KISC KAUAI INVASIVE SPECIES COMMITTEE	*Kauai Status*	*KISC Status*	*HPWRA*	*Invasive Impacts Score*	*Feasibility Score*	*Combined Score*
Buddleja paniculata (butterfly bush)	**UNCLEAR**	**EARLY DETECTION**	**HIGH RISK (7)**	**4**	**8**	**12**

Initial Prioritization Report completed: November 2017
Report updated as of: N/A
Current Recommendation for KISC: pending scoring rank and committee review
Knowledge Gaps and Contingencies:

1) Delimiting surveys surrounding known locations are required to gain knowledge of the extent of populations.
2) Early detection surveys should be conducted in herbarium voucher locations.
3) An understanding of partnership roles may increase the likelihood of success.
4) Landowners must be contacted to assess cooperation.
5) A plan for control along waterways/wetlands is necessary.
6) Plants should be monitored for production of seed.

Background

Buddleja paniculata (Buddlejaceae), or "butterfly bush", is a large, woody shrub that is cultivated as an ornamental (Staples and Herbst 2005). *B. paniculata* has not been considered for control by KISC in the past and thus, the purpose of this prioritization assessment report is to consider the potential invasive impacts of *B. paniculata* and evaluate whether KISC should attempt eradication (i.e. accept "Target" status) or joint control with partnering agencies (i.e. accept as "Partnership" species status). This will be informed by scoring and comparing *B. paniculata* to other "Early Detection" species known to Kauai (See Table 5 in KISC Plant Early Detection Report for status terminology).

Detection and Distribution

B. paniculata was first vouchered on Kauai in 1999 (D.H. Lorence 8402, PTBG) and the current invasive status of this plant on Kauai is unclear. Herbarium vouchers of this plant in Kokee indicate that this plant appears to be slowly spreading vegetatively from cultivated sites and no seeds have been recorded. A single occurrence was noted during 2015-2017 surveys in Waineke Swamp, Kokee that appeared to be spreading vegetatively but it was uncertain whether it established by seed or by cultivation (K. Brock 923, PTBG). *B. paniculata* is dioecious, requiring separate male and female plants to reproduce (HPWRA 2017), which may explain the absence of seeds in observed specimens. *B. paniculata* is not considered naturalized elsewhere in the state (Imada 2012). Currently, four sites of this plant are known, all clustered among cabin sites and roadways in Kokee within a 150 ha (300 acre) area. Thus, these data indicate that *B. paniculata* is currently located within 1 judiciary district (Waimea) and 2 watersheds (Milolii, Waimea; Figure C7- 1).

