Pacific Fire Exchange FY23 Annual Report (Project 20-3-01-5)

FY23 Overview

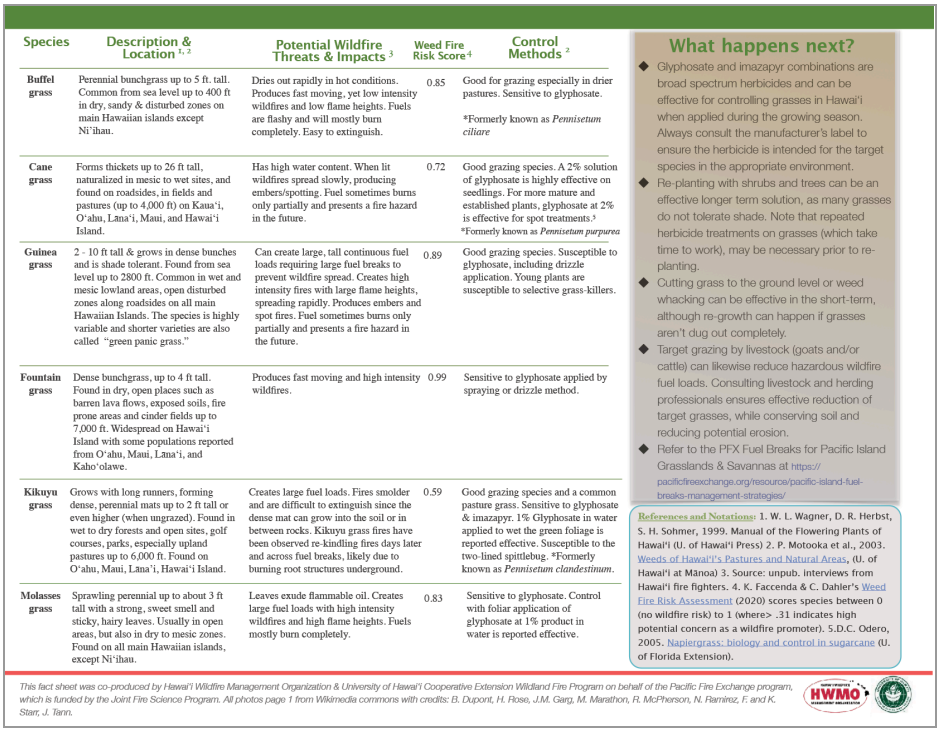
On August 8, 2023, Hawai'i experienced the state's worst disaster of the past century: seven fires were burning on two islands–Hawai'i Island and Maui–destroying the entire town of Lāhaina, leaving thousands homeless and 98 people dead. Lahaina has seen nine large interface fire since the close of sugar plantations in 1999 and the 2023 incident was devastatingly exemplary of all of the factors PFX and the Hawai'i's fire community have been working to communicate to leadership and the general public: unmanaged post-agricultural lands, fire-prone nonnative grasses, wet-dry weather cycles, and rapid moving fires. Nineteen homes were also lost in the Kula fire on Maui where high intensity burns through hundred year old eucalyptus stands have impacted hundreds of acres and are not fully extinguished. Up until that point, the Pacific Fire Exchange program had fully re-emerged from Covid-19, and was engaging with mostly existing wildfire stakeholders via in person, hybrid, and on-line meetings, workshops, webinars, field tours and media (fact sheets, social media, monthly Talk Story sessions). During the catastrophic fires on Maui which lasted many weeks, PFX pivoted to global and local news media inquiries and social media as the main form of communication about Pacific Island wildfire causes, conditions, and effects. As a result, we helped to increase the public's understanding of wildfire and, indirectly, awareness of the PFX as a source of information, in tandem with the proliferation of articles, television, and radio interviews. Likewise, our viewership, list-serv membership, and social media audiences increased across almost all of our digital platforms. We suddenly gained new audiences we never had and in a context that was unprecedented. We had the attention of and had our resources cited by groups as diverse as the Hawai'i electorate to Native Hawaiian community activists struggling for rights to land and water in the burn zones. During this time, we paused our near-term planning for webinars and presentations, and took to coordinating the many dozens of requests for information and offers of assistance. This effort culminated in rapidly compiling and writing our "After Fire'' webpage as a resource for many people wondering what they could do to help rebuild their communities and landscapes. During this time, it was a massive undertaking to both produce and distribute content and filter through and respond or re-direct inquiries appropriately. We also served as a clearinghouse for some of the after-fire land restoration response efforts on Maui, from reviewing research proposals to connecting people to each other's work.

