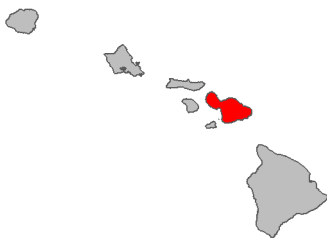


Fire risk report for *Gutierrezia sarothrae*

Full Species Name <i>Gutierrezia sarothrae</i> (Pursh) Britton & Rusby
Family: Asteraceae
Common names: broom snakeweed broomweed snakeweed
Synonyms:
Known occurrences (as of 2020) 
Year first documented as naturalized in Hawai'i: 2011
This species has been ranked by the Hawai'i Weed Risk Assessment program as High Risk with a score of 15.
View photos on Starr Environmental
View on Wikipedia
View occurrences on iNaturalist
View at Plants of Hawaii
View photos on Flickr

0 | .5 1
Lowest risk ⇔ Highest risk

This species is likely a **high** fire risk in Hawai'i with a fire risk score of **0.52**.

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*	No
Regenerates after fire	Yes
Promoted by fire	Yes
Reported flammable*	High
Relative is flammable*	Yes

*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	"The range of fire intervals reported for some species that dominate communities where broom snakeweed occurs are listed below. To learn more about the fire regimes in those communities and others listed below refer to the FEIS summary for those species ponderosa pine (<i>Pinus ponderosa</i>) 2 to 42 years. Mexican pinyon (<i>P. cembroides</i>) 20 to 70 years" https://www.fs.fed.us/database/feis/plants/shrub/gutsar/all.html [2020, June 10] Tirmenstein, D. 1999. <i>Gutierrezia sarothrae</i>. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer).
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	"Gatewood [34] observed that the primary limitation to burning in broom snakeweed communities is inadequate fine fuel. Often dense stands of broom snakeweed (with essentially no grass) do not carry a fire well except under hazardous burning conditions (high air temperatures, high winds, and low relative humidities)." # usually not fire promoting but there is a potential? https://www.fs.fed.us/database/feis/plants/shrub/gutsar/all.html#FIRE%20ECOLOGY
Fire promoting plant in its introduced range (Same as Fire Promoting Native but within the species introduced range)	No	#not introduced outside of HI
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	"Broom snakeweed, a weak-sprouting perennial, is severely damaged by fire [9]. Plants sometimes sprout but are more typically killed by fire [45]. Reestablishment proceeds rapidly through light, wind-dispersed seed from adjacent unburned areas [111]. The density of broom snakeweed often increases after fire [16,71]. Gatewood [34] reports that seeds can remain viable in the soil, unharmed by fire, and can germinate immediately after fire or in subsequent years." https://www.fs.fed.us/database/feis/plants/shrub/gutsar/all.html#FIRE%20ECOLOGY

Promoted by fire (Does the plant increase in abundance after a fire?)	Yes	"Broom snakeweed, a weak-sprouting perennial, is severely damaged by fire [9]. Plants sometimes sprout but are more typically killed by fire [45]. Reestablishment proceeds rapidly through light, wind-dispersed seed from adjacent unburned areas [111]. The density of broom snakeweed often increases after fire [16,71]. Gatewood [34] reports that seeds can remain viable in the soil, unharmed by fire, and can germinate immediately after fire or in subsequent years.... Fall fires may result in higher broom snakeweed mortality than spring fires. Fall prescribed burning in a basin big sagebrush community in east-central Oregon eliminated broom snakeweed from study plots in postfire year 1 and 2. Spring burning reduced broom snakeweed density relative to the control, but had no significant effect on broom snakeweed frequency [86]. See the Research Project Summary of this study for more information on fire effects on broom snakeweed and 60 additional woody plant, grass, and forb species." #variable response, potential to be promoted by fire, although in most cases it seems to decline https://www.fs.fed.us/database/feis/plants/shrub/gutsar/all.html#FIRE%20ECOLOGY ----- "Sandberg bluegrass was the dominant grass in the snakeweed [<i>G. sarothrae</i>] community at the beginning of the study (13% $\pm$ 1.4% cover), and it remained relatively stable throughout the study (data not shown). Snakeweed established quickly following the fire (2% $\pm$ 0.6% cover in 2002) and greatly increased to 31% $\pm$ 7.7% cover in 2005 (Fig. 2)." #Promoted by fire in this case Thacker, E. T., Ralphs, M. H., Call, C. A., Benson, B., & Green, S. (2008). Invasion of broom snakeweed (<i>Gutierrezia sarothrae</i>) following disturbance: evaluating change in a state-and-transition model. <i>Rangeland Ecology & Management</i>, 61(3), 263-268.
Reported flammable (Is the species described as being flammable, being a major wildfire fuel, or high fire risk?)	High	"Broom snakeweed is highly combustible when ignited. In the spring, numerous dried flowers and supporting branches from the previous year are readily consumed by fire if there is sufficient fine fuel to move the fire from plant to plant" https://www.fs.fed.us/database/feis/plants/shrub/gutsar/all.html [2020, June 10]

		Tirmenstein, D. 1999. <i>Gutierrezia sarothrae</i> . In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer).
Relative is flammable (Does a plant in the same genus meet the Reported Flammable criteria?)	Yes	" Snakeweed (<i>Gutierrezia lucida</i>) : fire reactions essentially identical with those of burroweed. The synonym "matchweed" suggests its almost explosive flammability... Burroweed (<i>Aplopappus tenuisectus</i>): an obligate nonsprouter with a dense crown of resinous leaves and stems; burns readily. Despite its susceptibility to fire the genus is difficult to control because of the abundant production of wind-disseminated seeds" https://www.resolutionmineeis.us/sites/default/files/references/humphrey-1974.pdf Humphrey, R. R. (1974). Fire in the deserts and desert grassland of North America. Fire and ecosystems. Academic Press, New York, 365-400.

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 Ronja Steinbach and Kevin Faccenda in 2020.

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