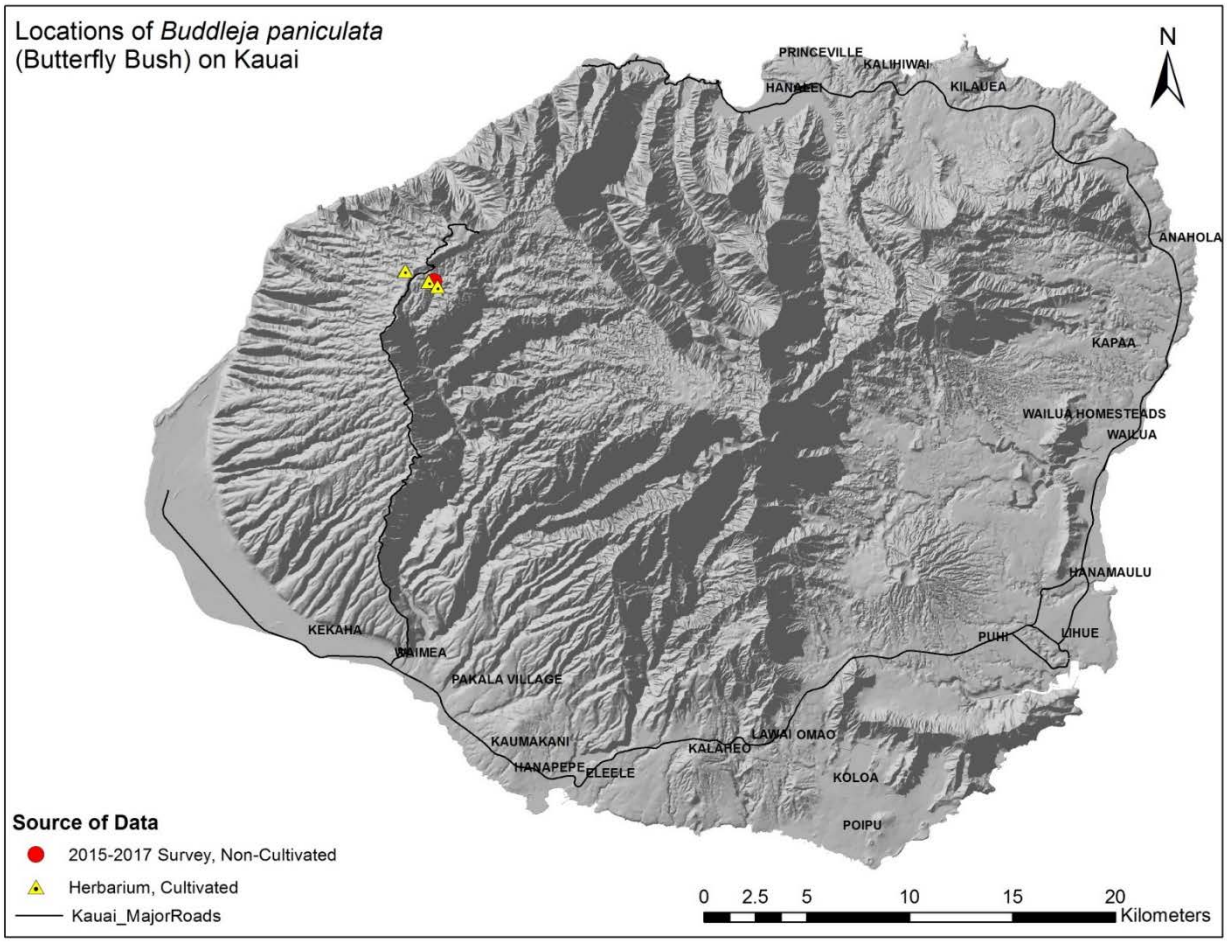

Figure C7- 1. Locations of *B. paniculata* on Kauai. Locations where presence of the plant was confirmed during 2015-2017 surveys are denoted by red circles.

Hawaii Pacific Weed Risk Assessment (HPWRA) Score

B. paniculata is designated as "High Risk", receiving a score of 7 (Daehler et al. 2004, HPWRA 2012). Traits contributing to this status are listed below according to whether they pertain to the likelihood a plant will invade vs. the consequences of the invasion, according to Daehler and Virtue (2010). Categorization of traits in this manner more accurately informs invasive impact potential scoring and prioritization of species that are already established on Kauai.

Likelihood of Invasion	*Consequences of Invasion*
• Well suited to climates in Hawaii • Tolerates a wide range of soil conditions • Produces viable seed • Hybridizes naturally • Reproduction by vegetative fragmentation • Propagules dispersed intentionally by people • Tolerates or benefits from mutilation	• A congeneric weed, sharing a genus with other known invasive vines (i.e. implies inheritance of tendencies to inflict invasive impacts)

Refer to the full Weed Risk Assessment for *B. paniculata*, including how these traits and characteristics traits affect HPWRA scoring, at https://sites.google.com/site/weedriskassessment/assessments/Download-Assessments.

