KISC KAUAI INVASIVE SPECIES COMMITTEE	*Kauai Status*	*KISC Status*	*HPWRA*	*Invasive Impacts Score*	*Feasibility Score*	*Combined Score*
Clerodendrum macrostegium (velvet leaf glory bower)	**Naturalized**	**TARGET**	**HIGH RISK (8)**	**6**	**6**	**12**

Initial Prioritization Assessment Report completed: April 2017
Report updated as of: N/A
Current Recommendation for KISC: Remain as TARGET and reevaluate PFOC after 1-3 are completed
Knowledge Gaps and Contingencies:

1) Early detection surveys need to be completed to confirm the presence of *C. macrostegium* at Alexander's Nursery Wailua and Olo Pua Gardens in Kalaheo. Confirmation of its presence there may decrease the overall feasibility of control score.
2) Delimiting surveys surrounding known locations as well as between herbarium voucher locations are required to gain knowledge of the extent of the populations. Confirmation of a larger population than currently known may decrease the overall feasibility of control score.
3) Need to do a site visit to see if a certified arborist is necessary, and if so, inquire regarding the cost of hiring someone. A high cost estimate may decrease the initial control score.

Background

Clerodendrum macrostegium (Lamiaceae) is considered a tall shrub or small tree, usually achieving heights of 3-6 m (Staples and Herbst 2005). This species spreads by bird and rat dispersal of fleshy fruits and forms dense stands by prolific root suckering up to 5 m from the parent plant (HPWRA 2012b, Staples et al. 2000). No data on seed dormancy or minimum time to maturity exists.

Detection and Distribution

A review of herbarium records revealed that a specimen of *C. macrostegium* was first recorded on Kauai in Kalaheo at Olu Pua Gardens in 1974 (J.J. Fay 192, PTBG), although it was not identified as *C. macrostegium* until 1996. A naturalized population (Lorence and Flynn 1997) was observed at the same location in 1995 (T. Flynn 5813, PTBG). At Alexander's nursery in Wailua, a voucher indicating the plant was an "ornamental escape" was taken in 1995. No planting records are known for this plant (Skolmen 1980); due to its presence in nurseries in Kauai, it is thought to have arrived through horticultural trade. *C. macrostegium* is considered naturalized on Kauai and Oahu (Imada 2012).

Control of *C. macrostegium* by KISC began in 2011 with a total of 71 work hours contributed so far and four known occurrences are represented in the KISC database. As this report marks the first examination of herbaria records for this species, surveys have not yet been conducted at Olu Pua Gardens and Alexander's nursery to determine the current presence/absence of voucher locations. Based on KISC and NTBG location data, the distribution of this plant is currently restricted to the Koloa and Kawaihau judiciary districts and is present in 2 out of 74 watersheds (Kalaheo, Lawai and Wailua watersheds) (Figure C11- 1).