Metric 1: Conceptual

Do you have evidence of the ways that your Exchange contributed to changes in knowledge, awareness, or understanding about these key fire science topics?

With the tragic fires of the recent past which impacted Hawai'i's native flora, fauna and people, we focused on producing practical guides which identified these impacts, the specific wildfire fuel types (grasses), recommended mitigation measures, and what to do first after fire. These included the following factsheets: Identifying & Controlling Fire Prone Invasive Grasses in Hawai'i, Wildfire's Impacts to Rare and Endangered Hawaiian Plants and After Fire, First Things First) as part of a new After Fire web page.

On Hawai‘i Island, the Leilani fire (2,362 acres, August 12, 2022) and the Mana Road fire which preceded it the year before (~40,000 acres, the second largest in Hawai‘i history) prompted us to shed light on the negative impacts to rare and endangered Hawaiian species. We also recognized we needed to provide a tool to identify and reduce non-native grasses (a predominant fuel type). We drew from an analysis by co-PI Trauernicht and Matthew Kier of fire incidents where they intersected with known Hawaiian rare/endangered plants between 1999 - 2021. We highlighted the impacts of fire on one of the most endangered ecosystems, Hawaiian dryland forests, summarized fires impacting rare plants on five islands, and recommended mitigation methods to improve their survival. As for fire-prone introduced grasses, we drew inspiration from University of Wyoming grass ID pamphlet to create ours below. The purpose is to provide a quick reference guide for land managers and property owners trying to identify and possibly control invasive grasses with a variety of methods.



Species	Description & Location [1, 2]	Potential Wildfire Threats & Impacts [3]	Weed Fire Risk Score [4]	Control Methods [2]
Buffel grass	Perennial bunchgrass up to 5 ft. tall. Common from sea level up to 400 ft in dry, sandy & disturbed zones on main Hawaiian islands except Ni'ihau.	Dries out rapidly in hot conditions. Produces fast moving, yet low intensity wildfires and low flame heights. Fuels are flashy and will mostly burn completely. Easy to extinguish.	0.85	Good for grazing especially in drier pastures. Sensitive to glyphosate. *Formerly known as *Pennisetum ciliare*
Cane grass	Forms thickets up to 26 ft tall, naturalized in mesic to wet sites, and found on roadsides, in fields and pastures (up to 4,000 ft) on Kaua'i, O'ahu, Lana'i, Maui, and Hawai'i Island.	Has high water content. When lit wildfires spread slowly, producing embers/spotting. Fuel sometimes burns only partially and presents a fire hazard in the future.	0.72	Good grazing species. A 2% solution of glyphosate is highly effective on seedlings. For more mature and established plants, glyphosate at 2% is effective for spot treatments.[5] *Formerly known as *Pennisetum purpureu*
Guinea grass	2 - 10 ft tall & grows in dense bunches and is shade tolerant. Found from sea level up to 2800 ft. Common in wet and mesic lowland areas, open disturbed zones along roadsides on all main Hawaiian Islands. The species is highly variable and shorter varieties are also called "green panic grass."	Can create large, tall continuous fuel loads requiring large fuel breaks to prevent wildfire spread. Creates high intensity fires with large flame heights, spreading rapidly. Produces embers and spot fires. Fuel sometimes burns only partially and presents a fire hazard in the future.	0.89	Good grazing species. Susceptible to glyphosate, including drizzle application. Young plants are susceptible to selective grass-killers.
Fountain grass	Dense bunchgrass, up to 4 ft tall. Found in dry, open places such as barren lava flows, exposed soils, fire prone areas and cinder fields up to 7,000 ft. Widespread on Hawai'i Island with some populations reported from O'ahu, Maui, Lana'i, and Kaho'olawe.	Produces fast moving and high intensity wildfires.	0.99	Sensitive to glyphosate applied by spraying or drizzle method.
Kikuyu grass	Grows with long runners, forming dense, perennial mats up to 2 ft tall or even higher (when ungrazed). Found in wet to dry forests and open sites, golf courses, parks, especially upland pastures up to 6,000 ft. Found on O'ahu, Maui, Lana'i, Hawai'i Island.	Creates large fuel loads. Fires smolder and are difficult to extinguish since the dense mat can grow into the soil or in between rocks. Kikuyu grass fires have been observed re-kindling fires days later and across fuel breaks, likely due to burning root structures underground.	0.59	Good grazing species and a common pasture grass. Sensitive to glyphosate & imazapyr. 1% Glyphosate in water applied to wet the green foliage is reported effective. Susceptible to the two-lined spittlebug. *Formerly known as *Pennisetum clandestinum*.
Molasses grass	Sprawling perennial up to about 3 ft tall with a strong, sweet smell and sticky, hairy leaves. Usually in open areas, but also in dry to mesic zones. Found on all main Hawaiian islands, except Ni'ihau.	Leaves exude flammable oil. Creates large fuel loads with high intensity wildfires and high flame heights. Fuels mostly burn completely.	0.83	Sensitive to glyphosate. Control with foliar application of glyphosate at 1% product in water is reported effective.

