	Kauai Status	KISC Status	HPWRA	Invasive Impacts Score	Feasibility Score	Combined Score
<p><i>Harrisia eriophora</i> (apple cactus)</p>	NATURALIZED	EARLY DETECTION	HIGH RISK (7)	4.5	8	12.5

Initial Prioritization Assessment 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 gain knowledge of the extent of populations.

Background

Harrisia eriophora (Cactaceae), or “apple cactus”, is a shrubby cactus occasionally cultivated as an ornamental, although it is not common in the trade (HPWRA 2017). *H. eriophora* has not been considered for control by KISC in the past, and thus, the purpose of this prioritization assessment report is to evaluate whether KISC should attempt eradication (i.e. accept “Target” status). This decision will be informed by scoring and comparing *H. eriophora* to other “Early Detection” species known to Kauai (See Table 5 in KISC Plant Early Detection Report for status terminology).

Detection and Distribution

H. eriophora was first collected on Kauai from a naturalized population near Poipu in 1995 (D.H. Lorence 7623a, PTBG). It is not known as naturalized on any other Hawaiian island (Imada 2012). 2015-2017 surveys confirmed *H. eriophora*’s presence in the Poipu area, where about 15 mature plants can be seen from the roadside in a vacant field dominated by *Leucaena leucocephala* (haole koa) and other naturalized cacti (Figure C22- 1). No other populations have been detected. Like many other naturalized cacti in Kauai, *H. eriophora* is likely an escape from Moir Gardens, which was established in the 1930’s but is now managed by Kiahuna Plantation Gardens (Ventura and Ventura 2017). Surveys of the garden did not detect any remaining cultivated plants. Naturalized plants were detected between 200 and 400m away from the garden, but there are likely more individuals under *L. leucocephala* canopy in nearby fields. As the fruit is edible (Taylor et al. 2017), *H. eriophora* is likely spreading by bird-dispersed seeds on Kauai, which were abundant during July surveys. So far, *H. eriophora* is only known to have naturalized in one judiciary district (Koloa) within one watershed (Waikomo).

