KISC KAUAI INVASIVE SPECIES COMMITTEE	Kauai Status	KISC Status	HPWRA	Invasive Impacts Score	Feasibility Score	Combined Score
Sesuvium* sp. near *verrucosum (sea purslane)	**Present**	**EARLY DETECTION**	**HIGH RISK (9)***	**5**	**8**	**13**

Initial PFC report completed: November 2017
PFC report updated as of: N/A
Current Recommendation for KISC: Pending Ranking and Committee approval (Remove known patch; return to survey list to document distribution?).
Knowledge Gaps and Contingencies:

1) Delimiting surveys along coastal sites near the known location are necessary to ensure it hasn't spread beyond its known distribution
2) Surveys for this species should be targeted during future island-wide early detection surveys.

* Risk assessment of *Sesuvium verrucosum* (see background for explanation).

Background

Sesuvium is a genus of "sea purslanes": herbs that most often occupy coastal areas (Wagner et al. 1999). The identification of plants detected on Kauai during 2015-2017 has not been verified. The specimens most closely resemble *S. verrucosum* collected from Oahu and Maui, but some differences in its morphology prevent it from being definitively recognized at the species level on Kauai. Based on a limited examination of Hawaiian herbarium samples and photographs (S. Perlman 15480, PTBG; K. Brock 1044, PTBG), it is possible that Kauai plants may be a hybrid of the alien *S. verrucosum* and the common indigenous *S. portulacastrum*. Alternatively, *S. portulacastrum* is quite variable throughout its large range, and unverified specimens from Kauai may simply represent atypical forms of this species found in Hawaii; but, these morphological differences incite suspicion as to whether it represents genetically dissimilar individuals from outside of Hawaii. Similarly, *S. verrucosum* is also highly variable throughout its range, and specimens from Kauai may be somewhat atypical compared plants studied to create species descriptions (Boufford 1997). Collection of seeds may help clarify the identification, as seed size is a key character distinguishing the species in the Flora of North America (Boufford 1997). A pictorial comparison of *S. verrucosum*, *S. portulacastrum* and samples from Kauai are presented below (Figure C39- 2), as well as a comparison of morphological traits gleaned from herbarium vouchers, photos and the Flora of North America (Boufford 1997). This prioritization assessment report was written to evaluate whether KISC should eradicate (i.e. accept "Target" status) this plant from Kauai. This will be informed by scoring this plant relative to other "Early Detection" species known to Kauai (See Table 5 in KISC Plant Early Detection Report for status terminology).

Detection and Distribution

Specimens resembling the *Sesuvium* sp. nr. *verrucosum* specimen (K. Brock 1044, PTBG) detected on Kauai have not been recorded prior to 2015-2017 surveys. Statewide, *S. verrucosum* is considered naturalized on Oahu, Maui and Molokai Islands (Imada 2012). 2015-2017 surveys detected 1 location in Poipu along a man-made, lava rock-lined pool in Prince Kuhio Park. However, the small stature of this plant makes it easy to miss during roadside surveys from a truck. Two small clumps exist, each approximately 2m long X 0.5m wide and are located about 40m from the beach. Shorelines in the immediate vicinity were coarsely searched, as these are considered to be ideal habitat, but no other plants were detected. It's unclear how this plant arrived at this location, as *Sesuvium* species have not been observed in the horticultural trade on Kauai, and the plant appears to be an uncultivated weed immediately adjacent to a patch of native *S. portulacastrum* and a single *Rhizophora mangle* (red mangrove; alien/invasive). Waterfowl are known to feed on the seeds of *S. verrucosum* (HPWRA 2017), which may explain how the plant was dispersed to this site.