What happens next?

- Glyphosate and imazapyr combinations are broad spectrum herbicides and can be effective for controlling grasses in Hawai'i when applied during the growing season. Always consult the manufacturer's label to ensure the herbicide is intended for the target species in the appropriate environment.
- Re-planting with shrubs and trees can be an effective longer term solution, as many grasses do not tolerate shade. Note that repeated herbicide treatments on grasses (which take time to work), may be necessary prior to re-planting.
- Cutting grass to the ground level or weed whacking can be effective in the short-term, although re-growth can happen if grasses aren't dug out completely.
- Target grazing by livestock (goats and/or cattle) can likewise reduce hazardous wildfire fuel loads. Consulting livestock and herding professionals ensures effective reduction of target grasses, while conserving soil and reducing potential erosion.
- Refer to the PFX Fuel Breaks for Pacific Island Grasslands & Savannas at https://pacificfirexchange.org/resource/pacific-island-fuel-breaks-management-strategies/

References and Notations: 1. W. L. Wagner, D. R. Herbst, S. H. Sohmer, 1999. Manual of the Flowering Plants of Hawai'i (U. of Hawai'i Press) 2. P. Motooka et al., 2003. Weeds of Hawai'i's Pastures and Natural Areas, (U. of Hawai'i at Mānoa) 3. Source: unpub. interviews from Hawai'i fire fighters. 4. K. Faccenda & C. Dahler's Weed Fire Risk Assessment (2020) scores species between 0 (no wildfire risk) to 1 (where> .31 indicates high potential concern as a wildfire promoter). 5.D.C. Odero, 2005. Napiergrass: biology and control in sugarcane (U. of Florida Extension).

This fact sheet was co-produced by Hawai'i Wildfire Management Organization & University of Hawai'i Cooperative Extension Wildland Fire Program on behalf of the Pacific Fire Exchange program, which is funded by the Joint Fire Science Program. All photos page 1 from Wikimedia commons with credits: B. Dupont, H. Rose, J.M. Garg, M. Marathon, R. McPherson, N. Ramirez, F. and K. Starr, J. Tann.