Invasive Impacts Score

1. Impact on natural community structure and/or composition

Score: 1 = Minor impacts

B. paniculata was assigned a score of 1 because no reports of invasive impacts to native ecosystems exist from Hawaii or elsewhere in the world. However, a great deal of uncertainty surrounds this scoring as this species is not as common in the nursery trade compared to other members of the genus, and therefore has had less opportunity to establish outside of its native range. No seed has been observed on Kauai plants, but this does not necessarily indicate that it is incapable of invasion. Serious infestations of the closely related *B. madagascariensis* in Australia appear to be sterile, and land managers have concluded that the spread of this plant into intact forest is like due to the transportation of vegetative fragments by birds, water and people (Stock 2002). As this plant is dioecious and seeds have been noted in its native range (HPWRA 2017), seed may eventually be produced once populations grow large enough to increase pollination among existing plants. The score for *B. paniculata* in this section will increase if it is proven capable of dispersing long distances. This plant is thought to be shade intolerant (HPWRA 2017), and thus is unlikely to establish in the understory of intact native forest. Although this plant has a sprawling and shrubby habit, observations from Kauai indicate that it may not be capable of vining into the canopies of trees like the closely related *B. madagascariensis* (Figure C7- 2). This plant should be monitored in the future to determine its method of dispersal on Kauai and whether they can overtop large shrubs or trees. Sites of *B. paniculata* currently lie within one pop ref polygon (Milolii - MIL) also containing PEP plants.

Figure C7- 2. Photo of *B. paniculata* (silver foliage) showing sprawling, shrubby growth habit in Waineke Swamp, Kokee.

2. Impacts to Agriculture, Culture and other Human Systems

Score: 2 = Moderate impacts

B. paniculata received a score of 2 because, although little is known about this plant, it grows rapidly and colonizes disturbed areas in its native range. It has an extensive root system and is recommended for revegetating bare hillsides to prevent erosion (HPWRA 2017), indicating that increasing human disturbance may provide ideal growing conditions and promote the spread of existing plants. On Kauai, vegetative patches may eventually encroach upon trails, roads and buildings. However, the largest patch is currently only 30m X 20m in area. This score may increase if long-distance dispersal is recorded on Kauai. Additionally, sap of this plant is thought to be poisonous to humans, although no reports of toxicity in humans have been recorded (Quattrocchi 2012).

Figure C7- 3. Photo of *B. paniculata* (silver foliage) on Camp 10 road after being pushed back by road maintenance/construction equipment.

3. Impacts to biotic and abiotic processes

Score: 1 = Minor Impacts

B. paniculata was assigned a score of 1 in this category because pounded bark is traditionally used as fish poison in Nepal (Quattrocchi 2012, HPWRA 2017). However, it's unclear what dosage is required to impact fish populations and whether these chemicals can be leached into streams without human assistance.

TOTAL INVASIVE IMPACTS SCORE: 4

Feasibility of Control Score

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

Delimiting Survey:

Score: 3 = Minor Effort

Feasibility of a delimiting survey for *B. paniculata* was given a score of 3 because most sites are likely cultivated (or originating from cultivation), allowing for easy access. For the time being, plants appear to spread vegetatively, so a relatively small delimiting search buffer is likely sufficient in non-ideal habitats.