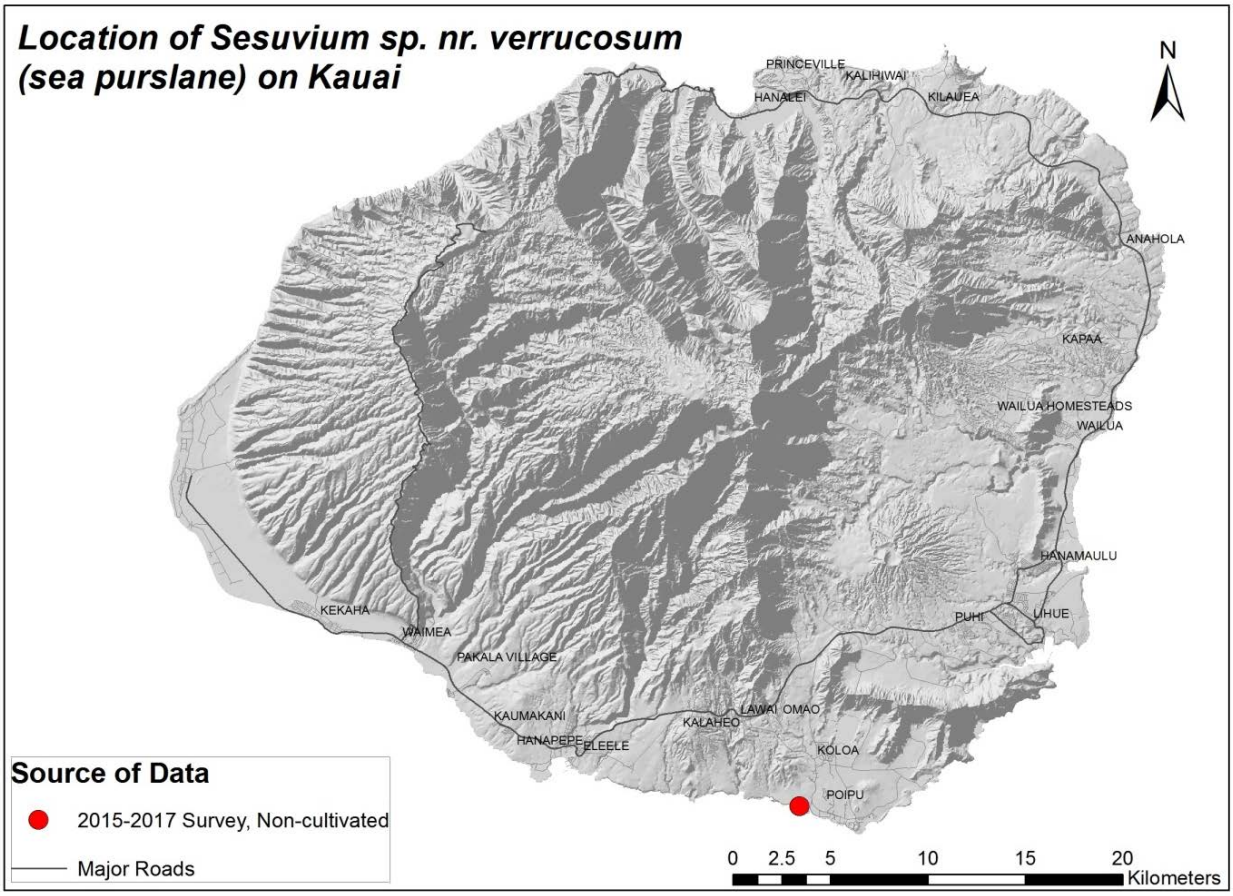

Figure C39- 1. Locations of *Sesuvium* sp. nr. *verrucosum* on Kauai.

Hawaii Pacific Weed Risk Assessment (HPWRA) Score

Although the identification of plants from Kauai remains unclear, the risk assessment for *S. verrucosum* will be used here because Kauai plants most resemble vouchers of this species collected from Oahu (S. Perlman 15480, PTBG). *S. verrucosum* is designated as "High Risk", receiving a score of 9 (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.

Likelihood of Invasion	*Consequences of Invasion*
• Well suited to climates in Hawaii • Naturalized in Hawaii and areas with comparable climates • Produces viable seed • Self-compatible • Reproduces by vegetative fragmentation • Matures in less than 1 year • Propagules dispersed intentionally by people (limited) • Propagules dispersed by water	• A congeneric weed, sharing a genus with *S. portulacastrum*, which is native to Hawaii but invasive in other areas (i.e. implies inheritance of tendencies to inflict invasive impacts)

Refer to the full Weed Risk Assessment for *Sesuvium* sp. nr. *verrucosum* at https://sites.google.com/site/weedriskassessment/assessments/Download-Assessments.

Above: *S. verrocusum* from Maui (photo credit K. Starr, F. Starr) Leaves and stem obviously verrucose with crystalline globules on surface easily observed without microscope, resulting in the blue-gray appearance of leaves; habit somewhat upright-leaves moderately fleshy; stems not rooting at nodes.