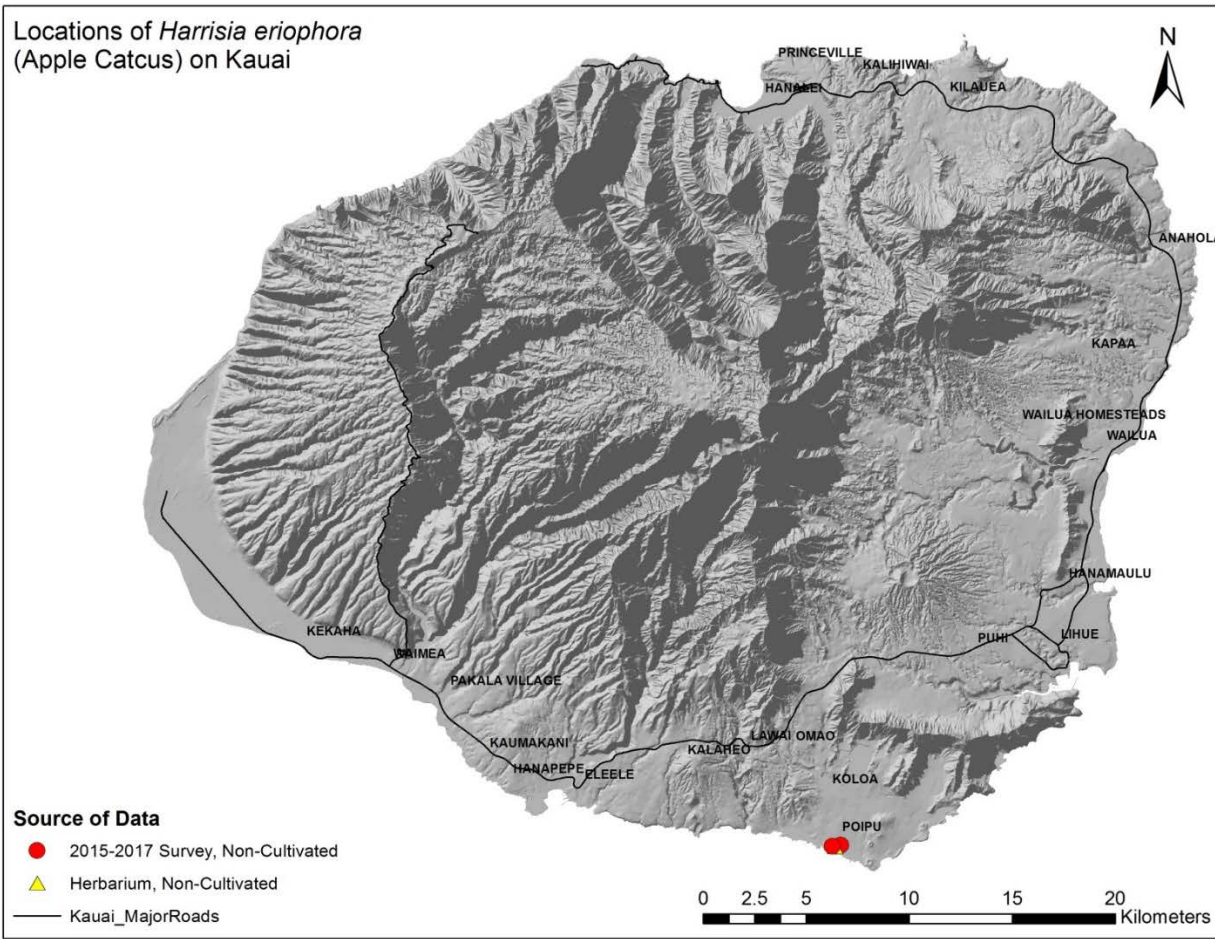


Figure C22- 1. Locations of *H. eriphora* on Kauai. Locations where presence of the plant was confirmed during 2015-2017 surveys are denoted by red circles.

Hawaii Pacific Weed Risk Assessment (HPWRA) Score

H. eriphora is designated as “High Risk”, receiving a score of 7 (Daehler et al. 2004, HPWRA 2017). 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 • Is shade tolerant at some point in its life cycle • Produces viable seed • Reproduces by vegetative fragmentation • Propagules dispersed intentionally by people • Propagules bird dispersed, survive passage through the gut • Benefits from mutilation 	<ul style="list-style-type: none"> • A congeneric weed, sharing a genus with other weedy species (i.e. implies inheritance of tendencies to inflict invasive impacts) • Produces spines

Refer to the full Weed Risk Assessment for *H. eriphora*, 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: 1.5 = Minor-Moderate impact

H. eriophora was assigned a score of 1.5 although no reports of invasiveness or naturalization have been reported elsewhere in the world. However, this is likely due to the fact that *H. eriophora* is rare in cultivation, occurring only in the collections of serious cactus enthusiasts. On Kauai, *H. eriophora* may continue to naturalize, facilitated by the spread of seeds by birds. However, it seems that the spread of *H. eriophora* is lagging behind other cacti species in the area that are now too widespread to eradicate (*Acanthocereus tetragonus*, *Cereus uruguayanus*, *H. martini*, *H. bonplandii*). However, it is unknown whether these species were brought to Kauai at the same time or were human-introduced to additional areas. As it is at least moderately shade tolerant, it may be able to establish beneath the canopies of trees and shrubs. On Kauai, it has been observed naturalizing beneath *L. leucocephala* in partial shade. However, there is no evidence to suggest that *H. eriophora* can form dense stands that may exclude native species. Because it can grow over 2.5m tall, it may influence light availability for immediately adjacent plants. In its native range in Cuba, *H. eriophora* is said to be widespread but forms small subpopulations of 5-15 individuals (Taylor et al. 2017), which implies that it does not form dense cover in its home range. However, plants often behave differently outside of their native ranges. Population densities of *H. eriophora* should be closely monitored on Kauai. In its native range, *H. eriophora* is distributed below 100m above sea level, suggesting that it may be restricted to the lowlands of Kauai (Taylor et al. 2017). It is unknown whether this plant can invade coastal environments, which should be monitored on Kauai as other viviparous (when seeds germinate in fruit) cacti species are thought to be salt tolerant (Cota-Sanchez et al. 2007, Barrios et al. 2012).

2. Impacts to Agriculture, Culture and other Human Systems

Score: 2 = Moderate Impacts

H. eriophora received a score of 2 in this category although no reports of impacts to agriculture or human systems are known elsewhere in the world. However, this may be due to the fact that *H. eriophora* is rare in cultivation. *H. eriophora*'s naturalizing status and growth habit on Kauai indicates that it may become at least a moderate nuisance in time. Although it is currently naturalizing in areas where other weedy cacti are abundant, *H. eriophora* has a unique growth habit relative to other naturalized cacti on Kauai where it sometimes forms a main trunk but maintains large sprawling branches reaching over 2.5m (8ft) high. Additionally, it is heavily armed with spines and irritating hairs (HPWRA 2017). Even if *H. eriophora* naturalizes only sparingly, the sprawling branches will likely impede access and may cause injury to humans, pets or livestock. This score may increase if future monitoring discovers increased population densities.



Figure C22- 2. *H. eriophora* naturalizing in Poipu, showing growth habit and spines

3. Impacts to biotic and abiotic processes

Score: 1 = Minor Impacts

H. eriophora was assigned a score of 1 because although no data indicates that densities of this plant will increase to the point of noticeable effects on soil nutrient or hydrological cycling, its spines could potentially cause injury to native ground-nesting birds if allowed to spread into prime nesting habitats.

