

The True Cost of the U.S. Military in Hawai'i

A comprehensive analysis of the economic,
environmental, strategic, and social impacts
of the U.S. military presence in Hawai'i

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A report produced by:
‘Āina Aloha Economic Futures
‘Īlio‘ulaokalani Coalition
Institute for Policy Studies
Sierra Club of Hawai‘i
The Costs of War Project
Transition Security Project

May 2026

About the Co-Sponsoring Organizations

‘Āina Aloha Economic Futures (AAEF) is a Native Hawaiian-led organization launched in 2020 to ensure that Native Hawaiian voices and values shaped Hawai‘i’s post-pandemic economic recovery. Its core vision is a regenerative, equitable economy rooted in ancestral knowledge that stewards the land and supports the many rather than the few. Through engagement with over 3,000 individuals and organizations, the initiative produced a values declaration, an action agenda, and a policy playbook with 26 concrete proposals for transforming Hawai‘i’s economy.

‘Īlio‘ulaokalani Coalition is a Native Hawaiian political advocacy organization made up of loea hula (master practitioners and educators) and other cultural practitioners, founded in 1997 to champion the protection of Native Hawaiian rights, culture, and land. The coalition has been a leading voice on issues of Native Hawaiian intellectual property rights, hosting conferences which produced the Paoakalani Declaration affirming the Native Hawaiian people’s collective rights over their traditional knowledge. The coalition also actively mobilizes cultural practitioners and hālau hula in support of broader Native Hawaiian causes, such as the protection of Maunakea from development.

Institute for Policy Studies is the nation’s oldest multi-issue progressive research organization. With over 60 years of groundbreaking public scholarship, we’ve partnered with virtually every major social justice movement — including movements for peace, civil rights, LGBTQ and gender equality, economic justice, global human rights, and the climate. We’ve advised policy makers at the highest levels, worked hand in hand with grassroots organizers, and mentored generation after generation of progressive scholars and activists.

Sierra Club of Hawai‘i, the Hawai‘i Chapter of the Sierra Club, was formed in 1968 and has over 20,000 members and supporters working throughout the islands to stop climate change, ensure climate justice for all, and protect Hawai‘i’s unique natural resources. Its past accomplishments include establishing Hawai‘i’s beverage container deposit (HI-5) and curbside recycling programs, advocating for the state’s 100% renewable energy goals, and building and maintaining numerous well-known hiking trails. The chapter pursues its goals through grassroots advocacy, an outings program, and public interest litigation, operating through island groups on O‘ahu, Maui, Hawai‘i Island, and Kaua‘i.

The Costs of War Project conducts and publishes research about the ongoing consequences of the United States post-9/11 wars in Afghanistan, Iraq and elsewhere; the costs of global U.S. military operations; and the domestic effects of U.S. military spending. Created in 2010 and housed at Brown University, the Costs of War project builds on the work of over 70 scholars, experts, human rights advocates, and physicians from around the world who aim to raise awareness and foster public debate by providing the fullest possible account of the human, economic, political, and environmental costs of U.S. militarism, laying the foundation for better informed U.S. foreign and domestic policies.

Transition Security Project investigates the US and UK military industrial complexes as economic, climate and geopolitical threats. Jointly founded by Common Wealth and Climate and Community Institute, Transition Security Project produces research and analysis to support organising. Working alongside trade unions, grassroots movements and policymakers, we design alternatives that prioritise everyday, universal safety over the profits of military contractors.

Contributor Bios

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Acknowledgments

This report was made possible thanks to the generous support of the Gerbode and Stupski Foundations. We are grateful to the following for their contributions to this report: Sarah Gertler, Naman Karl-Thomas Habtom, Justin Keli'ipa'akaua, Jon Letman, Anne Louise Mahoney, Malia Osorio, Kathleen Richards, and Seiji Yamada.



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Foreword

As I write this, we are one month into a war with Iran in which the United States president and Israel's prime minister initiated airstrikes on military and civilian targets, killing upwards of 2,000 people in Iran and Lebanon. The U.S. and Iran were engaged in negotiations over Iran's nuclear program at the time, which invites comparisons to America's outrage in 1941 when Japan initiated a surprise attack on the U.S. fleet at Pu'uloa while Japanese and American diplomats pursued unsuccessful negotiations in Washington.

This report, *The True Cost of the U.S. Military in Hawai'i*, is an impressive collection of data and analyses coupled with hope for the future of our land when the armies finally return home. Reading it, I feel that some great wall has begun to crumble and a great obstruction is shifting. People are clearing new paths and planning new initiatives, challenging political leaders to understand that Hawai'i is a place for life, not for the practice of war.

Relatively small groups of activists — almost always led by Native Hawaiians — have opposed and challenged military occupation and abuse of our 'āina for more than half a century. By raising cultural, legal, and social justice issues, our protests have incriminated the Army and Navy for the threats to our environment and health. Over the past 20 years, more and more residents and political and civic leaders have raised questions about the economic concessions the state has made in its hospitality to the military, and more recently, they have begun to question the

military's strategic value as protectors of Hawai'i.

The report's format presents analysis as an accessible tool for communities and individuals involved in disputes with the military and for policymakers to make informed decisions in these disputes. It also provides information that allows military leaders and families to understand the impact their occupation and operations have had on Hawai'i.

The ending of several 65-year military leases of Hawaiian trust lands has opened an opportunity for the public, the business community, policymakers, and Kānaka Maoli (Native Hawaiians) to have this conversation honestly and directly. This report provides both perspectives and facts to inform this necessary dialogue. Assuming the State of Hawai'i follows its own laws, no military leases can be extended without hearings in which the state must meet its obligation to protect the public trust. This report can guide and support public testimony and compel policymakers to reckon with the multiple ways military operations and occupation threaten our livelihood.

If the state fails to observe its own laws and allows the military to continue operations without having to answer to official state government concerns, this report can also guide and support the rightful public outrage that will follow. No one should feel unwelcome here because of their vocation, any more than for their appearance, language, or race. Yet, the

U.S. military enjoys prerogatives such as near-limitless access to land and, up to now, the ability to skirt laws designed to protect our lands, waters, forests, fish, creatures, and communities. Awareness of the facts and perspectives in this report, by all sides, could lead to a more thoughtfully negotiated future.

And yet, to be birthing this work in the frightful present — where the United States is the aggressor nation, and its political leadership seems as aimlessly confused as it is brutal — one must wonder whether this fascination with military power will bring consequences similar to those militarized faiths brought to Japan. If there is a striking difference between the Pearl Harbor attack in 1941 and the bombing of Iran in 2026, perhaps it is to be found in the long and successful history of protest in Hawai‘i and the ways ardent activists and loyal soldiers have found to understand and work together.

Doubtless, there is much beyond our horizon and reach for we who love Hawai‘i. But that has never really discouraged our willingness to try and protect our ‘āina and our communities, to maintain our peaceful resistance to the American empire. In the end, *The True Cost of the U.S. Military in Hawai‘i* is not so much an indictment as a blueprint for reclaiming our nation here, in hope and faith in one another.

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Introduction

Christine Ahn, Neta C. Crawford, and Davis Price

Introduction

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In November 2021, thousands of residents living near Pearl Harbor noticed that their tap water smelled of fuel and soon reported headaches, nausea, vomiting, and rashes. Within weeks, investigators discovered that the U.S. Navy’s Red Hill Bulk Fuel Storage Facility — which stored roughly 250 million gallons of jet fuel just 100 feet above O’ahu’s primary aquifer — had leaked, contaminating the drinking water supply of 93,000 people.

For years, community members, environmentalists, and legislators had raised concerns about the World War II-era tanks, but the Navy had assured the public that the facility was safe. The contamination — and the ensuing \$1.2 billion lawsuit filed by the Honolulu Board of Water Supply against the U.S. Navy — revealed the limits of those assurances. It also revealed something deeper: while often touted as wholly beneficial, the military’s presence in Hawai‘i — on more than 250,000 acres across the islands — has come with significant environmental, economic, and social costs.

Now, with the military’s leases and easements on more than 46,000 acres of land across the islands set to expire in or around 2029, as well as the Trump administration’s stated desire to fast-track the process, Hawai‘i residents have an unprecedented opportunity to reconsider the scope of the U.S. military presence and imagine alternative uses that better serve

the needs of Hawai‘i’s residents, especially Native Hawaiians, and their relationship to the land.

The purpose of this report is to provide an accurate and comprehensive assessment of the impacts of the U.S. military presence in Hawai‘i and to examine whether the current scale of its presence is necessary — especially at this crucial moment in the islands’ history. Drawing on original research by academics and experts across a range of disciplines, including anthropology, economics, environmental science, geography, history, law, political science, and public health, this report finds that the commonly accepted narrative of the military’s economic benefits and security necessity is overstated at best and inaccurate at worst, and that the total costs — in every sense — of the U.S. military footprint have been hidden from public view.

Background and Overview

The military’s occupation of land in Hawai‘i must be understood in the context of how it was initiated. The traditional Hawaiian relationship between people and ‘āina — the land that nourishes and feeds — codified in the laws of Hawaiian society, was defined primarily by reciprocal obligation, stewardship, and collective well-being. From this foundation, the Hawaiian Kingdom had also developed

a modern, internationally recognized nation: a constitutional government led by its own people, with universal compulsory public education, accessible health care, and a growing economy guided by both innovation and public accountability. ‘Āina (land) sustained more than subsistence, but a thriving social, political, and economic order.

When the United States Marines illegally aided the overthrow of the Hawaiian Kingdom in 1893, it did more than sever Native Hawaiians from ‘āina — it disrupted and dismantled this entire system. The living relationship to land was transformed into a commodity, converted into a disposable asset to be possessed, occupied, and ultimately exploited for profit. In its wake, militarization accelerated the displacement of communities, the degradation of ecosystems, and the redirection of land and resources away from the public good and toward strategic military interests. The consequences extend far beyond ‘āina, reshaping the conditions of life across Hawai‘i — from housing and economic stability to education, health, and the ever-present threat of war.

Most of the lands the U.S. military now controls were Crown and Government Lands of the Hawaiian Kingdom and are now claimed as part of the State of Hawai‘i’s public land trust, which is intended to support several public purposes, including the betterment of the Native Hawaiian people. But since 1964, the military has leased tens of thousands acres of public trust land for the token fee of \$1. That arrangement is one chapter in a much

longer story of dispossession — one that has never been adequately reckoned with, let alone repaid. In chapter 1, University of Hawai‘i Mānoa professor Kyle Kajihiro situates Hawai‘i’s military land use within the longer history of U.S. imperialism and the specific legal framework governing Hawaiian public lands.

What does the military’s presence actually provide in exchange? The standard answer is security — protection from foreign threats, stability in the Indo-Pacific, and a guarantee of American power in a contested region. This report does not dismiss the reality of geopolitical competition. But it does question whether the current military posture in Hawai‘i makes the islands safer — or less so.

In chapter 2, political scientist Neta Crawford’s analysis finds that the current U.S. Indo-Pacific strategy relies on offensive strike capabilities, plans for deep strikes into Chinese territory, and risks nuclear escalation. Rather than deterring conflict, this posture fuels a security dilemma: as the United States intensifies its military presence, China perceives encirclement and responds in kind, deepening mutual fear and raising the probability of the very war both sides claim to want to avoid. Hawai‘i, as a central node in U.S. Indo-Pacific war planning, would be an early and likely target in any such conflict.

Crawford’s research also challenges the premise that the current footprint is strategically necessary. Alternative doctrines — centered on deterrence by denial, diplomacy, and de-escalation rather than offensive first-strike

capabilities — could reduce the risk of war while substantially reducing the military’s physical presence in Hawai‘i. The question of what serves genuine security, as opposed to military and economic interests, deserves far more serious debate than it has received.

U.S. military bases, operations, and training activities have contaminated Hawai‘i’s land, air, and water with chemicals known or suspected to be neurotoxins, carcinogens, and mutagens. One of the most alarming costs of the U.S. military presence is PFAS contamination — a class of synthetic “forever chemicals” used in firefighting foam that has been widely deployed at military installations. In chapter 3, analysis by environmental attorney Wayne Tanaka finds that the full extent of PFAS contamination in Hawai‘i’s land and groundwater may be impossible to assess with current tools and that true remediation may be technically out of reach. Superficial remediation at just three military installations — Mākua, Schofield, and Bellows — is conservatively estimated at \$493 million, yet even this investment cannot fully eliminate PFAS from Hawai‘i’s environment. Long-term monitoring and filtering may be required indefinitely.

While proving direct causal links between military activities and human health is difficult, chapter 4 presents evidence of measurable associations. University of Texas at Austin professor Laurel Mei-Singh and Crawford document a positive correlation between proximity to military bases and self-reported poor health, as well as a negative correlation between base proximity and the Childhood Opportunity

Index — a composite measure of access to quality schools, safe housing, healthy food, parks, clean air, and economic opportunity. The military’s greenhouse gas emissions add yet another layer of harm. Climate change poses an existential threat to island communities: rising seas, increasing temperatures, declining rainfall, and the degradation of the ecological systems on which island life depends. Military installations and training activities are significant contributors to the emissions driving that threat. In fact, the U.S. military is the largest institutional contributor to global heating and climate change in the world.

In addition to its health and environmental implications, the economic case for the military presence is weaker than commonly claimed. For decades, the Pentagon, the State of Hawai‘i, and aligned economic, political, and military institutions have made exaggerated claims about the military’s economic impact, recently reporting around \$10 billion in annual contributions to Hawai‘i’s economy. But analysis by military bases expert David Vine in chapter 5 finds that the actual economic impact in the state is closer to \$7.2 billion not \$10 billion — roughly 6.4 percent of Hawai‘i’s GDP rather than the 9.2 percent frequently claimed. The military is not one part of a supposed “three-legged stool” supporting Hawai‘i’s economy, as many frequently say — at least five other industries represent larger shares of the state’s GDP than the military.

Employment impacts of military spending are also lower than is commonly asserted. In chapter 6, research by economist Heidi

Peltier shows that military spending is among the least efficient ways to create jobs. Every \$1 million in military spending generates significantly fewer jobs per dollar than investment in health care, education, housing, food production, or energy efficiency.

The military's presence in Hawai'i has not been an economic gift. It has been, in significant part, an extraction. In chapter 7, housing experts Omar Ocampo and Brag Selvarajan show how military demand has inflated rents, pushing rents up by 7.1 percent in 2024 alone, and costing non-military renters an estimated \$234.8 million in a single year. This military-related pressure on the housing market has been a significant driver of displacement, hardship, and the steady outmigration of Native Hawaiians and working-class families to the continental United States. If the military were to decrease in size, this would relieve pressure on the local housing market, making it possible for those with average salaries to find quality housing.

The economic harm extends to the value of the military-occupied lands, which were leased for a token \$1 around 1964. In chapter 8, David Vine calculates the actual value of the leased lands using unpaid back rent formulas, employing an existing methodology designed to determine the value of U.S. military base land worldwide. While the value of 'āina/land cannot be measured in dollar terms alone, unpaid back rent reaches up to \$133.7 billion in 2025 dollars (not including the costs of cleaning up the military's environmental damage).

The expiration of military land leases in 2029 is an invitation to imagine an alternative future. Hundreds of former military bases across the United States and around the world have been converted into housing, schools, hospitals, parks, farms, renewable energy installations, cultural sites, and community economic anchors. In chapter 9, Native Hawaiian attorney Davis Price and David Vine document a wide range of conversion models for Hawai'i to consider, from partial base infrastructure reuse to complete land return and ecological restoration.

Choices for Hawai'i's Future

The decisions about the future of these lands belong, above all, to Native Hawaiians, whose relationship to the 'āina (land) long predates U.S. statehood and whose dispossession has never been adequately addressed or compensated. The framework of *aloha 'āina* — love of the land, responsibility to the land — offers a grounding principle for imagining what comes next.

The people of Hawai'i deserve an honest accounting of what has been taken, what has been damaged, and what could be built in its place. The military lease expirations around 2029 afford residents of Hawai'i a once-in-a-lifetime opportunity to shape the future of these islands for generations to come. This report is offered as a resource for making those decisions wisely, justly, and with full knowledge of what's at stake.



Situating U.S. Militarization and Imperialism in Hawai'i

Kyle Kajihira

Situating U.S. Militarization and Imperialism in Hawai‘i

*Kyle Kajihiro*¹

Key Findings

- Hawai‘i is both a casualty of United States imperialism and an accessory to U.S. imperial war-making — a contradiction that is often overlooked.
- Due to the traditional Indigenous relationship to land, Hawai‘i has a unique land use history and legal framework, which were embedded within historical land laws implemented by the Hawaiian Kingdom.
- Military land use in Hawai‘i is a significant source of conflict in the state due to the U.S. military’s role in the overthrow of the Hawaiian Kingdom and the large military footprint across the islands. However, a lack of transparency prevents the public from accessing accurate and comprehensive data on military land use.
- The Public Lands (i.e., the Crown Lands and Government Lands of the Hawaiian Kingdom), which are classified as a special trust, make up the majority of the military’s land in Hawai‘i.
- The U.S. military must provide an accurate and comprehensive inventory and map of lands it holds and uses in Hawai‘i to enable responsible land use planning.
- The expiration of military leases on Public Lands in 2029 presents an opportunity to convert these lands to more sustainable and peaceful uses.

1 Kyle Kajihiro is an assistant professor in the Department of Ethnic Studies at the University of Hawai‘i at Mānoa.

Introduction

In 2011, when President Barack Obama and Secretary of State Hillary Clinton unveiled the U.S. “Pacific Pivot” at the Asia-Pacific Economic Cooperation (APEC) Summit in Honolulu, those familiar with the region’s historical geography understood that this was not something new but simply a continuation of an imperial process stretching back more than a century. This aggressive posturing toward China has intensified under the Biden and Trump administrations.

Hawai‘i has been central to the making of U.S. global power, and that history shapes contemporary debates over military land use, sovereignty, and justice. Hawai‘i has been a site of Indigenous dispossession and a strategic bridge for projecting U.S. power into the Pacific and beyond.

Hawai‘i functions as the head of a vast Pacific network of bases and surveillance systems.

The military presence in Hawai‘i has been integral to transformations in land tenure — from Indigenous stewardship to Western property regimes. These transformations have intersected with the 1893 overthrow, the contested annexation, and the transfer of Crown and Government Lands into a public trust. Military landholdings expanded dramatically during wartime, were institutionalized through statehood

and federal retention of trust lands, and remain legally and politically contested today.

Through its contemporary military presence — anchored by the United States Indo-Pacific Command — Hawai‘i functions as the head of a vast Pacific network of bases and surveillance systems. This footprint generates profound environmental, social, and cultural consequences locally and regionally. Taken together, debates over military land use in Hawai‘i cannot be reduced to questions of acreage or economic impact. They are inseparable from the islands’ role in U.S. imperial formation, the unresolved legality of annexation, Native Hawaiian trust claims, and ongoing struggles over sovereignty and demilitarization across the Pacific.

Imperial Formation² and the Making of U.S. Power in Hawai‘i

The United States has employed shifting, sometimes contradictory, forms of imperial power in Hawai‘i. First, settler colonialism — marked by territorial expansion, environmental transformation, settler migration, and Indigenous dispossession — moved from North America to Hawai‘i and outward into the Pacific. U.S. expansion and military power have consistently relied on portraying Indigenous peoples as threats to civilization. First used to justify westward expansion, this narrative later legitimized overseas empire in the late 19th century and continued to shape U.S. wars and counterinsurgencies, from World

2 Ann Laura Stoler, “Imperial Debris: Reflections on Ruins and Ruination,” *Cultural Anthropology* 23, no. 2 (2008), 191–219, <http://www.jstor.org/stable/20484502>.

War II to the Global War on Terror.³

A second imperial framework shaping Hawai'i's history emerged from the Monroe Doctrine (1823).⁴ This doctrine advanced U.S. power not only through territorial expansion, but also by recognizing formally independent states while placing them within a U.S. sphere of influence. In 1842, President John Tyler extended this logic to the Pacific, effectively bringing Hawai'i into the U.S. strategic orbit just before the Hawaiian Kingdom secured international recognition of its sovereignty. President Woodrow Wilson later sought to globalize this approach through the League of Nations. Although that effort failed, a comparable U.S.-led international order emerged after World War II with the creation of the United Nations. Together, these developments illustrate a consistent pattern: the United States has consistently acted as an exception to international law and exercised influence through international frameworks it shapes and leads, not solely through direct rule.⁵

A third modality of U.S. imperial expansion involved creating different kinds of colonial relationships. After its victory in the Spanish-American War, the United States acquired overseas territories in Puerto Rico, Guam, and the Philippines, and moved to annex Hawai'i through dubious legal means. This posed a dilemma: an

anti-colonial republic now governed colonies. To justify this contradiction, in a series of decisions known as the “Insular Cases,” the U.S. Supreme Court created a new legal category — “unincorporated territories” — which belonged to the United States without being fully part of it, described as “foreign in a domestic sense.”⁶ Hawai'i and Alaska were treated differently as “incorporated territories,” making them eligible for statehood. In Hawai'i's case, statehood was made possible by the long-standing presence and influence of white U.S. settlers, reflecting how race and white settler presence shaped which territories were eligible for full inclusion.⁷



Armed sailors from the U.S.S. Boston occupied the grounds of the Arlington Hotel in Honolulu under the command of Commander Lucien Young, January 1893 — providing the armed backing for the white settler coup that overthrew Queen Lili'uokalani, the legal foundation for the U.S. military's landholdings in Hawai'i today. Source: U.S. Naval Historical Center / Archives of Hawai'i.

