 KISC KAUAI INVASIVE SPECIES COMMITTEE	Kauai Status	KISC Status	HPWRA	Invasive Impacts Score	Feasibility Score	Combined Score
<i>Wisteria sinensis</i> (Chinese wisteria)	CULTIVATED	EARLY DETECTION	HIGH RISK (9)	6	6.5	12.5

Initial prioritization report completed: January 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 ensure it hasn't escaped cultivation
- 2) An understanding of partnership roles may increase the likelihood of success.
- 3) Landowners must be contacted to assess cooperation.
- 4) An assessment of outreach capacity is necessary

Background

Wisteria sinensis (Fabaceae), or “Chinese wisteria”, is a woody vine that is cultivated as an ornamental (Wu et al. 2010). Kauai plants morphologically match the description for *W. sinensis* in the Flora of China (Wu et al. 2010), although it should be noted that many hybrid cultivars with *W. floribunda* are present in the horticultural trade, which confuses taxonomy (Trusty et al. 2007, 2008). The breeding history of the single known plant on Kauai is unknown, although the landowner indicated that it is a white-flowering cultivar. *W. sinensis* 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 *W. sinensis* 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 *W. sinensis* to other “Early Detection” species known to Kauai (See Table 5 in KISC Plant Early Detection for status terminology).

Detection and Distribution

W. sinensis was first detected on Kauai during 2015-2017 surveys from a cultivated plant in Kokee (K. Brock 1020, PTBG). It has not been recorded as naturalized on any Hawaiian island (Imada 2012). A single, cultivated plant growing up a tree was detected at a cabin site on State Park land in Kokee, where it was planted by the previous owner but remains cultivated (Figure C42- 1). Although *W. sinensis* can produce viable seed, seed set is thought to be rare in this species (Woodward and Quinn 2011, HPWRA 2018). The plant in Kokee was observed producing fruit in July 2017, but only three pods were observed. Spread of this plant is said to be mainly vegetative outside of its native range and usually is spread long distances by improperly disposed yard trimmings (Woodward and Quinn 2011). Seeds are heavy and are not thought to be dispersed by birds or other animals but instead by flowing water (Woodward and Quinn 2011). No other *W. sinensis* were noted in the immediate vicinity of the cultivated plant. Thus, these data indicate that *W. sinensis* is currently cultivated within one district (Waimea) and one watershed (Kauhao).

