or other zoonotic diseases. We will continue to search for viable alternatives to rodenticide treatment. In 2009 we began a trial using raptor perches to determine if this approach might be a viable alternative to the use of rodenticides in certain areas. In 2012 we conducted a live trapping study to determine efficacy and costs compared to conventional treatment. We also looked at other factors such as whether live trapping is humane, what effects has trapping in open areas, and public perception related to live trapping including trap vandalism.

**Long Range:** We will work with our partners to continue to protect California's environment from new invasive pest threats. We will strive for eradication locally or countywide for targeted species (except ground squirrels) or containment for those species for which eradication is not feasible. We will continually monitor and assess methods and goals, looking for the least toxic method that is effective and within our budget.

**Ground squirrels:** We will maintain the level of control necessary to protect critical infrastructure that requires such protection, and we will maintain the level of preparation and expertise needed to act if a disease outbreak occurs that threatens human health.

## **VI. RECORDS**

1. Daily pesticide use sheets are kept for all treated and surveyed site locations. These records are specific to a ranch or property code ID. Records for each property include which staff member(s) treat or survey; time spent on the site; method of application or treatment (if any), including non chemical; for chemical treatments, the material and amount used and the gross acres surveyed and the net acres treated. In some cases we also document the exact number of noxious weed plants removed.
2. Records are maintained of properties where eradication of target noxious weeds are has been successful.
3. Monthly summary pest reports are prepared from the site specific data. The monthly summary details the total amount of each pesticide used. This data is entered into the Department of Pesticide Regulation data base and hard copies are kept for two years.
4. The Department also collects required monthly pesticide use summaries from County and city departments, from private applicators and from pest control operators. This data is similarly entered into the Department of Pesticide Regulation data base.
5. Monthly reports on eradication, pest management and pest detection activities are filed with CDFA.
6. Records of plant shipment inspections and quarantine violations at UPS, FedEx, plant nurseries and household shipments are kept and reported to CDFA on a monthly basis.
7. Records are kept of the results of official pest determinations by CDFA from specimens that the Department submits to the CDFA laboratory for identification.
8. Records of pest abatement notices issued are kept.
9. Staff training records, including annual pesticide safety training, ATV training, heat illness prevention, etc., are kept.
10. Pesticide labels and MSDS's are kept for all materials used by the Department.
11. Records of formal outreach presentations given by staff to agencies, the pest control industry, growers, ranchers, the public and others are kept.
12. Records of various County Biologist licenses that are issued by CDFA are maintained.
13. Records of State issued Qualified Applicator Licenses and Certificates that staff hold along with required continued education received by staff are kept and submitted to the State licensing agency.

## **VII. LICENSE REQUIREMENTS**



All staff Biologists and Deputies have one or more of five State issued licenses. Four of these involve pest management expertise. They are Integrated Pest Management, Investigation & Environmental Monitoring, Pesticide Regulation, and Pest Prevention & Plant Regulation. These licenses are required for staff members to increase in pay grade. Licenses are required to be maintained. A four year college degree in Biology or related discipline is required as a prerequisite to taking the licensing exams.

A Qualified Applicator Certificate (QAC) is required by staff that use restricted pesticides unless they are supervised by a certificate holder. All of our Biologists and Deputies have a QAC. Continuing education is required to maintain the QAC.

## **VIII. TRAINING**

Annual pesticide safety training is required for all staff that use pesticides. This training must include training on various aspects of safety including label requirements, MSDS's, proper storage and handling of materials, safety equipment, emergency procedures in case of accident or spill, evaluation of environmental conditions related to safe application, endangered species concerns, pest biology and recognition, heat illness prevention.

As stated above, continued education is required to maintain a QAC.

Staff are regularly sent to seminars, conferences and other training to increase their level of expertise in pest management and related disciplines.

Annual environmental training is performed for department staff and any contractors/volunteers. This training provides a review of habitat and species of concern along with any new or emerging issues in the County. Work site environmental tailgate sessions may also be conducted before work begins in areas where activities require specific protection measures for known occurrences of sensitive species and habitats.

## **IX. EMERGENCIES**

Various emergencies may occur related to pest management activities. They include but are not limited to vehicle and equipment accidents, and personal injury due to slips, falls, and other hazards of working on uneven terrain, rattlesnake bites, tick bites, sunburn, heat illness, accidental spillage of pesticides, and pesticide contamination. Adequate annual training on how to handle emergencies is given to all staff that are involved in the pest management program.

## **X. PUBLIC EDUCATION AND OUTREACH**

Education of the public, businesses, farmers, ranchers and government agency staff has been a mainstay of exotic pest and noxious weed control for many years. It is an essential component of our IPM program, although it is not a solution in and of itself. For example when private landholders and public land stewards are educated about the impacts of invasive weeds, they take an interest in surveying the lands they control. As a result the noxious invaders can be located while populations are still small making eradication efforts are more feasible, less costly and of less risk of impact to public health and the environment.

The Department maintains an “on call” desk where our biologists help the general public, businesses and agencies with the proper identification of pests. We provide IPM information that was developed by the University of California regarding the effective control of these pests. In addition we disseminate information on identifying exotic pests, noxious weeds, and vertebrate pests and on steps that can be taken to prevent their introduction or control damage.

Grower workshops, PowerPoint presentations to interested groups and stakeholders and staff training are part of our outreach effort for both exotic pest and invasive weed programs. Outreach is also conducted by staff at schools, government agencies, garden clubs and watershed groups as well as at special events such as the County Fair.

Benefits of Outreach and Education: These measures bring awareness to the threats of exotic pests and noxious weeds. They educate the public about quarantine regulations and steps that can be taken to prevent the introduction of exotic pests and noxious weeds. This helps to achieve compliance with established quarantines on the movement of plants and plant products and prevent their introduction in the first place. Increased awareness also increases the chances of early detection and rapid response if the pest or weed is introduced. Early detection and rapid response leads to greatly reduced need for chemical use when that approach is necessary to meet our control and eradication goals.

## **XI. MANAGEMENT PROCEDURES**

### **Monitoring Procedures and Frequency for Site**

#### For Invasive Species in General:

*Frequency:* For incoming plant material that may be infested, under pest exclusion quarantine laws, four UPS, one OnTrac and one FedEx facility that are located in the county are checked daily by staff Biologists. These facilities are also spot checked by our two canine detection teams that work in all greater Bay Area counties. Nursery shipments from glassy wing sharp shooter infested areas are

inspected to ensure the absence of this pest. House hold shipments from infested areas (generally northeastern U.S.) that include outdoor articles are inspected by staff for all gypsy moth life stages and for exotic pest-infested firewood and soil.

For Particular Invasive Species:

Under CDFA contract, insect pest detection trapping occurs for the following pests that threaten establishment in California and Contra Costa County: exotic fruit flies including Mediterranean fruit fly, Oriental fruit fly, melon fruit fly, peach fruit fly, guava fruit fly, Caribbean fruit fly and Mexican fruit fly; Japanese beetle; Asian and European gypsy moth; khapra beetle; Asian citrus psyllid; European grapevine moth; glassy wing sharp shooter; European pine shoot moth. Traps are generally deployed at one to five per square mile in urban areas of the county and at a lesser density in rural areas. They are checked and serviced every other week during the time of year of expected activity for the particular target species.

For Noxious Weeds:

*Frequency:* All sites that have historically been treated in the past are monitored at least once a year. This includes areas where eradication has been successful. . For some species, such as purple starthistle, red sesbania, white horsenettle and Japanese dodder, two and sometimes three or more site visits are made to treat new emerging plants or plants that were missed on previous visits. The key to control that leads to eradication is preventing any seed set. Treatment will then result in eventual depletion of existing seed banks. Depending on the weed species, this process can take many years, or even decades, to accomplish. Staff dedication and persistence is required to accomplish our goals.

For Ground Squirrels:

*Frequency:* Vulnerable sites that have historically experienced ground squirrel damage are monitored once a year. Monitoring starts when grasses dry out and staff has completed noxious weed work, typically mid-June. Monitoring continues through October or until the rains start. Monitoring consists of visual inspection combined with pre-baiting with untreated grain to increase squirrel activity and make them easier to monitor.

## **XII. CHARACTERIZATION OF KEY PESTS AND TREATMENT METHODS**

### **A. Exotic Insect Pests and Diseases-Trapping and Regulatory Programs**

**1. Light Brown Apple Moth:** “A” rated. Virtually all areas of Contra Costa County are now infested making eradication efforts by CDFA/USDA unlikely in CCC. Shipments of host plant material from areas outside of the quarantine area require inspection and certification. This is done by our county agricultural staff to facilitate export by our agricultural growers.



**Light Brown Apple Moth**

*Trapping Program Description:* Currently, pheromone traps specific to LBAM are deployed in all growing nurseries and in commercial host crops as a part of the quarantine/shipping requirement. All plant nurseries that ship out of the quarantine area are inspected by our staff on a monthly basis to meet the shipping requirements of the quarantine. All agricultural commodities that are hosts of



**LBAM trap in Contra Costa**

LBAM and shipped out of the quarantine area to non infested counties, states or foreign countries are inspected at the field level within 30 days of harvest or are inspected at the packing plant. Any shipping nursery or field that is found infested with larva or egg masses is prohibited from shipping until treated per CDFA guidelines and reinspected to confirm freedom from LBAM. The treatment is performed by the property owner and at their expense. Prophylactic treatments when done for tortricids, including LBAM, are also performed by the owner at their expense. Shipping nurseries are required to be under an IPM plan that includes inspection and may include the use of biological control agents.

**2. Glassy-Winged Sharpshooter (GWSS):** “B” rated. This CDFA funded program involves inspection of all incoming nursery stock that originates from GWSS infested areas mostly in Southern California to assure freedom from GWSS. There is also an origin inspection program that is performed by the county if the shipping nursery is located within the quarantine area, generally Southern California. This involves preshipment inspection and often verified treatment, typically using Sevin® (carbaryl), prior to shipment of plants to Northern California. . In addition, UPS and FedEx parcel shipments that contain plant material from quarantine areas are inspected by County Agricultural staff.



**Glassy winged sharpshooter egg mass found in Contra Costa July 2010**



**GWSS Trap**

*Trapping Program Description:* Detection traps are deployed at 5 traps per square mile from May through November in urban areas. Detection traps are out in all retail and growing plant nurseries from February through November. Traps are checked at two week intervals.