TOTAL INVASIVE IMPACTS SCORE: 4.5

Feasibility of Control Score

Feasibility of Control Scoring and rationale for *H. eriophora* 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 *H. eriophora* was given a score of 2 because despite the known population being small, a large survey buffer is necessary because fruits are bird dispersed. Importantly, this area is infested with a diverse assemblage of other invasive cacti species which provide dangerous spiny branches at low, mid, and upper canopies of *L. leucaena* shrubland. This makes on-foot delimiting surveys dangerous and slow, and protective clothing and eye protection must be worn.

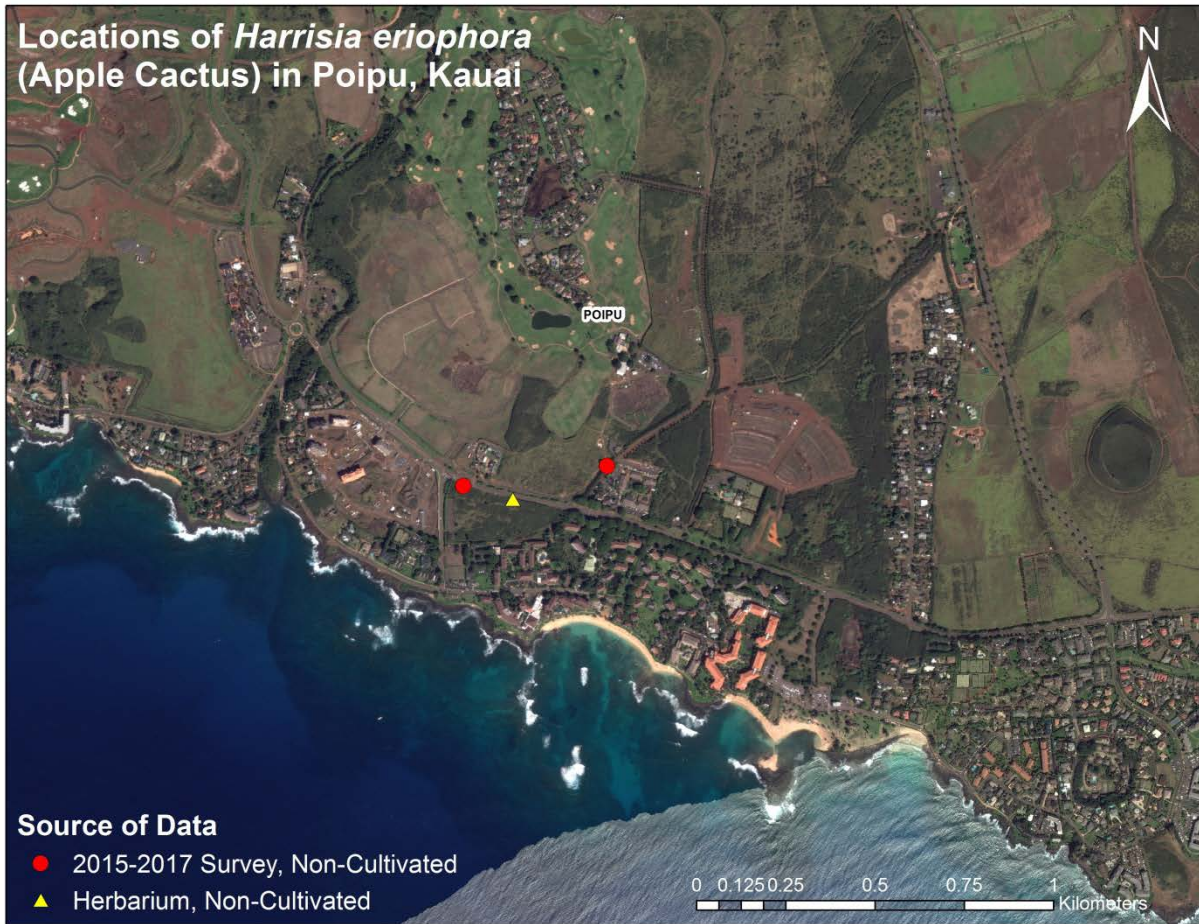


Figure C22- 3. Map of *H. eriophora* locations near Poipu.

Initial control:

Score: 3 = Minor Effort

Feasibility of initial control for *H. eriophora* was given a score of 3 because the known population is small and control of other *Harrisia* species has been effective with a variety of foliar-applied herbicides (HPWRA 2017). However, this score may change if many more additional plants are found.

Monitoring:

Score: 3 = Minor Effort

Feasibility of monitoring for *H. eriophora* was given a score of 3 because although no studies have been done on the length of time seeds can persist in the soil, *H. eriophora* often germinate within the fruit and most germinate within 8 weeks (Franck 2016). However, seeds of other *Harrisia* are known to last 18 months (Franck 2016). As cacti are relatively slow growing, monitoring re-visits can likely be well-spaced.

FEASIBILITY OF CONTROL SCORE: 8

COMBINED: 4.5 + 8 = 12.5

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