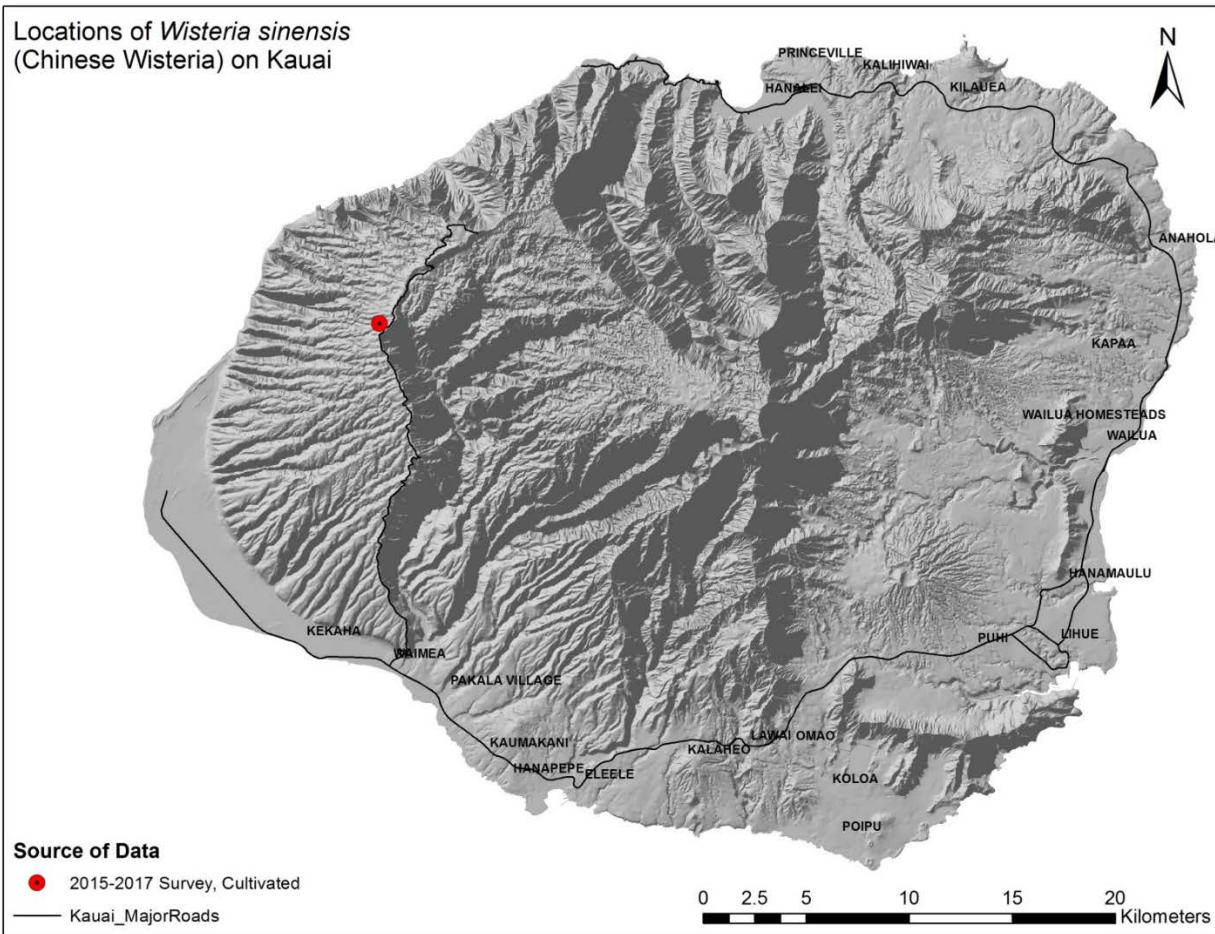


Figure C42- 1. Location of *W. sinensis* on Kauai.

Hawaii Pacific Weed Risk Assessment (HPWRA) Score

W. sinensis is designated as “High Risk”, receiving a score of 9 (Daehler et al. 2004, HPWRA 2018). 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"> • Broad climate suitability • Naturalized beyond its native range in tropical/subtropical climates • Tolerate a wide range of soil conditions • Produces viable seed • Hybridizes naturally • Reproduction by vegetative fragmentation • Propagules dispersed intentionally and unintentionally by people • Propagules water dispersed • Tolerates mutilation 	<ul style="list-style-type: none"> • An environmental weed • A congeneric weed, sharing a genus with other known invasive vines (i.e. implies inheritance of tendencies to inflict invasive impacts) • Toxic to animals and humans • Climbing and smothering growth habit forming dense thickets • Fixes nitrogen

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



Figure C42- 2. Photo of a cultivated *W. sinensis* (compound leaves, not flowering) climbing up a tree at a cabin site in Kokee

Invasive Impacts Score

1. Impact on natural community structure and/or composition

Score: 2 = Moderate impacts

W. sinensis was assigned a score of 2 because it is considered weedy in a number of different countries (Randall 2017) and has gained a reputation as an environmental weed in the eastern and southeastern United States (Woodward and Quinn 2011). Invasions have been well-described in Florida, where infestations cover many acres and reduce native plant and animal diversity by strangling or shading shrubs and trees with dense vining blankets (Miller 2006, Langeland et al. 2008). Additionally, densely infested trees can be toppled by *W. sinensis*, which creates a light gap that is further invaded (Miller 2006). Comparisons of Kauai to *W. sinensis*' native range of tropical-subtropical China at 500-1800m indicate that it may more successfully invade higher elevations on Kauai than lowland environments, although naturalization in tropical countries has been reported (Wu et al. 2010, Randall 2017). *W. sinensis* appears to have become widespread in mainland USA by human dispersal. Infestations are more common near residential areas where plants have escaped by vegetative growth and through the disposal of yard cuttings, while dispersal of seed has likely played a more minor role (Langeland et al. 2008, Woodward and Quinn 2011). *W. sinensis* has rampantly hybridized with *W. floribunda* throughout its invaded range, which implies that at least some seed germination is occurring, although it is suspected that most of this hybridization is human induced (Trusty et al. 2007, 2008, Woodward and Quinn 2011). Additionally, recent work suggests that many naturalized plants are hybrids, which may be more invasive than either of their parents (Trusty et al. 2007, 2008, CABI 2017). White flowering cultivars, such as the one growing in Kokee, are known to have a distinct genetic profile created through selective breeding (one of which is a hybrid with *W.*