Finds of two or more adults, nymphs or egg masses of GWSS in nurseries cause the nursery to be shut down until treated with an approved product by the owner and at their expense. The most effective material is carbaryl. That is the material that has been chosen by nurseries for treatment. Typically our staff reinspects the nursery the day after

treatment, and if no live GWSS is found, the nursery is released to resume sales. In the last ten years there have been approximately nine GWSS finds that have required treatment. Additionally in the year 2000 a small residential area in Brentwood was found to be infested with GWSS. Approximately 209 residential properties were treated with one application of Sevin<sup>®</sup>. Four highly infested landscaped areas around model homes and roadside landscaping were treated twice with Merit<sup>®</sup> (imidacloprid) insecticide. All work was performed by a licensed pest control business under contract to and supervision by our department. The eradication effort was a success, and official eradication was declared in 2001. This is one example of a success that prevented growers and others from using of hundreds of pounds or more of insecticide that would have been needed annually to protect their crops or landscaping from damage by this pest and the diseases that it vectors.

**3. Miscellaneous Exotic Insect Pests:** various “A” rated pest detection programs for exotic fruit flies, including Mediterranean fruit fly, oriental fruit fly, Caribbean fruit fly, melon fruit fly, and other exotic insects, such as gypsy moth, Japanese beetle, European pine shoot moth, European grape vine moth, Asian citrus psyllid, khapra beetle. The Department maintains monitoring and detection programs for these insects, none of which are known to be present in Contra Costa. Many are currently not found in California. These programs are funded by CDFA and involve pest detection traps, some with pheromone lure, others with food mimicking lure with a very small amount of pesticide on a cotton wick. Department staff place from one to five traps per square mile in residential and rural areas depending on the trap and the species that it is designed to attract. These traps are generally out from mid-March through November and are checked every other week with the exception of McPhail traps that are checked weekly. McPhail traps are a water trap the uses a yeast based attractant

for fruit flies in general. Weekly monitoring is required due to the evaporation of the water from the trap.

In 2001 we detected an incipient infestation of Oriental fruit fly in North Concord. CDFA successfully eradicated this infestation using a male attractant food lure laced with Dibrom<sup>®</sup> (naled) that was sprayed at a rate of 4,000 - 2" to 4" spots per square mile high up on tree trunks and telephone poles. Again this successful eradication prevented the use of untold pounds of pesticides by homeowners and farmers had Contra Costa become generally infested.

In early 1984 an incipient gypsy moth infestation was discovered in Clayton as the result of the detection trapping program. This infestation was successfully eradicated by CDFA using Sevin<sup>®</sup>. CDFA is now using *Bacillus thuringiensis* to eradicate incipient infestations of gypsy moth where it has been found in other locations in the state. Early detection and rapid response to these infestations have led to successful eradications thus pre-empting environmental, urban agriculture and crop damage along with widespread use of pesticides.

4. **Shipments** of soil, plant material, firewood and outdoor household goods from quarantined areas of the U.S are inspected by staff to assure freedom from exotic pests such as Japanese beetle, Asian and European gypsy moth and other exotic pests. Those shipments that are infested or that do not meet quarantine entry requirements are either destroyed or sent back to their place of origin. Note: egg masses of gypsy moth found on outdoor articles are spot sprayed with a soap/water solution prior to removal and destruction. The soap/water solution smothers the eggs rendering them inviable if they are missed in the collection process.

## **B. Noxious Weed Program**

The Contra Costa Agriculture Department has a long history of managing noxious weeds in a responsible and environmentally sensitive manner that has been of great benefit to agriculture, the environment and the citizens of the county. In 1979 the noxious weed program was implemented targeting artichoke thistle. Since then, the program has evolved and expanded to a wide variety of highly invasive noxious weeds that threaten local agriculture and the environment. The program has been a cooperative effort with land owners and land managers. Partners include John Muir National Park, East Bay Regional Park District, many cities, Contra Costa Water District, East Bay Municipal Utilities District, ranchers, growers and homeowners associations. Supplemental funding and some worker resources come from these partners. In 1998 a Weed

Management Area (WMA) was formed with many of these same partners along with Alameda County Department of Agriculture, the Native Plant Society, the Resource Conservation District, and others. WMA grant funding that was available to supplement our noxious weed program was not available in FY11/12 and will not be available in FY12/13. A small grant of ARRA pass-through funding in the amount of \$14,210 was available in 2011 but not in 2012. Currently all of our noxious weed work in Contra Costa County is funded out of our department budget with partial reimbursement from work performed for East Bay Regional Park District, Mt. Diablo State Parks, Cities of Concord and Walnut Creek, Contra Costa Water District, Contra Costa Sanitation District, CalTrans and some local ranchers and homeowner associations.

### **“A” Rated Weeds**

#### **1. Japanese Dodder (*Cuscuta japonica*)**

*Biology:* This is the only known “A” rated weed in the county. Japanese dodder is a parasitic weed that has the potential of completely overtaking and destroying a very wide variety of



First Japanese dodder find in Contra Costa County 2006.

native and ornamental plants. It appears similar to spaghetti strands that are yellow-orange in color, sometimes with a tinge of green. Growth can be up to six inches per day during optimal growing time. It has a small white flower but only occasionally flowers in the winter in Contra Costa County. Fortunately, it does not produce viable seed in California. Spread is mostly vegetative, but can also spread through movement as nesting material by birds and squirrels. It has alleged medicinal properties and because of this, is also spread by certain

cultural groups. Fortunately movement by humans usually ceases with adequate outreach to these groups. It has been found on California Live Oak, coast redwood, willow, California buckeye, elderberry, apple, plum, rose, blackberry and citrus as well as over 30 ornamental trees, shrubs and vines. Japanese dodder eventually completely covers its host plants smothering them to death.

*Problem:* Japanese dodder has the potential for widespread damage to trees and shrubbery in riparian and forested areas, ornamental plantings and agriculture. It can spread rapidly through dispersion as nesting material by birds and tree squirrels. Purposeful placement into new areas by humans is a large concern. Rapid vegetative spread is also a concern.

*History:* Japanese dodder was first found by one of our pest detection staff in 2005 at a property in San Pablo. Extensive outreach was done and continues to be done by our staff. Outreach has included press releases, newspaper articles, outreach to city maintenance personnel, landscapers and pest control operators. On two different occasions CDFA sent Japanese dodder post card mailings to higher risk portions of our county. Our staff performs routine detection surveys in the County. When a new infestation is found, staff conduct a specific door-to-door survey on all properties within a 1 mile radius of the new find. Of the 49 infested properties that have been found to date, 14 were discovered through the CDFA post card mailings, 24 from the various other outreach efforts and 11 were discovered through staff surveys. Forty-three of these properties are residential, 3 were in riparian creekside areas, 2 were industrial sites and 1 was a landscaped roadside right-of-way. We have had great success in the program with eradication on 46 of the sites (the sites have been free of Japanese dodder for at least 3 consecutive years).

*Monitoring, decision making and treatment method:* When a new infestation is found, we first obtain official confirmation of identification through submission of a sample to the CDFA botany lab. An official abatement notice is then issued to the property owner followed by removal of all infested plant material within a few days of issuance of the notice. A rapid response to removal of this species is needed due to the possibility of fragments being removed and relocated by humans interested in the alleged medicinal properties and the possibility of movement by birds and arboreal squirrels for nesting material. Removal is followed by three or more years of monitoring the property for residual infestation.

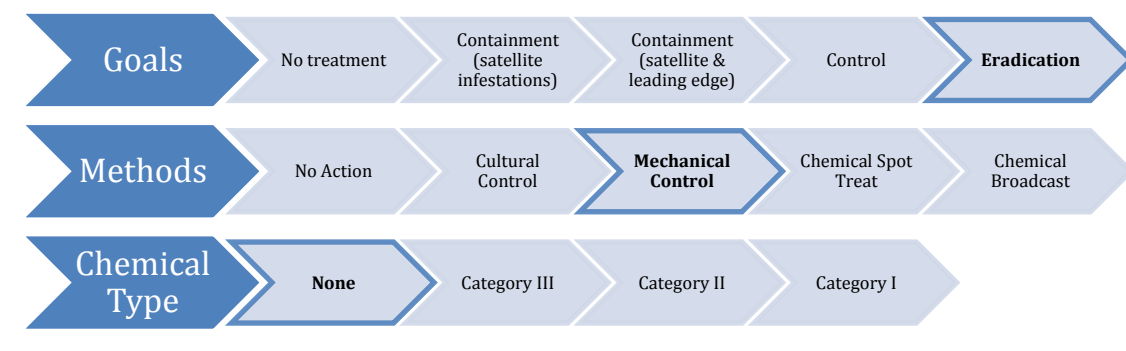
Though the use of triclopyr (Garlon<sup>®</sup>) and glyphosate as a general spray over the entire infested area to kill the host plant(s) is effective and has been used by a few other counties,



our department decided not to use this method on Japanese dodder for the following two reasons: 1) chemical control would have left very unsightly dead foliage behind in landscaped residential areas, and 2) though mechanical control is much more labor intensive, we determined that the infestation sites were manageable using mechanical control methods which fit into our overall goal to use the least toxic method available that is feasible. After the initial of two tree stumps with glyphosate after host removal on the first property in 2006, we found additional information on the biology of the organism that included its inability to produce viable seed in California. With this new information, we decided that we could feasibly remove all Japanese dodder infested plant material using mechanical means only.

Our method of control is 100% mechanical using hand tools and chain saws to completely remove all infested plant material. All removed infested plant material is transported in plastic lined and covered vehicle beds or trailers for burial at a land fill.

*Future Plans:* We will continue our outreach effort and perform detection surveys for Japanese dodder. If new sites are discovered, it is our intent to use only mechanical means of removal of this “A” rated noxious weed. We will also continue to monitor to assure that previously infested properties remain free of this organism. Japanese Dodder



## **“B” Rated Weeds**

### **1. Red Sesbania (*Sesbania punicea*)**



*Biology:* Red sesbania is a small tree that can grow to a height of about 15 feet with a mature trunk of less than six inches in diameter. Its pea-like flowers are about ½ inch long and bloom in clusters from June through September. Flowers are a beautiful red-orange color. Seed pods are 3” to 6” long and fluted with four sides.. Mature seeds tend to stay in the dry,

partially split pod through much of the winter and will rattle with movement, thus the common name rattlebox. It is suspected that the seed can live up to thirty years. The pods float, which assists in dispersal of the species. The plant can sprout from seed, flower and produce viable seed within four months. Foliage, flowers and seeds contain sesbanimides and saponins that are lethal in relatively small doses to animals and humans when ingested. The plant has been sold in the nursery trade (illegally) and is sometimes, though rarely, found in residential landscaping.