3 Jodi A. Byrd, *The Transit of Empire: Indigenous Critiques of Colonialism* (Minneapolis: University of Minnesota Press, 2011).

4 China Miéville, *Between Equal Rights: A Marxist Theory of International Law* (Chicago: Haymarket Books, 2006).

5 Neil Smith, *American Empire: Roosevelt's Geographer and the Prelude to Globalization* (Berkeley: University of California Press, 2004).

6 Christina Duffy Burnett and Burke Marshall, eds., *Foreign in a Domestic Sense: Puerto Rico, American Expansion, and the Constitution* (Durham: Duke University Press, 2001).

7 Lanny Thompson, *Imperial Archipelago: Representation and Rule in the Insular Territories under U.S. Dominion after 1898* (Honolulu: University of Hawai'i Press, 2010).

The fourth way that Hawai'i was instrumental to U.S. imperialism was the shift from a land-based to a sea-based military strategy. In 1893, naval strategist Alfred Thayer Mahan argued that national power depended on control of the seas and urged annexing Hawai'i as a Pacific base.⁸ That same year, the historian Frederick Jackson Turner declared that the American frontier had "closed" — that U.S. territories extended from the Atlantic to Pacific Oceans — which intensified calls to expand overseas into new markets.⁹



"The Annexation of Hawaii" — a political cartoon published July 15, 1897, depicting Uncle Sam reaching across the Pacific to claim Hawai'i while rival powers Japan, Germany and England look on. The image captures the imperial logic that drove annexation: Hawai'i as a strategic prize in a global competition for Pacific dominance. Source: Hawai'i Digital Newspaper Project / University of Hawai'i at Mānoa Libraries.

8 Alfred Thayer Mahan, *The Interest of America in Sea Power, Present and Future* (1897; repr., Bibliobazaar, 1997), 25–38.

9 Frederick Jackson Turner, "The Significance of the Frontier in American History" (1893), <https://www.historians.org/resource/the-significance-of-the-frontier-in-american-history>.

As U.S. leaders looked to Asian markets, beginning with Commodore Matthew Perry's forcible opening of Japan in 1853 and various military actions in China, Hawai'i was viewed as critical to securing Pacific sea lanes and projecting American power abroad.

In summary, Hawai'i has long been central to U.S. imperial power. As the United States expanded beyond the continent, it used Hawai'i as a strategic bridge to the Pacific. Ideas that justified continental expansion, such as Manifest Destiny, and policies like the Monroe Doctrine were extended outward through the islands. Hawai'i became both a base for projecting naval power and a testing ground where forms of rights and governance could be adjusted to fit imperial ambitions. The contradictions of U.S. imperialism are masked by this shape-shifting ability of U.S. imperial formation, which obscures the ways that Hawai'i is both a casualty of and an accessory to the crimes of U.S. imperialism. This history remains crucially relevant today as the Trump administration continues to invoke these expansionist doctrines to justify regime change in Venezuela and Iran, annexing Greenland, and bombing numerous countries around the world.

Complexities of Land Use in Hawai'i

Land use is one of the most debated issues connected to the U.S. military presence in

Hawai'i.¹⁰ The “ownership” and stewardship of the lands are complex and contested; thus, federal and state claims to them are equally so.

Before U.S. colonization, Hawai'i was an independent sovereign nation governed by Indigenous leaders. Land was not viewed as private property in the Western sense. The Native Hawaiian word 'āina means “that which feeds,” reflecting a deep spiritual and genealogical connection between people and land. Under the traditional land management system, the mō'i (paramount ruler) redistributed stewardship rights to ali'i (chiefs). While leadership could change, the maka'āinana (common people) generally continued to live on and care for the same lands.¹¹ Land was understood as something to be cared for and shared across generations — not bought and sold as a commodity.

In the mid-19th century, growing foreign pressure threatened Hawaiian control of land. In response, King Kamehameha III initiated a series of reforms to formalize land ownership in closer alignment with Western notions of property. In 1845, the Land Commission was formed. It recognized three classes of people with interests in the land: the mō'i, the ali'i, and the maka'āinana. In 1848, the Māhele, the first partitioning of land titles, divided land among the king, the ali'i, and the government, and the Kuleana Act (1850)

allowed commoners to claim small parcels of land they actively cultivated and a quarter acre for a house.^{12,13}

Out of approximately 4.1 million acres in the Hawaiian Kingdom, Kamehameha III transferred about 1.6 million acres to the ali'i, designated 1.5 million acres as Government Lands (held for the benefit of the people), and retained approximately 984,000 acres as Crown Lands. After additional transfers, the government ultimately controlled about 2 million acres — roughly half the land in the kingdom. In 1865, the Hawai'i legislature declared Crown Lands inalienable (not to be sold) and tied to the officeholder because they served the needs of the mō'i, who served the people of Hawai'i.¹⁴ The Kuleana Act created a process for maka'āinana to claim land they cultivated, plus a small house lot. However, many faced financial and cultural barriers to filing claims, resulting in low numbers of Kuleana awards. Out of 14,195 claims filed, only 8,421 were awarded, resulting in just 28,600 acres granted to commoners. The law also allowed maka'āinana to purchase additional Government Lands, leading to about 167,000 more acres becoming privately owned.¹⁵ Importantly, these land reforms preserved traditional and customary access rights such as gathering, fishing, and cultural practices. These rights continue to be recognized and upheld under Hawai'i state law today.

10 Ian Y. Lind, “Ring of Steel: Notes on the Militarization of Hawaii,” *Social Process in Hawaii* 31 (1984): 25–48.

11 Native Hawaiian Legal Corporation, “How Was Land Owned and Stewarded in Hawai'i Before the 1840s?” YouTube video, February 18, 2025, <https://www.youtube.com/watch?v=5cVRh317LZ0>.

12 Native Hawaiian Legal Corporation, “What Is the Mahele?” YouTube video, February 27, 2025, https://www.youtube.com/watch?v=F03i_LGFWRg.

13 Native Hawaiian Legal Corporation, “What Are Kuleana Lands?” YouTube video, March 4, 2025, <https://www.youtube.com/watch?v=E3OQKkk3wQc>.

14 Jon M. Van Dyke, *Who Owns the Crown Lands of Hawai'i?* (Honolulu: University of Hawaii Press, 2008), 8.

15 Native Hawaiian Legal Corporation, “What Are Kuleana Lands?”

The 1893 Overthrow and U.S. Involvement

Another reason that military land use is controversial in Hawai'i is the role the U.S. military played in backing the 1893 white settler insurrection against Queen Lili'uokalani. President Grover Cleveland described the overthrow as "An act of war ... committed with the participation of a diplomatic representative of the United States and without authority of Congress."¹⁶ Despite this acknowledgment, the leaders of the coup established a provisional government, declared the Republic of Hawai'i, and twice sought to secure a treaty of annexation with the United States, but failed due to steadfast Hawaiian opposition.¹⁷

After the overthrow, the newly established Republic of Hawai'i passed the Land Act of 1895, which allowed Crown Lands — previously inalienable — to be sold. Between 1895 and 1898, nearly 46,594 acres of Crown and Government Lands were sold.¹⁸

In 1898, during the Spanish-American War, these annexationists successfully pushed for a joint resolution of Congress — the

Newlands Resolution — to annex Hawai'i as a matter of military necessity. At that time, in a secret session that remained sealed until 1969, members of Congress debated the questionable legality of the resolution and the international legal jeopardy it created for the United States for violating the recognized neutrality of the Hawaiian Kingdom.¹⁹ Unlike a treaty (which requires approval by two-thirds of the Senate), this was a domestic law passed by a simple majority. Some legal scholars argue that a domestic resolution cannot lawfully annex a foreign nation without a treaty and that the "annexation of Hawaii is a myth."²⁰

Following annexation, the Republic of Hawai'i transferred to the United States approximately 1.8 million acres of Government and Crown Lands, also known as "Public Lands" or "ceded lands." Importantly, the Newlands Resolution recognized that Hawai'i's public lands were unique and not subject to ordinary federal land policies.²¹ In 1899, the U.S. Attorney General interpreted the lands as a "special trust" for the benefit of the people of Hawai'i.²² This trust concept remains central to ongoing legal and political debates over land use.

16 Hawaiian Islands, *Report of the Committee on Foreign Relations, United States Senate, with Accompanying Testimony, and Executive Documents Transmitted to Congress from January 1, 1883 to March 10, 1894* (Washington, DC: Government Printing Office, 1894), 1264, <https://babel.hathitrust.org/cgi/pt?id=miun.afj6811.0001.001&seq=448>. In 1993, the U.S. adopted Public Law 103-150, which apologized for and acknowledged the ramifications of the United States' participation in the overthrow but did not commit to any substantive reparations.

17 Noenoe K. Silva, *Aloha Betrayed: Native Hawaiian Resistance to American Colonialism* (Durham: Duke University Press, 2004).

18 John Temple, "What Are the 'Ceded Lands' of Hawaii?" *Honolulu Civil Beat*, October 25, 2010, <https://www.civilbeat.org/2010/10/5914-what-are-the-ceded-lands-of-hawaii>.

19 Associated Press, "Secret Debate on U.S. Seizure of Hawai'i Revealed," *Honolulu Star-Bulletin*, February 1, 1969.

20 Williamson B.C. Chang, Testimony and Appendix on "The Management of Mauna Kea and the Mauna Kea Science Reserve," April 16, 2015, William S. Richardson School of Law, University of Hawai'i at Mānoa.

21 Van Dyke, *Crown Lands*, 213.

22 Van Dyke, *Crown Lands*, 213.

In 1920, the Hawaiian Homes Commission Act set aside approximately 200,000 acres of Public Lands for the Hawaiian Home Lands program, which provides long-term, low-cost leases to “native Hawaiians” as a form of rehabilitation.²³ However, the federal government appropriated another 350,000 acres for military use and national parks. By 2018, out of approximately 4.1 million acres statewide, the federal government, including the U.S. Fish and Wildlife Service, National Park Service, and Department of Defense, claimed ownership of 829,830 acres. Of that total, 162,076 acres were controlled by the Department of Defense.²⁴

This history is crucial to understanding the military’s land use in Hawai‘i, which is not just a question of acreage but is tied to the shift from communal stewardship to private property, the overthrow of a sovereign nation, the disputed legality of annexation, the transfer of Crown and Government lands into a public trust, and ongoing Native Hawaiian land claims and customary access rights. For many Hawai‘i residents, military land use is inseparable from broader issues of sovereignty, historical justice, environmental protection, and cultural survival. Understanding these historical and legal foundations is essential to informed public discussion about the future of land in Hawai‘i.

Historical Foundations of Military Land in Hawai‘i

Military land use in Hawai‘i has historically expanded during times of war. As Native Hawaiian scholar Haunani-Kay Trask observed, “Whenever the U.S. goes to war, the military takes more of our land.”²⁵ Military holdings grew from 16,500 acres in 1900 to a peak of more than 648,666 acres in 1944 during World War II, much of it controlled through leases, easements, and permits rather than outright ownership. By 1948, the federal government controlled 226,743 acres, including 31,254 acres owned by the military and 29,391 acres of Public Lands under military control.²⁶ Although military land control decreased after World War II, it remained substantial, hovering around 250,000 acres in the following decades.

When Hawai‘i became a state in 1959 under the Admission Act, approximately 1.4 million acres of Public Lands were transferred to the State of Hawai‘i to be held in trust for specific public purposes, including education, improving conditions for Native Hawaiians, farming, home ownership, and public infrastructure improvements.²⁷ However, lands already being used by the federal government remained under U.S. control, and

23 *Hawaiian Homes Commission Act, 1920*, <https://dhhl.hawaii.gov/hhc/laws-and-rules>. The Act defines “native Hawaiian” as “any descendant of not less than one-half part of the blood of the races inhabiting the Hawaiian Islands previous to 1778.”

24 Linda A. Hanson and Carol Hardy Vincent, *Federal Land Ownership: Overview and Data*, CRS Report No. R42346 (Washington, DC: Congressional Research Service, 2020), <https://www.congress.gov/crs-product/R42346>. The total land area differs from the figure of 4,112,388 acres in the *State of Hawai‘i Data Book*, which includes inland bodies of water.

25 Haunani-Kay Trask, interview with the author, 2002.

26 Robert C. Schmitt, *Historical Statistics of Hawaii* (Honolulu: University of Hawai‘i Press, 1977), 300–301.

27 *An Act to Provide for the Admission of the State of Hawai‘i into the Union*, Pub. L. No. 86-3, 73 Stat. 4 (1959), <https://www.doi.gov/sites/default/files/uploads/An-Act-to-Provide-for-the-Admission-of-the-State-of-Hawaii.pdf>.

negotiations between 1959 and 1964 allowed the military to retain significant acreage through ownership (33,014 acres), control of Public Lands (177,375 acres), and long-term leases (40,546 acres).^{28,29}

Importantly, many of these lands are classified as ceded or trust lands, meaning they carry special legal obligations. While some were reclassified as “owned” for administrative purposes, they must revert to the State’s Public Land Trust if no longer needed by the military.³⁰ This legal distinction continues to shape debates about land use, Native Hawaiian rights, and federal military presence in Hawai‘i. According to the U.S. Indo-Pacific Command’s 2021 Hawai‘i Military Land Use Master Plan, “Ceded lands legally differ from ‘fee’ or ‘fee simple’ holdings in regard to process if the land is deemed surplus. DoD [Department of Defense] ceded lands not required by other DoD agencies are granted to the State of Hawai‘i.”³¹ These provisions are the basis for several military leases that expire in 2029 (see Military Leases, below).

Current Status of Military Lands in Hawai‘i

The public lacks access to clear, comprehensive information about which

lands the military occupies and the impact and legal status of those lands. According to the 2025 *Base Structure Report*, the U.S. military controls 133 sites in Hawai‘i, totaling 254,224.97 acres.³² The Hawai‘i National Guard operates about six additional sites, totaling 1,017.48 acres.³³

The public lacks access to clear, comprehensive information about which lands the military occupies and the impact and legal status of those lands.

However, reported totals vary depending on the source and criteria used. For example, the Department of Defense (DoD) Main Report categorizes Hawai‘i sites by size and plant replacement value, listing 48 sites that are at least 10 acres and have at least \$10 million in plant replacement value and 74 sites that are less than 10 acres and/or under \$10 million in plant replacement value.³⁴ This amounts to a total of 122 military sites — 11 fewer than the 133 sites reported in the 2025 *Base Structure Report*.

The totals also fluctuate from year to year without clear explanation. The 2024 *Base*

28 Schmitt, *Historical Statistics*, 300–301.

29 *Admission Act*, 1959.

30 Schmitt, *Historical Statistics*, 300–301.

31 U.S. Indo-Pacific Command, *Hawai‘i Military Land Use Master Plan* (HMLUMP) (2021), <https://www.dropbox.com/scl/fi/g8jicwbhrwk5m7wjvt2bh/HMLUMP-FINAL-30APR2021-2.pdf?rlkey=jgmjbjajftcidk1jeg8x2fdyb&e=1&st=1e-hsvhj9&dl=0>.

32 U.S. Department of Defense, *Base Structure Report FY25* (September 30, 2024), <https://www.acq.osd.mil/eie/imr/rpid/library.html>. The report defines a “site” as a specific geographic location with assigned land parcels or facilities under DoD jurisdiction.

33 U.S. Department of Defense, *Base Structure Report FY25*.

34 U.S. Department of Defense, *Base Structure Report FY25*.

Structure Report lists 129 sites covering 245,393.64 acres — nearly 9,000 fewer acres than reported in 2025. Furthermore, the 2021 Hawai'i Military Land Use Master Plan (HMLUMP) provides yet another set of figures (see Figure 1). Unlike the Base Structure Reports, HMLUMP separates

“ceded” lands from “Fee-owned” and “Leased” lands. However, the “Leased” category includes both Public Lands and lands leased from private owners, which complicates direct comparisons across reports.

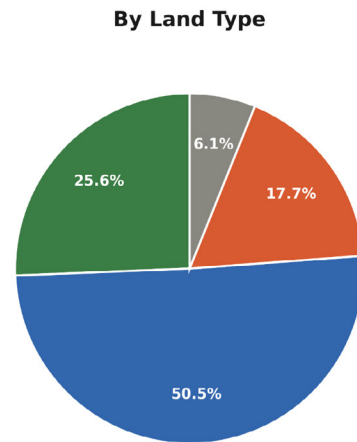
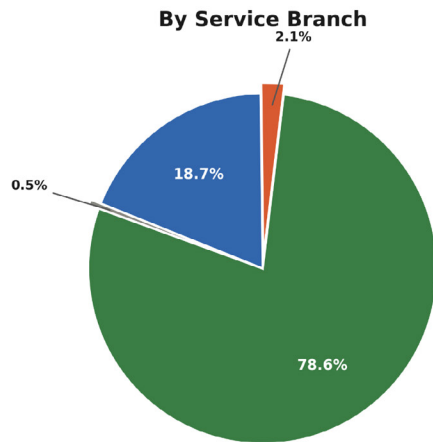
Figure 1. Military Land Holdings in the State of Hawai'i ³⁵

Service	Fee	Ceded	Leased	Other*	Total
Army	36,744	102,969	29,349	5,482	174,544
Navy	16,793	7,446	9,546	7,830	41,615
Air Force	409	0	474	235	1,118
Marine Corps	2,968	1,727	0	9	4,704
Total Acres	56,914	112,142	39,369	13,556	221,981

* “Other” includes easements, government/private agreements, and other interests in real property
 Source: Service Components updates in March 2021

U.S. Military Land Holdings

Total: 221,981 acres | Source: Service Branch Land Data



■ Army - 174,544 acres (78.6%)
 ■ Marine Corps - 4,704 acres (2.1%)

■ Navy - 41,615 acres (18.7%)
 ■ Air Force - 1,118 acres (0.5%)

■ Fee - 56,914 acres (25.6%)
 ■ Leased - 39,369 acres (17.7%)

■ Ceded - 112,142 acres (50.5%)
 ■ Other - 13,556 acres (6.1%)

35 U.S. Indo-Pacific Command, *Hawai'i Military Land Use Master Plan*, 13.

Figure 2. Expiring Leases and Easements Between 2029 and 2031³⁶

Service	Location	Island	Acres	Exp Year	Notes
Army*	Pōhakuloa Training Area (PTA)	Hawai'i	22,971	2029	Saddleback Road Lease
Army	Kahuku Training Area	O'ahu	1,150	2029	Parcel Lease
Army	Kawailoa Training Area (Poamoho)	O'ahu	4,390	2029	East Wahiawā Parcel Lease
Army	Mākua Military Reservation (MMR)	O'ahu	782	2029	Wai'anae Parcel Lease
Navy	PMRF	Kaua'i	391.65	2029	Main Base Lease
Navy	PMRF	Kaua'i	7,445.41	2029/ 2030	Main Base Easements
Navy	PMRF – Offshore	Kaua'i	7,680	2029	Ocean Right of Way Lease
Navy	Kamokala Ridge	Kaua'i	88.83	2029	Lease
Navy	East of PMRF Main Base	Kaua'i	0.29	2029	Water Well Lease
Navy	Mākaha Ridge	Kaua'i	203.1	2030	Lease
Navy	Mākaha Ridge	Kaua'i	42.21	2030	Easement
Navy	Miloli'i Ridge	Kaua'i	0.015	2030	Lease
Navy	PMRF Ni'ihau	Ni'ihau	1167	2028	Test Vehicle Land Recovery Site Lease
Air Force	Ka'ena Point Satellite Tracking Station	O'ahu	86.72	2029	Lease
Air Force	Ka'ena Point Satellite Tracking Station	O'ahu	51.47	2029	Easement
Air Force	Kā'ala Air Force Station	O'ahu	1.8	2028	Lease
Air Force	Kōke'e Air Force Station	Kaua'i	8.45	2030	Lease

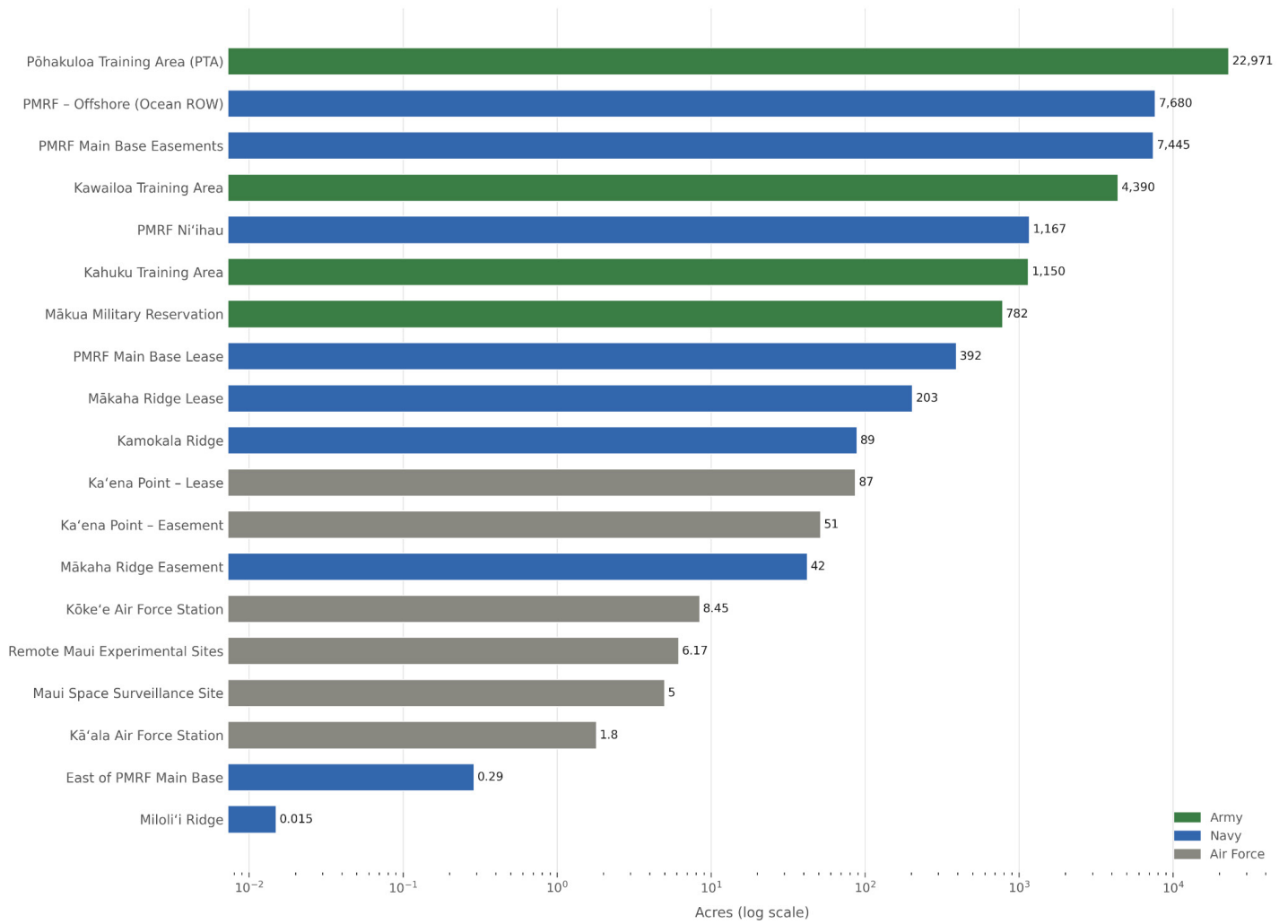
36 U.S. Indo-Pacific Command, *Hawai'i Military Land Use Master Plan*, 9.