Since its publication after the August 8, 2023 Maui fires, the grass fact sheet is the most viewed resource on our website. With all of the inquiries that followed (such as concerns about what type of vegetation to plant in the aftermath of fire), we did an immediate pivot to providing practical on-the-ground after-fire guidance. We published the fact sheet After Fire, First Things First: stabilize health, safety, property, infrastructure. This fact sheet serves as a starting point emphasizing human needs and soil stabilization as the first steps. We took this publication and also began immediately constructing an After-Fire resource page (in a few weeks) to bookmark important resources like the fact sheet, and organized with the following key messages:

- After fire, first things first: stabilize health, safety, property, infrastructure & soil.
- For long-term wildfire risk mitigation planning, supporting agriculture and reducing fuels around your home and community are key.
- What is your emergency soil stabilization plan? This can be done in various high-tech and low-tech ways.
- Consider re-vegetating burned areas in a way that makes sense for your community's unique ecology with the understanding that resources (time, money, long-term stewardship) may vary.
- What about direct seeding with native plant species?
- Where can I get plant material?

While still under construction, the page serves as a starting point for further content development and more succinct packaging. While our "Resources" page is still the top hit on our website, the After Fire page comes in just afterwards with the highest average view of 6 minutes of any page since the Maui fires in August.

Metric 2: Connectivity

Do you have evidence of the ways that your Exchange contributed to changes in the number and quality of relationships, networks, and trust?

By experimenting with new communication strategies, PFX broadened and strengthened its wildfire science reach among stakeholders new and old, such as Hawaiian language speakers, agricultural producers, contract grazers, and underserved communities.

Pacific Fire Exchange continued to serve as a key hub for connecting scientists with land managers and communities throughout the year, with an unprecedented interest by local, national and global media outlets in the exchange during and after the Maui catastrophes. Prior to the August 8th fires, we had increased our webinar presence among wildfire practitioners by partnering with the Pacific Climate Change Adaptation Science Center and Hawai‘i Invasive Species Council in addressing topics like *Changing Climate and Wildfire in Hawai‘i* and *Debunking Wildfire Myths*. We also adopted a new, more conversational science share-out format, “Talk Story Tuesdays” in which we invite leading experts to briefly present their wildfire science findings while taking questions and comments from audience members. We found that more frequent, less formal sessions like these (not requiring registration or huge amounts of preparation for the presenters) are an efficient, and easier means to reach our audiences on a more regular basis. Topics included the following:

- Informing Contemporary Wildfire Science from Historical Hawaiian Language Newspapers with co-PI Trauernicht and Alyssa Anderson (Extension Specialist in Hawai‘i Sea Grant at UH Mānoa) presented wildfire in Hawai‘i in the context of Hawaiian language 19th century "nupepa" (newspapers), as well as the historical landscape changes of the 20th century.
- Grazing to Reduce Blazing with co-PI Trauernicht and Dr. Mark Thorne, UH Hilo Rangeland Extension
- The In’s & Out’s of Contract Grazing with Raia Olsen, O‘ahu Grazers.

One of our most well-attended webinars (166 attendees + recorded views) was held two weeks after the start of the August fires: *Reducing wildfire risk across boundaries – recent projects and lessons learned.* For the first time, this brought together three community members from three islands to share challenges and lessons learned from working to reduce fuels across shared boundaries. This included Jeremie Makepa, a Kaua‘i Fire Department firefighter with ‘Āina Alliance; Erin Peyton with Paniolo Hale on Moloka‘i; and Robbie Justice with Forest Solutions, on Hawai‘i Island–all working to reduce vegetation fuels on a mix of state and private lands. We sought to highlight cross-boundary difficulties and best practices especially among underserved communities, like those of Hawaiian Homelands where homesteaders on Kaua‘i face wildfire threats from fallow sugarlands.

Similarly, co-PI Trauernicht and coordinator Melissa Chimera sought to strengthen fire science awareness and wildfire prevention among disadvantaged communities, with a second year's training for farmers and farming interns in Waiʻanae, West Oʻahu. These communities continue to be challenged by decades of socio-economic, environmental and food insecurity hardships, not the least of which is repeated wildfire, sometimes reoccurring year after year. Our "Fire and Agriculture" at Maʻo Farms for land stewardship interns introduced seven would-be young farmers to the basics of wildfire in the Pacific while giving them hands-on experience in pre-fire hazard identification and planning around Maʻo Farms itself. Feedback from the workshop included participants wanting to "connect Hawaii wildfire to food and supporting policy development for agriculture and fire prevention." Other things they liked were how we "were able to break down difficult contexts to inform individuals on current and environmental community concerns."