**Athenian School Volunteers with the collected seed pods  
May 2006**

*Problem:* Red sesbania has the potential to transform our species-diverse riparian areas into monocultures. Horticultural planting of this species provides the potential for natural seed dispersal into wildland areas as well as the potential in a rain event for floating seed pods to be washed into storm drains that lead to our riparian

areas. There have been serious infestation problems in the U.S. Southeast and in South Africa.

*History and treatment decision:* Red sesbania was first discovered in Contra Costa County in 2002 in the Kirker Creek area of Dow Wetlands in Pittsburg. In 2006 the department decided to attempt eradication after realizing the potential threat of this pest, especially to riparian areas that include endangered species habitat.

In that first year of the eradication program a total of 833 trees and tree seedlings were removed. All were hand pulled with the exception of 88 older trees that were too large to remove by hand. These were cut down using a chain saw and the stumps were and treated, some with Garlon® (triclopyr) and some with Roundup® (glyphosate). Both materials were mixed with horticultural oil and both worked well. Foliar application of triclopyr, glyphosate or imazapyr are very effective and a number of preemergent herbicides including Milestone® (aminopyralid ) have been suggested

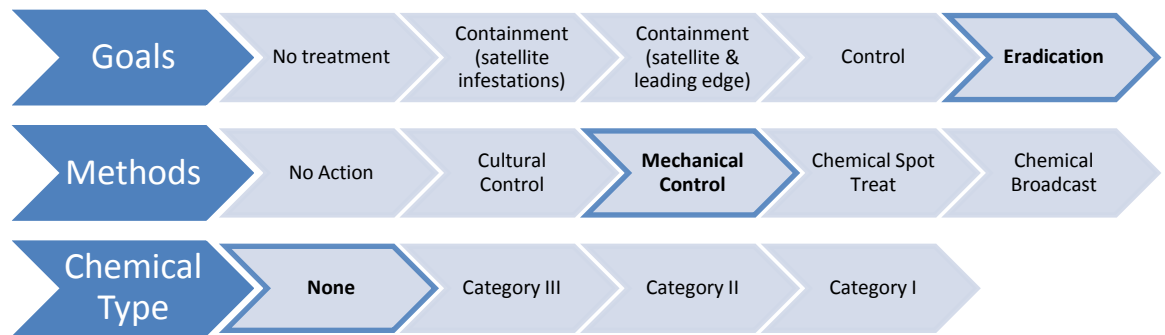
After the first year, all removal at Dow Wetlands and other areas in the county was accomplished by hand using weed wrenches or digging tools. Since red sesbania does not produce root sprouts and does not have rhizomes and because the infestations were not overwhelmingly extensive, the department decided that mechanical control was the best method of control for this species considering that this method met our goal of using the least toxic method feasible. Most plants removed in late summer and fall will have seed pods. These are removed from the plants that are pulled and bagged. All removed seed pods are disposed of by deep burying at a land fill. The first year of the program Athenian School student volunteers helped to remove existing seed pods prior to the removal of the trees.

The Contra Costa County Public Works department finds and removes a few isolated plants in the Walnut and Clayton Creek riparian areas almost every year. Our county Biologists and Pest Detection staff have found red sesbania in the ornamental plantings of eleven private residences in the county. Many of these properties were discovered by our Pest Detection Specialists. In August 2012, an infested residential property was found in Pittsburg and reported to us by a county Public Works employee. Then in September 2012 another infested residential property in Oakley was found by one of our pest detection staff. The owners of this property were propagating the plant to sell or give it away. Abatement notices were issued to residence owners followed by hand removal by our staff and year-to-year monitoring to remove new seedlings. The owners of the Oakley site were very concerned when they were informed of the potential to environmental damage and that the plant is poisonous to animals. They assisted in its removal. In 2013 one new site was found in a railroad right of way area in Pittsburg. This brings the total number of sites to 15 in the county.

*Future Plans:* Each year we will continue to remove all red sesbania seedlings by hand at all known sites until eventual seed bed depletion and declared eradication for the site. We will regularly monitor retail plant nurseries (at least one time per year) to assure that they are not selling red sesbania or other prohibited species. We will continue in pest detection efforts including outreach to discover new sites that may exist. An evaluation of new sites, if any, will be made to determine if the plants can be removed by mechanical means or if the site will require a chemical treatment. We will continue to monitor all historically infested sites to assure that all seedlings are removed prior to seed set. We will explore the

possibility of a biocontrol option if a heavily infested or remote site is discovered, especially if found in the Delta.

## Red Sesbania



## 2. Artichoke Thistle (*Cynara cardunculus*)

**Biology:** Artichoke thistle is a highly invasive non-native perennial weed species that displaces herbaceous plants and annual grasses, decreasing the value of agricultural land, open space and wildland areas. Mature plants are about head high. Stout flower stalks rise from a bushy base of leaves up to 5 feet in diameter. Large blue flowers up to 5 inches in diameter are produced in late May through July. Mature plants can produce hundreds of seeds, which remain viable in the soil for fifteen to twenty years or more. The formidable spines on the leaves and stems and on the bracts around the flowers make the plant easy to recognize.

**Problem:** Artichoke thistle has the potential to take thousands of acres of rangeland out of production. Horses and cattle will not consume the thistle and at high densities the long sharp spines make wildlife and livestock movement difficult. Horses will not walk through monocultures or patches of artichoke thistle. This thistle can make it impossible to hike through and can greatly limit use of our parklands and open space areas. Artichoke thistle has the potential to displace natives and endangered species thus altering the natural environment of Contra Costa County.



**Artichoke Thistle infested rangeland**

*History:* Contra Costa County was identified as one of the most heavily infested counties in the state with 100,000 acres of land affected at the inception of the Agriculture Departments' pest management program in 1979. This species has been eradicated from many properties in the county, and populations on many others have been drastically reduced to the point that eradication is near. Other properties, generally those that have been treated for only a few years, have suppressed, but still moderate to heavy, infestations. There remain some areas in the county where the department has not yet been able to start treatment due to limited resources. We estimate that there are another 400-600 net acres that have never been treated, mostly in the Moraga area. Each year we try to treat new, previously untreated areas.

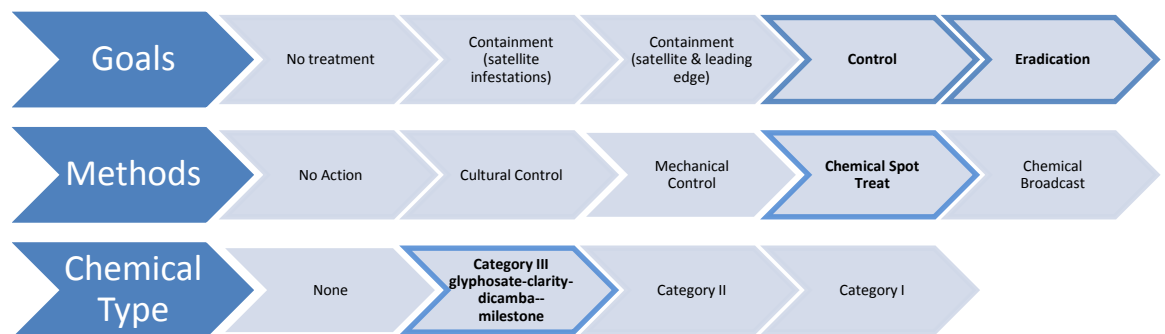
East Bay Regional Park District, Mount Diablo State Park, many of our cities and our ranchers have partnered with us both financially and with other resources over the years. Leasees of rangeland that is owned by East Bay Municipal Utilities District are required to treat artichoke thistle that is on the land that they lease.

*Monitoring, decision making and treatment:* Our department monitors and surveys over 185,000 gross acres of land each year for artichoke thistle. This is mostly on the hundreds of properties that we have treated in past years. We spot treated a total of 105 net acres in 2012.

*Mechanical Control:* Digging the plant out is a viable option where only a few plants are involved. However, this method is extremely time and resource consuming because established plants must be dug out to a depth of 14-18 inches otherwise they will resprout. When clay soils harden, this is an even more difficult task. It had been used without success by East Bay Regional Park crews at Briones after two previous years of herbicide treatment in the park by our department. They found that the crews were not thorough in finding the artichoke thistle nor in digging them out sufficiently deep enough to kill the plant. We were again brought in to resume our treatment program after the failure. Grazing and other techniques have not been found successful with this noxious weed.

*Chemical Control:* The department primarily uses Clarity<sup>®</sup> (diglycoamine salt of 3,6-dichloro-o-anisic acid) and Milestone<sup>®</sup> (aminopyralid) on artichoke thistle. Plants are spot sprayed by staff using backpacks either as they hike or as they ride ATVs through the property. On properties that are new to the program with heavy populations we generally use a 200 gallon spray rig mounted on a 4WD truck. Spray is directed only to the infested areas of the property. Generally Milestone<sup>®</sup> (aminopyralid) is added to Clarity<sup>®</sup>, especially in heavily infested areas because it has residual preemergent in addition to post emergent

properties. Late in the season after the grasses have started to dry we may use glyphosate. Glyphosate is not a material of choice earlier in the season as it also kills desirable grasses and vegetation whereas Clarity® and Milestone® are selective. Heavily infested areas that are sprayed using the spray rig are typically reduced in populations within 2-3 seasons so that the more directed backpack spray can be used. After the initial 3-5 years of treatment the populations drop off to a slow decline to going to zero or close to zero during the next 20 or so years.



*Future Plans:* Continue monitoring and treating all historically treated areas, using spot treatment or where the infestation is heavy spot area treatments, until seed bank depletion and eradication is achieved. Continue to evaluate new methods and materials. As resources allow treat areas that are not yet a part of the control program.

### 3. Purple Starthistle (*Centaurea calcitrapa*)

*Biology:* Purple starthistle is a highly invasive non-native biennial weed species that displaces annual grasses, desirable vegetation, and wildlife and decreases the production value of agricultural land. It also has allelopathic properties. Its formidable spines and high densities can be an impenetrable barrier to the movement of wildlife and livestock in open rangeland areas as well as to horses and hikers in parkland areas. Seed can remain viable in the soil for ten or more years.