Above: *Sesuvium* sp. nr. *verrucosum* from Kauai. Leaves and stem somewhat verrucose (not easily observed without microscope); leaves appearing less blue-gray than *S. verrocusum* but darker than *S. portulacastrum* with a waxy cuticle; habit more upright than *S. portulacastrum*, but less so than *S. verrocusum;* leaves moderately fleshy; stems not rooting at nodes.

Above Left: *S. portulacastrum* from Kauai (found immediately adjacent to *Sesuvium* sp. nr. *verrucosum* above); **Above Right: *S. portulacastrum* from Maui** (photo credit K. Starr, F. Starr). Leaves and stem glabrous, waxy looking; leaves appearing bright green, sometimes tinged yellow-orange; habit very prostrate, closely appressed to the ground; leaves usually very fleshy, but variable; stems rooting at most nodes. **Note: flower color** varies from white to pink (not a useful character to distinguish between species).

Figure C39- 2. *Sesuvium spp*. from Kauai and Maui.

Invasive Impacts Score

An assessment of potential invasive impacts is especially difficult for this occurrence as identification issues add uncertainty to predictions. For the purposes of assessing potential impact, research is based on behavior of *S. verrucosum* and publications relating to the entire genus as all representatives of the group occupy coastal habitats, where applicable.

1. Impact on natural community structure and/or composition

Score: 2 = Moderate impacts

Sesuvium sp. nr. *verrucosum* detected in Kauai was assigned a score of 2 based mostly on Hawaii-specific observations. However, studies of mangrove ecosystems in Bahrain indicate that *S. verrucosum* has become common in intertidal areas (Abido et al. 2011). *S. verrucosum* on Maui appears capable of attaining 100% vegetative cover in ideal, open wet areas with saline conditions (Figure C39- 3), as is observed in Kealia Pond National Wildlife Refuge. On Oahu, one herbarium voucher indicates that it has become a "very common plant" at Barber's point (S. Perlman 15480, PTBG) and another specifies it has naturalized along the intertidal zone at Maunalua Bay (OED 2009041601). This indicates that this species may have the potential to occupy low elevation wetlands and interfere with wetland restoration efforts on Kauai. Additionally, its habitat preference, distribution in its native range, and observations on Oahu indicate that it may invade coastal areas (Boufford 1997). The current known site on Kauai is located just 40 m from the beach habitat. Coastal areas remain one of the last lowland ecosystems in most of the Hawaiian Islands where one can find native-dominated vegetation, as few alien species can tolerate the wind shear and saline conditions of these sites. Thus, it would be a shame to allow the spread of species that are capable of out-competing stress-tolerant native species in coastal environments. Although data on this species is limited, observations from Kauai indicate that the comparatively upright habit of *Sesuvium* sp. nr. *verrucosum* may give it a competitive advantage over the native *S. portulacastrum.* Both species were growing adjacent to one another in the same site, with *Sesuvium* sp. nr. *verrucosum* growing overtop most portions of *S. portulacastrum.* If future studies determine that *S. verrucosum* can hybridize with *S. portulacastrum*, this score will increase to reflect the potential impacts of genetic dilution of a common wetland and coastal native plant.

2. Impacts to Agriculture, Culture and other Human Systems

Score: 1 = Minor impacts

Sesuvium sp. nr. *verrucosum* received a score of 1 because little is known of its ability to invade human-managed systems. The behavior of *S. verrucosum* in its native range, combined with its short stature, indicates that it may occasionally occur in waste areas and become a minor nuisance (Boufford 1997).

3. Impacts to biotic and abiotic processes

Score: 2 = Moderate Impacts

Sesuvium sp. nr. *verrucosum* received a score of 2 in this section because of behavior in coastal wetlands on Maui where it forms a thick ground cover in some area. On Kauai, it was observed intruding over open water. As coastal wetlands are important habitat for water birds, replacement of open water shallow pools with thick ground cover may greatly affect birds' ability to forage for aquatic invertebrates.

TOTAL INVASIVE IMPACTS SCORE: 5

Figure C39- 3. Photo of *S. verrucosum* forming a low mat at Kealia Pond National Wildlife Refuge on Maui in 2013 (Photo credit K & F Starr).

