Contra Costa County
DECISION DOCUMENTATION for WEED MANAGEMENT: Japanese Knotweed

Date: 8/4/14

Department: Agriculture

Location: Lafayette and El Sobrante

Situation: Two Japanese knotweed (*Fallopia japonica;* syn. *Polygonum cuspidatum*) infestations were found in summer 2012. This is a CDFA "B" rated noxious weed.

What are the management goals for the site or weed?	To control and eradicate two Japanese knotweed infestations that exist in the County.
Were the sites monitored and what was found?	Yes, and the following isolated infestations were found: • Lafayette (SW Corner of Village Parkway & Mt Diablo Blvd.) When this site was first found in 2012, it covered a solid area about 15' x 40'. In addition, there was a very small outlying patch, about 8' x 4', sixty feet to the west of the main infestation. The main infestation was growing mostly in concrete rip-rap on the bank of the creek with some sprouts pushing through a concrete reinforcement wall and between the wall and hard packed decomposed granite. Bloom occurs from late June through early August and is heavily visited by the European honeybee. • El Sobrante (5691 Circle Drive) This site was discovered in 2012. It is on a 45-degree slope and sprouts were 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. The infestation covered about 10' x 18'. Bloom occurs from mid June through early September. It was noted that early to full bloom is visited heavily by the European honeybee and late bloom is heavily visited by native bees. See photos of both sites on Page 5.
Weeds have been identified as the following:	**Weed**: Japanese knotweed (*Fallopia japonica;* syn. *Polygonum cuspidatum*) There are two known sites in CCC: 1) Beth Slate, Agricultural Biologist with the Department, discovered the Lafayette site on June 29, 2012. A sample was taken, and the California Department of Food and Agriculture (CDFA) identified it as *Fallopia japonica* (CDFA pdr number 1649771) on July 2, 2012. 2) On July 16, 2012, Ralph Fonseca, Agricultural Biologist with the Department, discovered a second small site in El Sobrante during a Japanese dodder delimitation survey. CDFA identified the plant as *F. japonica* (CDFA pdr number 1641164) on July 19, 2012. On July 26, 2012, Vince Guise, Agricultural Commissioner, visited both sites with CDFA Botanist, Dean Kelch, who later identified the plant at the El Sobrante site as a Japanese knotweed/giant knotweed hybrid. Both Japanese knotweed and giant knotweed are CDFA "B" rated noxious weeds and are 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. **Photos**: See page 5 **Family**: Polygonacae **Habitat**: Riparian areas/floodplains, forest edges, meadows, rights-of-way, and parks **Origin**: Native to Japan, China, and eastern Asia—apparently escaped from cultivation. It was introduced to the United Kingdom as an ornamental in 1825 and from there to North American in the same century. **Weedy characteristics**: This fast growing, herbaceous perennial can form dense thickets up to 9 feet high, and so thick that virtually all other plants are shaded out. These stands can significantly alter natural habitat. The plant has an extensive system of thick rhizomes that store large quantities of carbohydrates and spread aggressively. Rhizomes are often 5-6 m long and have been documented to 20 m long. Japanese knotweed can reproduce from even just fragments of these rhizomes or from stem sections that can root at the nodes. The rhizomes and stem fragments can move great distances in flowing water and can be transferred in soil.