floribunda), further complicating predictions of its invasive potential on Kauai (Trusty et al. 2008). Scoring of this plant is difficult because seed set is thought to be rare and requires water to move large distances. Additionally, some reports indicate that plants grown from seed take many years to mature (HPWRA 2018). However, as *W. sinensis* is fast-growing, people are likely to prune excess growth and may deposit viable fragments in green waste piles; this action, when done often, appears to have sufficiently facilitated the widespread invasions of other vegetative plants on Kauai (e.g. *Epipremnum aureum*, *Thunbergia* sp.). As this plant is only known from one cultivated site, the spread of *W. sinensis* in the near future may be mitigated by careful monitoring and proper disposal of yard trimmings. This plant should be monitored carefully in the future to determine invasiveness, the frequency of seed set on Kauai and other methods of dispersal, which may affect this scoring. Currently, *W. sinensis* lies within one POPREF polygon (Kauhao-KAU) also containing PEP plants.

2. Impacts to Agriculture, Culture and other Human Systems

Score: 2 = Moderate impacts

W. sinensis received a score of 2 because it grows rapidly and readily colonizes open, disturbed areas (Woodward and Quinn 2011). Owing to the fact that *W. sinensis* is a woody vine, vining masses can become very heavy and may weigh down tree limbs, causing a safety hazard, or may climb over man-made infrastructure (e.g. utility lines) (HPWRA 2012). Additionally, some parts of the plant are toxic to humans and animals and have irritating hairs, although this has not stopped it from being commonly cultivated throughout the world (Southcott and Haegi 1992, HPWRA 2018). Additionally, *W. sinensis* can be an alternative host for cucumber mosaic virus (Ward et al. 2008). This score may change if future monitoring of this plant on Kauai reveals additional data regarding its method and rate of dispersal.



Figure C42- 3. A plant casually identified as *W. sinensis* invading a pine forestry plantation in Georgia (Photo credit Don Tago).

3. Impacts to biotic and abiotic processes

Score: 2 = Moderate Impacts

W. sinensis was assigned a score of 2 in this category because it is a known nitrogen fixing shrub and hosts a large diversity of rhizobium bacteria species (Liu et al. 2005). Fixation of nitrogen may facilitate colonization of alien species that may be able to uptake soil nitrogen more quickly than native species. Additionally, its ability to form dense thickets indicates that at least moderate impacts for soil moisture and nutrient cycling may occur in dense infestations. However, this score may change if future monitoring of this plant on Kauai reveals additional data regarding its method and rate of dispersal.

TOTAL INVASIVE IMPACTS SCORE: 6

Feasibility of Control Score

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

Delimiting Survey:

Score: 3 = Minimal Effort

Feasibility of a delimiting survey for *W. sinensis* was given a score of 3 because although Kokee is far away from the KISC baseyard, plants are distinctive and only one location is known. Partnering with Kokee Resource Conservation Program (KRCP) may increase the likelihood of success in detecting additional plants in Kokee. As *Wisteria* is a genus commonly traded as an ornamental, outreach efforts are necessary to detect plants on private property that were not visible during early detection surveys.

Initial control:

Score: 1 = Major Effort

Feasibility of initial control for *W. sinensis* was given a score of 1 because the owner expressed that he valued the plant highly, and would not like to remove it. Additionally, other important, potentially invasive plants are located on his property (including *Jasminum polyanthum*), so maintaining a good relationship with him is important. Additionally, the cultivated specimen is large and is tangled amongst a living tree, thus multiple visits with careful herbicide or cutting may be necessary to remove the plant. This score may change if future contact with the landowner/leaseholder reveals that he is willing or completely unwilling to remove the plant.

