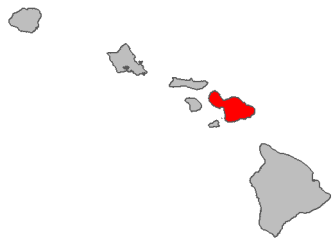


Fire risk report for *Pinus pinaster*

Full Species Name <i>Pinus pinaster</i> Aiton
Family: Pinaceae
Common names: maritime pine cluster pine
Synonyms:
Known occurrences (as of 2020) 
Year first documented as naturalized in Hawai'i: 2001
This species has been ranked by the Hawai'i Weed Risk Assessment program as High Risk with a score of 7.
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 **0.53**.

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	Yes
Fire promoting plant in its introduced range*	Yes
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	"Fire is a major factor in the dynamics of Mediterranean pine forests (Barbéro et al., 1998), which are relatively more abundant at intermediate levels of fire recurrence, i.e. a fire every 10–40 years (Pausas, 1999)." https://doi.org/10.1016/j.foreco.2007.01.010 Fernandes, Paulo, and Eric Riglot. "The Fire Ecology and Management of Maritime Pine (Pinus Pinaster Ait.)." <i>Forest Ecology and Management</i> 241, no. 1–3 (2007): 1–13.
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?)	Yes	"The wildfire problem associated with maritime pine [P. pinaster] stands is especially acute in the western part of the Iberian Peninsula, at the intersection of Mediterranean and Atlantic climate influences, i.e. where summer drought and high plant productivity coexist. Here, fuels can build-up to levels which are probably unequalled by pine stands in temperate climates elsewhere (Vega, 2001)." https://doi.org/10.1016/j.foreco.2007.01.010. Fernandes, Paulo, and Eric Riglot. "The Fire Ecology and Management of Maritime Pine (Pinus Pinaster Ait.)." <i>Forest Ecology and Management</i> 241, no. 1–3 (2007): 1–13.
Fire promoting plant in its introduced range (Same as Fire Promoting Native but within the species introduced range)	Yes	"Its invasive capacity can vary depending on the type of vegetation and may be facilitated by fire (Richardson et al., 1994), which is commonly experienced in forests and woodlands dominated by P. pinaster due to its highly flammable resinous needles which accumulate under the canopy " https://doi.org/10.1016/j.foreco.2020.118042 Etten, Eddie van, C. Anne Belen, and María Calviño-Cancela. "Invasion Patterns of Pinus Pinaster in South-West Australia in Relation to Fire, Vegetation Type and Plantation Management." <i>Forest Ecology and Management</i> 463 (2020): 118042. ----- "Fire is often vital to maintain pine status in ecosystems, but it is also a major hazard in plantations and the most significant threat to Pinus forests in the Mediterranean Basin (Barbéro et al., 1998). The closed canopy and high tree stocking that characterize silvicultural regimes focused on the maximization of biomass productivity generate accumulations of intrinsically flammable pine fuel with the potential for extreme fire behavior"

		https://doi.org/10.1016/j.foreco.2007.01.010 . Fernandes, Paulo, and Eric Riglot. "The Fire Ecology and Management of Maritime Pine (<i>Pinus Pinaster</i> Ait.)." <i>Forest Ecology and Management</i> 241, no. 1–3 (2007): 1–13.
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	"Fire is the most significant threat to maritime pine plantations but also a disturbance that plays a vital role in the perpetuation of natural stands. The species has physical characteristics that allow survival after low-intensity fire, namely thick bark, and reproduction processes that facilitate recovery after stand replacement fire from seeds stored in serotinous cones." https://doi.org/10.1016/j.foreco.2007.01.010 Fernandes, Paulo, and Eric Riglot. "The Fire Ecology and Management of Maritime Pine (<i>Pinus Pinaster</i> Ait.)." <i>Forest Ecology and Management</i> 241, no. 1–3 (2007): 1–13.
Promoted by fire (Does the plant increase in abundance after a fire?)	Yes	"The absence of a significant reduction in germination rate in high severity plots, associated with combusted crowns, is consistent with the results obtained in field studies carried out after wildfire in <i>P. pinaster</i> (Martínez et al., 2002) and after experimental crown fires in <i>P. banksiana</i> (de Groot et al., 2004). It is also consistent with the observations from laboratory studies in which <i>P. pinaster</i> cones subjected to high temperatures showed very low loss of seed viability (Martínez-Sánchez et al., 1995; Reyes and Casal, 1995, 2002; Escudero et al., 1999; Torres et al., 2006). Natural soil seed banks in the unburnt <i>P. pinaster</i> stands were sparse and germination rate was particularly low." #germination basically requires fire, so definitely promoted by fire Vega, J. A., Fernández, C., Pérez-Gorostiaga, P., & Fonturbel, T. (2008). The influence of fire severity, serotiny, and post-fire management on <i>Pinus pinaster</i> Ait. recruitment in three burnt areas in Galicia (NW Spain). <i>Forest Ecology and Management</i> , 256(9), 1596-1603.
Reported flammable (Is the species described as being flammable, being a major wildfire fuel, or high fire risk?)	High	"Its invasive capacity can vary depending on the type of vegetation and may be facilitated by fire (Richardson et al., 1994), which is commonly experienced in forests and woodlands dominated by <i>P. pinaster</i> due to its highly flammable resinous needles which accumulate under the canopy " https://doi.org/10.1016/j.foreco.2020.118042 Etten, Eddie van, C. Anne Belen, and María Calviño-Cancela. "Invasion Patterns of <i>Pinus Pinaster</i> in South-West Australia in Relation to Fire, Vegetation Type and Plantation

		Management.” Forest Ecology and Management 463 (2020): 118042.
Relative is flammable (Does a plant in the same genus meet the Reported Flammable criteria?)	Yes	"Its invasive capacity can vary depending on the type of vegetation and may be facilitated by fire (Richardson et al., 1994), which is commonly experienced in forests and woodlands dominated by P. pinaster due to its highly flammable resinous needles which accumulate under the canopy " https://doi.org/10.1016/j.foreco.2020.118042 Etten, Eddie van, C. Anne Belen, and María Calviño-Cancela. "Invasion Patterns of Pinus Pinaster in South-West Australia in Relation to Fire, Vegetation Type and Plantation Management.” Forest Ecology and Management 463 (2020): 118042.

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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