Other valuable in-person learning exchanges included the following: Pacific Risk Management ʻ Ohana conference (Oʻahu) focused on emergency response organizations; a field tour of natural resources at risk for US Forest Service Leadership fire (Hawaiʻi Island); Waiʻanae Hui field trip with students from Waianae, Nanakuli, and Kamaile High Schools learning about fuels mitigation projects; and the Hawaiʻi Conservation Conference where co-PI Trauernicht held a Forum/Workshop titled "the Need for Seed'' on the bottlenecks and resources associated with native seed and plant production. Perhaps one of the most important wildfire science learning exchanges of FY23 was a fire field tour of Hawaiʻi Island among members of the Wildland Fire Leadership Council (WFLC). This brought WFLC members together with key state, county, private and federal partners to discuss, share, and learn about the current state of wildfire in Hawaiʻi. About 40 participants learned about and saw first hand some of the wildfire causes, conditions and impacts of the 2021 Mana Road fire which impacted 40,000 acres of lands, the nearshore waters, the fire suppression response, and local residents.

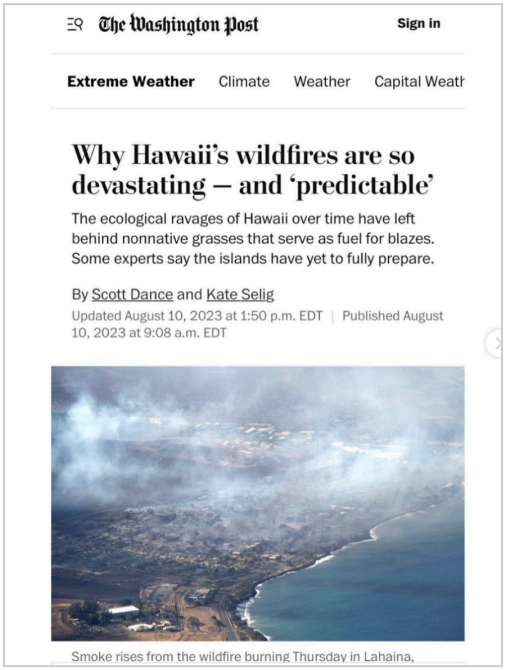
Metric 3: Capacity-Building:

Do you have evidence of the ways that your Exchange contributed to changes in skills, expertise, or resources related to these key fire science topics?

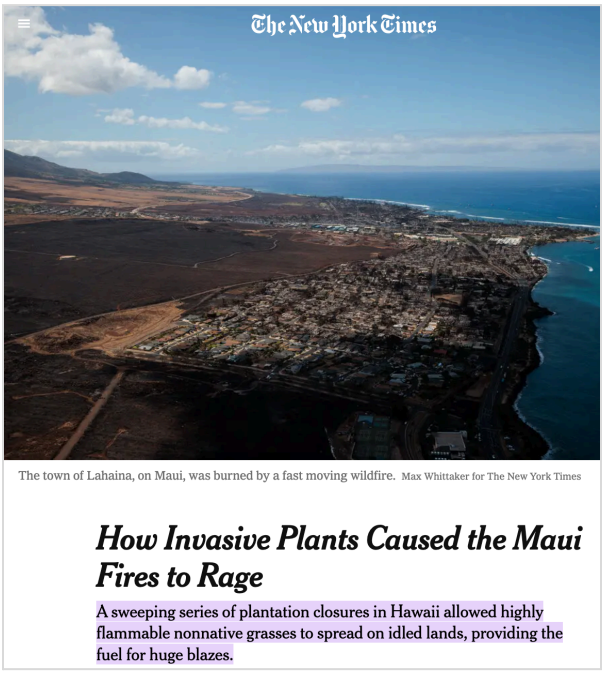
By way of the catastrophic Maui fires and an increased effort by the PFX team, we helped coordinate initiatives among after-fire groups, and also pivoted to both news and social media to reach new, diverse audiences–from native Hawaiian activists to state and federal executive leadership.