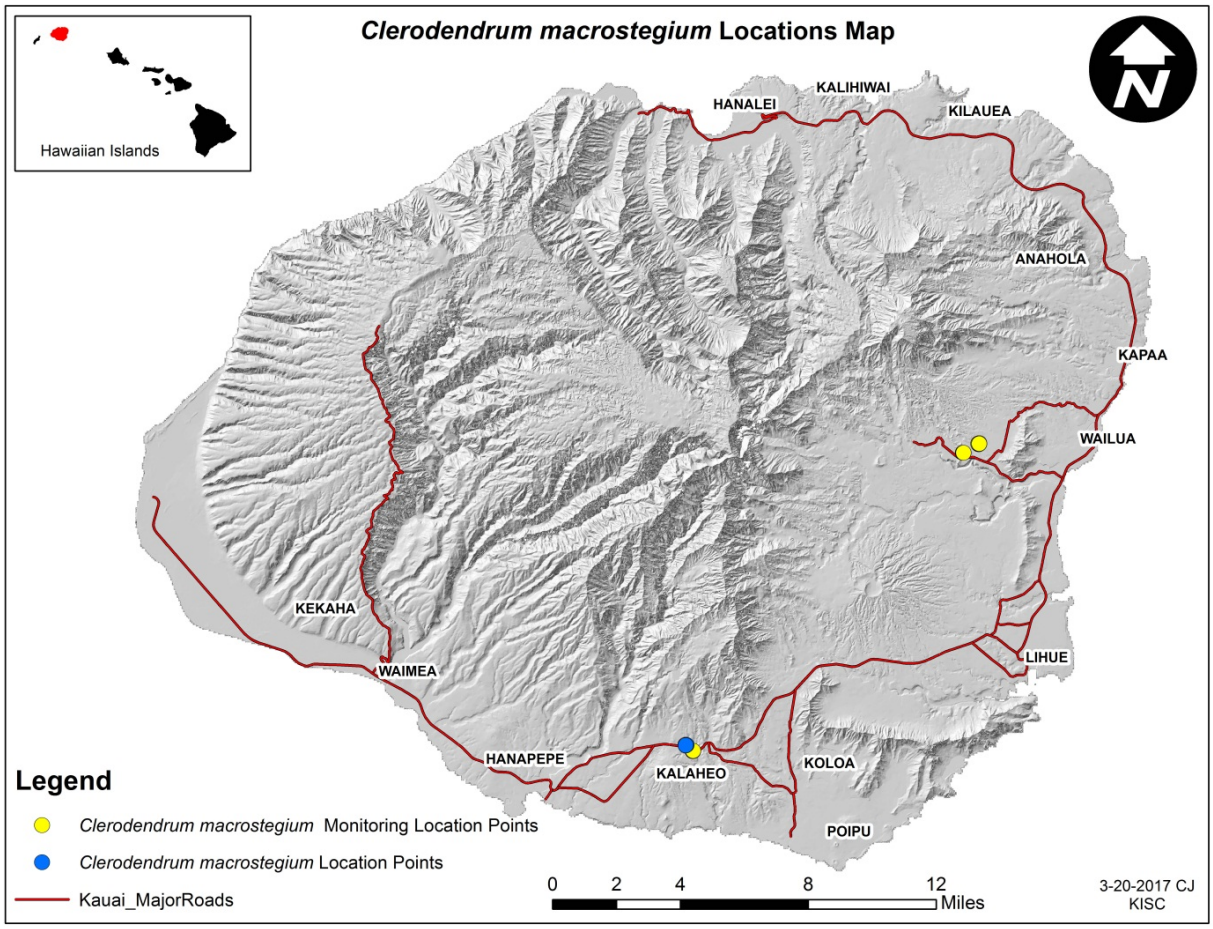

Figure C11- 1. Known locations of *C. macrostegium* on Kauai (excluding unverified locations identified through herbarium records) with yellow circles representing sites treated by KISC and blue circles representing known locations that have not yet been treated.

Hawaii Pacific Weed Risk Assessment (HPWRA) Score

C. macrostegium is designated as "High Risk" (HPWRA 2012b), listing the following biological traits as contributors to its high risk status:

Likelihood and Consequences of Invasion
• Naturalized within Hawaii • Forms thickets • Seeds easily dispersed by animals (including rats and birds)

Refer to the full Weed Risk Assessment for *C. macrostegium* at https://sites.google.com/site/weedriskassessment/assessments/Download-Assessments.

Invasive Impacts Score

1. Impact on natural community structure and/or composition

Score: 2 = Moderate impacts

C. macrostegium was assigned a score of 2 in the "Impacts to Natural Communities" category due because of its ability to form thickets and disperse by seeds, which may allow it to disperse into native-dominated habitats (HPWRA 2012b, Staples et al. 2000). Potential impacts may be greater, warranting a score of 3, but little is known about the invasive behavior of this plant elsewhere in the world. Thus, impacts are predicted based on naturalized populations in Hawaii, all of which are somewhat incipient. Kauai locations outside of nurseries and residential areas may indicate that new occurrences were established by bird dispersal, and observations by KISC staff confirm *C. macrostegium*'s ability to form a dominant understory in alien forest. Locations of *C. macrostegium* lie with one pop ref polygon (LAW) also containing PEP plants.

Figure C11- 2. Photo of *C. macrostegium* beginning to form dense stand in Kalaheo (prior to KISC control).

2. Impacts to Agriculture, Culture and other Human Systems

Score: 2 = Moderate impacts.

C. macrostegium received a score of 2 in the "Impacts to Agriculture" category due to reports of abundant suckering in cultivated landscapes, presenting a risk to horticulture on Kauai (Staples and Herbst 2005). Agricultural impacts may be greater, but data regarding this species is lacking, likely due to the relative rarity of this plant in the horticultural trade. However, the more common and closely related *Clerodendrum quadriloculare* is a well-known pest of horticulture, with weed reports citing a prolific and difficult to control suckering habit similar to *C. macrostegium* (HPWRA 2012c).

3. Impacts to Biotic and Abiotic Processes

Score: 2 = Moderate Impacts

C. macrostegium was assigned a score of 2 in the "Impacts to Biotic and Abiotic Processes" rather than a higher score due to lack of studies measuring changes in abiotic factors associated with this plant. However, field observations indicate that this plant prefers moist conditions and dense thickets have been known to occur in low lying areas including ephemeral streams on Kauai. Additionally, rapid growth and root suckering will likely cause at least minor impacts to soil nutrient and moisture cycling.

TOTAL INVASIVE IMPACTS SCORE: 6

Feasibility of Control Score

Feasibility of Control Scoring and rationale for *C. macrostegium* is presented below. Refer to Appendix A for details regarding the Invasive Impact Score.