Service	Location	Island	Acres	Exp Year	Notes
Air Force	Remote Maui Experimental Sites	Maui	6.17	2021/ 2023	Leases
Air Force	Maui Space Surveillance Site	Maui	5	2031	Lease
		Total	46,471.12		

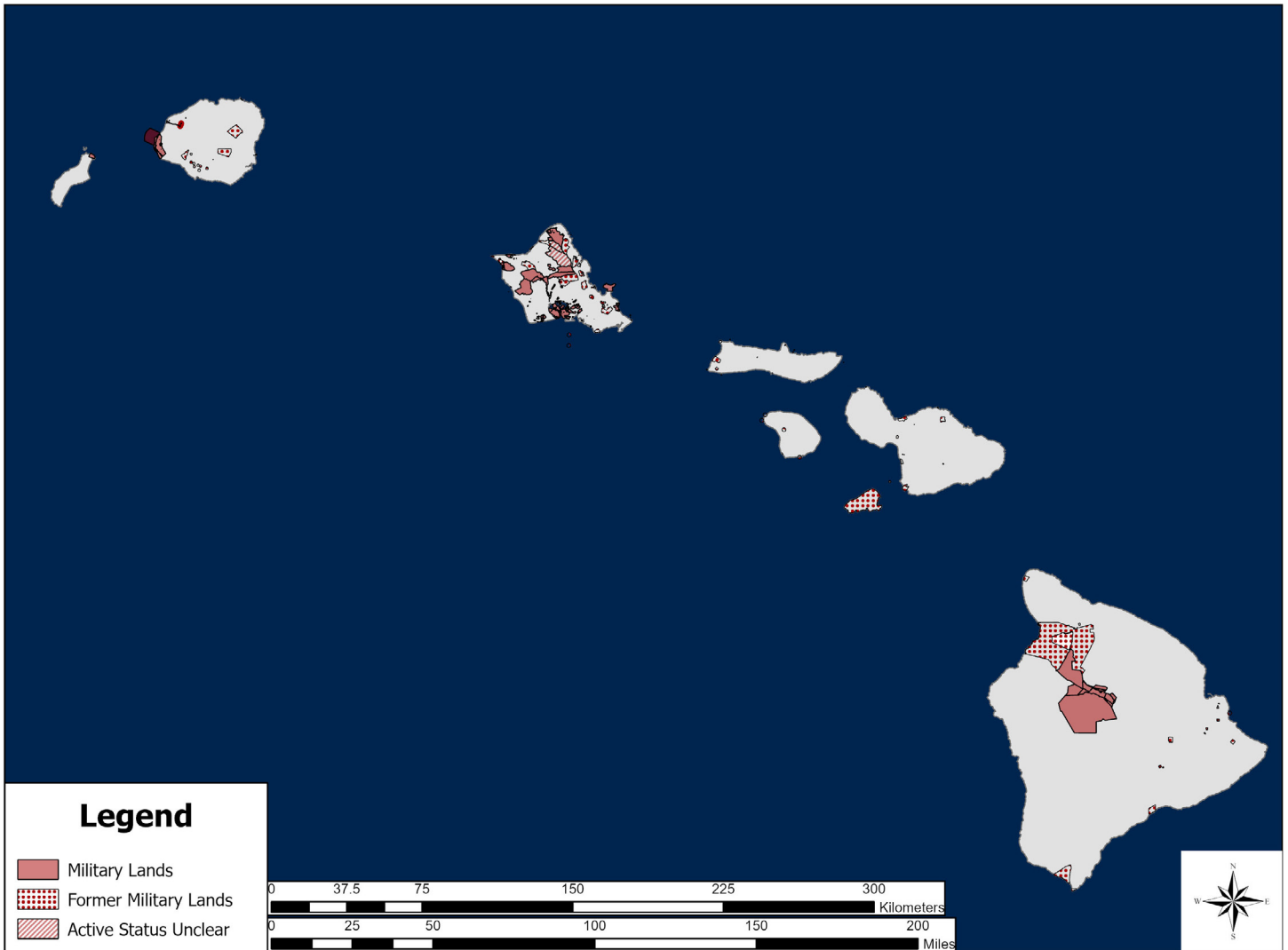
* Army expiring easements are not included in the table as they are small in scale, routine, and not tied to the 65-year lease.

Figure 2. Expiring Leases and Easements Between 2029 and 2031

Hawaii military installations | Total: 46,471.12 acres



Military Lands in Hawai'i (Current, Former, Leased & Easement)



"Military Lands" include lands actively used by the military including leases.

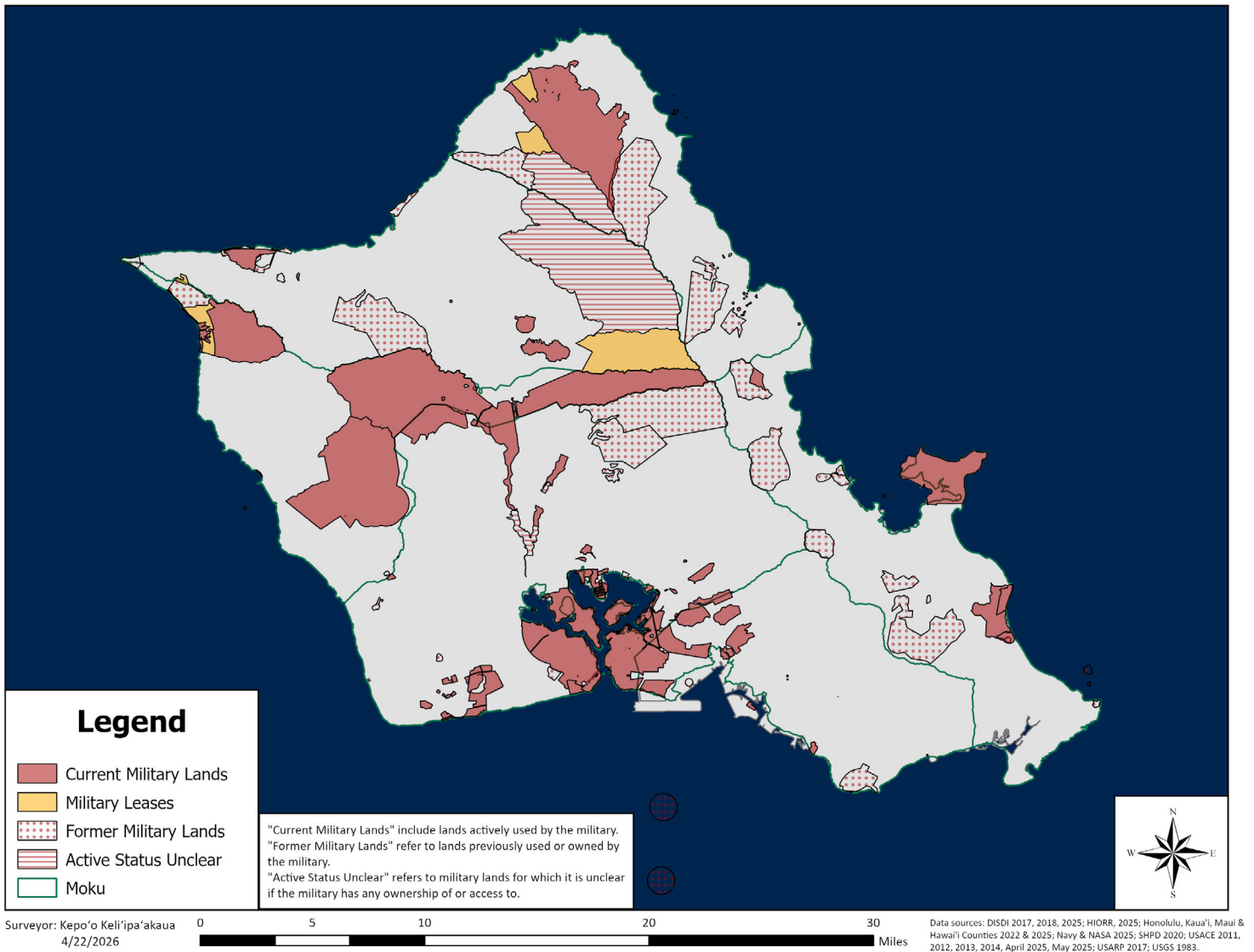
"Former Military Lands" refer to lands previously used or owned by the military.

"Active Status Unclear" refers to military lands for which it is unclear if the military has any ownership of or access to.

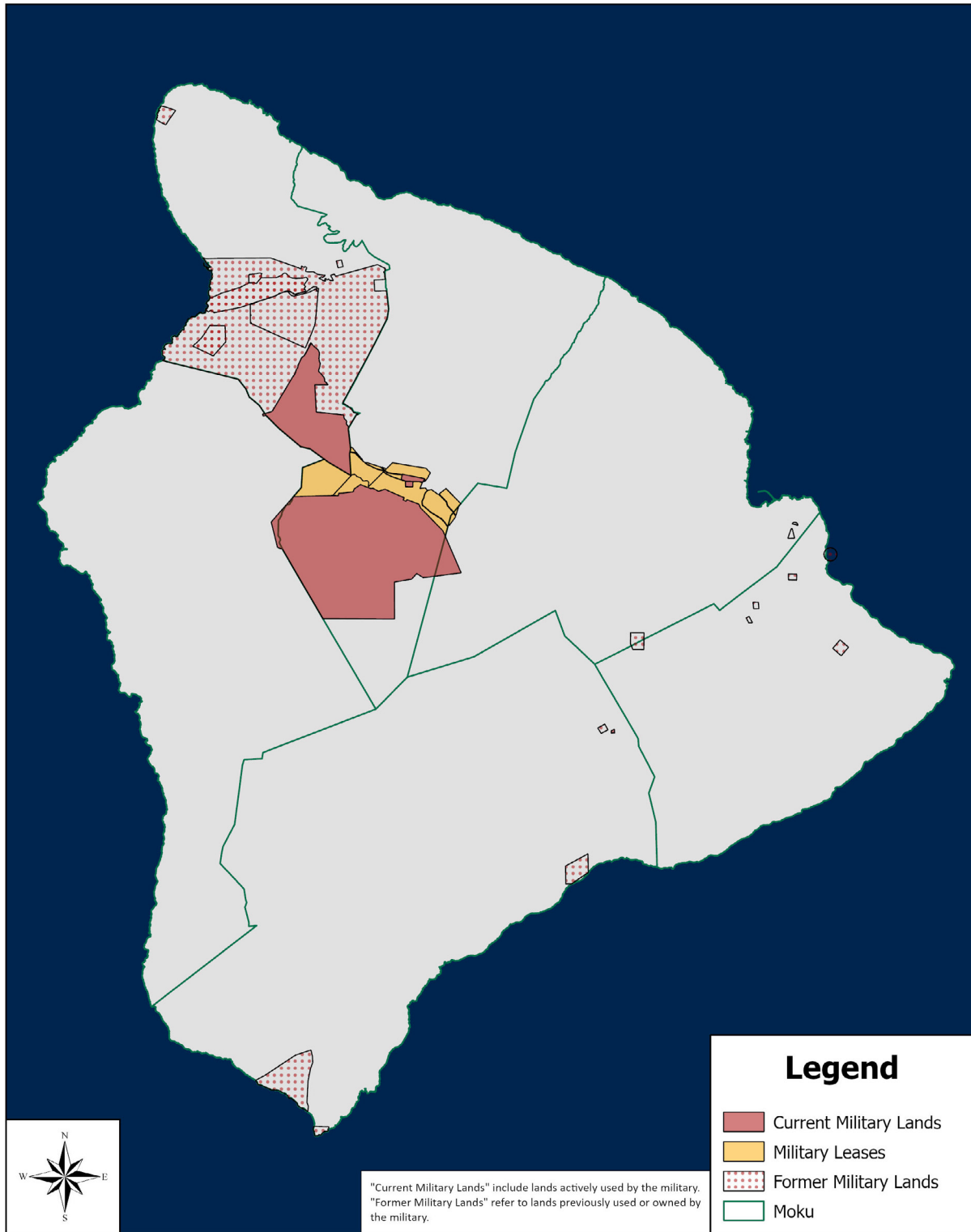
Surveyors: Kepo'o Keli'ipa'akaua, Punahele Kane
4/22/2026

Data sources: DISDI 2017, 2018, 2025; HIORR, 2025; Honolulu, Kauai, Maui & Hawai'i Counties 2022 & 2025; Navy & NASA 2025; SHPD 2020; USACE 2011, 2012, 2013, 2014, April 2025, May 2025; USARP 2017; USGS 1983.

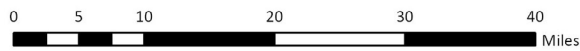
Current, Former and Leased Military Lands on O‘ahu



Current, Former and Leased Military Lands on Hawai'i

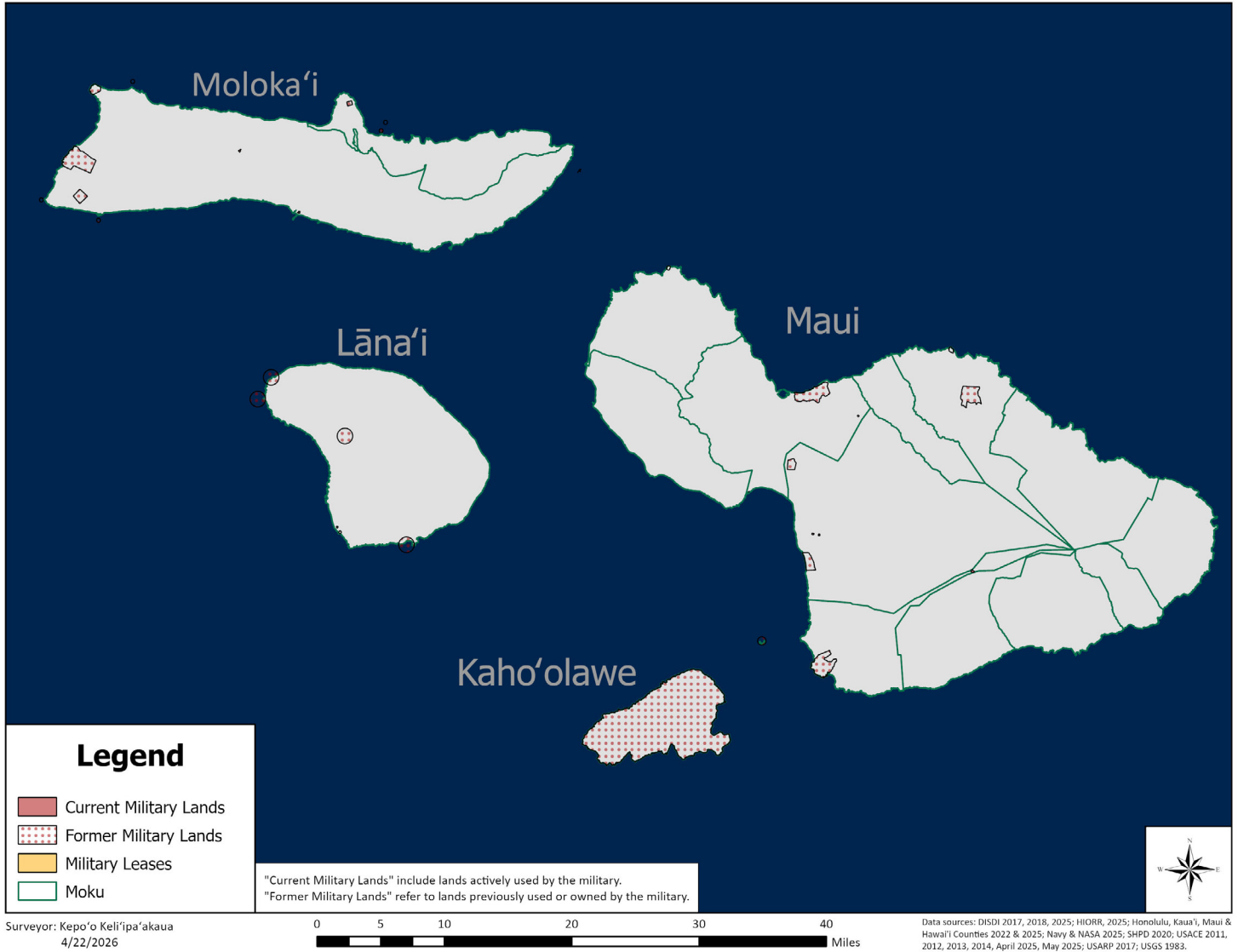


Surveyor: Kepo'o Keli'ipa'akaua
4/22/2026

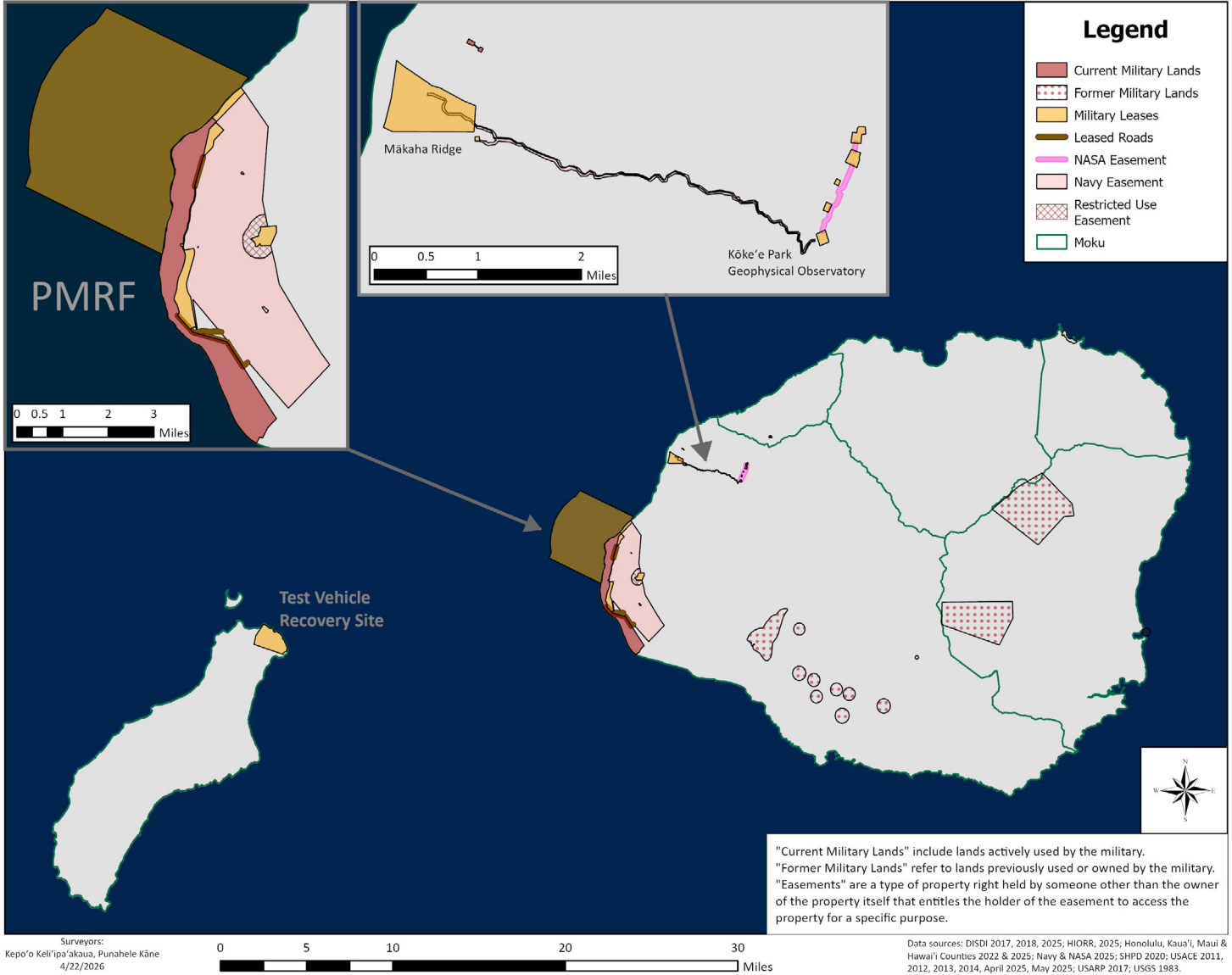


Data sources: DISDI 2017, 2018, 2025; HIORR, 2022; Honolulu, Kaua'i, Maui & Hawai'i Counties 2022& 2025; Navy & NASA 2025; SHPD 2020; USACE 2011, 2012, 2013, 2014, April 2025, May 2025; USARP 2017; USGS 1983.