**Cattle grazing limited due to Purple star**

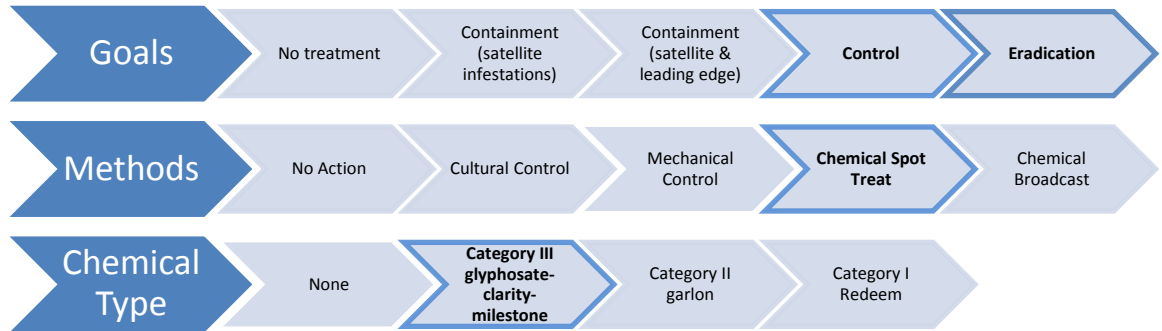
*Problem:* Purple starthistle grows in very dense impenetrable patches. Stiff spikes make it difficult for hikers and horses to get through. It can displace endangered species and native vegetation. It takes valuable rangeland out of production.

*History, decision making and treatment:* The occurrence of purple starthistle infestations in

Contra Costa County is not as widespread as artichoke thistle infestations. However, being a prolific seed producer, it has the potential to become as large scale a problem as artichoke thistle. Early identification and eradication of isolated populations is key to preventing its establishment in non-infested agricultural lands. We have the same partners in our control and eradication efforts on this noxious weed as with artichoke thistle. The first 6-8 years of treatment present the biggest challenge as population from year to year fluctuates widely. The next five or so years involve a much reduced and declining population with a larger percentage of our time involved in survey and monitoring. Currently about 90% of the infested areas in the county is under treatment by the department. Digging out individual plants and seedlings can be effective on a small scale with the need to only take out the plant a couple inches in depth. This method is time consuming and not practical for our department considering the extensiveness of the infestations. Treatment is the same as for artichoke thistle.

Our department treated 61 net acres of purple starthistle in 2012 over an area that covered about 27,000 gross acres of land. The net acres treated in 2012 dropped to 40% of what was treated in 2011. We attribute this to the effectiveness of Milestone<sup>®</sup> that we first started using a couple of years ago in combination with Clarity<sup>®</sup>. The Milestone<sup>®</sup> has been very effective at preventing germination in existing seed bank.





*Future plans:* Continue monitoring and treating all historically treated areas, using spot treatment or spot area treatments where the infestation is heavy, until seed bank depletion and eradication is achieved. Continue to evaluate new methods and materials. As resources allow, treat areas that are not yet a part of the control program. Most of the untreated area in the county is in Moraga. Monitor and retreat sites that are nearing eradication as this plant tends to germinate and mature after initial treatment in the late spring.

#### 4. **Purple Loosestrife** (*Lythrum salicaria*):

*Biology:* Purple loosestrife is a native of Eurasia. It is an erect, herbaceous perennial that that can grow to eight feet tall. From June through August it has showy pinkish purple flowers on spikes and has sometimes been sold as a landscape plant in nurseries – though it is illegal to do so. A mature plant is capable of producing two million seeds in one season. Roots form dense mats that sprout in the spring. Seed longevity is not known.



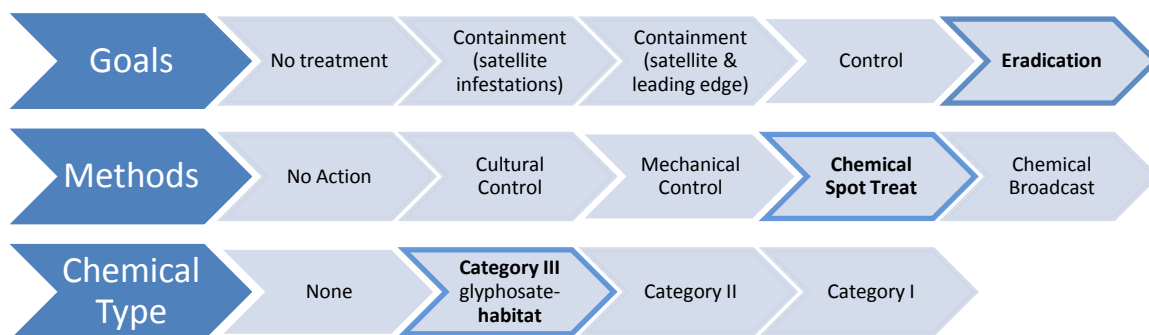
**Purple loosestrife in Pacheco Creek riparian area**

*Problem:* Purple loosestrife has the potential to grow very densely in riparian corridors and other wetland areas. It creates monocultures in those areas that displace native vegetation and wildlife.



This alteration of the natural environment has the potential to adversely impact andronomous salmon species, red legged frog, tiger salamander and other at risk species.

*History, decision making and treatment:* Purple Loosestrife was first detected in the Walnut Creek watershed by our Public Works Department in 2003 as a direct result of outreach done at a Weed Management Area meeting. It is an extremely serious pest in parts of the Midwest and has been found in isolated areas of the northern Sacramento Delta and southern San Joaquin River. Purple loosestrife has the potential of growing in dense monocultures that displace native vegetation and wildlife destroying the riparian environment. The infestation in Contra Costa County extends over 12 linear river miles in the Walnut Creek riparian areas with currently less than 200 plants. This eradication effort involves surveys for detection, GPS mapping and spot spraying of individual plants. The original infestation sites are monitored and treated each year and have been reduced by more than 85%. It was first treated by Public Works Department in 2004 and now mostly by our department using Habitat<sup>®</sup> (imazapyr) herbicide. We found through trial that glyphosate was not as effective as imazapyr and hand removal is not practical. We treated a total of 32 plants 2012 and for the first time none were upriver from the Concord Avenue creek overpass.



*Future Plans:* Continue to survey the length of the riparian area each year and treat all plants that are found until eradication can be achieved.

## 5. Kangaroothorn (*Acadia paradoxa*):

*Biology:* Kangaroothorn is a small tree that grows to about 12 feet tall. The flower is yellow, spherical and about 3/8” in diameter. It forms pods and the seed can remain viable in soil in excess of ten years.

*Problem:* Kangaroothorn has the potential to displace natural chaparral. It has small spines that cause discomfort to those that attempt to hike through it. It is found only in one very small area in Contra Costa County. This area is adjacent to a large regional park which would be a corridor for spread throughout the Oakland-Berkeley Hills.

*History, decision making and treatment:* There is only one known infestation in Contra Costa County. It is located in El Cerrito. Since kangaroothorn has a single taproot it does not have a propensity to resprout if pulled or dug out. For this reason and because of the relatively small area of the site all control is done by hand pulling or use of digging tools. Originally the infestation was about ½ net acre when the eradication program was started in 2006. The first year older plants were cut down using chain saws. The stumps were treated with Remedy® (triclopyr)-oil mix. All removed plant material was chipped in place. There is now less than 0.01 net acre of seedlings removed, all by hand, each year with generally decreasing numbers as the seed bank is depleted.



**Kangaroothorn mechanical eradication**

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*Future plans:* Continue to monitor the infested property and hand pull all new seedlings each year until the seed bank is depleted and eradication is declared.

**6. Smooth Distaff Thistle (*Carthamus baeticus*):**

*Biology:* This is an annual noxious weed that grows to about three feet tall. It flowers in June to August. The flower is a pale yellow and is about ¾ inch across. Seed persists in soil for at least ten years.

*Problem:* Smooth distaff thistle is found in only one very small rangeland area in Contra Costa County. It is problematic in other states where it has been introduced.



**Smooth Distaff Thistle**

*History, decision making and treatment:* There is only one infestation site in the Contra Costa located in southwest Martinez grazing land area. It was first discovered and treated in 2005 by a staff Biologist. Grazing does not work on this noxious weed. It has been reported that mowing just prior to flower set is somewhat effective as a control method. This is not



compatible with in an eradication program.

Seedlings have been treated for seven years with less than one tenth of a net acre remaining of the original one net acre infestation. Up until this year treatment involved spot treating with Clarity<sup>®</sup> mixed with Milestone<sup>®</sup>. We also used some glyphosate in the past. All treatment was spot spray using a backpack sprayer. For the first time, in 2012, we used only hand or mechanical removal without the use of any herbicide. We removed a total of 42 plants in 2012.

*Future plans:* Continue to monitor and hand pull all new seedlings each year prior to flower and seed set. Check for missed plants at time of flowering and hand remove, bag and dispose of at a land fill.

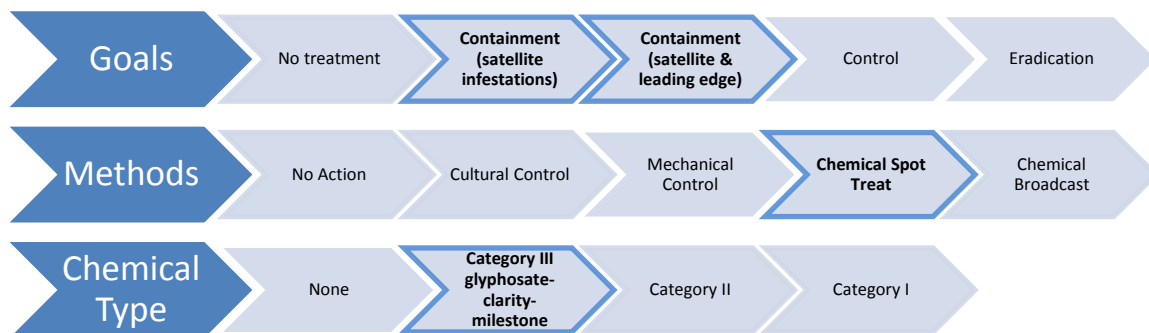
## **7. Oblong Spurge (*Euphorbia oblongata*):**

*Biology:* Plants are herbaceous and grow to about four feet tall. Roots form mats that sprout from the base. Flowers are small occurring in June and July. Seed is long lived.

*Problem:* Oblong spurge has the potential to grow in dense stands that will displace natural grassland areas and take rangeland areas out of production. It is poisonous to animals and the sap is poisonous to humans.