Delimiting Survey:

Score: 2 = Moderate Effort.

Feasibility of a delimiting survey for *C. macrostegium* was given a score of 2 because of the four known occurrences in the KISC database, three have been treated and monitoring revisits have not found substantially more plants. However, examination of herbaria records uncovered two additional historic infestations at nursery or garden sites, indicating that KISC known locations may be the result of bird dispersal from previously unknown cultivated plants. The known Wailua occurrence is located approximately 500 m away from Alexander's nursery and the Kalaheo occurrences are more than 1500m away from Olu Pua Gardens (Figures C11- 3 and 4). Delimiting surveys are required between known data points and historic planting sites revealed by herbaria voucher locations, potentially encompassing a large area including many landowners. Land access permission for Alexander's nursery and Olu Pua Gardens has not yet been requested. However, 3 out of 4 KISC data based locations are currently being treated and land access was recently granted for the large known and untreated population in Kalaheo in March 2017. Additionally, the population in Wailua overlaps with known *Miconia* infestation zones, so delimiting surveys for this species will also assist with *Miconia* detection.

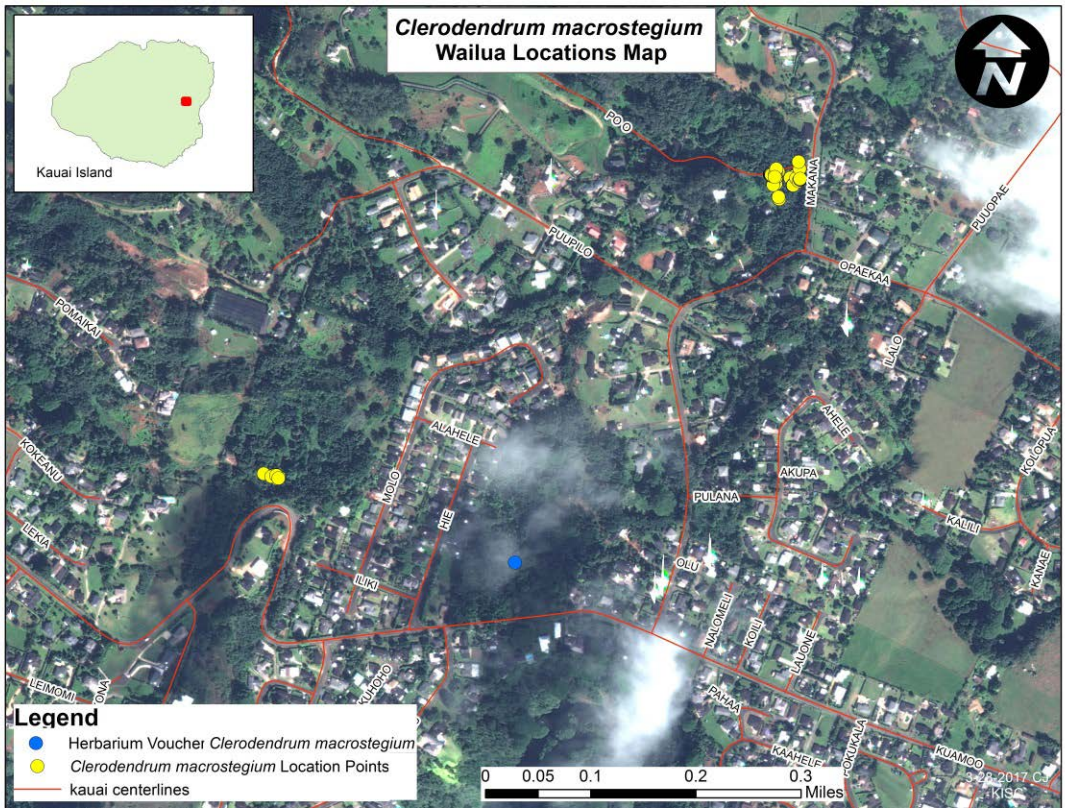

Figure C11- 3. Map of *C. macrostegium* locations in Wailua with yellow circles indicating locations known and treated by KISC and blue circles indicating the location of a herbarium voucher.