Current, Former, and Leased Military Lands in Maui Nui



Current, Former, Leased and Easement Military Lands on Kaua'i and Ni'ihau



Mapping the He'e (Octopus)

In 2003, at the 9th Nuclear Free and Independent Pacific Conference in Tonga, Native Hawaiian scholar Kaleikoa Ka'eo described the U.S. military in Hawai'i and the Pacific as a monstrous he'e (octopus), with Hawai'i as its head. Its brain and nervous system, he said, are the United States Indo-Pacific Command (USINDOPACOM)—the oldest and largest U.S. unified command, established in 1947 and headquartered at Camp Smith overlooking Pearl Harbor. Its area of responsibility spans more than half the globe and most of the world's population.

Major military commands under USINDOPACOM are based in Hawai'i, including the United States Army Pacific, United States Pacific Fleet, United States Marine Corps Forces Pacific, Pacific Air Forces, and Special Operations Command Pacific.

Hawai'i is a command and control center for U.S. military force projection in the Pacific.³⁷ With over 107,000 soldiers and civilians, and two brigade combat teams of the 25th Infantry Division at Schofield Barracks, the U.S. Army Pacific (USARPAC) is the Nation's largest Theater Army.³⁸ The U.S. Pacific Fleet (PACFLT), which is headquartered at Joint Base Pearl Harbor-Hickam (JBPHH), "is the largest naval command in the world, responsible for 102

million square miles of ocean, nearly 200 ships, 1,700 aircraft and more than 225,000 Sailors and Marines."³⁹ The Navy maintains



Aerial view of Joint Base Pearl Harbor-Hickam during 1986 RIMPAC exercises. Headquartered here, the U.S. Pacific Fleet commands 102 million square miles of ocean, nearly 200 ships, 1,700 aircraft and more than 225,000 Sailors and Marines — all anchored on Crown and Government Lands seized. Source: National Archives and Records Administration.

cruisers assigned to Naval Surface Group Middle Pacific, three attack submarine squadrons, and a destroyer squadron at JBPHH. The Air Force and Space Force maintain fighter, refueling, and airlift squadrons there, including the 15th Wing.⁴⁰ The U.S. Marine Corps Forces Pacific (MARFORPAC) is the largest operational command in the Marine Corps, including the I Marine Expeditionary Force and III Marine Expeditionary Force.⁴¹ Army and Air Force Reserve and National Guard units further expand this footprint.

37 U.S. Indo-Pacific Command, *USINDOPACOM-Mission* (September 2024), <https://dod.hawaii.gov/jstaff/files/2024/09/USINDOPACOM-Mission.pdf>; D. Shin, "Practical Understanding of U.S. Indo-Pacific Strategy: Analysis of USINDOPACOM and Implications for U.S. Allies and Partners," *Asia-Pacific Journal: Japan Focus* 22, no. 7:3 (2024), <https://apjif.org/2024/7/shin>; Marine Corps Base Hawai'i, "Unit Home," <https://www.mcbhawaii.marines.mil>.

38 U.S. Army Pacific, "Our Units," <https://www.usarpac.army.mil/Our-Team/Our-Units>.

39 Commander, Navy Region Hawaii, "Duty in This Region," <https://cnrh.cnrc.navy.mil/About/Duty-in-this-Region>.

40 Pacific Air Forces, "PACAF Units," <https://www.pacaf.af.mil/Info/PACAF-Units>.

41 U.S. Marine Corps Forces, Pacific, <https://www.marforpac.marines.mil>.

The he‘e’s “eyes” and “ears” are surveillance and tracking sites across the islands: the Air Force Maui Optical and Supercomputing Site on Haleakalā;⁴² the Ka‘ena Point Space Force Station on O‘ahu;⁴³ and Navy tracking facilities associated with the Pacific Missile Range Facility (PMRF) on Kaua‘i.⁴⁴ Underwater acoustic sensors in the ocean near PMRF monitor naval exercises.⁴⁵ In Wahiawā, the Naval Computer and Telecommunications Area Master Station (NCTAMS)⁴⁶ and the National Security Agency/Central Security Service (NSA/CSS) regional signals intelligence center conducts intelligence gathering and surveillance of electronic communications.⁴⁷ This facility is implicated in domestic surveillance programs.⁴⁸

Finally, the metaphor extends to the “waste” of the he‘e: the uneven social, cultural, environmental, and economic impacts of militarization. While proponents cite security and economic

benefits, they often overlook the significant costs, including land dispossession, environmental degradation, and social inequities.

Military Population and Social Impacts

According to the most recent available data (2024), Hawai‘i’s military population totaled 86,094—42,503 active-duty service members and 43,591 dependents—representing 6 percent of the state’s total population of 1,446,146.⁴⁹

The presence of large military installations in Hawai‘i is associated with a range of documented social impacts, including accidents, crime, and physical violence involving military personnel and local residents. Globally, base communities have also been linked to sexual exploitation of women and children through abuse, prostitution, and trafficking.⁵⁰

42 United States Space Force, “15th Space Surveillance Squadron,” <https://www.spaceforce.mil/About-Us/Fact-Sheets/Fact-Sheet-Display/Article/3739425/15th-space-surveillance-squadron>.

43 Peterson and Schriever Space Force Base, “Ka‘ena Point SFS, Hawaii,” <https://www.petersonschriever.space-force.mil/Kaena-Point-SFS-Hawaii>.

44 Commander Navy Region Hawaii, “Pacific Missile Range Facility Barking Sands,” <https://cnrh.cnrc.navy.mil/Installations/PMRF-Barking-Sands>.

45 Naval Air Systems Command, “Underwater Training Range Refurbishment Complete,” <https://www.navair.navy.mil/node/16671>.

46 Commander, Naval Information Forces, “NCTAMS PAC,” <https://www.navifor.usff.navy.mil/nctamspac>.

47 National Security Agency/Central Security Service, “NSA/CSS Unveils New Hawaii Center,” press release, January 6, 2012, <http://www.nsa.gov/Press-Room/Press-Releases-Statements/Press-Release-View/Article/1630554/nsacss-unveils-new-hawaii-center>.

48 CBS Mornings, “Inside NSA Hawaii, the ‘Front Lines’ and Secretive Outpost of Intelligence Gathering,” YouTube video, May 20, 2019, https://www.youtube.com/watch?v=WFM_HkIIS_g.

49 Department of Business, Economic Development, and Tourism, *2024 State of Hawai‘i Data Book*, table 1.22, “Military Personnel and Dependents, by Service and Island: June 30, 2024” (Honolulu: State of Hawai‘i, 2024), <https://files.hawaii.gov/dbedt/economic/databook/db2024/section01.pdf>.

50 Katharine H.S. Moon, *Sex Among Allies: Military Prostitution in U.S.-Korea Relations* (New York: Columbia University Press, 1997); Annie Isabel Fukushima and Gwyn Kirk, “Military Sexual Violence: From Frontline to Fenceline,” *Foreign Policy In Focus*, June 17, 2013, http://fpif.org/military_sexual_violence_from_frontline_to_fenceline; Nik Cristobal, Sam Ikehara, ‘Ihilani Lasconia, and Hina Ka‘ōpua-Canonigo, “Genuine Security for Whom?: Militourism and Violence Against

Many Hawai'i residents view the U.S. military as a foreign occupier and an obstacle to self-determination.⁵¹ The settlement of military-connected populations has altered the ethnic composition and political demographics of the islands. Military personnel, for example, participated in and influenced the outcome of the 1959 statehood referendum.

Beyond Hawai'i, the tentacles of this he'e extend across Okinawa, Guam, the Marshall Islands, American Sāmoa, Japan, South Korea, Australia, Palau, and the Philippines. Communities in these locations report similar patterns of environmental damage, socioeconomic impact, crime, accidents, and infringements on local sovereignty. Even where bases have been removed—such as Clark Air Base and Subic Naval Base in the Philippines in 1992—U.S. forces have returned through advisory missions and expanded joint-use agreements, now framed around countering China's military expansion in the South China Sea.⁵² Closing U.S. military bases in the region without a significant reduction of the major military center in Hawai'i would allow for future remilitarization and offensive operations in the region. As Kaleikoa Ka'eo observed in his 2003 speech in Tonga, to catch a he'e one must grasp its head. Any substantial

and long-term reduction of U.S. military impacts across the Pacific and Asia would therefore need to confront the fundamental nature and purpose of the U.S. military in Hawai'i.

Conclusion

Hawai'i stands at a historic crossroads. Because the islands have been central to the architecture of U.S. imperial power—from the outward extension of the Monroe Doctrine to annexation through the Newlands Resolution and the territorial regime shaped by the Insular Cases—they hold unique potential to redefine it.

Hawai'i stands at a historic crossroads. Because the islands have been central to the architecture of U.S. imperial power... they hold unique potential to redefine it.

As headquarters of the U.S. Indo-Pacific Command, Hawai'i has functioned as the

the Feminine in Hawai'i and Asia and the Pacific," *JCSCORE* 10, no. 1 (2024): 35–57, <https://doi.org/10.15763/jissn.2642-2387.2024.10.1.35-57>; *Star-Advertiser* Staff, "Man Fatally Stabs Wife, 27, on H-3 in Kailua, Honolulu Police Say," *Honolulu Star-Advertiser*, July 21, 2022, <https://www.staradvertiser.com/2022/07/20/breaking-news/h-3-freeway-stabbing-injures-2/>; Nikki Cristobal, *Holoī Ā Nalo Wāhine 'Ōiwi: Missing and Murdered Native Hawaiian Women and Girls Task Force Report (Part 1)* (Honolulu: Office of Hawaiian Affairs, 2022), <https://www.oha.org/wp-content/uploads/MMN-HWG-Report-Web.pdf>.

51 Mahealani Richardson, "Native Hawaiian Groups Call for OHA Support in 'Epic Battle' over Military Land Leases," *Hawaii News Now*, October 17, 2025, <https://www.hawaiinewsnow.com/2025/10/17/native-hawaiian-groups-urge-oha-stand-with-them-epic-battle-over-military-land-leases>; Jill Tokuda, Instagram post, March 5, 2026, <https://www.instagram.com/repiilltokuda/reel/DVhYRjVj2ds>.

52 Sarang Shidore, *Defending Without Provoking: The United States and the Philippines in the South China Sea* (Washington, DC: Quincy Institute for Responsible Statecraft, February 12, 2025), <https://quincyinst.org/research/defending-without-provoking-the-united-states-and-the-philippines-in-the-south-china-sea>.

nerve center of U.S. military projection across the Pacific. Instead, Hawai'i could become a piko (navel or source) of a demilitarized Pacific. Meaningful demilitarization in Hawai'i would therefore resonate far beyond the islands themselves, signaling a structural shift in how the United States exercises power in the region and the world.

Demilitarization presents a once-in-a-lifetime opportunity to reverse long-standing harms: the dispossession of Native Hawaiian lands, the environmental degradation of fragile ecosystems, and the legal distortions that accompanied imperial expansion. The reversion of trust and ceded lands, the restoration of 'āina to community stewardship, and the redirection of public resources toward housing, education, and ecological repair could transform Hawai'i and the region. Such a transition would not simply reduce military presence; it would confront the historical foundations of U.S. imperialism and open space for new forms of regional cooperation grounded in sovereignty, sustainability, and peace.



Reducing Hawai'i's Military Footprint to Reduce Risk

Neta C. Crawford

Reducing Hawai‘i’s Military Footprint to Reduce Risk

Neta C. Crawford¹

Key Findings

- Current U.S. strategy fuels a security dilemma with China. As the United States expands its military presence and offensive capabilities in the Indo-Pacific, China may see this activity as encirclement and respond with its own military buildup, deepening mutual fear and tension.
- Hawai‘i is central to this posture. Hawai‘i is a key node in U.S. Indo-Pacific war planning.
- Current U.S. doctrine is based on deep offensive strikes and deliberately threatens escalation. It relies on deep strikes into Chinese territory and plans for nuclear escalation, increasing the risks not only of war but of catastrophic consequences for Hawai‘i.
- An offensive doctrine is not the only way to address China’s potential military threat to Taiwan. The threat of a Chinese invasion may be overstated, and even if conflict occurred, Taiwan could use the strategy of deterrence and defense by denial — a less risky, lower-cost strategy based on resilience and defense rather than offensive forces and doctrine.
- The military footprint in Hawai‘i can be reduced by changing military doctrine. Shifting toward deterrence by denial, diplomacy, and de-escalation would lower the risk of war, reduce the need for permanent U.S. bases and operations in Hawai‘i, and free land and resources for the islands’ ecological, economic, and social well-being.

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Executive Summary

The United States maintains a large military presence in Hawai'i because the islands are central to U.S. strategy in the Indo-Pacific.² Hawaii serves as a hub for command, logistics, intelligence, training, and force projection across the region. That posture is justified largely by the claim that China poses a major and potentially imminent threat, especially in relation to Taiwan. This paper argues that the threat has often been overstated, that current U.S. doctrine is unnecessarily provocative and escalatory, and that a different defensive strategy could both lower the risk of war and reduce the military footprint in Hawai'i.

There are at least two major ways of interpreting China's intentions. The dominant view in Washington treats China as a revisionist power bent on regional domination and potentially global hegemony. A competing view sees China as primarily focused on regime security, economic development, and regional defense, while still acknowledging its authoritarianism, repression, territorial disputes, and military modernization. The difference matters because U.S. strategy has increasingly been driven by worst-case assumptions about what China might do in the future rather than by a clear assessment of its present intentions. This type of "threat inflation" can encourage arms racing, higher military spending, and escalating tensions — dynamics with historical precedents.

The report argues that current U.S. strategy contributes to a classic security dilemma. As the United States expands its military presence, strengthens alliances, and develops capabilities for deep strikes into Chinese territory, Chinese leaders may interpret these moves as offensive and encircling. China's response then reinforces U.S. perceptions of threat, producing a cycle of mutual fear and military buildup. Hawai'i sits at the center of this dynamic because it is a key node in U.S. Indo-Pacific war planning.

Current U.S. doctrine for a conflict with China is not simply defensive. It anticipates deep strikes against targets on the Chinese mainland and relies on the threat of escalation, including nuclear strikes against Chinese conventional and nuclear forces. That posture places Hawai'i at risk, not only as a support site but as a likely target in a wider conflict. So long as Hawai'i remains central to an offensive U.S. military posture, it remains exposed to these dangers.

The report also argues that the case for this large military footprint is weaker than commonly assumed. China may not intend to invade Taiwan, and even if it did, Taiwan is not defenseless. A strategy of deterrence and defense by denial — built on resilience, dispersed defenses, geography, and the ability to deny China a quick victory — would be less risky and costly than the current U.S. emphasis on forward offensive power. Such a strategy would rely less on

² The most recent Department of Defense *Base Structure Report* lists 47 Department of Defense (DoD) sites in Hawai'i with at least 10 acres and \$10 million in plant replacement value (PRV). Including six Army National Guard stations that are at least 5 acres and \$5 million PRV, Hawai'i accounts for approximately 18 percent of the larger bases and installations within the U.S. Indo-Pacific Command (INDOPACOM) area of responsibility. An additional 74 DoD sites in Hawai'i have less than 10 acres. U.S. Department of Defense, *FY 2025 Base Structure Report*, <https://www.acq.osd.mil/eie/imr/rpid/library.html>.

deep strikes, massive force projection, and permanent U.S. basing across the Pacific.³

A shift to deterrence and defense by denial would have direct implications for Hawai'i. Because such strategies are less provocative and less dependent on expensive long-range strike platforms and large permanent bases, they would make it possible to reduce U.S. force levels, operations, and land use in the region, including in Hawai'i. Diplomacy, military-to-military communication, and cooperation on shared challenges could further reduce tensions and the likelihood of war.

The report concludes that the large U.S. military presence in Hawai'i is not necessary. Rather, it is the product of worst-case assumptions about China and strategic choices — particularly the reliance on offensive doctrine. A strategy centered on deterrence by denial, de-escalation, and diplomacy would better protect U.S. interests while reducing the risk of catastrophic war. It would also make possible a smaller military footprint in Hawai'i and the return of land and resources for purposes more aligned with the ecological, economic, and social well-being of the islands and their people.

Alternative Perspectives on China

There are *at least* two alternative

perspectives on China's aims. Both begin from the same baseline: China's regime is authoritarian, it abuses the rights of ethnic and religious minorities, it has active territorial disputes with several of its neighbors, and it is modernizing its military. But the perspectives differ in how they interpret China's motives and intentions.

Alternative 1: China as a Rival Revisionist Power with Aggressive Military Intentions

The dominant view in Washington is that China is a revisionist power bent on regional domination. China may, in the long run, seek to become a global hegemon and to overturn the liberal world order the United States helped build after World War II.

In this view, China's economic growth, technological advances, human rights violations, secrecy, and military modernization make it a growing threat. The U.S. 2022 *National Security Strategy* summarized: "The PRC is the only competitor with both the intent to reshape the international order and, increasingly, the economic, diplomatic, military, and technological power to do it."⁴ It further emphasized China's military buildup, describing the PRC as "investing in a military that is rapidly modernizing, increasingly capable in the Indo-Pacific, and growing in strength and reach globally

³ These are located in American Samoa, Australia, Diego Garcia, Guam, Japan, Johnston Atoll, Marshall Islands, Northern Mariana Islands, Singapore, South Korea, and Wake Island. There are 43 smaller sites located in Japan, Northern Mariana Islands, Cambodia, the Marshall Islands, Singapore, and South Korea in the INDOPACOM area of responsibility. U.S. Department of Defense, *FY 2025 Base Structure Report*.

⁴ The White House, *National Security Strategy* (Washington, DC: October 2022), <https://bidenwhitehouse.archives.gov/wp-content/uploads/2022/11/8-November-Combined-PDF-for-Upload.pdf>.

— all while seeking to erode U.S. alliances in the region and around the world.”⁵

This perspective interprets China’s increased military spending, expanding capabilities, and regional operations as evidence of aggressive intent. The fear is that if the United States does not arm aggressively, the future balance of power will shift in China’s favor. Even within this view, however, there is disagreement about how urgent the threat is and whether conflict is inevitable. As Secretary of Defense Lloyd Austin said in 2024, “conflict is neither imminent or inevitable. Deterrence is strong today — and it’s our job to keep it that way.”⁶

Alternative 2: China as a Status Quo Power and Economic Rival with Defensive Military Intentions

This view holds that China’s intentions are primarily defensive, concerned with border disputes, regime security, and continued economic growth, rather than regional or global domination. In this view, Chinese leaders’ statements — that China has “no intention” of replacing the United States or remaking the world order in its image — are plausible. “Chinese leadership is concerned about internal challenges more than external threats or expansion.”⁷

This view contends that China is focused on economic development, domestic political legitimacy, and regional security. Its domestic legitimacy depends on improving living standards and on sustaining the narrative that China is overcoming a century of humiliation. Conflict with the West can provide an external adversary to blame for domestic unrest or economic frustration.

Chinese economic growth has been rapid, and it often behaves aggressively in trade, but economic rivalry does not necessarily translate into hegemonic ambition. It is possible to co-exist with China without turning disputes over intellectual property, tariffs, or pricing into causes for military confrontation. This view also acknowledges that China seeks to absorb Taiwan but holds that Beijing would prefer to achieve that goal by diplomatic rather than military means.