*History, decision making and treatment:* This noxious weed is somewhat prevalent in areas of our coast range. It can take over meadows and open areas. The department has treated it

since 2001 in the Alhambra Creek watershed and has treated small isolated “leading edge” populations in three other areas in the county including a couple of small sites on Mount Diablo. Root structure and the propensity for the top to break off at the root make hand removal difficult and generally not effective. Both glyphosate and Clarity® are effective on oblong spurge. We also have used some Milestone® mixed with Clarity® early in the season. We treated 1.03 net acres this year over a gross area of about 167 acres.




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*Future plans:* Continue to monitor and treat historically treated areas until local eradication is achieved. Survey for and treat new “leading edge” infestations. Consider treating new areas if resources allow.

## 8. Perennial Pepperweed (*Lepidium latifolium*)

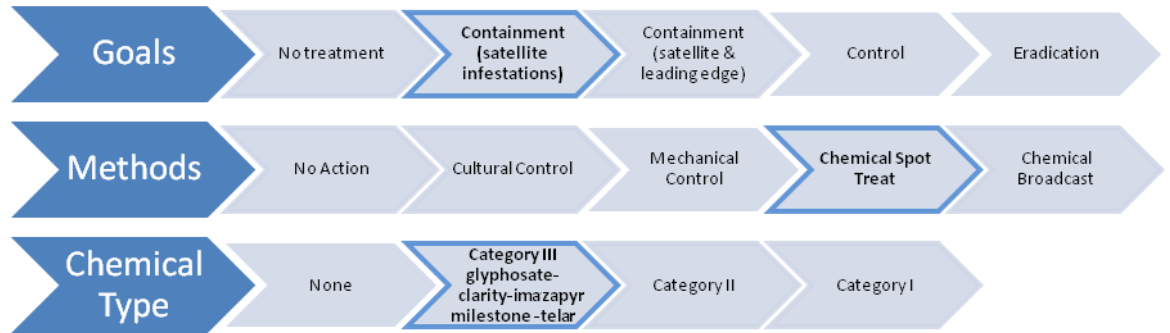
*Biology:* Perennial pepperweed is a herbaceous plant that grows to six feet tall. It flowers profusely late May through August. Flowers are white. One common name is tall whitetop. It grows in very dense stands displacing native vegetation and wildlife. It grows in riparian areas as well as dryland areas. Roots are fibrous and aggressive rhizomes and it can spread through mechanical dispersal of root fragments. Seed longevity appears to be less than 5 years. It is poisonous to cattle.

*Problem:* Perennial pepperweed has the potential to grow in very dense stands in both grassland and riparian corridor areas. It will take rangeland areas out of production. It displaces native vegetation and forms very dense stands around ponds and creeks making it impossible for endangered plant species to live and destroys red-legged frog and tiger salamander habitat. It has an extensive root system and is difficult to control.



*History, decision making and treatment:* We estimate that there is over 2,000 net acres in Contra Costa, mostly along the northern water front areas of the county. We have seen significant expansion into dryland areas in the last 5-10 years and movement with soil and equipment as satellite infestations into our agricultural core and areas on central county. We have done our best treating these new small satellite areas and have eradicated some and greatly suppressed others. We also treat CalTrans rights of way where perennial pepperweed has appeared as this is a conduit leading to uninfested and open space areas of the county. The most effective treatment is using Telar<sup>®</sup> (chlorsulfuron). This is the material recommended by U.C. IPM. We have also tried a Roundup<sup>®</sup> and Garlon<sup>®</sup>/Milestone<sup>®</sup> mix as an alternative treatment but have had limited success with these materials on this noxious weed.





*Future plans:* We plan to continue to monitor and treat historically treated areas and survey for and treat satellite infestations that are threats to new areas.

## 9. Russian Knapweed (*Acroptilon repens*)



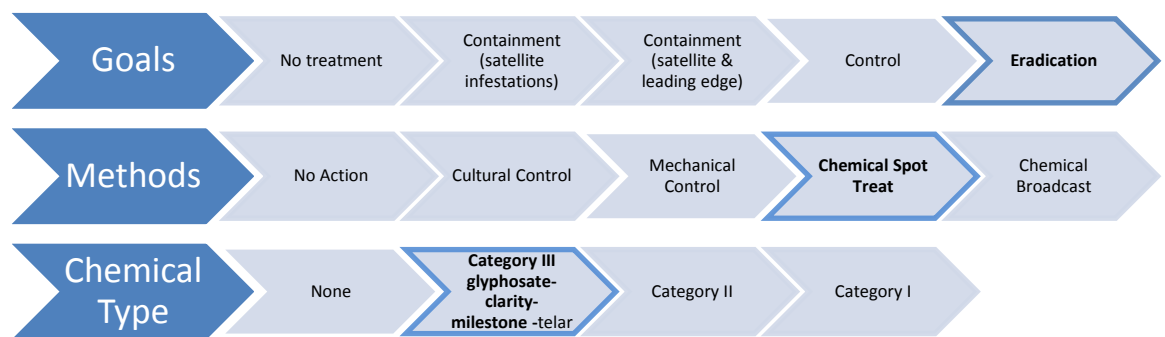
**Russian Knapweed in Discovery Bay**

**Biology:** Grows four feet tall in dense stands. Flowers are about  $\frac{3}{4}$  inch in diameter, pink to lavender-blue. Bloom is from May through September. Roots are rhizomatous and very aggressive. Root fragments can sprout. Seed is short-lived and does not appear to be viable for more than three or four years. Russian knapweed is poisonous to horses causing “chewing disease” and liver failure similar to that caused by yellow starthistle.

**Problem:** Russian Knapweed can grow in very dense monocultures. It displaces native vegetation and takes rangeland out of production. The root system is

extensive. Hand removal is ineffective.

*History, decision making and treatment:* Currently, there are only three known infestations. All are in East County. Two of these are new infestations that were found in 2011. One was found by one of our Biologists on Orwood tract. It is a quite large infestation with some in waste area between farmland and the levee and some along farm roads and farm irrigation ditches. A total of 36 net acres were treated in 2012 using glyphosate along the ditches and farm roads and Clarity<sup>®</sup>/ Milestone<sup>®</sup> and Telar<sup>®</sup> in the waste areas. The other very small infestation was found in Discovery Bay. The total treatment area at Discovery Bay was 0.06 net acres. We have eradicated three other infestations in Central and East County. We tried hand pulling one small infestation and greatly exacerbated the problem.



*Future plans:* Continue to monitor and treat until eradication is achieved. Monitor for new infestations.

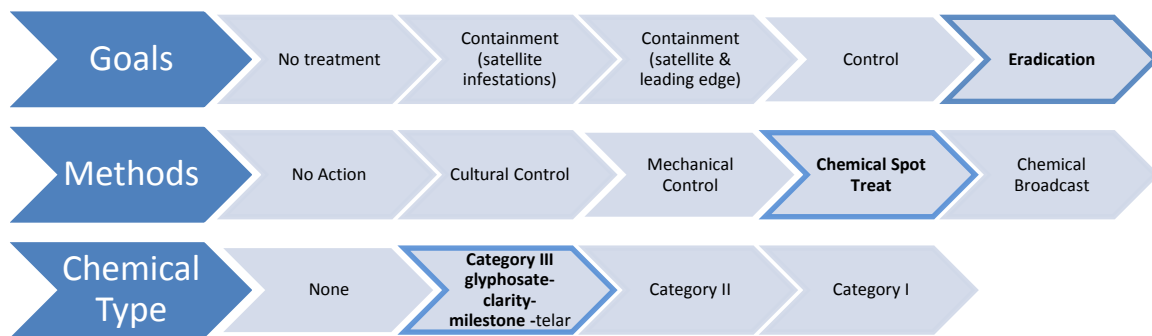
## 10. White Horsenettle (*Solanum elaeagnifolium*)

*Biology:* This is a beautiful perennial plant when it is in flower. It grows in dense stands to about three feet tall. It has dark silvery green foliage with showy dark blue flowers about one inch in diameter with yellow anthers. It blooms from May through September. Seeds are in spherical smooth berries that mature in late fall to a yellow-orange to red color. They are about ½ inch in diameter and are poisonous. Seed viability is at least ten years. The berries tend to stay on the dormant plant through the winter.





**White Horsesettle**



*History, decision making and treatment:* There is a very limited number of small infested sites in the county. Most are in East County with some in the Ag core. Most of these sites have been treated for five years or more years. We treated a total of 0.43 net acres in 2012. We have used Telar<sup>®</sup>, Clarity<sup>®</sup>, and glyphosate, triclopyr and Milestone<sup>®</sup> at different times and have had effective control with each. We have tried hand pulling with no success. Sites require multiple monitoring and treatment as new seedlings tend to germinate and grow after the initial treatment, typically in June, is performed.

*Future plans:* Continue to monitor and treat historic sites until eradication is achieved. Monitor and retreat each site as needed. Survey for new sites.

#### **11. Barb Goatgrass (*Aegilops triuncialis*)**

*Biology:* This annual grass has barbed awls that can be carried on fur or clothing to infest new sites. It is not easy to distinguish this grass from other native and beneficial annual grasses until those grasses begin to dry out while barb goatgrass will remain green for a couple of weeks longer before seed maturity. Barb goatgrass forms dense patches that displace natives and beneficial forage. Seeds remain viable in the soil for only 3-5 years.