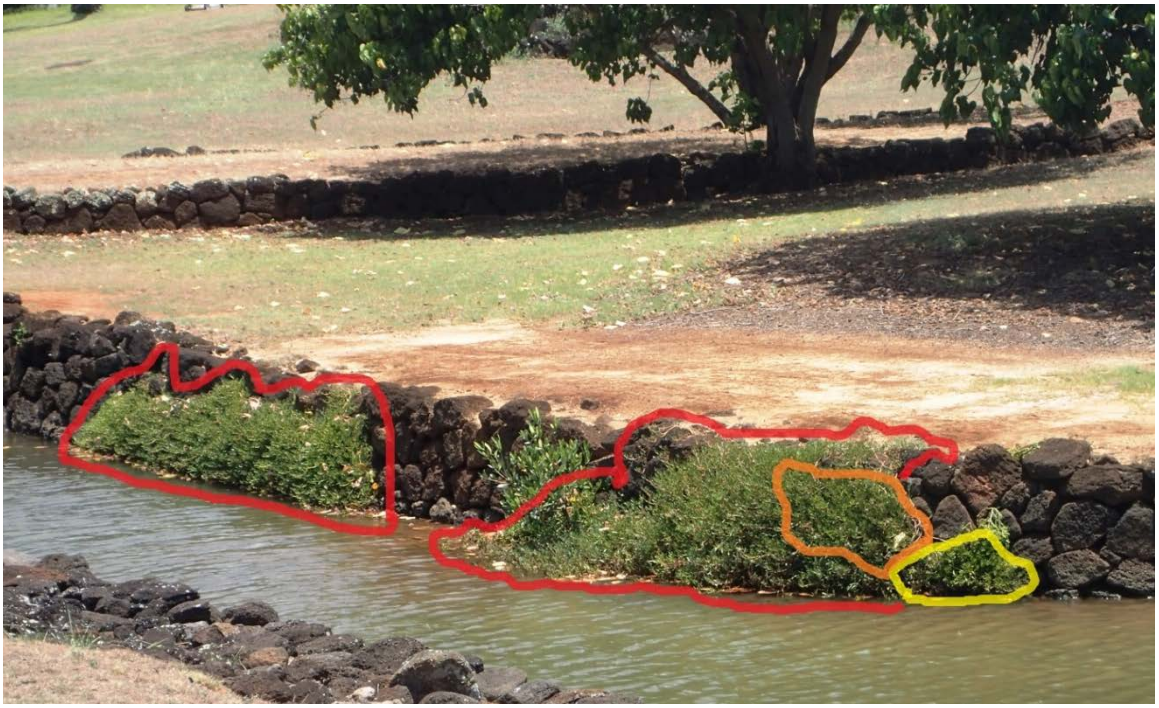

Figure C39- 4. Photo of *Sesuvium* sp. nr. *verrucosum* at Prince Kuhio Park on Kauai. Approximately, vegetation delimited by a yellow line = the native *S. portulacastrum*, red = *Sesuvium* sp. nr. *verrucosum*, and orange = area where *Sesuvium* sp. nr. *verrucosum* is overtopping *S. portulacastrum*.

Feasibility of Control Score

Feasibility of Control Scoring and rationale for *Sesuvium* sp. nr. *verrucosum* 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 *Sesuvium* sp. nr. *verrucosum* was given a score of 2 because only one site was detected in a single TMK. However, the small stature of this plant, its resemblance to the native *S. portulacastrum* as well as its preference for coastal areas increases the likelihood that some populations were not detected during 2015-2017 roadside surveys. Specific surveys targeting wetlands and coastal areas, especially during future island-wide early detection surveys, should be conducted to ensure the plant is not more widespread than currently known.

Figure C39- 5. Map of *Sesuvium* sp. nr. *verrucosum* locations in Prince Kuhio Park near Poipu.

Initial control:

Score: 3 = Minimal Effort

Feasibility of initial control for *Sesuvium* sp. nr. *verrucosum* was given a score of 3 because the known patches are small. Even if herbicide cannot be used due to the plants' proximity to water, plants can be manually removed in less than one visit.

Monitoring:

Score: 3 = Minimal Effort

No information is available to predict the ability *Sesuvium* sp. nr. *verrucosum* seeds to persist in the soil on Kauai. However, since the site is easily accessible, regeneration from seeds may be monitored as part of a work day focused on other target species, warranting a score of 3. Revisit intervals would need to be short, probably every 4 months until germination ceases, to make progress towards eradication.

FEASIBILTY OF CONTROL SCORE: 8

COMBINED SCORE: 5 + 8 = 13

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