	Rhizomes can sprout through 2 inches of asphalt and rhizomes buried in soil to 1 m can regenerate. Seed production is rare in California, and seedlings generally do not survive well. If left unchecked, this plant can be very difficult to remove.	
Are populations high enough to require control? **Explain**	Yes, the Department's goal is eradication and therefore, the tolerance level is zero. It is important to eradicate these infestations while they are still small and relatively easy to treat in order to prevent their spread. Reasons for undertaking eradication: • The plant is considerably invasive (it receives a "moderate" rating for invasiveness by the California Invasive Plant Council). • It can cause harm to natural areas as well as horticultural areas by displacing native and horticultural species. • It presents a threat to rare and endangered plant species that may be growing in the vicinity and can alter the environment, thereby threatening vertebrate and invertebrate species. • Unless eradicated, there is the potential that plant enthusiasts could collect and propagate the plant thus contributing to the spread and environmental and horticultural harm. • The two infestations are very limited. • The Department has the resources and effective management tools to pursue eradication.	
Is this a sensitive site?		
	Are any areas part of the court-ordered injunctions? (see: https://www.epa.gov/endangered-species/interim-use-limitations-eleven-threatened-or-endangered-species-san-francisco-bay) Note: The Lafayette site is adjacent to Las Trampas Creek and is part of the salmonid injunction.	Yes
	Is this a known or potential habitat for any endangered or threatened species?	No
	Is it on or near an area where people walk or children play? The Lafayette site is near a walking path. Treatment will not occur on the path or where the public is expected to have contact.	Yes
	Is it near a drinking water reservoir?	No
	Is it near a creek or flood control channel?	Yes
	Is it near crops?	No
	Is it near desirable trees or landscaping?	Yes
	Is the soil highly permeable, sandy, or gravelly?	No
	Is the ground water near the surface?	Unknown but not expected.
	Are any of the sites near well heads?	No
Which cultural controls were considered?	**Mulching, weed barrier**: Mulching with plastic sheets or fabric weed barriers for at least 2 years may provide some control, though success using this method has been reported to be poor. Weed barrier fabric has been reported to work better when laid loosely over the colony and walking on or otherwise crushing the stalks as they push up the fabric. Mendocino County reported that sprouts grew through tarps. This method is neither effective enough nor reliable enough for the Department's purposes. **Planting Desirable Species**: This plant is an aggressive competitor and establishing desirable vegetation that would out-compete Japanese knotweed would probably be impossible. The literature does not mention this as a viable control method. In addition, the County has no control over plantings in the areas where it is found. **Burning**: This is not mentioned in the literature as a viable method. It is not practical in these areas and County has no control over infested sites. **Comments**: In Mendocino County, CalTrans decided to try a combination of digging out rhizomes, tarping the area, and then repeated mowing. This combination is on-going although it has not been very effective and has been supplemented with stem injection of glyphosate. Stassia Samuals, Plant Ecologist with the National Park Service, and Ray Harries with the Mendocino County Department of Agriculture, both have experience with digging, mowing, and tarping. They informed the Department that they had not had acceptable success with any of these methods. Joe DiTomaso, California weed expert and UC Davis Weed Research Institute researcher, in personal conversation with Vince Guise, has said that grubbing and tarping will not work. Digging encourages spread and heavy growth because of the plant's ability to regenerate from small fragments. **CONCLUSIONS: None of these strategies is effective or practical**.	