A Tendency to “Threat Inflation” and Doubt About China’s Intentions

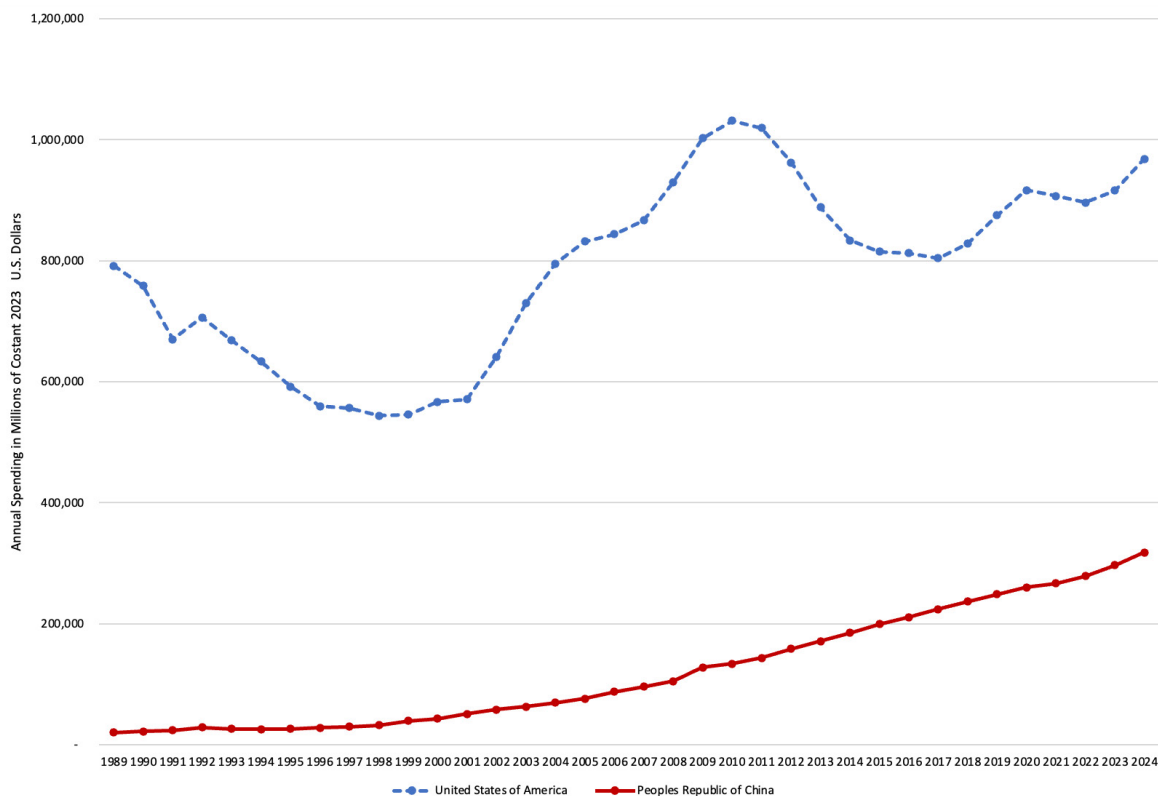
Even as the United States describes China as its “pacing” military challenge, U.S. military spending far exceeds China’s (see Figure 1) — and indeed that of all U.S. rivals combined. The United States also maintains a clear edge in most military technologies.

5 The White House, *National Security Strategy*, 22–23.

6 Lloyd J. Austin III, “A Shared Vision for the Indo-Pacific: Remarks by Secretary of Defense Lloyd J. Austin III at the Shangri-La,” June 5, 2023, <https://sg.usembassy.gov/a-shared-vision-for-the-indo-pacific-remarks-by-secretary-of-defense-lloyd-j-austin-iii-at-the-shangri-la-dialogue-as-delivered>.

7 David C. Kang, Jackie S.H. Wong, and Zenobia T. Chan, “What Does China Want?” *International Security* 50, no. 1 (Summer 2025): 50.

Figure 1. Annual Military Spending of the U.S. and China, 1989–2024, in Constant U.S. 2023 Dollars



Source: Stockholm International Peace Research Institute (SIPRI), *World Military Expenditures Database*, <https://www.sipri.org/databases/milex>

U.S. strategy is increasingly driven by what China *might* be able to do in the future rather than what it can do now. This tendency — to exaggerate a rival’s current capabilities, equate capabilities with intentions, and focus on worst-case futures — is known as “threat inflation.”⁸

The pattern is familiar. During the Cold War, U.S. officials warned of a “bomber gap” in the 1950s, a “missile gap” in the 1960s,

and a “window of vulnerability” in the late 1970s and early 1980s.⁹ The Soviet Union was not unarmed or benign, but these outsized potential future threats the United States projected never materialized. These fears did, however, help justify increased U.S. military spending and rising tensions. The Cold War ended not through military buildup alone but through diplomacy, arms control, and the persistent work of peace and human rights movements.

8 Michael D. Swaine, “Threat Inflation and the Chinese Military,” QI Papers, no. 7 (June 2, 2022). <https://quincy-inst.org/research/threat-inflation-and-the-chinese-military-2/#>.

9 Greg Thielmann, “The Missile Gap Myth and Its Progeny,” *Arms Control Today*, May 2011, <https://www.arms-control.org/act/2011-05/missile-gap-myth-and-its-progeny>.

Threat inflation, an emphasis on the capabilities an adversary *might* acquire, can be used as a reason or justification for preventive wars. For example, in launching war against Iran in February 2026, President Trump claimed that Iran posed an imminent danger to the U.S. and U.S. allies. Specifically, Trump said that although the U.S. and Israeli strikes in June 2025 had “obliterated” Iran’s nuclear production facilities, the Iranian regime has “attempted to rebuild their nuclear program and to continue developing the long range missiles that can now threaten our very good friends and allies in Europe, our troops stationed overseas, and could soon reach the American homeland.”¹⁰ Despite his implied urgency, Trump’s language implicitly acknowledges — with the use of the words “developing” and “soon” — that these *potential* Iranian weapons, and their role in a *possible* strike, posed a *hypothetical future* threat. There was no *imminent* threat. Nor would Iran have acquired nuclear capability within six months or even a year. While it is true that Iran’s longest-range conventional ballistic and cruise missiles were capable of reaching all of the Middle East, Iran did not have the capability to launch a strike with conventional forces against the United States mainland.¹¹

A similar emphasis on actual and *potential* future Chinese capabilities appears in recent U.S. assessments of Chinese military power. These reports often stress what China may possibly do without comparing those potential capabilities to what the United States already can do. One such report notes that China has one overseas support base in Djibouti (as does the United States) and adds that “the PRC is very likely already considering and planning for additional military logistics facilities to support naval, air, and ground forces projection.”¹² By contrast, the United States has long maintained hundreds of military bases around the world, including 300 bases encircling China. Similarly, the United States projects that China “may also be exploring development of conventionally-armed intercontinental range missile systems” that could threaten the continental United States, Hawai‘i, and Alaska.¹³ But the United States already possesses those capabilities against China.

There are, however, other ways to interpret China’s military buildup. China’s official strategy of “active defense” is strategically defensive, even while allowing for “offensive action at the operational and tactical levels.”¹⁴ As the Department of Defense (DoD) notes, China’s 2019 defense white paper states: “We will not attack

10 PBS NewsHour, “Read Trump’s Full Statement on Iraq Attacks,” February 28, 2026, <https://www.pbs.org/news-hour/world/read-trumps-full-statement-on-iran-attack>.

11 Mariel Ferragamo, Will Merrow, and Jonathan Masters, “What Are Iran’s Nuclear and Missile Capabilities?” Council on Foreign Relations, <https://www.cfr.org/articles/what-are-irans-nuclear-and-missile-capabilities>.

12 U.S. Department of Defense, *Military and Security Developments Involving the People’s Republic of China, 2024* (Washington, DC: Department of Defense), xi, <https://media.defense.gov/2024/Dec/18/2003615520/-1/-1/0/MILITARY-AND-SECURITY-DEVELOPMENTS-INVOLVING-THE-PEOPLES-REPUBLIC-OF-CHINA-2024.PDF>.

13 U.S. Department of Defense, *Military and Security Developments Involving the People’s Republic of China, 2024*, vi.

14 U.S. Department of Defense, *Military and Security Developments Involving the People’s Republic of China, 2024*, 33.

unless we are attacked, but we will surely counterattack if attacked.”¹⁵

This posture is also consistent with China’s declared “No First Use” nuclear doctrine. The DoD states, “The PRC’s approach to nuclear force includes a declaratory no-first-use (NFU) policy, stating it will never use nuclear weapons first at any time under any circumstances....”¹⁶

The United States, however, remains skeptical of China’s actual nuclear posture. One assessment argues that despite its public NFU commitment, Beijing might consider nuclear first use if conventional attacks threatened the viability of its nuclear forces or command-and-control systems or if defeat in a Taiwan conflict endangered CCP regime survival.¹⁷

For years, U.S. military leaders have warned that war with China is imminent. In January 2023, General Mike Minihan issued a memo stating, “My gut tells me we will fight in 2025.”¹⁸ In May 2025, Secretary of Defense Pete Hegseth said Beijing was “credibly preparing” to use force and that Xi had ordered the People’s Liberation Army to be capable of invading Taiwan by 2027.¹⁹ Hegseth added, “The threat China

poses is real. And it could be imminent.”²⁰

Yet, even the most frequently cited threat — a Chinese move against Taiwan — may be overstated. Even if China were to take Taiwan by force or otherwise, the regional balance of power would not be transformed overnight. As former U.S. Deputy Secretary of State James Steinberg and policy analyst Michael O’Hanlon argue, Chinese possession of bases on Taiwan “would complicate regional dynamics, but it would not be a radical shift.”²¹

Mutual Fear and Security Dilemmas

While anticipating a major threat from China, the United States has expanded its military presence in the region and armed its allies, which may reinforce the perception among Chinese leaders that the United States and its partners intend to encircle China. In this way, U.S. strategy may help produce a self-fulfilling prophecy in which China reacts to what it perceives as a growing military threat.

This is a classic security dilemma.²² As one scholar of international relations explains,

15 U.S. Department of Defense, *Military and Security Developments Involving the People’s Republic of China*, 2024, 33.

16 U.S. Department of Defense, *Military and Security Developments Involving the People’s Republic of China*, 2024, 102.

17 U.S. Department of Defense, *Military and Security Developments Involving the People’s Republic of China*, 2024, 102.

18 “Read for Yourself: The Full Memo from AMC Gen. Mike Minihan,” *Air & Space Forces Magazine*, January 30, 2023, <https://www.airandspaceforces.com/read-full-memo-from-amc-gen-mike-minihan>.

19 Pete Hegseth, “Remarks by Secretary of Defense Pete Hegseth at the 2025 Shangri-La Dialogue in Singapore (As Delivered),” U.S. Department of War, May 31, 2025, <https://www.war.gov/News/Speeches/Speech/Article/4202494/remarks-by-secretary-of-defense-pete-hegseth-at-the-2025-shangri-la-dialogue-in>.

20 Hegseth, “Remarks by Secretary of Defense Pete Hegseth.”

21 James Steinberg and Michael E. O’Hanlon, *Strategic Reassurance and Resolve: U.S.-China Relations in the Twenty-First Century* (Princeton: Princeton University Press, 2014).

22 Robert Jervis, “Cooperation under the Security Dilemma,” *World Politics* 30, no. 2 (Winter 1978): 167–214.

such dynamics are already operating. “Not surprisingly, China regards America’s long position of regional influence — and especially its network of military bases and its naval and air presence — as a potential threat. As it has grown wealthier, Beijing has quite understandably used some of that wealth to build military forces that can challenge the U.S. position ... Each side’s efforts to deal with what it regards as a potential security problem merely reinforced the other side’s own security fears, thereby triggering a response that strengthened the former’s original concerns. Each side sees what it is doing as purely defensive reaction to the other side’s behavior, and identifying ‘who started it’ soon becomes effectively impossible.”²³

From the U.S. perspective, China has already begun this cycle. China has invested in anti-access and area denial (A2/AD) capabilities intended to keep U.S. forces farther from its coasts and to make U.S. military operations in the region more difficult and costly. As the range and effectiveness of these systems have grown, U.S. defense planners have responded by investing in capabilities designed to overcome coastal defenses and strike deep into Chinese territory “early in a conflict.”²⁴ While the United States views these deployments as defensive and reactive, China may see them as offensive and threatening.

From China’s perspective, however, it is the United States that is encircling and aggressive. Chinese leaders view the

expanding U.S. military presence in the Pacific, together with U.S. operations in waters near China and growing support for regional allies, as evidence of hostile intent. These fears may in turn encourage

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further military buildup and more assertive behavior. As the most recent *Annual Threat Assessment* states, “Beijing is deeply suspicious of U.S. intentions and views Washington’s measures against China as part of a concerted, whole-of-government effort, working with U.S. allies and partners, to contain China’s development and rise, undermine CCP rule, and prevent the PRC from achieving its aims. PRC leaders are most concerned about strong unified opposition from the United States and its allies, and are responding, in part, by strengthening ties with partners like

23 Stephen M. Walt, “Does Anyone Still Understand the ‘Security Dilemma?’” *Foreign Policy*, July 26, 2022, <https://foreignpolicy.com/2022/07/26/misperception-security-dilemma-ir-theory-russia-ukraine>.

24 Vincent A. Manzo, “After the First Shots: Managing Escalation in Northeast Asia,” *Joint Forces Quarterly* 77 (Second Quarter, 2015): 93, https://ndupress.ndu.edu/Portals/68/Documents/jfq/jfq-77/jfq-77_91-100_Manzo.pdf.

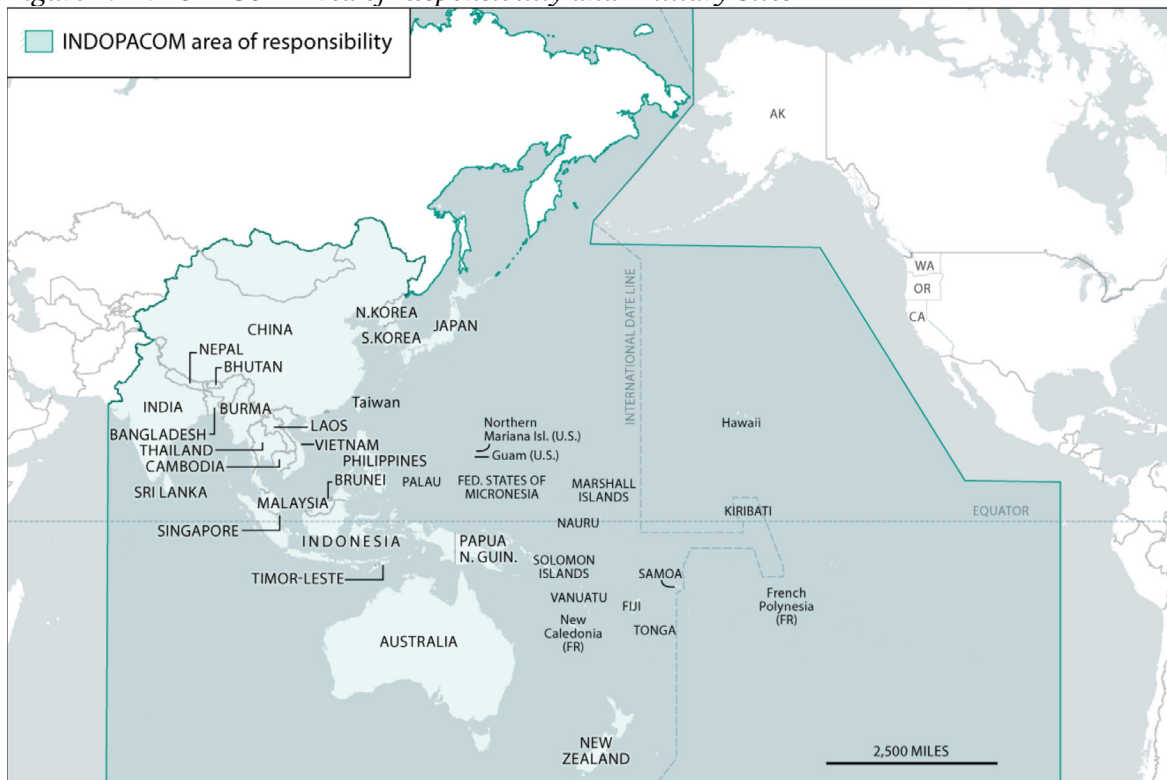
Russia and North Korea.”²⁵

The U.S. Indo-Pacific Command (INDOPACOM) defines its area of responsibility broadly, including not only treaty allies and partners but also what it considers the U.S. homeland in the Pacific. That broad understanding of homeland includes Alaska and Hawai‘i, but also sovereign states in Compacts of Free Association with the United States, including Guam and American Samoa, as well as the Freely Associated States of Palau, the Federated States of Micronesia,

and the Marshall Islands.²⁶ In other words, these are not the U.S. homeland.

Guam, which has 45 military sites occupying half the island, is called the “tip of the spear.” Hawai‘i is the head and heart of the U.S. Indo-Pacific strategy. Figure 2 shows INDOPACOM’s area of responsibility and some of the major enduring and episodically used bases in the region. Although outside INDOPACOM’s formal area of responsibility, Alaska, California, and Washington also host more than a dozen bases that support Indo-Pacific missions.

Figure 2. INDOPACOM Area of Responsibility and Military Sites



Source: Congressional Research Service, *U.S. Defense Infrastructure in the Indo-Pacific: Background and Issues for Congress*, June 6, 2023, <https://www.congress.gov/crs-product/R47589>

25 Office of the Director of National Intelligence, *Annual Threat Assessment of the U.S. Intelligence Community* (March 2025), 9, <https://www.dni.gov/files/ODNI/documents/assessments/ATA-2025-Unclassified-Report.pdf>.

26 U.S. Indo-Pacific Command, <https://dod.hawaii.gov/jstaff/files/2024/09/USINDOPACOM-Mission.pdf>.

U.S. Doctrine Deliberately Threatens and Risks Nuclear Escalation

Current U.S. doctrine for a conflict with China is not simply defensive. It anticipates deep strikes into Chinese territory and accepts the possibility that a conventional war could escalate, including to nuclear use. This matters for Hawai'i because the islands are not peripheral to that strategy — they are central to it as a hub for command, logistics, intelligence, training, and force projection across the Indo-Pacific. As long as the United States relies on an offensive doctrine, Hawai'i will remain deeply embedded in a warfighting posture that heightens danger rather than reducing it.

As China's military capabilities have grown, U.S. planners have responded by emphasizing the ability to strike deep into Chinese territory.²⁷ U.S. doctrine is explicit: The United States seeks to be "capable of attack-in-depth to disrupt, destroy and defeat adversary forces."²⁸ Strategic attack doctrine envisions strikes far beyond the front lines in order to damage an adversary's military capacity, weaken infrastructure, and coerce political leaders.²⁹ It also assumes that credible deterrence requires adversaries to believe the United States is prepared to escalate, including through nuclear threats.³⁰ Deep



The USS Barry transits the Taiwan Strait, April 23, 2020. Routine U.S. naval operations in waters near China are central to a security dilemma that keeps Hawai'i embedded in an offensive warfighting posture as a key hub for Indo-Pacific command and force projection. Photo: U.S. Navy / Ensign Samuel Hardgrove.

U.S. strikes into the Chinese mainland are intended to defend not only Taiwan, but also the broader network of U.S. and allied bases across the Pacific that would implement those strikes. That network includes what the United States defines as the homeland in the region.³¹ In practice, this means that places such as Hawai'i are not remote support sites but integral parts of a potential war with China.

That approach is dangerous. Beijing could interpret deep strikes on Chinese territory as attacks not only on conventional forces but also on command-and-control systems or nuclear forces, especially because some Chinese conventional and nuclear capabilities are intertwined. Under those conditions, a conventional war could

27 Eugene Gholz, Benjamin Friedman, and Enea Gjoza, "Defensive Defense: A Better Way to Protect US Allies in Asia," *The Washington Quarterly* 42, no. 4 (Winter 2020): 179.

28 U.S. Naval War College, "Air-Sea Battle: Service Collaboration to Address Anti-Access & Area Denial Challenges," *Current Strategy Forums* (May 2013): 4, <https://digital-commons.usnwc.edu/csf/1>.

29 U.S. Air Force, *Strategic Attack*, Air Force Doctrine Publication 3-02 (August 4, 2025), 2, 10, 11, https://www.dctrine.af.mil/Portals/61/documents/AFDP_3-02/AFDP_3-02_Strategic_Attack.pdf.

30 U.S. Air Force, *Strategic Attack*, 11; U.S. Air Force, *Nuclear Operations*, Air Force Doctrine Publication 3-72, 2, https://www.dctrine.af.mil/Portals/61/documents/AFDP_3-72/3-72-AFDP-NUCLEAR-OPS.pdf.

31 U.S. Naval War College, "Air-Sea Battle."

escalate into a nuclear conflict through misperception, panic, or use-it-or-lose-it pressures. U.S. officials have acknowledged this risk even as they continue to plan around it.³²

Current U.S. doctrine for a conflict with China is not simply defensive. It anticipates deep strikes into Chinese territory and accepts the possibility that a conventional war could escalate, including to nuclear use. This matters for Hawai'i because the islands are not peripheral to that strategy — they are central to it.

The danger is not abstract for Hawai'i. In war games involving a U.S.-China conflict over Taiwan, escalation scenarios have included Chinese attacks on U.S. forces in Guam and Hawai'i, including a nuclear detonation near Hawai'i.³³ Structured as a central node in an offensive doctrine, Hawai'i becomes a likely target in any wider conflict.

The policy implication is clear. If the United States adopts a doctrine of deterrence and defense by denial rather than deep offensive strikes, it could reduce the risks of escalation and lessen the need for such a large military footprint in Hawai'i. A less provocative strategy would better protect the islands while making it possible to reduce bases, operations, and land use and to return land in Hawai'i for other purposes.

Taiwan Can Defend Itself at Lower Cost and Lower Risk

Much of the case for maintaining a large U.S. military footprint in Hawai'i rests on the assumption that China is likely to move soon against Taiwan and that deterring or defeating such an attack requires a forward-deployed, offensive U.S. posture across the Pacific. But both assumptions are overstated.

Although U.S. officials often claim that Xi Jinping has directed the People's Liberation Army to be ready to invade Taiwan by 2027, there is no clear public evidence that China has made the decision to launch an invasion on that timeline.³⁴ As Mark Milley, then-Chairman of the Joint Chiefs of Staff,

32 Thomas J. Christensen, "The Meaning of the Nuclear Evolution: China's Strategic Modernization and U.S.-China Security Relations," *Journal of Strategic Studies* 35, no. 4 (August 2012): 453; Eric Heginbotham et al., *The U.S.-China Military Scorecard: Forces, Geography, and the Evolving Balance of Power, 1996-2017* (Santa Monica: RAND Corporation, 2015), 354.