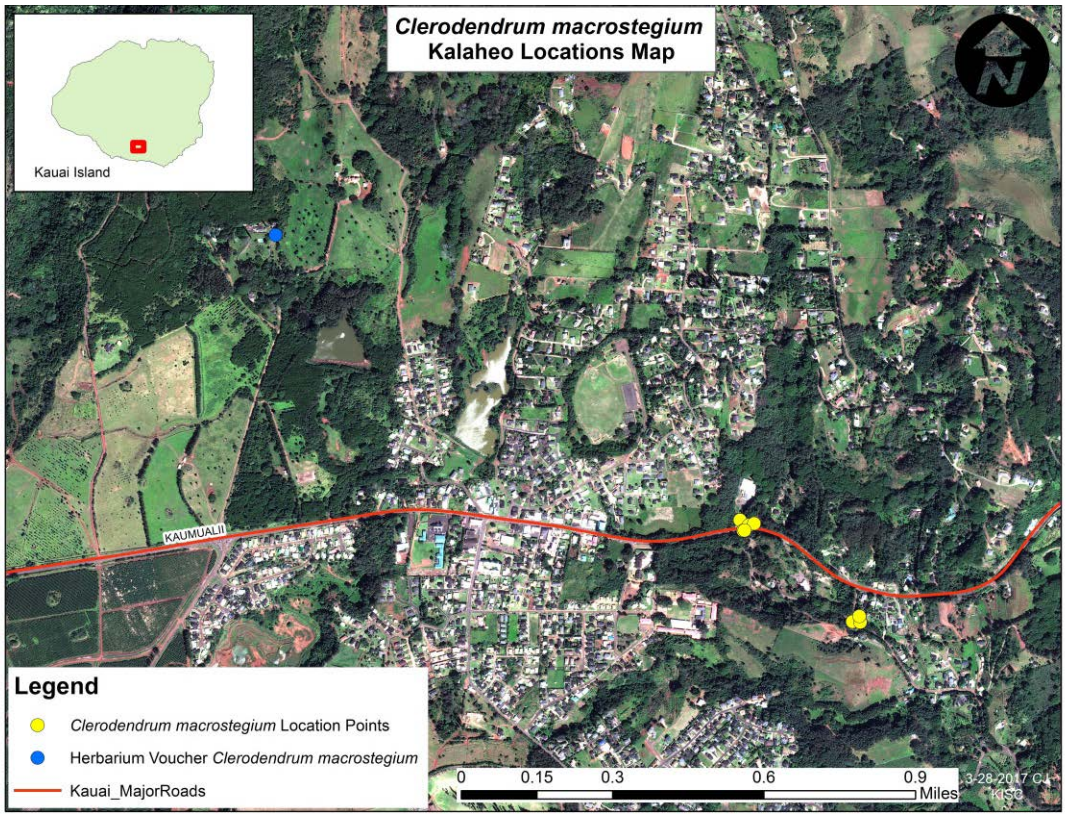

Figure C11- 4. Map of *C. macrostegium* locations in Kalaheo with yellow circles indicating locations known by KISC and the blue circles indicating the location of a herbarium voucher.

Initial control:

Score: 2 = Moderate Effort

Feasibility of initial control for *C. macrostegium* was given a score of 2 because there are few, relatively small populations and previous control efforts have been effective. However, there is one population in Kalaheo where trees have grown close to the highway and utility lines. Felling these trees or leaving a dead standing tree would pose a threat to human safety and thus, KISC would likely require an arborist to remove some of those trees.

Monitoring:

Score: 2 = Moderate Effort

Feasibility of monitoring for *C. macrostegium* was given a score of 2. While there are currently few known locations and the plant is easy to identify, there is no known seed bank or minimum time until maturity information available. Lack of these data requires greater use of KISC resources because frequent revisits to treat regeneration are required to ensure plants do not mature, allowing the population to reset seeds. Although no seed dormancy information is available, a few saplings were present at a site in March 2017 where all adult plants were removed five years ago – indicating that *C. macrostegium* is capable of dormancy.

FEASIBILTY OF CONTROL SCORE: 6

COMBINED SCORE: 6 + 6 = 12

Literature Cited

HPWRA. 2012b. Clerodendrum macrostegium. Hawaii Pacific Weed Risk Assessment.

HPWRA. 2012c. Clerodendrum quadriloculare. Hawaii Pacific Weed Risk Assessment

Imada, C. T. 2012. Hawaiian native and naturalized vascular pland checklist (December 2012 update). Bishop Museum Technical Report 60/ Hawaii Biological Survey Contrib. 2012-021: 29 pp. + 27 appendices.

Lorence, D. H., and T. Flynn. 1997. New naturalized plant records for Kaua'i. Bishop Museum Occasional Papers **49**:9-13.

Skolmen, R. G. 1980. Plantings on the forest reserves of Hawaii 1910-1960.*in* U. S. Institute of Pacific Islands Forestry and F. Service., editors., Honolulu, USA.

Staples, G.W., D. Herbst, and C. T. Imada. 2000. Survey of invasive or potentially invasive cultivated plants in Hawai'i. Bishop Museum Occasional Papers **65**:2.

Staples, G., and D. Herbst. 2005. A tropical garden flora: plants cultivated in the Hawaiian Islands and other tropical places. Bishop Museum Press., Honolulu, HI.