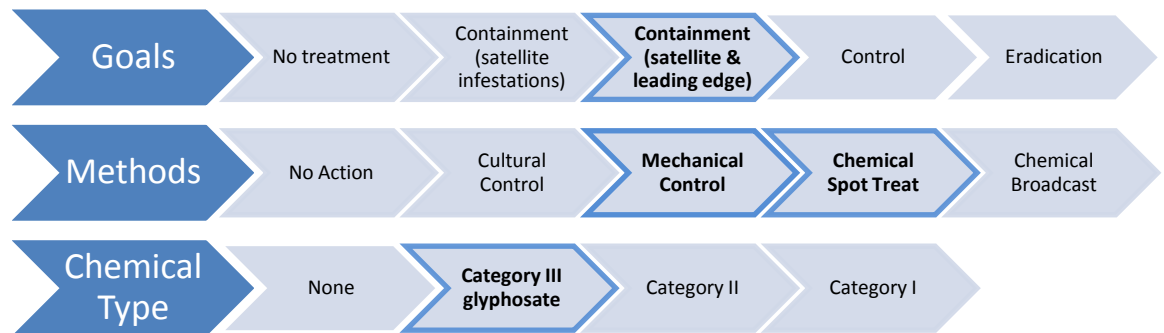
*History, decision making and treatment:* Barb goatgrass was first found in Mount Diablo State Park in 2005 by a park ranger in the Riggs Canyon area. Riggs Canyon has several sensitive aquatic sites and is known to have red-legged frog and tiger salamander. About the same time a very small patch of about 5' by 15' was discovered by a local rancher near the park and our staff found another patch between Martinez and Crockett. We hand-pulled and bagged the smaller patch each year and there was none found at this site in 2011 or 2012. There is a very short window of time to spray because of the difficulty of distinguishing from other



**Barb Goatgrass**

common annual grasses until those grass begin to die off. This treatment window is difficult for us because within a couple of weeks the seed matures and because it is while we are still involved with other noxious weed control. We use glyphosate which is very effective on grasses. We treated a total of 10 net acres in 2012. Burning is another effective technique as long as there is a sufficient fuel load to sustain a hot fire. We do not use this

technique because of the hazard of uncontrolled escape of the fire, the tremendous labor force that is needed to keep it safe and because of the permitting that would be required. Grazing is not effective on this species as it results in denser stands.



*Future plans:* we will continue to treat these infestations and hope for eradication. The Mount Diablo State Park infestation is very difficult to get to and is larger than we first thought. It is scattered over about 20 gross acres. We have also discovered a large infestation of 20-40 net acres on a nearby private ranch. We do not have the resources to start eradication efforts on this ranch and have also had unconfirmed reports of barb goatgrass in other areas. This is very unfortunate as we also do not have resources to pursue other areas especially due to the extremely short treatment window.

## 12. Heart-podded, Lense-podded, and Globe-podded Hoary Cress (*Cardaria draba*, ~~*a*~~ and *Cardaria chalepensis* and *Cardaria chinensis*)

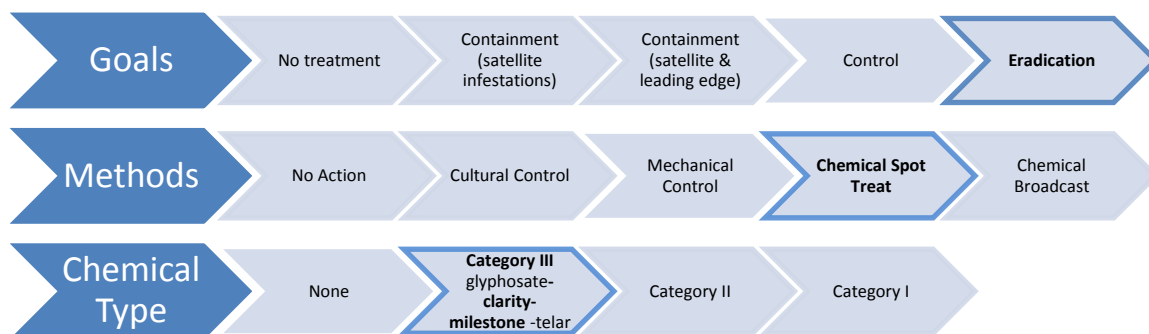
*Biology:* Hoary cress is a perennial herbaceous plant that grows to about a foot and a half in height. The roots are extremely aggressive forming stolens and rhizomes. These three species have profuse small white flowers and bloom from June through



**Hoarycress**

August. They are sometimes called whitetop. Seed pods of each species are distinctive to the common name. Seed is viable for about five years in the soil.

*History, decision making and treatment:* We have six small infestations that we know of in Contra Costa. One new small infestation was found and treated by our staff this year. One site between Martinez and Orinda in the largest, originally about 4 net acres. We have treated it for six years greatly suppressing the population. There is a small infestation that was found by our staff in Black Diamond Mines Regional Park four years ago. It was treated and none has been found last two years at this site. A third small infestation of about 0.1 net acres was first found in 2010 by our staff on a small ranch in the Tassajara Valley. It was determined that it came in as contamination in hay from Solano County in either 2008 or 2009. One new small site of about 0.2 net acres was discovered this year. Our material of choice is Clarity<sup>®</sup> which is very effective. We also have used some Milestone<sup>®</sup> mixed with Clarity<sup>®</sup> or glyphosate. Grazing and hand pulling of this noxious weed are not effective.



*Future plans:* Continue to treat and monitor all sites. Survey for other sites that are not presently known.

### 13. Japanese knotweed (*Fallopia japonica*)

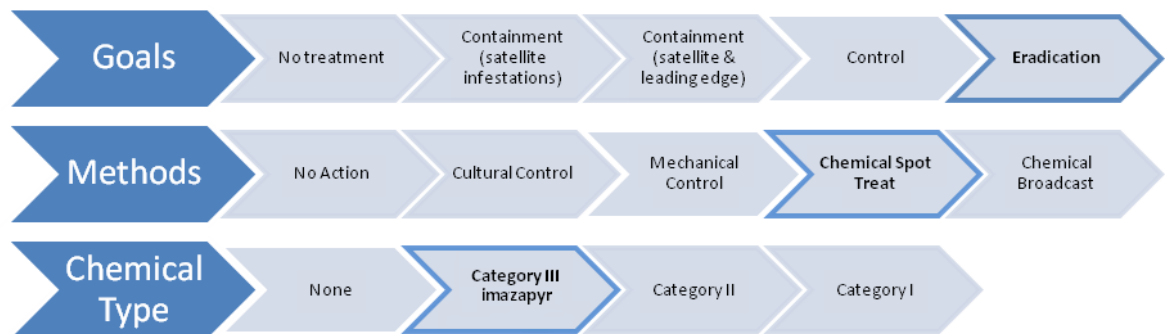


State Botanist, Dean Kelch, checking the El  
Sobrante Site



Bamboo-like Stems and shoots

*Biology:* Japanese knotweed can grow to eight feet tall. It flowers profusely June into September. Flowers are in small sprays and are creamy white in color. They are very attractive to both honeybees and some species of native bees. The main stem is bamboo-like. The plant has very extensive rhizomes. It usually does not produce seed in California. It grows in very dense stands displacing native vegetation and wildlife. It will grow in riparian areas and cultivated areas.



*Problem:* Japanese knotweed will displace native vegetation and can displace endangered plant species as well as red-legged frog and tiger salamander. It has an extensive root system and is very difficult to control.



*History, decision making and treatment:* There are only two known small infestation sites in Contra Costa County. One is in Lafayette and the other is in El Sobrante. Both sites were first discovered in 2012. See Appendix A for detailed decision-making information. Imazapyr is the most efficacious and least toxic material. It is the material we have chosen to use on this noxious invasive species. A total of 0.08 net acres were treated.

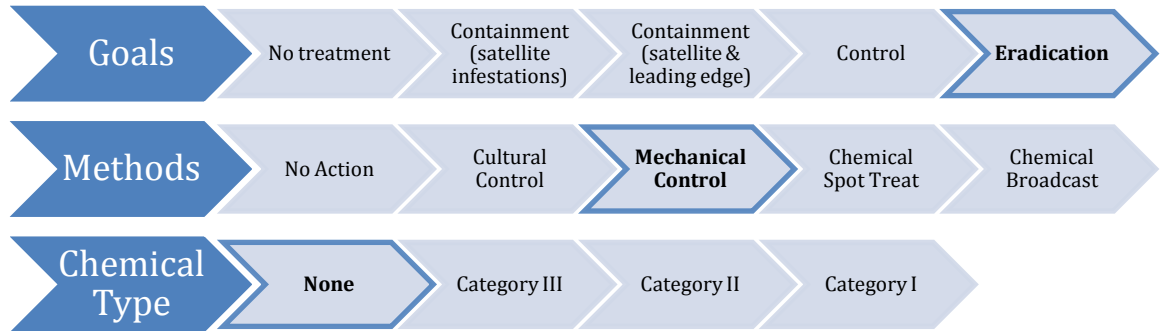
*Future plans:* We plan to continue to monitor and treat the two sites and survey for other possible sites in the county.

**14. Woolly Distaff Thistle (*Carthamus baeticus*):**



**Woolly Distaff Thistle**

*Biology:* This is an annual noxious weed that grows to about three feet tall. It flowers from June to August. The flower is bright yellow and is about  $\frac{3}{4}$  inch across. Seed longevity is no known.



Problem: Woolly distaff thistle is problematic in other states where it has been introduced.

*History, decision making and treatment:* Two woolly distaff thistle plants were discovered in 2012 growing alongside the asphalt in the median area of Highway 4 where it crosses over Highway 680 in Martinez. It was discovered by a member of our staff. These plants were hand pulled. See Appendix B for more decision making detail.

*Future plans:* We will monitor this site as there is the possibility that other seed is in the soil and may germinate in the next few years.

## “C” Rated Weeds:

### 15. Pampas Grass and Jubata Grass

(*Cortaderia selloana* & *Cortaderia jubata*)

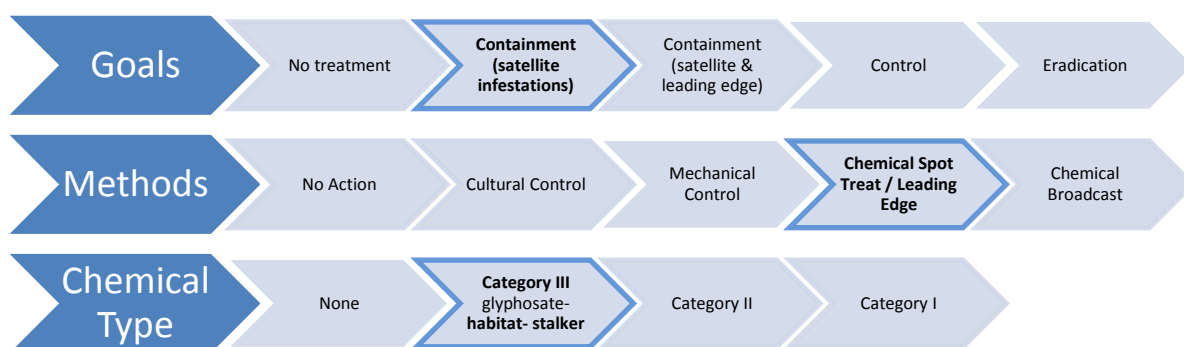
*Biology:* Pampas and Jubata grass are large clumping grasses that can get up to ten feet in diameter. Both are very invasive especially in coastal areas of central California. Pampas grass is commonly sold in plant nurseries and is not regulated in this regard. We have observed that it can grow in dry open space areas of the central and eastern parts of our



**Pampas Grass on the Sacramento River Delta**

county. And both are very invasive in the western areas of the county.

