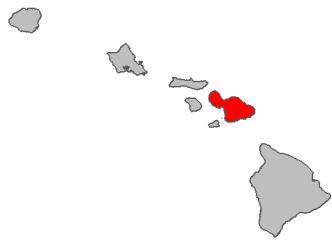


Fire risk report for *Silybum marianum*

Full Species Name (L.) Gaertn.
Family: Asteraceae
Common names: milk thistle
Synonyms:
Known occurrences (as of 2020) 
Year first documented as naturalized in Hawai'i: 2009
This species has been ranked by the Hawai'i Weed Risk Assessment program as High Risk with a score of 20.5.
View photos on Starr Environmental
View on Wikipedia
View occurrences on iNaturalist
View at Plants of Hawaii
View photos on Flickr

0 **I** .5 1
Lowest risk ⇔ Highest risk

This species is likely a **high** fire risk in Hawai'i with a fire risk score of **0.50**.

This species was ranked by our machine learning algorithm using the data presented on the next page. A predicted score of > .34 suggests the plant is a high fire risk.

Summary of Fire ecology	
Native habitat fire proneness	Fire-prone
Fire promoting plant in its native range	No
Fire promoting plant in its introduced range*	Yes
Regenerates after fire	Yes
Promoted by fire	Yes
Reported flammable*	High
Relative is flammable*	No

*These values were used by the model to predict fire risk

Detailed summary of Fire Ecology

Native habitat fire proneness (In any part of the plant's native range is its habitat described as fire prone due to natural or human caused fires?)	Fire-prone	"Originating from the Mediterranean region, and eastwards to Iran and Afghanistan. Naturalised in pastures and paddocks in non-arid parts of southern Australia and occasional as far N as Ravenshoe, NE Qld." https://profiles.ala.org.au/opus/foa/profile/Silybum%20marianum ----- "The similar response to fire of both the individual plant and the community as a whole is one of the most striking common features of these mediterranean shrub communities. Their resistance to recurrent fires and even pyrophytism seems to be no less significant than their well-known resistance to prolonged summer drought, and may be closely related to the latter [previously listed <i>S. marianum</i> as a member of this community]" Naveh, Z. (2007). Transdisciplinary challenges in landscape ecology and restoration ecology-an anthology (Vol. 6). Springer Science & Business Media. ----- "[Lists the species as occurring in a fire adapted community in Israel]" Naveh, Z., Goldammer, J. G., & Jenkins, M. J. (1990). Fire in the Mediterranean—A landscape ecological perspective. Transdisciplinary Challenges in Landscape Ecology and Restoration Ecology, 95.
Fire promoting plant in its native range (Does the species act as a major fuel source, increase fire severity, frequency, or modify fuel bed characteristics within its native range?)	No	
Fire promoting plant in its introduced range (Same as Fire Promoting Native but	Yes	"<i>Carduus</i> spp., <i>Cirsium</i> spp., <i>Silybum marianum</i> Could be ladder fuels in open woodlands;" http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.468.2022&rep=rep1&type=pdf#page=31