33 Stacie Pettyjohn, Becca Wasser, and Chris Dougherty, *Dangerous Straits: Wargaming a Future Conflict Over Taiwan* (Washington, DC: CNAS, June 2022), 8. <https://www.cnas.org/publications/reports/dangerous-straits-wargaming-a-future-conflict-over-taiwan>.

34 John Culver, "China, Taiwan, and the PLA's 2027 Milestones," *The Interpreter*, February 12, 2025, <https://www.lowyinstitute.org/the-interpreter/china-taiwan-pla-s-2027-milestones>; Noah Robertson, "How DC Became Obsessed with a Potential 2027 Chinese Invasion of Taiwan," *Defense News*, May 6, 2024, <https://www.defensenews.com/pentagon/2024/05/07/how-dc-became-obsessed-with-a-potential-2027-chinese-invasion-of-taiwan>.

clarified in 2021, he saw no evidence that Beijing had decided to invade and seize Taiwan, even if it sought to accelerate the capability to do so.³⁵

China has not renounced the use of force, but capability should not be confused with intent. War over Taiwan would be highly costly for China, risking major economic sanctions, diplomatic isolation, and the destruction of Taiwan's infrastructure. A prolonged conflict would also undermine the CCP's domestic legitimacy. For these reasons, an invasion is neither inevitable nor the most likely scenario.³⁶

The more plausible dangers lie below the threshold of full-scale war: coercion, blockade, quarantine, disinformation, and political pressure. Taiwan can reduce these threats by strengthening civilian resilience, democratic institutions, stockpiles of food and fuel, and the capacity to withstand economic pressure and temporary isolation. These measures are far less escalatory than preparing for deep offensive strikes by the United States.³⁷

Even if China did attack, Taiwan is not defenseless. It has significant existing capabilities and, more importantly, strong geographic advantages. An amphibious invasion across the Taiwan Strait would be difficult, costly, and uncertain. Taiwan can make such an operation even harder through a defense-by-denial strategy built around mobile anti-ship and air defenses, mines, dispersed forces, and resilient civilian and military infrastructure.

Rather than seeking to match China system for system, Taiwan can raise the costs of invasion and deny China a quick victory. This is the key point for Hawai'i: If Taiwan can be defended primarily through resilience and denial, the United States does not need to rely as heavily on an offensive doctrine centered on deep strikes, massive force projection, and a large permanent military footprint across the Pacific. A denial strategy can defend Taiwan more cheaply and with less escalation risk, which means the United States does not need such a large, offensive military posture in the region, including in Hawai'i.³⁸

35 Sam LaGrone, "Milley: China Wants Capability to Take Taiwan by 2027, Sees No Near-Term Intent to Invade," *USNI News*, June 23, 2021, <https://news.usni.org/2021/06/23/milley-china-wants-capability-to-take-taiwan-by-2027-sees-no-near-term-intent-to-invade>.

36 Marek Jestrab, "A Maritime Blockade of Taiwan by the People's Republic of China: A Strategy to Defeat Fear and Coercion," *Atlantic Council*, 2023, 7, <https://www.atlanticcouncil.org/wp-content/uploads/2023/12/strategy-paper-naval-blockade-of-Taiwan.pdf>.

37 Network for Effective Security, *From Nuclear Deterrence to Democratic Resilience: Towards a 21st Century Security Paradigm* (London: London School of Economics, Conflict and Civicness Research Group, October 24, 2025), <https://www.lse.ac.uk/ideas/projects/conflict-and-civicness-research-group/assets/Assets/Publications/Research-Reports/Non-Nuclear-Deterrence-Report-Final.pdf>; Jestrab, "A Maritime Blockade of Taiwan by the People's Republic of China," 3; Jeff Kucharski, "Taiwan's Greatest Vulnerability Is Its Energy Supply," *The Diplomat*, September 13, 2022, <https://thediplomat.com/2022/09/taiwans-greatest-vulnerability-is-its-energy-supply>; Jackson Rice, "The Resilience of Taiwan's Energy and Food Systems to Blockade," UC San Diego School of Global Policy and Strategy, August 2023, <https://www.cfe-dmha.org/LinkClick.aspx?fileticket=sJ7hhDPJF8%3D&portalid=0>.

38 Lee Hsi-min and Eric Lee, "Taiwan's Overall Defense Concept, Explained," *The Diplomat*, November 3, 2020, <https://thediplomat.com/2020/11/taiwans-overall-defense-concept-explained>.

Alternative Doctrine: Defensive Defense, A Strategy of Denial

The 2026 U.S. National Defense Strategy signals support for deterrence by denial.³⁹ While recent U.S. rhetoric emphasizes a greater role for allies in their own defense, actual military posture still heavily relies on offensive capabilities, deep strikes, and forward presence. As long as that remains the case, the United States will continue to sustain a large and risky military footprint across the Indo-Pacific, including in Hawai'i.

A strategy of deterrence and defense by denial offers an alternative. Rather than threatening escalation and deep strikes into Chinese territory, deterrence by denial aims to convince an adversary that it cannot quickly or easily achieve its objectives. It relies on the traditional advantages of defense: shorter lines of communication, local knowledge, prepared positions, resilient infrastructure, and the political legitimacy defenders enjoy. Militarily, it emphasizes dispersed, mobile, survivable, and relatively low-cost systems such as air defenses, anti-ship coastal defenses, mines, drones, and electronic warfare organized for defense, not offense.⁴⁰

For Taiwan, such a strategy uses geography and military and civilian resilience. The island is difficult to invade and occupy, and

a denial strategy focuses on complicating assaults, resisting blockades, and raising the costs of occupation through both military and civilian means. It would also reduce reliance on offensive systems and lessen the danger that a conflict would escalate into a wider one or even nuclear war.

Rather than threatening escalation and deep strikes into Chinese territory, deterrence by denial aims to convince an adversary that it cannot quickly or easily achieve its objectives.

Deterrence by denial also has broader regional implications. Because it is less provocative and less dependent on expensive long-range strike platforms, it can reduce tensions, lower costs, and lessen greenhouse gas emissions.⁴¹ More importantly for this report, this approach can reduce the U.S. need for a large permanent force posture across the Pacific. Fully shifting from offensive dominance to deterrence and defense by denial would strengthen defense at lower cost and lower risk, allow for a smaller U.S. military footprint in Hawai'i, and enable the return of land and resources to other, more productive purposes.⁴²

39 U.S. Department of War, 2026 NDS, *National Defense Strategy*, January 2026, <https://media.defense.gov/2026/Jan/23/2003864773/-1/-1/0/2026-NATIONAL-DEFENSE-STRATEGY.PDF>.

40 Kelly A. Greico and Hunter Slingbaum, "Taiwan's Squandered Defensive Potential," Stimson Center, September 11, 2025, <https://www.stimson.org/2025/taiwans-squandered-defensive-potential>; Lee and Lee, "Taiwan's Overall Defense Concept."

41 Lee and Lee, "Taiwan's Overall Defense Concept."

42 Gholz, Friedman, and Gjoza, "Defensive Defense"; Riley Bailey and Frederick W. Kagan, "A Defense of Taiwan with Ukrainian Characteristics: Lessons from the War in Ukraine for the Western Pacific," Institute for the Study of War, October 30, 2024.

Conclusion

Current U.S. strategy assumes that deterring China — and, should deterrence fail, defending against it — requires a forward, offensive posture, including the capacity for strikes against targets on the Chinese mainland and the possibility of nuclear escalation. This strategy is dangerous: It can intensify a security dilemma, increase the risk of conventional and nuclear war, and lock the United States into an unnecessarily large military footprint across the Indo-Pacific, including in Hawai'i.

This posture may also be unnecessary. China may not intend to invade Taiwan, and even if it did, Taiwan can be defended through a strategy of deterrence and denial that relies on resilience, defensive capabilities, and the advantages of geography. Such an approach would lower the risk of escalation, reducing regional tensions.

Diplomacy, military-to-military communication, and cooperation on shared challenges could further reduce the likelihood of conflict. Deterrence and defense by denial should therefore be considered not merely a supplement to the current doctrine but a genuine alternative. By adopting such an approach, the United States could defend its interests and support its partners while reducing its military presence in the region.

This shift matters especially for Hawai'i, which has long been treated as a platform for U.S. warfighting in the Pacific. Like many other parts of the world, Hawai'i faces urgent economic, ecological, and social challenges that demand a new approach. Climate change, sea-level rise, ocean acidification, declining rainfall, and wildfire risk are immediate and certain threats. A potential future war with China, by contrast, is uncertain and potentially avoidable. Restructuring U.S. strategy around deterrence by denial would not only lower the risk of a catastrophic war with China but also allow for a smaller military footprint in Hawai'i, returning land and resources to purposes more aligned with the well-being of the islands and their people.



PFAS Contamination by the U.S. Military in Hawai'i

Wayne Tanaka

PFAS Contamination by the U.S. Military in Hawai‘i

Preliminary Remediation Cost Assessment

Wayne Tanaka¹

Key Findings

- PFAS (“forever chemicals”) and other long-lasting contaminants in Hawai‘i’s lands and waters pose significant long-term risks to public health. With current technology, PFAS contamination is difficult if not impossible to remediate once released into the environment.
- The widespread and decades-long use of PFAS on military installations throughout Hawai‘i, including but not limited to aqueous film-forming foam (AFFF) used in firefighting drills and responses, has created a threat of chronic exposure through contaminated air, water, and food sources for generations to come.
- Superficial remediation of military-related PFAS contamination at just three installations — including excavation, storage, and off-island disposal — is conservatively estimated to cost over \$493 million and would not necessarily remove all PFAS from the environment, including from food and drinking water sources.
- Long-term monitoring and filtering for PFAS in groundwater may be required indefinitely and will not eliminate all human exposure pathways. There is no method for true environmental remediation of PFAS.
- It remains unclear whether the U.S. military will remediate PFAS contamination on any appreciable timeframe, meaning Hawai‘i and its people may ultimately bear the economic and human costs.

¹ Wayne Tanaka is the executive director of the Sierra Club of Hawai‘i. The author would like to thank Pat Elder, director of Military Poisons, for his assistance with this chapter.

Introduction

The prevailing narrative surrounding the military presence in Hawai'i emphasizes its economic contributions, reinforced by a long line of political leaders, contractors, and others. In 2022, after the U.S. Navy's Red Hill Bulk Fuel Storage Facility leaked 19,000 gallons of jet fuel into O'ahu's sole-source drinking water aquifer, then-Governor David Ige cited the military as a "vibrant part in our economy" to justify his reluctance to order the facility shut down.² Governor Josh Green has similarly framed military land negotiations in economic terms, stating that he would seek \$10 billion in federal investments in exchange for lands the U.S. Army is seeking to retain, including at Pōhakuloa Training Area.³

Missing from this narrative is the true cost burden of military activities in Hawai'i. Even a limited accounting reveals costs that likely far exceed annual defense spending: billions of dollars in health impacts from exposure to military toxins, such as heavy metals and PFAS; billions of dollars to clear unexploded ordnance and remediate dangerous toxins found across hundreds of thousands of acres of land used or formerly used by the military; and unquantifiable losses to native species, cultural sites and practices, and ocean ecosystems.

This paper examines one subset of these costs in depth: per- and polyfluoroalkyl

substances (PFAS) — synthetic "forever chemicals" whose widespread military use has left a contamination legacy that will persist for generations. Drawing on several thousand pages of military records — which still do not provide a full picture of potential PFAS contamination — and publicly available cost benchmarks, we estimate the scale of harm and what it would cost to begin addressing it.

What Are PFAS and Why Do They Matter?

PFAS are a class of over 16,000 "forever chemicals" whose exceptionally strong carbon-fluorine bonds make them resistant to heat, water, oil, and biological breakdown.⁴ Because they do not degrade — some compounds persist for over a thousand years⁵ — PFAS accumulate in soils, water systems, and living tissue. Decades of research, including by the U.S. military itself, have established that even very small amounts can cause serious health effects over time.

In the military context, PFAS were most heavily concentrated in aqueous film-forming foam (AFFF), used at airbases, fuel farms, fire training areas, and aircraft crash sites for over 50 years.⁶ When AFFF was deployed, it saturated surrounding soils and entered groundwater, often migrating far from the point of release. In

2 Kevin Dayton, "Hawaii Governor Says He's Not Ready to Permanently Close Red Hill," *Honolulu Civil Beat*, January 26, 2022, <https://www.civilbeat.org/2022/01/hawaii-governor-says-hes-not-ready-to-permanently-close-red-hill>.

3 Josh Green, "Letter to the Honorable Dan Driscoll, Secretary of the Army," State of Hawai'i, Office of the Governor, October 10, 2025, https://governor.hawaii.gov/wp-content/uploads/2025/11/2510100-GOV_Letter-to-Hon.-Dan-Driscoll-Secretary-of-the-Army.pdf.

4 U.S. Department of Agriculture, "Improving Ways to Detect PFAS in Food Packaging," n.d., <https://scientificdiscoveries.ars.usda.gov/explore-our-discoveries/northeast/improving-ways-detect-pfas-food-packaging>.

5 United Nations Environment Programme, "Per- and Polyfluoroalkyl Substances (PFAS)," n.d., <https://www.unep.org/topics/chemicals-and-pollution-action/pollution-and-health/persistent-organic-pollutants-pops/and>.

6 U.S. Fire Administration, "Firefighting Foams: PFAS vs. Fluorine-Free Foams," May 25, 2023, <https://www.usfa.fema.gov/blog/firefighting-foams-pfas-vs-fluorine-free-foams>.



Honolulu Board of Water Supply Chief Engineer Ernie Lau and Hawai'i State Senator Kurt Fevella join water protectors in Honolulu following the November 29, 2022 release of PFAS-based firefighting foam from the Navy's Red Hill Bulk Fuel Storage Facility, located just 100 feet above O'ahu's sole-source drinking water aquifer. Photo credit: Wayne Tanaka.

November 2022, 1,300 gallons of foam concentrate was released from the Red Hill Bulk Fuel Storage Facility,⁷ directly above O'ahu's sole-source aquifer.⁸ AFFF use has not been consistently documented, sometimes requiring anecdotal interviews with retired personnel to reconstruct contamination histories.⁹



Over 1,000 Hawai'i residents march to Navy Facilities Command headquarters in December 2022, one year after the U.S. Navy's Red Hill facility poisoned O'ahu's sole-source aquifer and drinking water for 93,000 residents — and one month after a 1,300-gallon spill of PFAS-based fire-fighting foam concentrate at the same facility. Photo credit: Wayne Tanaka.

Health Consequences

Epidemiological research has linked elevated PFAS exposure to kidney, testicular, bladder, and thyroid cancers; thyroid disease and immune suppression; developmental harm in fetuses and children; high cholesterol and cardiovascular disease; and reduced vaccine efficacy.¹⁰ No safe level of exposure has been established for several of the most common compounds. In 2024, the U.S. Environmental Protection Agency set enforceable maximum contaminant levels for PFAS in drinking water at 4 parts per trillion for PFOA and PFOS¹¹ — equivalent

7 U.S. Government Accountability Office, *Red Hill Fuel Storage: DOD's Contract Approaches and Oversight Before and After the 2021 Fuel Leaks*, GAO-25-106572 (Washington, DC, November 4, 2024), <https://www.gao.gov/products/gao-25-106572>.

8 U.S. Environmental Protection Agency, "Environmental Investigation and Remediation," March 24, 2026, <https://www.epa.gov/red-hill/environmental-investigation-and-remediation>.

9 See, e.g., U.S. Army Corps of Engineers, *Final PFAS Preliminary Assessment and Site Inspection of Per- and Polyfluoroalkyl Substances: U.S. Army Garrison-Hawaii Sub-installations Dillingham Military Reservation, Kahuku Training Area, Kipapa Ammunition Storage Site, Kunia Field Station, Mākua Military Reservation, and Waikakalaua Ammunition Storage Tunnels* (Hanover, MD: Arcadis U.S., Inc., April 2022), https://aec.army.mil/Portals/115/PFAS/USAG-HI_PFAS-PA.pdf.

10 Suzanne E. Felton et al., "Per- and Polyfluoroalkyl Substance Toxicity and Human Health Review: Current State of Knowledge and Strategies for Informing Future Research," *Environmental Toxicology and Chemistry* 40, no. 3 (March 1, 2021): 606–30, <https://doi.org/10.1002/etc.4890>.

11 PFOA and PFOS are two types of PFAS. U.S. Environmental Protection Agency, *Per- and Polyfluoroalkyl Substances (PFAS): Final PFAS National Primary Drinking Water Regulation* (Washington, DC: U.S. Environmental Protection Agency, April 10, 2024), <https://www.epa.gov/sdwa/and-polyfluoroalkyl-substances-pfas>.

to roughly one teaspoon in 500 Olympic swimming pools — a threshold many affected communities already exceed.¹²

Why Hawai'i Faces Unique Risk

Hawai'i's island geography amplifies the consequences of toxic contamination, including PFAS contamination, in several critical ways. Groundwater is the primary source of drinking water for most of the islands and has no comparable alternative, as might be found on the North American continent. Remediation costs are also dramatically higher: PFAS-contaminated soil and treatment media must be containerized, manifested as hazardous waste, and shipped by a limited ocean freight network¹³ to disposal facilities on the North American continent, adding hundreds to thousands of dollars per ton.¹⁴

Status of PFAS Investigations in Hawai'i

The federal government addresses contamination at military installations primarily through CERCLA (the Comprehensive Environmental Response, Compensation, and Liability Act), commonly known as Superfund. Under CERCLA, the Department of Defense must identify, investigate, and remediate hazardous substance releases through four stages: Preliminary Assessment and Site Inspection; Remedial Investigation and

Feasibility Study; Records of Decision; and Remedial Design and Action.¹⁵ Progress across Hawai'i is deeply uneven.



A fisherman wades into the waters off South O'ahu. Fish tissue testing across O'ahu's high-risk waterways is among the chapter's recommended remediation priorities, as subsistence fishing remains a foundation of local livelihoods and cultural practices. Active subsistence fishing practices continue to occur in areas exposed to PFAS runoff from nearby military installations; while government responses have focused on drinking water, ingestion of PFAS-contaminated seafood remains an undermonitored exposure pathway. Photo credit: Wayne Tanaka, 2022.

As of March 31, 2025, nine military installations have been closed from further PFAS investigation — including Kahuku Training Area, which was cleared after only a \$50,000 assessment — while 18 installations have preliminary site assessments, inspections, or remedial investigations planned or underway, including Schofield Barracks, Joint Base Pearl Harbor-Hickam, Red Hill Bulk Fuel Storage Facility, and MCBH Camp H.M. Smith.¹⁶

12 U.S. Environmental Protection Agency, *Per- and Polyfluoroalkyl Substances (PFAS)*.

13 Christine Hitt, "The 2021 Guide to Hawai'i's Shipping, Air and Transportation," *Hawaii Business Magazine*, September 1, 2021, <https://www.hawaiibusiness.com/hawaii-shipping-air-and-transportation-guide-2021>.

14 U.S. Environmental Protection Agency, *Interim Guidance on the Destruction and Disposal of Perfluoroalkyl and Polyfluoroalkyl Substances — Version 2 (2024)* (Washington, DC: U.S. Environmental Protection Agency, April 2024), <https://www.epa.gov/system/files/documents/2024-04/2024-interim-guidance-on-pfas-destruction-and-disposal.pdf>.

15 U.S. Environmental Protection Agency, *Superfund Cleanup Process*, January 12, 2026, <https://www.epa.gov/superfund/superfund-cleanup-process>.

16 Department of Defense, *Progress at the 723 Installations*, March 31, 2025.

A critical and recurring gap in these investigations is the systematic underweighting of surface water and sediment pathways. Despite well-established PFAS transport behavior — including



Residents fish near He'eia Kea small boat harbor, with a portion of Mōkapu, now occupied by the Kāne'ohe Bay Marine Corps Base Hawai'i, in the background. Military contamination and other environmental concerns, from repeated wastewater discharge violations to PCB detections in local fish, continue to persist in Kāne'ohe Bay, and at the Bellows Air Force Station just south of the Marine Corps' Mōkapu installation. Photo credit: Wayne Tanaka, 2022.

documented runoff to Kaukonahua Stream, Waikele Stream, and Wahiawā Reservoir — the Army's preliminary assessments have concluded that surface-water exposure pathways are “incomplete” because streams on base are not used as drinking water sources.¹⁷ This rationale is inconsistent with CERCLA requirements and with the mobility of PFAS compounds in Hawai'i's stream networks.¹⁸

Site-by-Site Assessment: Costs and Contamination Pathways

The following section summarizes investigation and remediation cost estimates for three focal installations on O'ahu, based on publicly available benchmark costs, site-specific assumptions, and established PFAS frameworks. All figures are conservative lower-bound estimates, not ceilings.