*History, decision making and treatment:* In 2008 we first treated these grasses on all CalTrans right of way areas as the right of way provides a conduit for these species to invade our open space and rangeland areas of the county. We use Habitat<sup>®</sup> or Stalker<sup>®</sup> herbicide and have greatly reduced the populations in the f years since we started.



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*Future plans:* We will continue to monitor and treat the right of way and any pampas/jubata grass that is found escaping into wildland areas.

*Other Noxious weeds of concern:*

French and Scotch broom are present mostly in the hills of west county. Tree-of-heaven is becoming more prevalent invasive species in the county. Medusahead grass is becoming more prevalent in the rangeland areas of the county. Yellow starthistle is widespread throughout the county. Giant reed *Arundo donax* is common in the delta and near other waterways. These are a few of the noxious weeds in the county that we are not trying to manage because of limitations in resources.



#### 14. Yellow starthistle (*Centaurea solstitialis*)

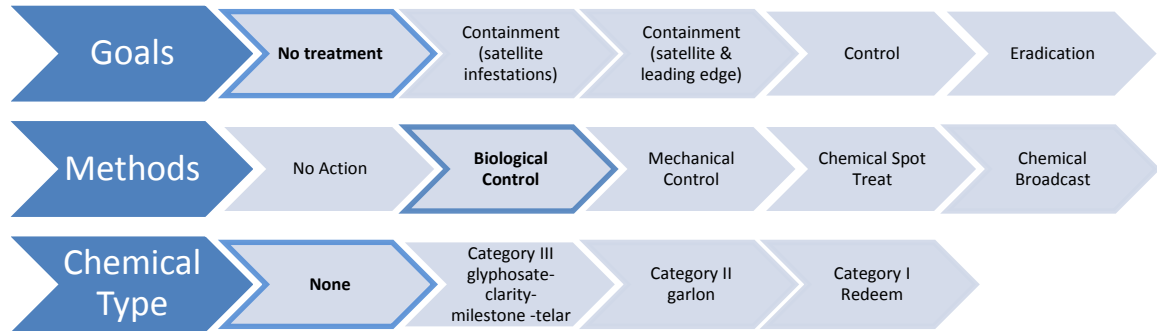
Over the years our department has worked closely with both USDA and CDFA biocontrol research staff and



**Yellow star thistle infestation**

worked closely with both USDA and CDFA biocontrol research staff and have released five organisms on YST as the organisms became approved for release. Four of these biocontrol agents are insects: a bud weevil (*Bangasternus orientalis*), a gall fly (*Urophora siruneseva*), the hairy weevil (*Eustinopus villosus*), the flower weevil (*Larinus curtis*).

We have also released a rust fungus (*Puccinia jaceae*). Monitoring for these organisms show that all of the insects are becoming well distributed through the county on YST. So far the success rate is low and the insects have been in the environment for over ten years. A few areas have shown some control and it often takes many years for these organisms to build to a point that results in control. The rust organism has not spread significantly in the five years since it has been released probably because our climate is too dry. There has been limited success with it in North Bay counties.



## C. Vertebrate Pests

### 1. Ground Squirrel (*Spermophilus beecheyi*)

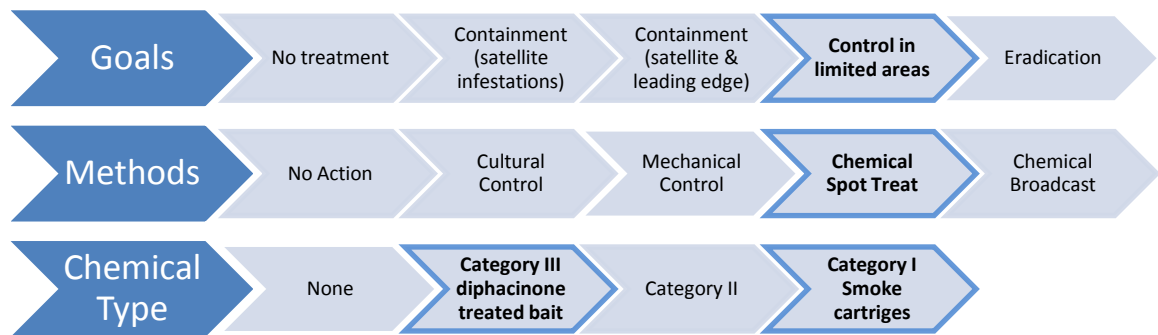
**Biology:** Ground squirrels are a natural part of our ecosystem. In certain areas ground squirrels can cause unacceptable damage or risk. They can also carry many diseases that threaten humans.

**History and treatment:** Ground squirrels are associated with the spread of Rocky Mountain spotted fever, rat bite fever, tularemia, ‘Chagas’ disease, adiospiromycosis and encephalomyocarditis. The disease they are most often associated with is sylvatic (bubonic) plague. Circumstantial evidence points to ground squirrels as the host to plague-infected fleas in over half of the reported cases of human plague in California in the last 40 years. Plague is not a disease native to California. It was brought here to San Francisco by infected rats in 1899. The first ground squirrel to be confirmed as plague-infected was in 1908 in Contra Costa County. It has since spread to all of California. Ground squirrels do not “reservoir” the disease, a reservoir is an animal that has the disease, but may not show any symptoms and are usually not harmed by the infection. It is suspected that native mice and their fleas act as the reservoir for the plague bacteria from which the disease periodically spreads to other rodents. The disease is spread when a flea feeds on an infected animal and then feeds on a human. Since ground squirrels are themselves susceptible to plague, occupied or vacant burrows may harbor infected fleas that exist in the burrow entrance. The

county has had a control program on ground squirrels since early in the 20<sup>th</sup> century. In the past it was an aggressive control program. The present day program consists of control in areas where there is unacceptable damage potential mostly to critical infrastructure that includes earthen dams, levees, railroad beds, county roads in rural areas, water conveyance canals, CalTrans right of way and certain damage to private property such as retaining walls and foundations. There is also one suppression area treated where there is a high risk and history of problems with rattlesnakes that are feeding on the ground squirrel population. This area is an open area adjacent to a community swimming pool and play ground that are used by young children and a community swim team.

We use first generation anticoagulant baits, diphacinone and sometimes chlorophacinone. First generation anticoagulants have minimal risk of secondary poisoning to nontarget species when used properly by trained professionals, such as our staff, as a scattered bait or in bait stations. (Note: Second generation baits that are commonly used by homeowners and the structural pest control industry have a great risk of secondary poisoning if used outdoors). First generation anticoagulants are only effective when consumed over several feedings for at least 5 consecutive days. Effectiveness is greatly reduced if 48 or more hours pass between feedings. It is important that a constant supply of bait be available during the time of baiting and should only be discontinued when feeding stops. These characteristics, as well as an effective antidote (Vitamin K) make the use of anticoagulant baits relatively safe. These baits are not effective in the winter and spring because squirrels will graze on grasses which contains vitamin K. The bait is composed of the anticoagulant material applied to grain. The grain baits are dyed a color, and are somewhat disfigured by being crushed or “crimped”. This makes them less attractive to seed eating birds. The bright color, usually blue, also prevents possible accidental human consumption and reduces the hazard of baits being accidentally used to feed livestock. Anticoagulant baits can be used in two ways: in bait stations, or by repeated scattering or “broadcasting” the bait. Broadcasting is done using mechanical spreaders or sometimes by hand application. The rate is 10 pounds/acre which amounts to 6-8 treated kernels/square foot. Bait stations are small structures which the ground squirrel must enter to eat the bait. Stations contain enough bait for repeated feedings and help keep children and pets from reaching the bait. Bait stations are the preferred baiting method around homes and other areas where children, pets, and poultry are present. Entrance holes of about 3.5” in diameter allow access by ground squirrels, but not by larger animals. A lip prevents bait from spilling when squirrels exit. We sometimes use gas cartridges in the winter and spring when there is sufficient moisture in the soil to hold the released carbon

monoxide in the burrow.



*Future plan:* We will continue to treat in the above identified areas where squirrels are present. We look for alternative materials or methods that will provide adequate suppression in critical areas. We are currently testing raptor perches in three areas. We purchased under a grant 20 perches and installed them in the fall of 2009. Two of the areas were previously treated with baits to see if the suppressed populations can be maintained at acceptable levels. We installed perches in one area that had not been treated previously to see if the population in this area will be reduced. Unfortunately this method has not been successful in the reduction of ground squirrel populations in the areas where we have used the perches. We intend though to continue our monitoring of the perches.

In 2012 we experimented with live trapping a 1,200 linear foot area of a roadway in Antioch that was fairly heavily infested with ground squirrels. This roadway is closed off to traffic. It has very little foot traffic. Live traps (2'x2'x 8inch high) were placed at 100 foot intervals and checked a minimum of once per day for five consecutive days. We were successful in trapping ground squirrels with 152 caught over the five day period. Relocation of these squirrels is not allowed by Fish & Game law. We found many problems with this method. Though we expected live trapping to be a humane method, we found that it was not. Our staff working with the traps observed sometimes fierce fighting that occurred between trapped squirrels to the point of open bloody wounds especially on the nose and shoulders,

gnashing of teeth on the cage wire that caused profuse bleeding from the gums, and heat stress even with covered traps, exposure of capture squirrels that adds stress when they cannot dive into burrows if danger is near. Handling of the trapped and dead squirrels exposed staff to possible disease carrying fleas and ticks. We experienced human vandalism even though the 1,200 foot test area was in a remote area that is very lightly used by the public. The members of the public that vandalized the traps were exposed to fleas, ticks and the possibility of direct injury from the teeth or claws of captured squirrels. We have talked with two pest control companies that have done some live trapping and they have experienced similar problems. The expense was very high compared to that of using treated bait. We extrapolated a linear mile cost of \$7,374.11 for the live trapping. That compares with \$270.71/linear mile for the treated grain bait method. With all of that being said, the value of live trapping may outweigh the detriment in certain areas. An example would be an area such as in the vicinity of an endangered kit fox den where treated bait is not allowed but there is a serious potential for damage to critical infrastructure within the immediate area.

