 KISC KAUI INVASIVE SPECIES COMMITTEE	Kauai Status	KISC Status	HPWRA	Invasive Impacts Score	Feasibility Score	Combined Score
<i>Dillenia suffruticosa</i> (shrubby simpoh)	CULTIVATED	EARLY DETECTION	HIGH RISK (11)	7	6	13

Initial Prioritization Assessment completed: December 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 whether additional trees have established from cultivated sites.
- 2) Landowner cooperation is necessary to remove cultivated trees
- 3) Outreach effort is necessary to increase chances that individuals at private residences are reported.
- 4) An assessment of how costly/necessary it is to hire a certified arborist and equipment to haul away debris.
- 5) An invasive plant prevention plan designed to encourage collaboration between Botanical Gardens and local conservation agencies should be considered.

Background

Dillenia suffruticosa (Dilleniaceae), or “shrubby simpoh”, is a large shrub or small tree occasionally cultivated as an edible and medicinal plant or as an ornamental (Staples and Herbst 2005, HPWRA 2015). *D. suffruticosa* gained a KISC status of “Early Detection” in 2011, when it was detected during surveys for another KISC target in Wailua Homesteads. Plants were removed shortly afterwards based on expert opinion of its invasiveness on Oahu and the belief that it was not known elsewhere on Kauai. However, additional locations have been detected during 2015-2017 surveys. Thus, the purpose of this prioritization assessment report is to reevaluate whether KISC should attempt eradication (i.e. accept “Target” status) by scoring and comparing *D. suffruticosa* to other “Early Detection” species known to Kauai (See Table 5 in KISC Plant Early Detection Report for status terminology).

Detection and Distribution

D. suffruticosa was first vouchered from a single cultivated individual at National Tropical Botanical Garden (NTBG) in 1989 (T. Flynn 3457, PTBG). However, it is likely that it was cultivated on Kauai before 1989 as numerous herbarium records are present from cultivated specimens at the Bishop Museum herbarium which indicate its presence in the Hawaiian islands since at least 1945 (M. Kerr s.n., BISH). Statewide it is considered naturalized only on Oahu (Imada 2012). In addition to the cultivated plant at NTBG, two additional locations in Wailua Homesteads and Koloa have been detected (Figure C17- 1). The Wailua Homesteads site consisted of three apparently non-cultivated saplings found during surveys for other KISC targets in 2011; these plants were subsequently removed and monitoring revisits indicate that it has been eradicated in the immediate area surrounding the site. 2015-2017 surveys detected a third site including a single cultivated tree in the yard of a private residence in Koloa. Although it was flowering prolifically when it was detected in March 2017, no fruit were observed. Combined, sites of *D. suffruticosa* occur across two districts, Koloaa and Kawaihau (where plants were removed), and three watersheds, Lawai, Waikomo, and Wailua (Where plants were removed; Figure C17- 1).