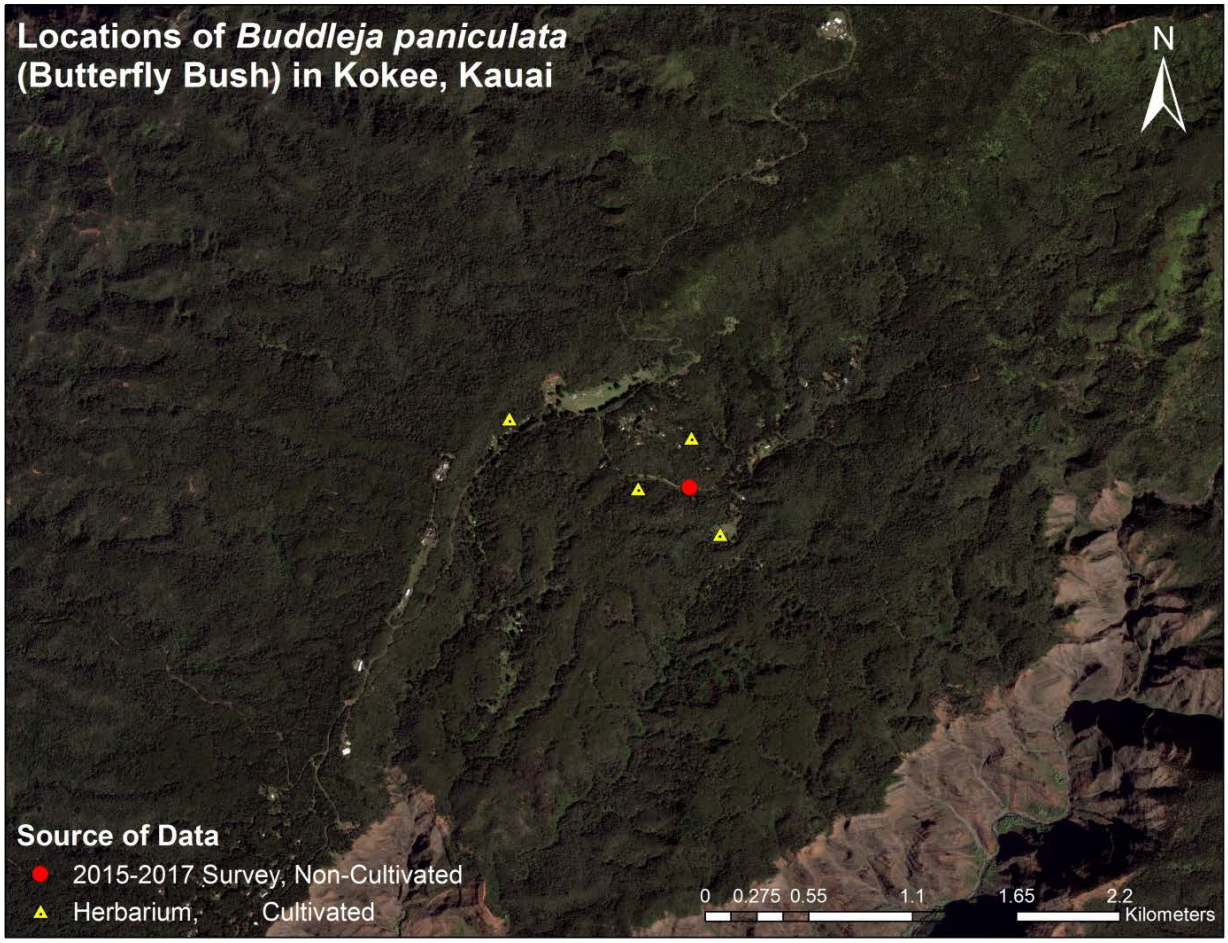

Figure C7- 4. Map of the Puhi/Huleia *B. paniculata* population, with red circles denoting locations found during 2015-2017

Initial control:

Score: 2 = Moderate Effort

Feasibility of initial control for *B. paniculata* was given a score of 2 because some plants appear to be cultivated in private residences and the swampy terrain and dense vegetation of the largest patch may be difficult to remove. Additionally, herbicide use is likely restricted in wetland areas such as the patch located at Waineke swamp.

Monitoring:

Score: 3 = Minor Effort

Feasibility of monitoring for *B. paniculata* was given a score of 3 because lack of seed from plants prevents the establishment of a persistent soil seedbank. However, this scoring assumes that seeds are not being produced on Kauai (but see dioecy comments in "Impact on natural community structure and/or composition" above). This score will decrease if this plant is found to produce seed on Kauai.

FEASIBILTY OF CONTROL SCORE: 8

COMBINED SCORE= 4 + 8 = 12

Literature Cited

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