Monitoring:

Score: 2.5 = Moderate - Minor Effort

Feasibility of monitoring for *W. sinensis* was given a score of 2.5 because although nothing is known about the ability of seeds to persist in the soil, many members of the Fabaceae have long lasting seeds (de Oliveira et al. 2016, de Casas et al. 2017, Liyanage and Ooi 2017). Thus, follow up visits are necessary after removal of the plant. However, plants are said to take a long time to until they are able to produce seeds, so monitoring visits may be well-spaced (HPWRA 2018).

FEASIBILITY OF CONTROL SCORE: 6.5

COMBINED SCORE= 6 + 6.5 = 12.5

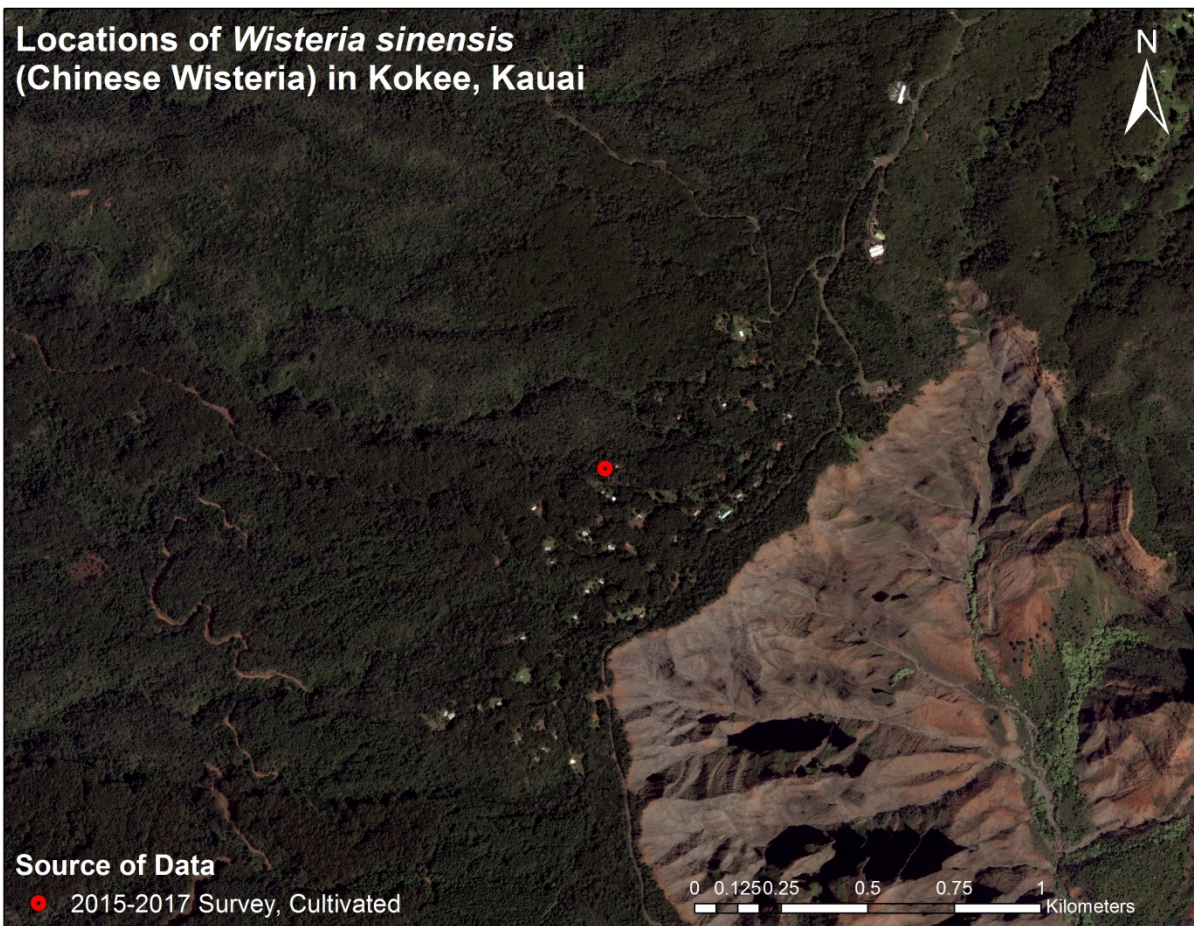


Figure C42- 4. Map of the known *W. sinensis* point in Kokee found during 2015-2017 surveys.

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