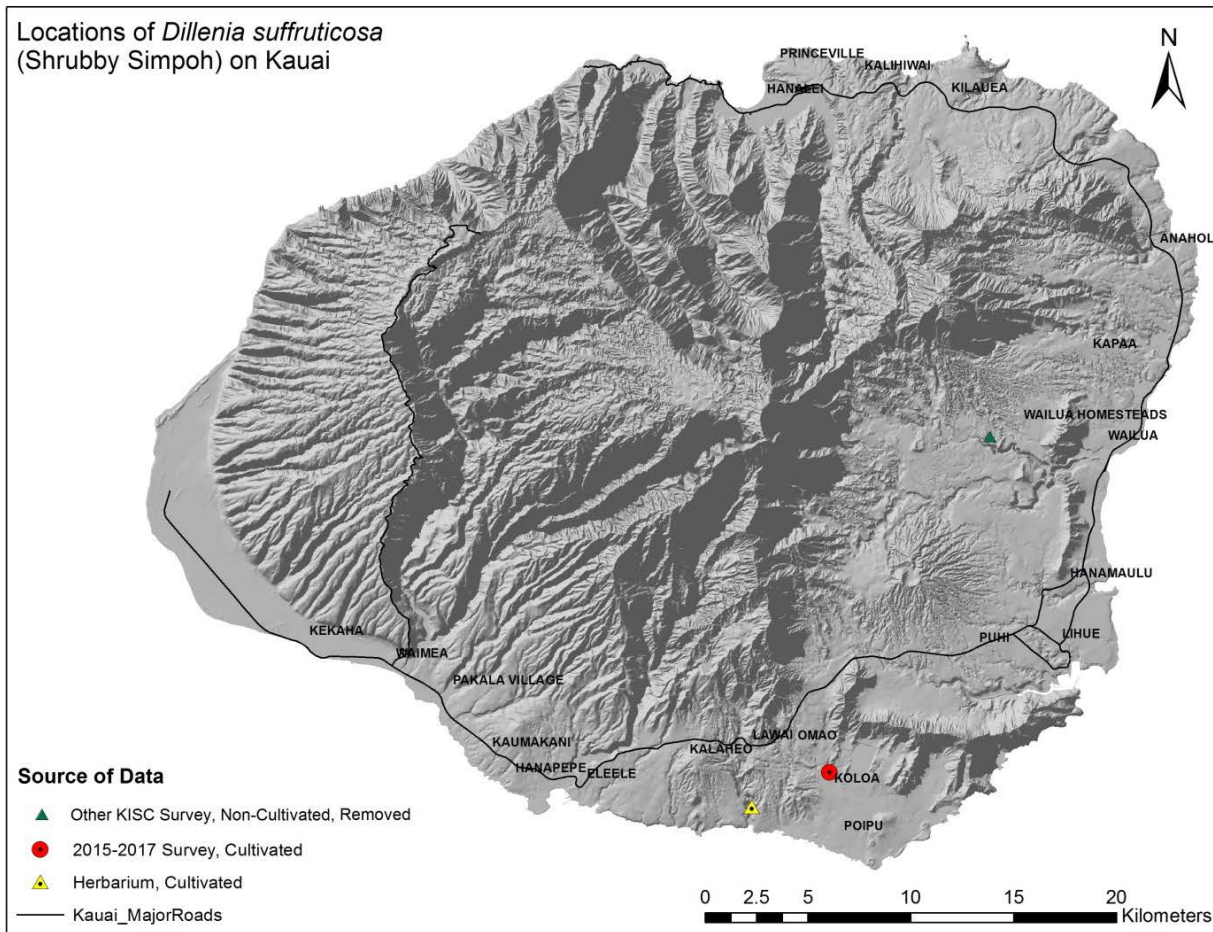


Figure C17- 1. Locations of *D. suffruticosa* on Kauai.

Hawaii Pacific Weed Risk Assessment (HPWRA) Score

D. suffruticosa is designated as “High Risk”, receiving a score of 11 (Daehler et al. 2004, HPWRA 2015). 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.

<i>Likelihood of Invasion</i>	<i>Consequences of Invasion</i>
<ul style="list-style-type: none"> • Well suited to climates in Hawaii • Repeatedly introduced and naturalized outside of its native range in areas with comparable climates • Shade tolerant • Tolerates a wide range of soil conditions • Produces viable seed • Reproduces by vegetative fragmentation • Propagules dispersed intentionally by people • Propagules bird dispersed, surviving passage through the gut • Prolific seed production (>1000/m²) • Benefits from disturbance 	<ul style="list-style-type: none"> • Environmental weed • A host of pests and pathogens • Forms dense thickets

Refer to the full Weed Risk Assessment for *D. suffruticosa*, including how these traits and characteristics 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: 3 = Major impacts