1. Bellows Air Force Station

Bellows is a military reservation on O'ahu's windward shore, bordering Waimānalo Bay. A former airfield, Bellows is now largely used for recreational purposes and for training exercises by the Army and Marine Corps, which acquired 1,049 acres of land at Bellows in January 2000 for the Marine Corps Training Area Bellows.¹⁹ The adjacent Waimānalo Stream drains directly into the Bay, creating a pathway from inland contamination sources to a sensitive coastal ecosystem. Key contamination sources include fire training areas, aircraft crash sites with AFFF application, AFFF drum burial locations, helicopter landing zones, and historical disposal sites; notably, jurisdictional issues have limited a comprehensive identification of all areas of potential concern.²⁰

17 U.S. Army Corps of Engineers, Final Preliminary Assessment and Site Inspection of Per- and Polyfluoroalkyl Substances: Schofield Barracks and Kawailoa-Poamoho Training Area, Hawaii (Hanover, MD: Arcadis U.S., Inc., August 2023), https://aec.army.mil/Portals/115/PFAS/Schofield_PFAS_PASI.pdf.

18 U.S. Army Corps of Engineers, *Final Preliminary Assessment and Site Inspection of Per- and Polyfluoroalkyl Substances*.

19 U.S. Indo-Pacific Command, *Hawai'i Military Land Use Plan: Interim 2021 Update*, U.S. Department of Defense, April 2021, <https://www.dropbox.com/scl/fi/g8jicwbhrwk5m7wvt2bh/HMLUMP-FINAL-30APR2021-2.pdf?rlkey=jgmjbj-ftjcidk1jeq8x2fdyb&e=1&st=1ehsvhj9&dl=0>.

20 U.S. Army Corps of Engineers, *Final Preliminary Assessment and Site Inspection of Per- and Polyfluoroalkyl Substances: Bellows Air Force Station, Oahu, Hawaii* (Denver, Colorado, and Honolulu, Hawai'i: Ayuda and Ch2m, November 2017), <https://static1.squarespace.com/static/6005a180c8cd610112a8a795/t/69b06b7dd64b->

Bellows: Key Cost Drivers

- Soil excavation and off-island hazardous waste disposal at two high-priority sites: ~\$25M
- Pump-and-treat groundwater interception system (30-year lifecycle): ~\$30M
- Surface and groundwater sampling across Waimānalo Stream corridor and Waimānalo Bay
- Marine and coastal testing, including nearshore sediments, sea foam, shellfish, and fish
- Voluntary PFAS blood serum testing for residents and long-term employees

Excavating the Most Contaminated Soil: ~\$25 Million

The most urgent remediation need at Bellows is removing PFAS-saturated soil from its two highest-risk sites — the fire training area and an aircraft crash site. As with all Hawai'i military sites, there is no approved hazardous waste landfill on the islands: every ton of contaminated material

must be sealed, shipped, and disposed of on the continent.

The EPA's standard estimating approach assumes excavation to 3 feet deep at firetraining and foam-release sites.²¹ Disposal fees for PFAS-contaminated soil run between \$1,300 and \$3,660 per ton.²² Hawai'i's island location

[4703d6af38f7/1773169533906/Bellows%2C+HI++PA.pdf](https://static1.squarespace.com/static/6005a180c8cd610112a8a795/t/69b07c409b26607311ab38b3/1773173825029/Bellows+report+2000.pdf); U.S. Air Force, *Informal Technical Information Report for Site SD-22: Engineering Evaluation/Cost Analysis for Operable Unit 1 (Sites LF01, DP17, Sd22, and DP06), Bellows Air Force Station, Oahu, Hawaii* (Honolulu, Hawai'i: CH2M HILL, January 7, 2000), <https://static1.squarespace.com/static/6005a180c8cd610112a8a795/t/69b07c409b26607311ab38b3/1773173825029/Bellows+report+2000.pdf>; U.S. Naval Facilities Engineering Systems Command Hawaii, *Site Inspection: Per- and Polyfluoroalkyl Substances (PFAS) Sites, Marine Corps Base Hawaii, Oahu, HI, Kane'ohe Bay, Hawaii (Site 4; AOI 1-6, 22)* (November 2023); Pat Elder, "The PFAS Shell Game at Bellows Air Force Station," *Military Poisons*, March 10, 2026, <https://www.militarypoisons.org/latest-news/the-pfas-shell-game-at-bellows-air-force-station>.

²¹ U.S. Environmental Protection Agency, *Interim Guidance on the Destruction and Disposal of Perfluoroalkyl and Polyfluoroalkyl Substances*, 2024, <https://www.epa.gov/system/files/documents/2024-04/2024-interim-guidance-on-pfas-destruction-and-disposal.pdf>; U.S. Environmental Protection Agency, "Superfund Site Profile: South Weymouth Naval Air Station (EPA ID: MA2170022022)," (n.d.), <https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?function=second.cleanup&id=0101826>.

²² U.S. Environmental Protection Agency, *Interim Guidance on the Destruction and Disposal of Perfluoroalkyl and Polyfluoroalkyl Substances*, 2024.

adds roughly \$500 to \$1,000 per ton for containerizing the soil, ocean freight, and trucking on the continent — bringing the average all-in cost to approximately \$3,230 per ton.²³ The combined cost for both sites comes to approximately \$25 million.²⁴

Soil, Groundwater, and Coastal Testing and Monitoring

Beyond the two excavation sites, testing at helicopter landing zones, weapons firing areas, fuel storage areas, and disposal pits ranges from \$935 per surface sample²⁵ to over \$4,000 for samples taken 20 feet below ground.²⁶ Monitoring well installation runs \$15,000 to \$40,000 per well.²⁷ If groundwater contamination is confirmed, a pump-and-treat system benchmarked at \$5.55 million to construct and \$1 million per year to operate would push 30-year costs above \$35 million.²⁸ Because Bellows borders Waimānalo Bay, testing nearshore sediments, sea foam, shellfish, and fish

is essential to determine how much contamination has reached the coast. Water and sediment samples cost \$765 and \$935, respectively.²⁹ Voluntary blood serum testing for residents is estimated at \$279 per participant plus overhead.³⁰



U.S. Army soldiers conduct an amphibious training operation at Bellows Air Force Station on the windward coast of O’ahu, February 25, 2026. PFAS remediation costs at Bellows alone are conservatively estimated at \$55 million, with contamination documented in soil, groundwater, and the adjacent Waimānalo Stream corridor. Photo credit: U.S. Army / Sgt. Devin Davis.

23 Freightos, *Free Container Shipping Cost Calculator*, 2024, <https://www.freightos.com/freight-resources/container-shipping-cost-calculator-free-tool>.

24 The \$25 million estimate is based on a 3-foot excavation across two half-acre sites (roughly 4,840 cubic yards), a bulk density of 1.6 tons per cubic yard, and an all-in disposal cost of \$3,230 per ton, which includes containment, ocean transport, and mainland disposal.

25 Sampling cost is estimated at approximately 1.7 times the laboratory analytical fees to account for field labor, mobilization, project management, overhead, and contractor profit. Laboratory fees are based on University of Wisconsin-Madison State Laboratory of Hygiene, *PFAS (Per and Polyfluoroalkyl Substances) Testing* (November 2025), <https://www.slh.wisc.edu/environmental/pfas>.

26 University of Wisconsin-Madison State Laboratory of Hygiene, *PFAS analytical pricing schedule*. <https://www.slh.wisc.edu/environmental/pfas>; Interstate Technology & Regulatory Council (ITRC), *PFAS Technical and Regulatory Guidance Document and Fact Sheets (PFAS-1): Sampling and Analysis*, <https://pfas-1.itrcweb.org/11-sampling-and-analytical-methods>; Sinodrills, “Geotechnical Drilling Cost: How Much Does Geotechnical Drilling Cost?” May 14, 2025, <https://www.sinodrills.com/geotechnical-drilling-cost>. The \$4,000 estimate is derived as follows: small-rig mobilization for a single day, allocated to one sample location, costs \$1,000; drilling/boring to 20 feet at \$50 per foot: \$1,000; field labor and technical oversight (4 hours at \$150 per hour): \$600; advanced analytical testing and reporting for one deep soil sample: \$1,000; utility locating, permits, site prep, restoration, basic clearance, setup, and closeout: \$400.

27 DrillerDB, *Hawai’i Private Well Guide*, <https://drillerdb.com/resources/well-owner/hawaii-well-guide#costs>.

28 National Guard Bureau, *Engineering Evaluation/Cost Analysis, Alternative A4: Stewart Air National Guard Base Groundwater Interception System — Appendix A*. United States Army National Guard, 2022.

29 University of Wisconsin-Madison State Laboratory of Hygiene, *PFAS Testing*, November 2025.

30 Empower DX, *PFAS Exposure Blood Test, Self-Collected*, <https://empowerdxlab.com/products/product/pfas-16-test-legacy-compounds>. The cost of \$279 per participant is multiplied by a factor of 1.7 to account for administrative and contractor overhead, producing an all-in cost estimate.

Accordingly, total costs for the excavation of PFAS-contaminated soil at just two high-risk sites at Bellows, along with environmental testing and monitoring, would likely far exceed \$55 million over the course of 30 years.

2. Schofield Barracks

Schofield Barracks covers 17,725 acres in central O‘ahu. Its 56 Federal Facility Agreement sites,³¹ plus four newly identified Areas of Potential Interest,³² i.e., sites identified by the DoD as warranting further evaluation under the CERCLA process, represent the most complex

contamination problem in this analysis. Confirmed PFOS (a type of PFAS) contamination at 130 µg/kg (130,000 ppt)³³ at 0–2 feet below ground surface indicates severe and likely deeper contamination,³⁴ as comparable military sites show PFAS penetrating 4–5 feet down.³⁵ The installation’s wastewater treatment plant distributes R-1 quality recycled water across Schofield, Helemano Military Reservation, Leilehua Golf Course, and East Range – but R-1 treatment does not remove PFAS.³⁶ Overflow discharges to Kaukonahua Stream, spreading contamination into the broader watershed.³⁷

31 U.S. Environmental Protection Agency Region IX, State of Hawaii Department of Health, and U.S. Army, *Federal Facility Agreement for Schofield Barracks* (June 2025), <https://www.epa.gov/system/files/documents/2025-06/schofield-barracks.pdf>.

32 U.S. Army Corps of Engineers, *Final Preliminary Assessment and Site Inspection: Schofield Barracks and Kawaihoa-Poamoho Training Area*, August 2023.

33 U.S. Army Corps of Engineers, *Table 7-2 Soil PFOS, PFOA, PFBS, PFNA, and PFHxS Analytical Results, in Final Preliminary Assessment/Site Inspection: Schofield Barracks and Kawaihoa-Poamoho Training Area*, August 2023.

34 U.S. Army Corps of Engineers, *Final Preliminary Assessment and Site Inspection: Schofield Barracks and Kawaihoa-Poamoho Training Area*, August 2023.

35 Amec Foster Wheeler Environment & Infrastructure, Inc., *Final Site Inspection Report: Patrick Space Force Base, Florida* (prepared for Air Force Civil Engineer Center, Joint Base San Antonio-Lackland, TX, December 2017), https://www.patrick.spaceforce.mil/Portals/14/documents/PFAS_Final_SiteInv_Report_Patrick_AFB_Dec_2017.pdf. The report notes PFOS concentrations of 660 µg/kg at 4 to 5 feet below ground surface at fire training areas, demonstrating that PFAS contamination can penetrate significantly into the vadose zone under repeated AFFF application conditions.

36 Roger Brewer, *Field Study of Per- and Polyfluoroalkyl Substances Associated with Wastewater Treatment Plants, Landfills and AFFF-Release Sites in Hawai‘i* (Hawai‘i State Department of Health, November 2024), <https://health.hawaii.gov/heer/files/2025/04/HawaiiPFASStudyHIDOHNov2024rev21Apr2025.pdf>; Wastewater Branch, *Reuse Guidelines* (Hawai‘i State Department of Health, January 2016), <https://health.hawaii.gov/wastewater/files/2021/10/V1-RWFacilities1.pdf>.

37 State of Hawai‘i Department of Health, *Notice of Clean Water Branch Recommendations for Water Pollution Control Permit for Schofield Barracks Wastewater Treatment Plant NPDES Permit No. HI 0110141*, November 6, 2024, <https://health.hawaii.gov/cwb/submenu/notice-of-clean-water-branch-recommendations-for-water-pollution-control-permit-for-schofield-barracks-wastewater-treatment-plant-mpdes-permit-no-hi-0110141>. The notice explains that the plant treats all influent water to R-1 quality and discharges it into an irrigation system, but when the irrigation system is under maintenance or storage capacity is exceeded, secondary effluent may be discharged into Kaukonahua Stream through Outfall Serial No. 001.

Schofield: Key Cost Drivers

- Soil excavation and Subtitle C hazardous waste disposal (four fire training sites, 5-foot depth): \$69.3M
- 10 groundwater pump-and-treat systems (30-year lifecycle): \$339M combined
- 16 deep multilevel monitoring wells at high-priority sites: \$41.6M
- Deep water monitoring well at H-Power waste-to-energy facility: \$2.6M
- Soil testing across 60 sites (2,132 samples): \$2.5M
- Landfill leachate GAC treatment ~\$750,000 plus \$9.6M (operations and maintenance for 30 years)
- Fish testing, wastewater pathway testing, indoor dust and blood serum screening: ~\$270,000

Cleaning Up Contaminated Soil: \$69 Million

The single largest cost is excavating and disposing of PFAS-contaminated soil at four fire training sites. Hawai‘i has no approved hazardous waste landfill — every ton must be packaged, shipped, and disposed of on the mainland. Excavation goes 5 feet deep at each half-acre site — deeper than typical — because comparable military bases

show PFAS doesn’t stay near the surface; it sinks.³⁸ Each site generates roughly 5,600 tons of hazardous waste.³⁹ Disposal fees alone run approximately \$2,200 per ton,⁴⁰ and ocean shipping adds another \$5 million per site.⁴¹ Assuming all PFAS-contaminated soil must be managed as hazardous waste, each site could cost roughly \$17.3 million to “remediate,”⁴² bringing the total for four sites to about \$69.3 million.

38 U.S. Environmental Protection Agency, *Interim Guidance on the Destruction and Disposal of Perfluoroalkyl and Polyfluoroalkyl Substances*, 2024.

39 Author’s calculation: A 0.5-acre site excavated to 5 feet yields approximately 108,900 cubic feet (4,033 cubic yards) of soil; at 1.4 tons per cubic yard, this equals about 5,647 tons per site.

40 Clean Harbors Environmental Services, *CleanPack Disposal Rate Sheet* (2023), <https://imlive.s3.amazonaws.com/Missouri%20Office%20of%20Administration/ID249077886527834892082299916314520038615/cs-181001001price.pdf>. Subtitle C landfill disposal is \$329.68 per 55-gallon drum; assuming a net weight of 300 pounds per drum for dense soil, this converts to approximately \$2,200 per ton.

41 Freightos, *Free Container Shipping Cost Calculator*, 2024. At 20 tons per 40-foot container, 5,647 tons of soil requires approximately 282 containers per site. Combined ocean freight, port handling, manifesting, and drayage costs are estimated at about \$5 million per site.

42 U.S. Environmental Protection Agency, *Resource Conservation and Recovery Act (RCRA) Overview*, <https://www.epa.gov/rcra/resource-conservation-and-recovery-act-rcra-overview>. Under current EPA regulations, hazardous waste is managed under RCRA Subtitle C; the EPA has proposed listed nine PFAS compounds as hazardous under RCRA.

*Capturing Contaminated Groundwater:
\$339 Million over 30 Years*

Containing PFAS migration requires pump-and-treat systems — extraction wells that pull up contaminated groundwater, filter out the PFAS, and discharge treated water. These systems manage the problem; they do not solve it. Given Schofield’s scale of more than 17,000 acres, a credible strategy requires 10 such systems. Using the Stewart Air National Guard Base as a benchmark, a 50-gallon-per-minute system has a present-worth 30-year operating cost of \$33.9 million.⁴³ Ten systems over 30 years: \$339 million.

*Tracking How Deep the Contamination Goes:
\$41.6 Million*

Sixteen deep multilevel monitoring wells are needed at the base’s highest-risk sites to determine whether and when PFAS has

reached deeper aquifers.⁴⁴ A single deep well in Hawai‘i costs approximately \$2 million, with multilevel designs running 20 to 40 percent higher.⁴⁵ Sixteen wells at a 30 percent premium for multilevel designs: \$41.6 million.

Additional Testing and Treatment

Sludge from the Schofield Barracks Wastewater Treatment Plant, which treats sewage from Schofield and Wheeler Army Airfield, is delivered primarily to the H-POWER waste-to-energy facility, with overflow or non-combustible material occasionally diverted to the municipal landfill.⁴⁶ However, H-POWER’s incinerator does not get hot enough to destroy PFAS. The ash, which contains PFAS, is loaded into trucks and sent to the Waimānalo Gulch Sanitary Landfill. One deep monitoring well should be installed at the landfill, with

Our calculation assumes all excavated soil would be managed as hazardous waste. See U.S. Environmental Protection Agency, “Proposal to List Nine Per- and Polyfluoroalkyl Compounds as Resource Conservation and Recovery Act Hazardous Constituents,” March 2, 2026, <https://www.epa.gov/hw/proposal-list-nine-and-polyfluoroalkyl-compounds-resource-conservation-and-recovery-act>.

43 National Guard Bureau, Environmental Division, Restoration Branch, *Final Engineering Evaluation/Cost Analysis Non-Time-Critical Removal Action of Per- and Polyfluoroalkyl Substances in Groundwater and Stormwater Infrastructure* (Joint Base Andrews, MD: July 2025), https://www.105aw.ang.af.mil/Portals/6/documents/250813_Final%20Engineering%20Evaluation_Cost%20Analysis_Stewart%20ANGB.pdf. The report notes that the present-worth cost for a single 50-gallon-per-minute groundwater treatment system operating over a 30-year period is approximately \$33.9 million; 10 such systems would cost \$339 million.

44 The 16 high-risk sites are based on descriptions in the Federal Facility Agreement for Schofield Barracks, the final preliminary assessment and site inspection for PFAS at Schofield Barracks, and Kawaihoa-Poamoho Training Area, and the role of H-Power waste-to-energy facility in processing solid waste from these facilities. See Department of the Army, *Schofield Barracks Federal Facility Agreement* (Department of Defense, September 27, 1991), <https://www.epa.gov/system/files/documents/2025-06/schofield-barracks.pdf>; U.S. Army Corps of Engineers, *Final Preliminary Assessment and Site Inspection of Per- and Polyfluoroalkyl Substances: Schofield Barracks and Kawaihoa-Poamoho Training Area, Hawaii*.

45 Hawai‘i Commission on Water Resource Management, *FY2025-2027 Budget Requests Detail*, State of Hawai‘i Department of Land and Natural Resources, February 3, 2024, 6, <https://files.hawaii.gov/dlnr/cwrm/submittal/2025/sb20250218C4.pdf>. Baseline costs are estimated at \$2 million per 1,000-foot conventional deep well, adjusted upward 20–40 percent for multilevel completion. This yields an estimated \$2.6 million per multilevel well; for 16 wells, total costs are approximately \$41.6 million.

46 City and County of Honolulu, Department of Environmental Services, *Final Integrated Solid Waste Management Plan Update*, November 2019, https://www.honolulu.gov/env/wp-content/uploads/sites/29/2023/10/ISWMP_2019_Final.pdf.

an estimated cost of \$2.6 million.

Additional costs include:

- Soil testing across 60 never-evaluated sites: ~\$2.5 million.⁴⁷
- Landfill leachate carbon filtration at Waimānalo Gulch: approximately \$750,000 capital plus \$321,000 per year in operations and maintenance.⁴⁸
- Fish tissue testing (100 samples, O‘ahu waterways): ~\$100,000.⁴⁹ The Hawai‘i

Department of Health has completed testing at 11 high-risk sites as of March 2026, with results pending.⁵⁰ Wastewater pathway testing along the irrigation and drainage network: \$60,605.⁵¹

- Indoor dust screening at 30 homes and voluntary blood serum testing for 30 residents: \$70,329.⁵²
- Sludge testing across the Navy composting facility and eight distribution sites: \$103,275.⁵³

47 University of Wisconsin-Madison State Laboratory of Hygiene, *PFAS Testing*, November 2025. Estimated soil testing across 60 sites includes approximately 1,770 surface samples at \$1,025 each, 210 samples at 5 feet below ground at \$1,425 each, and 152 samples at 20 feet at \$2,400 each, for an estimated total cost of \$2,478,300.

48 U.S. Environmental Protection Agency, *Resource Conservation and Recovery Act (RCRA) Overview*, 2024, <https://www.epa.gov/rcra/resource-conservation-and-recovery-act-rcra-overview>; Claire Caulfield, "The Proposed Sites For Oahu's New Landfill Would Threaten Drinking Water, Officials Say," *Honolulu Civil Beat*, December 14, 2021, <https://www.civilbeat.org/2021/12/the-proposed-sites-for-oahus-new-landfill-would-threaten-drinking-water-officials-say/>; Water & Wastewater, "Cost of PFAS Removal," August 7, 2025, <https://www.waterandwastewater.com/cost-of-pfas-removal>. Installation costs for activated carbon filtration systems range from \$500,000 to \$2 million; the \$750,000 estimate is a conservative approximation based on the relatively smaller size of Waimānalo Gulch, although construction and other costs unique to Hawai‘i's location may lead to higher estimates;

Minnesota Pollution Control Agency, *Evaluation of Current Alternatives and Estimated Cost Curves for PFAS Removal and Destruction from Municipal Wastewater, Biosolids, Landfill Leachate, and Compost Contact Water*, May 2023, <https://www.pca.state.mn.us/sites/default/files/c-pfc1-26.pdf>. Annual operations and maintenance (O&M) costs are estimated at approximately \$321,000 per year for a PFAS activated carbon leachate system treating about 10,000 gallons of leachate per day. This estimate is derived from the agency's landfill-leachate cost curve for Alternative 1a (GAC sorption followed by high-temperature incineration), which gives the annual operations and maintenance formula as: $O\&M = 2.82 \times MGD + 0.293$ (in millions of dollars per year). With approximately 10,000 gallons per day of leachate (as reported by *Civil Beat*), O&M costs for Waimānalo Gulch landfill leachate carbon filtration would be $2.82 \times 0.01 MGD + .293 = \0.321 million or \$321,000 annual (see fig. 8-3, p. 106).