within the species introduced range)	Lambert, A. M., D'antonio, C. M., & Dudley, T. L. (2010). Invasive species and fire in California ecosystems. <i>Fremontia</i>, 38(2), 29-36. ----- "Silybum marianum Alters understory and fire regime, and competes with native species" https://www.catalinaconservancy.org/userfiles/files/wildlife/oak_symposium/08-Knapp.pdf Knapp, J. (2010). Catalina Island's invasive plant management program, with an emphasis on invasion and protection of oak ecosystems. ----- "Cultivation can control seedlings. Mowing mature plants before flowers open can help control stands. Burning can encourage seed germination and establishment" #reference not accessed directly, copied from HI invasive species assesment DiTomaso, J. 2007. Weeds of California and Other Western States. 2 Volumes. UCANR Publications, Oakland, CA ----- "Over-grazing and fire are two factors which encourage the spread of Silybum in large areas." The Nature Conservancy's Element Stewardship Abstract https://www.invasive.org/gist/esadocs/documnts/silymar.pdf ----- "Grasslands or understories dominated by invasive herbaceous plants contain high fuel loads from annual and perennial grasses, such as Harding grass (<i>Phalaris aquatica</i>), medusahead (<i>Elymus caput-medusae</i>), wild oats and bromes (<i>Avena</i> spp. and <i>Bromus</i> spp.), ryegrass (<i>Festuca perennis</i>), and invasive thistles (<i>Carduus</i> spp., <i>Cirsium</i> spp., <i>Silybum marianum</i>). Since invasive herbaceous plants act as flashy fuels, they facilitate the spread of fire into unburned areas and in grassy understories below woodlands and shrublands. They also can increase the frequency of fire and length of the fire season in the future." https://www.cnps.org/wp-content/uploads/2019/08/cnps-fire-recovery-guide-2019.pdf California Native Plant Society FIRE RECOVERY GUIDE
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Regenerates after fire (Does the plant regrow after fire by any means? This includes resprouters, reseeder, and recruiters which dispersed into the area within approximately one year post fire)	Yes	"[Silybium marianum was reported to grow in an area 1-2 years after fire but then disappears. paraphrasing from table]" https://www.researchgate.net/profile/Necattin_Tuerkmen2/publication/267792677_Changes_in_floristic_composition_of_Quercus_coccifera_macchia_after_fire_in_the_Cukurova_region_Turkey/links/551bc2f20cf20d5fbde20bc6/Changes-in-floristic-composition-of-Quercus-coccifera-macchia-after-fire-in-the-Cukurova-region-Turkey.pdf Türkmen, N., & Düzenli, A. (2005, January). Changes in floristic composition of Quercus coccifera macchia after fire in the Çukurova region (Turkey). In Annales Botanici Fennici (pp. 453-460). Finnish Zoological and Botanical Publishing Board.
Promoted by fire (Does the plant increase in abundance after a fire?)	Yes	"Cultivation can control seedlings. Mowing mature plants before flowers open can help control stands. Burning can encourage seed germination and establishment" #reference not accessed directly, copied from HI invasive species assessment DiTomaso, J. 2007. Weeds of California and Other Western States. 2 Volumes. UCANR Publications, Oakland, CA ----- "Eleven species germinated in the control but not the burn treatment (Aira caryophyllea, Alnus rubra, Bromus hordeaceus, Cotula coronopifolia, Oxalis corniculata, Picea sitchensis, Poa annua, Rubus parviflorus, Salix lucida, Silybium marianum, and Viola sempervirens). Of these, Aira caryophyllea, Bromus hordeaceus, Cotula coronopifolia, Oxalis corniculata, Poa annua, and Silybium marianum are nonnative. None of these species are uncommon or of conservation concern either" http://humboldt-dspace.calstate.edu/bitstream/handle/10211.3/140127/Nuckols_Jason_thesis_fr.pdf;sequence=1 Nuckols, J. L. (2002). Assessing the role of seed banks and fire in the restoration of coastal prairie (Doctoral dissertation, Humboldt State University). # - this suggests that it does not benefit from fire at least in its germination ----- "Burning: Burning effectively limits seed production, but may stimulate germination of seeds already in the soil." https://ir.library.oregonstate.edu/downloads/3t945r03g

		Colquhoun, J. (2003). Pacific Northwest's least wanted list: invasive weed identification and management. # - also suggests it does not benefit from fire
Reported flammable (Is the species described as being flammable, being a major wildfire fuel, or high fire risk?)	High	"The following species are highly flammable and should be avoided when planting within the first 50 feet adjacent to a structure. [S. marianum reported in list below]" https://www.sandiegocounty.gov/pds/docs/DPLU199.pdf County of San Diego, Department of Planning and Land Use FIRE, PLANTS, DEFENSIBLE SPACE AND YOU ----- "Carduus spp., Cirsium spp., Silybum marianum Could be ladder fuels in open woodlands;" http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.468.2022&rep=rep1&type=pdf#page=31 Lambert, A. M., D'antonio, C. M., & Dudley, T. L. (2010). Invasive species and fire in California ecosystems. <i>Fremontia</i> , 38(2), 29-36.
Relative is flammable (Does a plant in the same genus meet the Reported Flammable criteria?)	No	

Text in quotes are direct quotes from the source

Text in square brackets was added by the assessor to clarify something or to summarize from a figure.

Text preceded by a “#” is comment from the assessor

The data presented were assembled from literature and database searches for each species using as much data as could be collected regarding the plant’s fire ecology under natural conditions. Searches aimed to be exhaustive and consist of as much data as could be located in 2020. Our machine learning algorithm was trained on 49 species of plants which had their fire risk ranked by 49 managers in Hawai’i in November 2020. The model used a conditional random forest regression algorithm to predict scores for each species using the manager score as the response variable and the fire ecology traits of each plant as the predictor variables to generate a fire risk score. This trained model was then used to predict the fire risk for all species which were not ranked by managers. The model was calibrated such that it is 90% accurate at predicting high fire risk plants and 79% accurate at predicting low fire risk plants. This research and the resulting fire risk model has been published in the journal [Biological Invasions](#) by [Kevin Faccenda](#) and [Curt Daehler](#) (both at the University of Hawai’i at Mānoa).

Note that the analysis doesn't account for a plant species' spatial distribution, population density, or distinct climate and ecosystem conditions (which can also influence fire risk). The fire risk of these species are mostly under "worst case" environmental conditions where the climate is dry enough to maintain fire, but wet enough to allow for plant growth and fuel accumulation. The fire risk ranking should not be taken as a stand-alone risk metric in prioritizing weed control efforts. Rather, this information may also be useful for determining if a newly discovered species poses a potential fire threat in wildland areas.

More general information on the weed risks and ecology of non-native plants in Hawai'i is available from the Hawai'i Invasive Species Committee's [Weed Risk Assessment database](#).

View more fact sheets at <https://www.pacificfireexchange.org/weed-fire-risk-assessments>

Fact sheet prepared by Kevin Faccenda (faccenda@hawaii.edu) in November 2021. Data were prepared by Kevin Faccenda in 2020.

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