Fire risk report for *Typha latifolia*

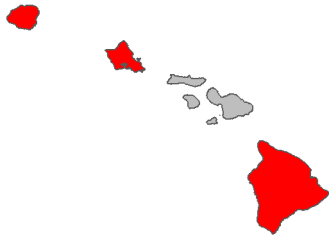
Full Species Name
Typha latifolia L.

Family: Typhaceae

Common names:
common cattail

Synonyms:

Known occurrences (as of 2020)



Year first documented as naturalized in Hawai'i: 1979

This species has been ranked by the Hawai'i Weed Risk Assessment program as High Risk with a score of 29.

View photos on Starr Environmental

View on Wikipedia

View occurrences on iNaturalist

View at Plants of Hawaii

View photos on Flickr

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Lowest risk ⇔ Highest risk

This species is likely a **high** fire risk in Hawai'i with a fire risk score of **0.72**.

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*	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	"Freshwater marsh vegetation is very productive and provides abundant fuel [232]. In the Driftless Area peatlands of Tempealeau County, Wisconsin, where broadleaf cattail is a common emergent, pollen records indicate that fire frequency was high before European settlement [40]. Frost [65] suggests that marshes in North Carolina's Croatan National Forest burned "frequently" in fires originating in flammable adjacent upland vegetation. Likely the fire frequency would have been similar to that of surrounding mixed-pine (Pinus spp.) and pond pine (P. serotina) communities, which typically burned every 1 to 3 years in presettlement times." https://www.fs.fed.us/database/feis/plants/graminoid/typlat/all.html#FIRE%20ECOLOGY
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	"Broadleaf cattail is restricted to moist or wet sites; however, some indicate that these habitats can burn frequently [40,65]. Fires are not considered frequent in all broadleaf cattail habitats, though. In alluvial communities of the southeastern Coastal Plain, broadleaf cattail occurs at the edge of oxbow lakes, where fire is not common [29]. It is likely that fire regimes in broadleaf cattail marshes and stands are dictated by surrounding upland vegetation. If nearby vegetation is highly flammable and conditions are dry, fire is likely in broadleaf cattail vegetation [65]." https://www.fs.fed.us/database/feis/plants/graminoid/typlat/all.html#FIRE%20ECOLOGY
Fire promoting plant in its introduced range (Same as Fire Promoting Native but within the species introduced range)	No	#only introduced to AU an NZ; no evidence fire promoting there although it is likely to be
Regenerates after fire (Does the plant regrow after fire by any means? This includes resprouters, reseeders, and recruiters which dispersed into the area	Yes	"After fires in established broadleaf cattail stands, broadleaf cattail typically sprouts from rhizomes. Within 1 year of the fire, burned and unburned sites may only be different in litter accumulations [11]" https://www.fs.fed.us/database/feis/plants/graminoid/typlat/all.html#FIRE%20ECOLOGY

within approximately one year post fire)		
Promoted by fire (Does the plant increase in abundance after a fire?)	Yes	"Broadleaf cattail may also occur on burned forested and woodland sites within 1 year of a fire, even though plants were not present before the fire [54]. These findings suggest that broadleaf cattail germinates from a persistent seed bank or is rapidly dispersed to burned sites." https://www.fs.fed.us/database/feis/plants/graminoid/typlat/all.html#FIRE%20ECOLOGY
Reported flammable (Is the species described as being flammable, being a major wildfire fuel, or high fire risk?)	High	"Fires are not uncommon in broadleaf cattail habitats, and often fuel loads are more than adequate for fire spread. Robertson [179] reported that the fuel load/unit area in wetlands can be higher than that of uplands in the upper Midwest. Wetland fires may burn "hotter" and, given proper conditions, "faster" than upland sites. Fires in cattail marshes produce thick, black smoke, similar to that produced when tires burn (Rhode, personal communication in [179])." https://www.fs.fed.us/database/feis/plants/graminoid/typlat/all.html#FIRE%20ECOLOGY
Relative is flammable (Does a plant in the same genus meet the Reported Flammable criteria?)	Yes	"In contrast, fire has been shown to favor T. domingensis by creating openings in the landscape and increasing bioavailable P (Smith and Newman 2001); fire can temporarily increase T. domingensis dominance over native species for 1–2 years post-fire (Ponzio et al. 2004)" https://core.ac.uk/reader/232336416 Bansal, S., Lishawa, S. C., Newman, S., Tangen, B. A., Wilcox, D., Albert, D., ... & Elgersma, K. J. (2019). Typha (Cattail) invasion in North American wetlands: Biology, regional problems, impacts, ecosystem services, and management. Wetlands, 39(4), 645-684. --- "Spring fires in 2006 and 2011 were followed by much more rapid green-up of T. domingensis in late spring and 30% higher peak summer NDVI values compared to non-fire years ($P < 0.001$). Fires removed thatch and returned nutrients to the water, resulting in more vigorous vegetation growth compared to non-fire years" https://doi.org/10.1016/j.ecoleng.2012.06.046 Mexicano, L., Nagler, P. L., Zamora-Arrroyo, F., & Glenn, E. P. (2013). Vegetation dynamics in response to water inflow rates and fire in a brackish Typha domingensis Pers. marsh in the delta of the Colorado River, Mexico. Ecological Engineering, 59, 167–175.

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

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

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