## Decision Making Process

### Japanese knotweed, *Fallopia japonica*

The site was discovered by Beth Slate, Agricultural Biologist with the County Department of Agriculture, on June 29, 2012. A sample cutting was taken. It was pressed and sent to the California Department of Food and Agriculture (CDFA) Plant Lab for positive identification. The determination (CDFA pdr number 1649771) came back on July 2, 2012.

Japanese knotweed is a CDFA “B” rated noxious weed. It is listed in the California Code of Regulations, section 4500 which is the California designated noxious weed list. As a “B” rated weed treatment/eradication is the prerogative of the county agricultural commissioner.

Tanya Drlik was informed of the find and that we were in the research and decision making process.



*Japanese knotweed in Lafayette*



*Bamboo-like stalk at El Sobrante site*

### This was our process for determination of treatment/no treatment:

Consulted various books including “Weeds of California”, Joe DiTomaso author, to determine plant invasive characteristics, difficulty of control, etc. Also consulted various web sites including Cal-IPC and Cal Flora, Encyloweedia, UC-IPM

Important findings: Rhizomes are thick, extensive, store large quantities of carbohydrates, and spread aggressively. Small fragments can produce new plants. Japanese knotweed: Rhizomes often 5-6 m long, but documented to 20 m long. Rhizomes can penetrate 2 inches of asphalt. Rhizomes buried to soil

depths of 1 m can regenerate. Seed production is rare in California. Seedlings generally do not survive well but when established the plant spreads very aggressively and crowds out other plants. Because of these characteristics and the current early detection status of the site I decided that 1) it is well worth while to treat and eradicate, if possible. This is considering the invasiveness of this species and its potential harm to the environment as well as to local horticultural areas. 2) There is the potential that plant enthusiasts will collect and propagate the plant thus contributing to the spread and exacerbating the potential environmental and horticultural harm. 3) We have the resources and effective management tools to do so.

Determined if the infestation site has special Endangered Species Act or endangered species “injunctions” considerations. The site is not a habitat listed area for endangered species and therefore has no endangered species use restrictions per the Endangered Species Act or two of the three injunctions. It is listed in the salmonid injunction. However, that injunction is not applicable to herbicide use.

From personal knowledge I know that this species exists in very limited areas and was treated along the north coast so I e-mailed three Agricultural Commissioners (Del Norte, Humboldt and Mendocino counties) to ask their experiences with Japanese knotweed and whether they knew others that may also relate experiences. I was contacted back by two of the three commissioners (in less than 24 hours). The Mendocino County commissioner related on-going experience with a patch that is adjacent to Highway 1. CalTrans had scheduled roadwork at the site and they decided to try a combination of digging out the rhizomes and tarping and then continued mowing. This method alone was not very effective though it is on-going and it was supplemented by stem injection of sprouts with glyphosate. The Mendocino commissioner related that his staff had some experience with glyphosate injection and suggested we contact the national forest service person that worked on this. He also suggested that we consider the use of imazapyr that he felt would be more effective.

We consulted herbicide labels to assure legal use of various products and label use limitations/restrictions.

Beth contacted Michelle Forsy of California State Parks. Michelle had used the glyphosate injection method. She said that injection is not her method of choice because it involves what she felt was high amounts of glyphosate concentrate, though it is somewhat effective. Besides the high use of concentrate she said that it was very difficult to get to and treat each shoot. The injection equipment cost was about \$200. She was willing to loan it to us but did not recommend this method.

Beth also contacted Stassia Samuals, Plant Ecologist with the National Park Service and Ray Harries with the Mendocino County Department of Agriculture. Both have worked on giant or Himalayan knotweed and have had experience with varying methods including injection, digging, the mowing and tarping, foliar and injection treatment with glyphosate. They had some success with the glyphosate treatments and not acceptable success with the other treatments.

During a Cal-HIP (California Horticultural Invasives Prevention) committee meeting that I serve on with Joe Ditomaso (see attached credits that include UC-IPM Director and UC Davis Weed Research Institute researcher, author of many weed identification and management publications and highly regarded in

this area of expertise) we discussed his experiences and recommendations for Japanese knotweed control. He advised that imazapyr would be the best material to use for control. He had been to the Humboldt site numerous times and said that grubbing/tarping will not work. Digging encourages spread and heavy growth due to the plants ability to regenerate from small fragments. He also had the same opinion as Michelle Forsy of the National Park Service in regard to glyphosate injection. He did not feel glyphosate foliar application to be effective. He recommended imazapyr use in summer to fall for the best efficacy.

In the meantime, Ralph Fonseca, Agricultural Biologist with our Department, during a Japanese dodder delimitation survey discovered a second small site in El Sobrante on July 16th. This plant was identified as Japanese knotweed (CDFA pdr number 1641164 on 7/19/12) though subsequent samples that Ralph brought by the office had a slightly different look to them.

I visited both site with Dean Kelch, CDFA Botanist. We took more samples and pictures at both sites. The El Sobrante site appears to be either giant knotweed or a Japanese/giant knotweed hybrid. The older leaves, inflorescences and plant in general were much larger than Japanese knotweed. Later Dean confirmed that it was the hybrid (same CDFA rating and invasiveness potential). The El Sobrante site was in full bloom (7/26) and the Lafayette site was at the end of bloom. The end of bloom is a good time to treat with imazapyr as the herbicide will better be translocated into the root system at this stage. We also observed that European honeybees were profusely working the bloom at the El Sobrante site and, though the bloom on 95% of the Lafayette site was over there was a branch in partial shade that was in full bloom. It was also being worked heavily by honeybees. The El Sobrante site was on about a 45 degree slope with sprouts coming up next to and through the roadway asphalt. There were also some sprouts coming up adjacent to old concrete areas that existed from a previous structure. This site covered an area about 10'X18'. There are no endangered species restrictions at this site.

The Lafayette site had sprouts coming through a concrete reinforcement wall and between a stone and concrete wall and hard packed decomposed granite. It covered an area about 15'X40' and there was a very small patch about 8'X4' in size 60 feet to the west of the main infestation.

#### **Decision:**

I decided to attempt eradication because of the invasiveness of these species. Also, it appears that there are effective tools to accomplish this goal. Both sites are incipient and this is a case of early detection/rapid response.

#### **Treatment option decision analysis:**

- **Mechanical:**
- **Digging:** not an option due to sprouting from small fragments and missed rhizomes, the need to go 3 feet deep and the growth adjacent to or in concrete and asphalt structures.
- **Cutting/Mowing and tarping:** not effective due to ability of sprouts to penetrate through the tarps.
- **Chemical:**



- **Cutting/Mowing and herbicide treatment:** treating the foliage with materials that are translocative is more effective than treating stubble and treating in the summer or fall when plant juices tend to flow to root storage with a translocative material is more effective in killing out the roots than treating a regrowth flush of leaves.
- **2,4-D:** We have gotten away from using this material and, though efficacious on Japanese knotweed, do not consider it an option to use again
- **Triclopyr:** Prefer not to use this product due to possible effects on closeby non target plants due to volatility of the material (especially the ester form).
- **Glyphosate Injection:** uses high amounts of concentrate and is time consuming so we decided against this method
- **Glyphosate foliar spray:** Not as efficacious as other materials that could be used
- **Telar® (chorsulfuron):** Not a good choice considering that a portion of the Lafayette site is very near the water. Also, though legal for use, Japanese knotweed is not specifically mentioned on the label.
- **Imazapyr:** Seems to be the most efficacious material. Japanese knotweed is specifically listed on the label. Habitat® formulation can be used close by to water (Lafayette) and Stalker® formulation because it is oil based may be used on the El Sobrante site.

#### **Timing:**

- UC-IPM literature recommends a summer or fall treatment. This is when the plant juices will tend to move into the roots resulting in a better translocation of imazapyr.
- Because of the profuse use of flowers by honeybees we decided to wait until the bloom is over. For the Lafayette site this will be about August 1<sup>st</sup> this year and likely 1-2 weeks later for the El Sobrante site. Though there is not a temperature restriction on the use of imazapyr, we feel that we will get better results if the temperature is not over 90 degrees Fahrenheit. We will also consider mandated Title 3 California Code of Regulations section 6614 restrictions that are intended to prevent drift, off-site movement and exposure to humans.

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#### **Actual Treatment (2012):**

**Lafayette:** The site was treated with Habitat® on August 6<sup>th</sup>. The bloom was 99% over and honeybees were not present. The daytime temperature was not projected to exceed 90 and was about 75 degrees at the time of treatment (11AM) and the high temperature for the day in Lafayette was recorded at 88 degrees Fahrenheit. Two-thirds of a backpack sprayer of mixed Habitat® was used.

**El Sobrante:** The site was visited on August 6<sup>th</sup>. The bloom on the main infestation area was declining but still in about 50% bloom with honeybees working the flowers. A small area in heavy shade that was not blooming was treated as well as sprouts that were breaking through the road asphalt. One-tenth of a backpack sprayer of Habitat® mixture was used.

August 16, 2012: Went by the El Sobrante site and found that it was still in approximately 30% bloom. The European honeybees were not visiting the bloom, however, native bees were very actively using it. Our speculation is that the flowers were no longer producing pollen but were producing nectar that is attractive to native bees. We decided to postpone the application.

August 30, 2012: Still in about 25% bloom with significant native bee numbers visiting the flowers. We decided to continue to monitor to when an application will do the least harm to non target organisms.

September 6, 2012: The site was checked and there was no bloom. It was sprayed with Stalker®. A total of ½ of diluted mix was used.

***Further note:*** Post bloom fruiting berries were not forming at either site. This indicates that seeding has not occurred in the past and that eradication may be implemented much quicker due to the lack of a seed bank reservoir.

## Decision Making Process

### Woolly Distaff Thistle, *Carthamus lantanis*

Site discovered by Vince Guise, Agricultural Commissioner with the County Department of Agriculture, on June 12, 2012. Knowing that woolly distaff thistle is a CDFA “B” rated noxious weed and that it is listed in the California Code of Regulations, section 4500 which is the California designated noxious weed list, and because there were only two plants, the immediate decision was to mechanically remove the plants. A sample was sent to the CDFA Plant Lab for positive identification. The determination (PDR number 1649643) came back on June 14, 2012.



Woolly distaff flower head



Chemical treatment for woolly distaff thistle is the same as for smooth distaff thistle. Chemical treatment would be considered if a patch was found that is too big or too dense for mechanical control.

As a “B” rated weed treatment/eradication is the prerogative of the county agricultural commissioner.