Which physical/mechanical controls were considered?	**Hand pulling/digging**: Japanese knotweed cannot be controlled this way because the extensive rhizomes are impossible to remove intact and fragments quickly resprout. In addition, the plants are growing adjacent to or in concrete or asphalt structures. **Mowing/cultivation by machine**: Mowing can reduce growth, but seldom, if ever, will it control the plant. Mowing that is repeated at least every 4 weeks and at least 7 weeks before senescence can suppress the plant. This method is highly labor intensive and would not eradicate the plants. **Grazing**: Neither Japanese knotweed nor giant knotweed is known to be poisonous to livestock, and they are, in fact, edible for humans. Grazing could provide some reduction on growth, but has not been shown to eliminate plants. Note: See also Cultural Controls, above. **CONCLUSIONS: None of these strategies is effective or practical for our purpose of eradication.**
Which biological controls were considered?	**Biological controls available:** There are no biological control agents available in the U.S. A sap-sucking psyllid (*Aphalara itadori*) has been released on Japanese knotweed in Europe. In the future this insect may be cleared for release in the U.S. There are other biological control agents under investigation, including a leaf spot pathogen in the genus *Mycosphaerella*. **CONCLUSIONS**: **No biological controls are available.**
Which chemical controls were considered? For more information on pesticides listed here visit the National Pesticide Information Center (NPIC). This is a joint project of Oregon State University and the Us EPA. http://npic.orst.edu/ You can communicate with an actual person at 800.858.7378 or npic@ace.orst.edu They are open from 8 am to 12 noon Pacific Time, Mon.-Fri.	**After researching the literature and consulting with researchers and colleagues about materials that are labeled for, and effective on, Japanese knotweed, the Department has considered the herbicide options listed below. The Department continues to consult researchers and colleagues, as well as new literature, to identify new choices that may be more effective, more environmentally friendly, and of lesser human toxicity.** **Pesticides may potentially exhibit both acute and chronic toxicity. The Signal Words below refer to acute hazards. For information on chronic toxicity, contact NPIC (info on left).** **Herbicides and application methods are chosen that prevent or minimize the potential for drift and exposure to humans and wildlife.** As with all weed control techniques, herbicides must be reapplied periodically to suppress weeds over the long term. **Note that the Weed Science Society of America (WSSA) and the Herbicide Resistance Action Committee (HRAC) both create resistance group designations to help weed managers reduce the likelihood of creating resistant weeds.** **Pre-emergent (residual) herbicide:** There is no evidence of seed production at either of the two sites. Without a seed bank, pre-emergent herbicides are not appropriate **Possible herbicide choices:** **2,4-D**—The Department does not use this material anymore and although it is somewhat effective for Japanese knotweed, it is not considered an option to use again. Also, it is enjoined for salmonids. **Dicamba**—Consultation with colleagues and the literature indicate that this material is not effective. **Triclopyr**—We prefer not to use this product because of the volatility of the material (especially the ester form) and the possible effects on nearby non-target plants. **Glyphosate Stem Injection**—Michelle Forys with California State Parks has used the injection method and said to us that injection is **not** her method of choice because it used what she felt were large amounts of glyphosate concentrate and it was very difficult to get to and treat each shoot. Though she found this method somewhat effective, she does not recommend it. The injection equipment cost was about $200, but she was willing to loan it to the Department if we chose to try this method. Joe DiTomaso was in agreement with Michelle Forys. Stassia Samuals and Ray Harries indicated to us that they had had some success with glyphosate stem injection and foliar spray. The Department decided against stem injection because of the large amounts of concentrate necessary, the staff time involved, and the marginal effectiveness. **Glyphosate Foliar Spray—**This is not as effective as other materials that could be used. Joe DiTomasso did not feel that this method was effective. **Chlorsulfuron—**This is not a good choice considering that a portion of the Lafayette site is very near the water. Also, though it would be legal to use, Japanese knotweed is not specifically mentioned on the label. **Imazapyr**—Joe DiTomaso and Chuck Morse, Agricultural Commissioner for Mendocino County, both recommended imazapyr as a more effective treatment. Japanese knotweed is specifically listed on the label. By label, the Habitat® formulation of imazapyr can be used near water at the Lafayette site. The Stalker® formulation of imazapyr is an oil-based product. Either Stalker® or Habitat® can be used at the El Sobrante site. Imazapyr is labeled "Caution" with that being the safest chemical category. It has very low nontarget animal/mammal toxicity. **CONCLUSIONS: The Department has concluded that imazapyr is the safest and most effective material.**