D. suffruticosa was assigned a score of 3 because this plant has been observed naturalizing in native dominated forests on Oahu (Figure C17- 2). Thickets with little or no understory have been observed on Oahu, especially in open areas, although it's unclear whether these observations were gathered from native or alien-dominated habitats (HPWRA 2015). Additionally, *D. suffruticosa* is considered a major invader of wet areas in Sri Lanka and the Seychelles. In Sri Lanka, impacts to wet, marshy areas and riparian areas have been noted where it forms thickets that provide dense shade and leaf litter that prevent native species from germinating (Wickramathilake et al. 2013). In the Seychelles, it has been observed invading closed-canopy forests at mid-elevations composed of native or alien-native mixed forest (Senterre et al. 2017). This indicates that it may be capable of outcompeting native species and forming dense thickets in native habitats on windward and mesic-moist areas on Kauai. *D. suffruticosa* is an early successional plant in its native range and is often an indicator of degraded habitat, which indicates that it may be able to colonize Kauai's increasingly disturbed natural habitats (HPWRA 2015, Tokumoto and Nakagawa 2016). *D. suffruticosa* requires large, specialized pollinators that can perform "buzz pollination", which is usually accomplished by large bees. In its native range, carpenter bees (*Xylocopa*) fulfill this function; but its ability to produce seed on Oahu and the common presence of the introduced Sonoran carpenter bee (*Xylocopa sonorina*) on Kauai indicates that seed set is likely not limited by pollination (Nishida 2002). Although *D. suffruticosa* often flowers year-round, studies have shown that it is sensitive to non-ideal climatic conditions, causing it to abort flowers/fruits before they mature (Tokumoto and Nakagawa 2016). This mechanism may explain why saplings or seeds have not been observed on plants in the relatively dry sites of Koloa and Lawai.



Figure C17- 2. *D. suffruticosa* naturalizing in Koa-Ohia native-alien mixed forest in Manoa valley, Oahu at approximately 270m elevation.

2. Impacts to Agriculture, Culture and other Human Systems

Score 2 = Moderate Impacts.

D. suffruticosa received a score of 2 because, although little is known about its potential impacts to agriculture and other human systems, populations of this plant are known to increase following disturbance and fruits are spread rapidly via bird dispersal (Wickramathilake et al. 2013). These traits may allow it to colonize human-controlled systems including residential areas, gardens/landscapes, forestry plantations and pastures. Observations of this plant forming dense stands in open areas on Oahu indicate that at least moderate impacts to human-dominated systems are possible (HPWRA 2015). Additionally, it has become a common component of roadside vegetation in lowlands in the Seychelles (Senterre et al. 2017).

3. Impacts to biotic and abiotic processes

Score: 2 = Moderate Impacts.

D. suffruticosa was assigned a score of 2 because the ability of this plant to form dense thickets and its affinity for wet/riparian areas is likely to cause at least moderate influences to soil, hydrology and ecosystem structure (HPWRA 2015). Some sources cite that *D. suffruticosa* can contribute to increased sedimentation in waterways (Wickramathilake et al. 2013), but others promote it as a stream bank stabilizer (Prasad et al. 2012). As such, impacts to soil erosion have not been included in this score. This score may increase if impacts to streams are observed within the Hawaiian Islands.

TOTAL INVASIVE IMPACTS SCORE: 7

Feasibility of Control Score

Feasibility of Control Scoring and rationale for *D. suffruticosa* 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 *D. suffruticosa* was given a score of 2 because the detection of non-cultivated saplings in 2011 indicates that a mature plant may exist in the Wailua Homesteads area. Surveys of the neighborhood and nurseries should be conducted to detect mature individuals. Additionally, surveys should be conducted around cultivated plants in Lawai and Koloa. As this plant has been distributed as an ornamental in Hawaii, outreach efforts are necessary to increase the likelihood that additional plants are reported from private residences.

Initial control:

Score: 1 = Major Effort

Feasibility of initial control for *D. suffruticosa* was given a score of 1 because the tree located in Koloa is large and very close to the owner's house and garage. A certified arborist may be required to prevent property damage. Additionally, an agreement with NTBG is necessary manage plants within the living collection. Development of an invasive plant prevention plan designed to remove plants or control seed production within Botanical Gardens may increase the feasibility of this score.



Figure C17- 3. Photo of *D. suffruticosa* cultivated in Koloa showing its position relative to a house and garage that may require a certified arborist to fell.

Monitoring:

Score: 3 = Minimal Effort.

Feasibility of monitoring for *D. suffruticosa* was given a score of 3 because seeds of this species exhibit no dormancy (Tiansawat and Dalling 2013). Thus only a few followup visits are required once plants have been removed to control seedlings that were not detected during their germination phase.

FEASIBILITY OF CONTROL SCORE: 6

COMBINED: 7 + 6 = 13

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