The Maui fires not only prompted the creation of new content in response to people ``wanting to do something." For about a month, the fires also brought the world's attention to our doorstep in Hawaiʻi where the PFX is based. For several weeks, there were many dozens of daily media requests to interview our staff from every outlet across the country and elsewhere. Staff provided important contextual

information on the causes and conditions of wildfire, including the land use legacy which left the fuels in the form of hazardous vegetation. Publications and outlets included the Wall Street Journal, BBC, NPR, the New York Times, Democracy Now, NBC, the Associated Press, the Atlantic, CNN, Bloomberg, the LA Times, as well as many local outlets. In addition, the PFX provided a point of contact for information requests to local and national leadership. Informational briefs were provided to the White House Science for Disaster Science Reduction Interagency Working Group, the Hawaii House of Representatives Wildfire Prevention Working Group, the Maui County Council Committee on Agriculture and Land Use, the USGS National Climate Adaptation Science Center meeting. This also resulted in multiple contacts from researchers pivoting to address fire science in Hawaii, including four teams applying for NSF RAPID funding, two existing Hawaii-based projects looking to integrate fire risk into their research objectives, and a proposal by the UH Atmospheric Science Program to develop an extreme weather event center.



The Washington Post, Aug. 10, 2023



New York Times, Aug. 13, 2023

Our membership across digital platforms and our Wildfire Communications (WC) list-serv increased. As soon as the fires began, we posted almost daily on social media regarding the "state of the science" or the latest facts from the Maui fires, some of which was being reported via our interviews with the national and international news outlets. We also gained a completely unexpected and organic following among Native Hawaiian activist and cultural practitioner accounts who pointed to the science demonstrating the causes, conditions, and consequences of agricultural decline and the resulting increase of fires of the past 60 years. They were able to tell the story of how plantation agriculture and the subsequent lack of resources for essentials like land and water for subsistence farming helped create the fire prone landscape they were now homeless in. This was a profound connection to the science in ways we never could have predicted. As a result, by the end of FY23, our Instagram account following more than doubled. Our website (which had undergone an overhaul the year before) viewership

increased by 21% from 11,844 page views in FY22 to 14,981 total views for FY23. After August 8, our WC list-serv which is normally “core” professionals, responders, landowners and stewards bumped up 13% to almost 400 members (including 52 new ones since the fires). Some of these new subscribers are journalists, homeowners, state legislators, or else have no affiliation with fire other than being concerned. In total, our membership across all digital platforms increased from 1,738 to 2,089 subscribers and followers in FY23.

Challenges and conclusions

Clearly, the catastrophes on Maui were the pivotal force behind the increased interest in wildfire and, by extension, our drive to provide the most results-oriented science exchange and coordination in the last part of FY23. We had been steadily increasing our in-person events, experimenting with new media and had some draft wildfire science products in the works for Micronesia. The tragedies which unfolded engulfed our time and energy in unprecedented ways, providing the means by which to focus on high-impact educational opportunities among audiences we would have never otherwise had. Simply put, the investment in the PFX by the Joint Fire Science Program since 2013 built the infrastructure of expertise and relationships that made it possible to respond to these events with science-based explanations for the media, public, and local and national leadership.

A tragedy like the Maui fires could make one point to the limitations of prior work - all of us have questioned whether we missed opportunities before these fires to make meaningful change. However, we are far far ahead of where we would have been without JFSP support and are well positioned to provide tangible help as the political and economic landscape of fire continues to shift locally. We no longer have to urge people to pay attention to our content. Instead we can leverage our prior work and relationships to point to actual on-the-ground solutions that need to be scaled up and therefore can help pave a path forward for our region. The Maui fires remain a stark reminder of the scale of the challenge and our own project’s challenge remains in addressing fire-related needs among other communities and islands in our region. Although we are still very much in the trenches, one of the biggest lessons we continue to learn from this event with the new attention is the need to organize and intervene further and further ‘upstream’ to educate and affect change across as wide an audience as possible.