	UC-IPM literature recommends a summer or fall treatment. This is when the plant juices will tend to move into the roots resulting in better translocation of the herbicide. **Although there is no temperature restriction on the use of imazapyr, the Department feels that better results will be obtained if the temperature is below 90 degrees Fahrenheit. The Department also considers mandated Title 3 California Code of Regulations section 6614 restrictions that are intended to prevent drift, off-site movement and exposure to humans.** **Knotweed flowers are used heavily by honeybees and native bees, and though imazapyr is of very low toxicity to bees, the Department decided to delay the initial knotweed treatment in 2012 until after the bloom was over, and to treat in future years either before the bloom begins or wait until the bloom is over.** **Lafayette: In 2012, the Lafayette site was treated with Habitat on August 6. Bloom was 99% over and no honeybees were present. The daytime temperature was not projected to exceed 90 degrees and at the time of treatment (11 AM), the temperature was about 75 degrees. The high temperature for the day was recorded at 88 degrees. Two-thirds of a backpack sprayer of mixed Habitat was used.** **In 2013 the infestation was greatly reduced through the success of the previous year's treatment. There were only about six small runners of the plant in scattered areas of the original infestation. These were treated pre-bloom with Habitat on June 2.** **Monitoring in spring and summer of 2014 found no visible plant growth indicating that the goal of eradication at this site may have been achieved. There will be further site monitoring in future years.** **El Sobrante: In 2012 the site was monitored on August 6. The bloom on the main infestation was declining but still at about 50% with honeybees working the flowers. A small area in heavy shade that was not blooming was treated along with sprouts that were breaking through the road asphalt. One-tenth of a backpack sprayer of mixed Habitat® was used.** **The site was monitored again on August 16. Bloom was at approximately 30%. European honeybees were no longer visiting the flowers, but native bees were actively using them. Our speculation was that the flowers were no longer producing pollen, but were still producing nectar that is attractive to native bees. The application was postponed.** **On August 30, the plant was still in about 30% bloom with significant numbers of native bees visiting the flowers. The application was again postponed.** **On September 6, 2012 the site was monitored again. No flowers were present, so the site was sprayed with ½ of a mixed backpack of Stalker.** **In 2013 there were only about four runners under three feet long in scattered areas of the original infestation, including shoots that were pushing through the roadway asphalt. These were treated pre-bloom with Stalker on June 24.** **Monitoring in spring of 2014 found only a couple of sprout stalks breaking through the asphalt. The spray application was postponed until more emergent foliage was present, which allowed greater translocation of the herbicide to the underground rhizomes that are still present. Treatment occurred on July 11, 2014 with only 0.05 ounce of Stalker used on the non-blooming sprouts that were emerging through the asphalt.** **Further monitoring of both sites revealed that fruits were not forming on the plants. This indicates that seeding has not occurred in the past and that eradication may be implemented much more quickly because of the lack of a seedbank reservoir.**
Were adjuvants (drift retardants, surfactants, water conditioners, etc.) used with any of the herbicides? If so, explain the choices.	Pro-tron®, a hydrolyzed vegetable oil adjuvant product, is added to the herbicide mix. Pro-tron® helps to break water tension and thus increase the efficacy of the herbicide on the plant surface. It also helps with plant and soil penetration and drift reduction.
Which herbicide application methods are available for this chemical?	**Methods available:** Directed spot spray or injection. **CONCLUSIONS: A directed spot spray using a backpack sprayer is the most appropriate method considering the size of the infestations and the surrounding environment. As noted above, injection is difficult, uses large quantities of herbicide, would require new equipment, and is of questionable efficacy.**
What factors were considered in choosing the herbicide application method?	The size of the noxious weed infestations and their location are the most important factors in considering the application method. We also consider safety to the applicator, the environment, and nontarget species; endangered species; the effectiveness of the method; and the cost to the Department.
What weather concerns must be checked prior to application?	Wind that could cause non-target drift and the presence of bees are the Department's primary concerns. Though imazapyr is not known to be harmful to bees, it is prudent not to spray when they are actively working the blossoms. Wind can carry the herbicide off-site to sensitive native and ornamental plant areas so treatments occur when there is little or no wind.

State Botanist, Dean Kelch, with Japanese Knotweeed, El Sobrante, CA, July 26, 2012

Japanese Knotweed Leaves and Flowers, El Sobrante, CA, July 26, 2012 (This plant has been identified by Dean Kelch as a Japanese knotweed/Himalayan knotweed hybrid.)

State Botanist, Dean Kelch, with Japanese Knotweed, Lafayette, CA, July 26, 2012

Japanese Knotweed Leaves and Flowers, Lafayette, CA, July 26, 2012