49 University of Wisconsin-Madison State Laboratory of Hygiene, *PFAS Testing*, November 2025. Estimated cost for fish tissue analysis using EPA Method 1633: \$450 per sample. For 100 samples plus QC blanks, laboratory fees total \$45,000, which, when multiplied by a 1.7 contractor factor and combined with \$20,000 in field and management costs, yields an estimated total of \$96,500.

50 Hawai‘i Department of Health, Hazard Evaluation & Emergency Response Office, *Highlighted Projects: Per- and Polyfluoroalkyl Substances (PFAS)*, <https://health.hawaii.gov/heer/environmental-health/highlighted-projects/pfas>.

51 University of Wisconsin-Madison State Laboratory of Hygiene, *PFAS Testing*, November 2025. Estimated cost for wastewater pathway testing: 40 soil and 15 sediment samples at \$550 each, 10 water samples at \$450 each, plus one wastewater treatment plant effluent and one outfall sample at \$450 each, multiplied by a 1.7 contractor factor, for a total of approximately \$60,605. State of Hawai‘i Department of Health, *Notice of Clean Water Branch Recommendations*.

52 University of Wisconsin-Madison State Laboratory of Hygiene, *PFAS Testing*, November 2025. Indoor dust: 60 samples at \$550 each multiplied by 1.7 contractor factor totals \$56,100. Empower DX, *PFAS Exposure Blood Test, Self-Collected*, <https://empowerdxc.com/products/product/pfas-16-test-legacy-compounds>. Blood serum: 30 participants at \$279 each, multiplied by 1.7 contractor factor, totals \$14,229. The 30 participants would be tested as a sample population.

53 Naval Facilities Engineering Systems Command Hawai‘i, *Biosolids Treatment Facility Operations Report: Schofield/Wheeler Wastewater System Sludge Destinations* (United States Navy, 2023). Sludge testing includes compost source confirmation and eight representative application sites, totaling approximately 113 samples at an all-in cost of

What This Estimate Does Not Include

One cost category cannot be calculated: concentrated PFAS waste on the base — including firefighting foam residues, used filtration materials, and contaminated protective gear. These materials are likely classifiable as hazardous waste,⁵⁴ but without the military’s procurement records and disposal manifests, there is no defensible way to estimate the volume or removal cost.



U.S. Army soldiers from the 25th Infantry Division conduct a live-fire exercise at Schofield Barracks, August 6, 2018. Covering 17,725 acres in central O’ahu, Schofield represents the most complex PFAS contamination problem in the state, with remediation costs conservatively estimated at over \$430 million. Photo: U.S. Army / 1st Lt. Ryan DeBooy.

This estimate also does not include costs associated with filtration of groundwater used for drinking water that may be contaminated or threatened with contamination by PFAS releases at

\$103,275.

⁵⁴ U.S. Environmental Protection Agency, *Resource Conservation and Recovery Act (RCRA) Overview*, 2024. Concentrated PFAS waste streams — including AFFF residues, spent GAC, ion-exchange resins, reverse-osmosis membranes, and contaminated gear — may be classified as hazardous waste under RCRA Subtitle C but cannot be quantified without DoD procurement records, maintenance logs, and disposal manifests.

⁵⁵ Board of Water Supply, *City and County of Honolulu v. United States*, Complaint, No. 1:25-cv-00271 (D. Haw, filed July 1, 2025), <https://www.boardofwatersupply.com/bws/media/files/bws-red-hill-complaint-with-exhibits-2025-07-01.pdf>.

Schofield. To use groundwater for human consumption purposes would require much more intensive and expensive filtration systems than the pump-and-treat systems described above. For example, a granular activated carbon-based system being constructed to filter PFAS- and jet fuel-contaminated groundwater from the U.S. Navy’s Red Hill shaft for human consumption will cost an estimated \$500 million to construct, with operating costs of \$15 million per year over its 50-year working life.⁵⁵

The \$465 million sum of the above costs is a floor, not a ceiling.

3. Mākua Military Reservation

Mākua is a remote, ecologically sensitive valley on O’ahu’s western coast with a long history of live fire training and open-burn ordnance disposal. It contains rare and endangered native species and holds deep cultural significance. Key investigation priorities are the large open burn/open detonation (OB/OD) area, firefighting foam used in wildfire suppression, burn pits, three stream corridors, and groundwater migration toward the coast.

Mākua: Key Cost Drivers

- Soil testing at OB/OD burn area: \$289,500
- Surface water, sediment, and stream bank sampling (three corridors): \$94,605
- Three deep groundwater monitoring wells: \$2.44M
- Pump-and-treat system if contamination confirmed: \$8.5M capital / ~\$50M over 30 years
- Fish tissue testing, soil testing in weapons training areas, helicopter landing zone testing

Testing the Burn Areas: \$289,500

The most significant contamination source is the large open-burn and detonation area used for decades to destroy unexploded ordnance. Firefighting foam used during wildfire suppression and prescribed burns adds another likely source. Because the area is large, testing requires high-density sampling across the full footprint, estimated at \$289,500 using Wisconsin State Laboratory of Hygiene pricing.⁵⁶

Following the Water and Testing the Groundwater

Three stream corridors — the Kaluakauila, Mākua, and Kaiahi streams — drain toward the coast, and PFAS compounds accumulate in streambed sediments. Testing surface water, sediments, and stream banks at 54 locations would reveal



Live-fire training sends plumes of smoke across Mākua Military Reservation, October 2001. Decades of open-burn and ordnance disposal operations at Mākua have contaminated the valley's soil, streams, and groundwater with PFAS and other toxic residues — while wildfire smoke from training exercises poses ongoing respiratory health risks to surrounding Wai'anāe communities. Photo from the personal collection of Mālama Mākua founders Leandra Wai and Sparky Rodrigues. Credit: Leandra Wai.

⁵⁶ University of Wisconsin-Madison State Laboratory of Hygiene, *PFAS Testing*, November 2025. Estimate assumes Level 1 surface sampling density (20 samples per half-acre) across an 18-acre area, at \$550 per sample multiplied by a 1.7 contractor factor (~\$935 per sample), totaling approximately \$289,500.

how widely contamination has spread. Cost: \$94,605. Three deep monitoring wells — one in the upper training corridor, one in the central valley, one near the coastal plain — would determine whether PFAS has reached the valley’s groundwater. At Hawai’i drilling rates, each well is estimated at approximately \$813,000, for a total of roughly \$2.44 million.⁵⁷

If Groundwater Is Contaminated:

Up to \$50 Million More

Together, these investigation and monitoring costs total approximately \$3 million. If monitoring wells confirm PFAS in the groundwater, a three-well pump-and-treat system could add \$8.5 million in capital costs and up to \$50 million over a 30-year lifecycle.⁵⁸

Combined Cost Summary

Table 1 below summarizes investigation and initial remediation cost estimates for the three focal installations. These cover only a fraction of affected sites statewide; costs may increase significantly depending on the scale of contamination uncovered through site investigations; and they mitigate but do not eliminate pathways for future generations’ potential PFAS exposure. The true cost of meaningful PFAS remediation across all Hawai’i military installations with potential or likely PFAS releases is likely several multiples of the figures below.

Table 1. Investigation and Initial Remediation Cost Estimates for Bellows MCTA, Schofield Barracks, and Mākua

Site / Category	Estimated Cost
Bellows MCTA — Investigation & Initial Response	\$25M
Bellows MCTA — Pump-and-Treat (30-year lifecycle)	+\$30M
Schofield Barracks — Investigation & Partial Cleanup (not including solid waste stream remediation)	\$465M
Mākua Military Reservation — Investigation Program	\$3M
Mākua — Pump-and-Treat if contamination confirmed	+\$58M
COMBINED (investigation + initial response, three sites)	>\$493M
COMBINED with long-term groundwater treatment	>\$581M
Unquantified solid waste streams	Unknown

57 Department of Land and Natural Resources, Commission on Water Resource Management, *Hawai’i Well Construction and Pump Installation Standards*, February 2004, <https://files.hawaii.gov/dlnr/cwrm/regulations/hwcpis04.pdf>. Estimated cost assumes three deep monitoring wells at \$813,000 each (~\$2.44 million total), proportionally reduced from the \$2 million per 1,000-foot baseline to reflect shallower groundwater depths in this valley setting.

58 National Guard Bureau, *Engineering Evaluation/Cost Analysis, Alternative A4: Stewart Air National Guard Base Groundwater Interception System — Appendix A* (United States Army National Guard, 2022). A pump-and-treat system scaled to three extraction wells is estimated at approximately \$8.5 million in capital costs and \$1.4 million in annual operation and management, for a 30-year lifecycle cost of roughly \$50 million.

Limitations of Remediation: What the Above “Cleanup” Cannot Guarantee

Even full investment in the approaches described above cannot ensure the complete removal of PFAS from Hawai‘i’s environment. Several fundamental constraints must be acknowledged:

No Widely Available Technology Destroys PFAS

Soil excavation, pump-and-treat systems, and granular activated carbon filtration do not destroy PFAS — they relocate or concentrate it, transferring contamination to disposal facilities where it remains a managed hazard indefinitely. True destruction requires high-temperature incineration well beyond the capacity of standard facilities such as H-POWER.⁵⁹

Unique Circumstances and Considerations

Even superficial “remediation” of PFAS through excavation and off-site disposal may face significant complications due to Hawai‘i’s physical, economic, cultural, and regulatory context. This includes the aforementioned limited availability of vessels that can safely transport contaminated soil off-island. In addition, excavation and ground-disturbing activities may impact historic properties, including Native Hawaiian burial sites, which could

require extensive community consultation, planning, and regulatory compliance.⁶⁰

Groundwater May Require Management for Centuries

Pump-and-treat systems can hydraulically contain PFAS plumes and reduce concentrations, but they rarely achieve complete aquifer restoration — and Hawai‘i’s freshwater lens has no mainland alternative. At Wurtsmith Air Force Base in Michigan, 13 extraction wells installed after years of community pressure still do not fully capture the plume. Active management at affected Hawai‘i sites may be required for decades or centuries.



The late Protect Kaho‘olawe ‘Ohana member Gwen Kim holds an unexploded practice bomb recovered from Mākua Valley, July 17, 1977. Decades of live-fire training and open-burn ordnance disposal at Mākua have left the valley’s soil, streams, and groundwater contaminated with PFAS and other toxic residues. Photo courtesy of Ed Greevy.

59 Office of Environmental Quality Control, “Acceptance of Final Environmental Impact Statement: H-Power Expansion,” State of Hawai‘i Department of Business, Economic Development and Tourism, May 23, 2009, https://files.hawaii.gov/dbedt/erp/EA_EIS_Library/2009-05-23-OA-FEIS-Acceptance-H-Power-Expansion.pdf; U.S. Environmental Protection Agency, *Technical Brief: Per- and Polyfluoroalkyl Substances (PFAS): Incineration to Manage PFAS Waste Streams*, February 2020, https://www.epa.gov/sites/default/files/2019-09/documents/technical_brief_pfas_incineration_ioaa_approved_final_july_2019.pdf; U.S. Environmental Protection Agency, *EPA Tools and Resources Webinar: Evaluating PFAS Destruction: Testing at a Hazardous Waste Incinerator*, October 15, 2025, https://www.epa.gov/system/files/documents/2025-11/hwi-pfas-testing_october-webinar_508-compliant.pdf.

60 Mali Akutagawa and Natasha Baldauf, *Ho‘i Hou I Ka Iwikuamo‘o: A Legal Primer for the Protection of Iwi Kūpuna in Hawai‘i Nei* (Ka Huli Ao Center for Excellence in Native Hawaiian Law, William S. Richardson School of Law, 2013), <https://scholarspace.manoa.hawaii.edu/server/api/core/bitstreams/25e90d3a-c8d9-4f4e-8dea-8b697d7e0540/content>.

Multiple Exposure Pathways Remain Open
PFAS reaches people through routes beyond drinking water: fish from affected coastal and freshwater areas; produce irrigated with PFAS-contaminated recycled water; indoor dust near contaminated drainage corridors; and laundering clothes and gear exposed to PFAS-laden water or dust. R-1 recycled water distributed across Schofield and surrounding areas actively spreads PFAS with no current regulatory requirement for treatment.⁶¹

PFAS Is Not the Only Legacy Contaminant
PFAS are far from the only trans-generational toxin embedded in Hawai'i's environment by military activities. Other unresolved contaminants include unexploded ordnance and its chemical constituents, depleted uranium, PCBs, PAHs, perchloroethylene, petroleum hydrocarbons, dieldrin, and nitrate compounds.⁶² The decades-long failure to remediate these known hazards raises serious doubts about whether PFAS remediation will be achieved at any meaningful scale without significant external pressure.

Data Gaps and the Accountability Deficit
A central obstacle to accurate cost estimation, and to remediation itself, is the military's failure to disclose key

operational data: AFFF procurement records, maintenance logs, treatment system replacement schedules, disposal manifests, and records of use events and spills. The Army's PFAS assessments have systematically underweighted surface water and sediment pathways and deprioritized deep subsurface characterization.⁶³ Without this information, critical waste streams — AFFF residues, spent filters, contaminated membranes, and firefighter gear — cannot be quantified. All remediation estimates in this paper are conservative lower bounds that likely understate the true financial and environmental burden.



Bomb craters scar the floor of Mākuia Valley, documented by Protect Kaho'olawe 'Ohana members during a July 7, 1977 tour of the valley. The open-burn and open-detonation operations that created this landscape drove PFAS-laden firefighting foam and toxic ordnance residue into three stream corridors draining toward the Wai'anana coast. Photo courtesy of Ed Greevy.

61 State of Hawai'i Department of Health, *Notice of Clean Water Branch Recommendations*. The notice indicates that R-1 recycled water is distributed across Schofield Barracks, Helemano Military Reservation, Leilehua Golf Course, East Range Training Area, and Wheeler Army Airfield; current regulations do not require PFAS treatment for R-1 recycled water used for unrestricted irrigation.

62 U.S. Environmental Protection Agency, "Pearl Harbor Naval Complex: Contaminant List," <https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.contams&id=0904481>; U.S. Environmental Protection Agency, "Schofield Barracks (USARMY): Contaminant List," <https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.contams&id=0902923>; Tetra Tech, *Hickam Air Force Base Military Housing: Human Health Risk Assessment*, Tetra Tech R&D. <https://rd.tetrattech.com/?pursuit=RiskAssessment&proj=XXX-Hickam>; "The Navy's 'Superfund Six,'" *Environment Hawai'i* 2, no. 6 (December 1991), <https://environment-hawaii.org/?p=3935>.

63 United States Army Corps of Engineers, *Final Preliminary Assessment and Site Inspection: Schofield Barracks and Kawaiiloa-Poamoho Training Area, Hawaii*, August 2023. The PA/SI concludes that surface-water exposure pathways are "incomplete" because on-installation streams are not used as drinking water sources, despite documented uncontrolled runoff to Kaukonahua Gulch and adjacent drainage features.

Recommendations

Addressing the full scope of military PFAS contamination in Hawai'i requires coordinated action across all levels of government.

Federal Action

- Require comprehensive PFAS disclosure: Congress should mandate that the Department of Defense (DoD) release procurement records, maintenance logs, and disposal manifests for AFFF and related materials at all Hawai'i installations.
- Expand CERCLA investigations by reopening sites that were prematurely closed, including 11 Army installations where PFAS investigations were halted; require investigation of all possible PFAS release sites, including medical facilities, training areas, industrial sites, and any sites where PFAS may have been released; investigate potential PFAS sources beyond AFFF; and require mandatory testing of soil, groundwater and vadose zones, wastewater, nearshore waters and sediment, biota, and all possible environmental sources and exposure pathways within and outside of installation fencelines, using a full range of PFAS analytes such as those covered by EPA method 1633 or successor methods.
- Impose enforceable timelines and real-time public disclosure requirements for CERCLA investigation and remediation

actions.

- Require reexamination of DoD “critical use” determinations on what PFAS uses are “indispensable” to ensure that safer alternatives are fully evaluated and that “essential use” claims are narrowly defined and scientifically justified.
- Fund research into PFAS destruction technologies and prioritize deployment at Hawai'i installations where off-island disposal is prohibitively expensive.
- Establish a dedicated Hawai'i PFAS remediation fund that accounts for island-specific logistics costs.

State Action

- Require PFAS testing in recycled water. The Hawai'i Department of Health should set maximum PFAS concentrations for R-1 recycled water and require treatment upgrades where contamination is detected.
- Implement statewide fish tissue monitoring comparable to programs in states with significant military PFAS contamination.⁶⁴

Community Protections

- Establish voluntary biomonitoring programs offering PFAS blood serum testing to residents near identified source areas and drainage corridors.⁶⁵
- Ensure public access to all PFAS sampling results, investigation reports,

64 See Michigan Department of Environment, Great Lakes, and Energy, “PFAS in Fish,” State of Michigan, accessed May 13, 2026, <https://www.michigan.gov/pfasresponse/fishandwildlife/fish>.

65 Empower DX, *PFAS Exposure Blood Test, Self-Collected*. Voluntary serum testing should be offered to residents of the 30 homes selected for indoor dust sampling, with priority given to those closest to identified source areas and drainage corridors. <https://www.google.com/search?client=safari&rls=en&q=Empower+DX%2C+PFAS+Exposure+Blood+Test%2C+Self-Collected.&ie=UTF-8&oe=UTF-8>

and remediation plans in a centralized, accessible database.

- Fund independent technical oversight — not on DoD contractors — to review investigation adequacy and remediation design.

Conclusion

PFAS contamination at Hawai'i military installations is not a future risk — it is a present harm with generational consequences. The chemicals are already present in soil, groundwater, fish, air, and indoor dust and have been detected in the blood of nearly all people, far beyond the boundaries of any single site. The question before policymakers is not whether action is needed but whether the political will exists to demand the accountability and investment required. Conservative estimates for investigating and partially remediating just three installations exceed \$493 million. Statewide costs would be several multiples of that — and even this extraordinary investment cannot guarantee elimination of PFAS from Hawai'i's environment, only its ongoing management at great expense. Indirect and additional costs (including those related to drinking water filtration), increased cancer rates and other public health impacts, and losses in economic activity due to PFAS contamination (including food production, housing, and tourism) would put the total cost of military-sourced PFAS

contamination at billions of dollars, if not more.

Broader discussions about the military's economic contributions to Hawai'i and about the future of military land leases must not proceed without honest accounting of these and many other largely unaddressed environmental costs. The communities of Hawai'i — present and future — deserve nothing less.



Public Health Consequences of Military Presence in Hawai'i

Laurel Mei-Singh and Neta C. Crawford

Public Health Consequences of Military Presence in Hawai‘i

Laurel Mei-Singh and Neta C. Crawford¹

Key Findings

- Robust human health in Hawai‘i depends on clean air, land, water, and a diverse plant and animal life. The ‘āina — that which nourishes and feeds, which sustains us all — is threatened by pollution and climate change, both of which are exacerbated by military operations.
- U.S. military bases, operations, and training activities have polluted Hawai‘i’s land and air, as well as the surface, ground, and ocean waters, with chemicals known or suspected to be neurotoxins, carcinogens, and mutagens. Military land use has caused the dispossession and displacement of Native Hawaiians.
- While proving the exact health impacts of military activities is difficult, military operations and related pollutants are more likely than not to have caused significant short- and long-term harm to the residents of Hawai‘i, including higher rates of certain diseases. Those living in or near military bases are more likely to self-report “poor” or “fair” health and to live in areas with less access to resources. While there is no incontrovertible evidence that military presence directly causes these outcomes, the findings show a consistent correlation between base proximity and lower overall community well-being.
- Greenhouse gas emissions from military installations and training also pose long-term harm to Hawai‘i, as climate change increases temperatures, decreases rainfall, and raises sea levels, increasing flood risks. Further, military exercises may also disrupt the ocean’s carbon cycle by damaging marine life.
- The military’s use and control of 250,000 acres in the islands — including more than 46,000 acres of leased land that expires in 2029 — prevents alternative land uses that could promote health.

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Caption: Mākuā, spanning mauka to makai, is part of an ahupuaʻa system that approaches land and sea as interconnected to sustain community health and well-being. Photo credit: Still from Mālama Mākuā documentary

Introduction

For generations, Native Hawaiians have stewarded the land in ways that sustain both communities and the environment. Within this model, ecological vitality and abundance are directly tied to community and individual well-being.²

Yet the military's presence in Hawai'i has systematically undermined this relationship between land stewardship and well-being, threatening both the environment and the health of island communities.

The military impacts public health in numerous ways, both direct and indirect. The military directly affects public health through the release of toxins into

the environment. Specifically, military equipment, fuel, and weapons have polluted the water, soil, and air, posing significant immediate and long-term health hazards. For example, recent jet fuel leaks at Red Hill on O'ahu contaminated O'ahu's primary aquifer, leading to numerous health issues among Hawai'i residents and military personnel. These leaks had been occurring for several years before the military acknowledged and addressed them. Yet, little information is available about the precise health outcomes of exposure to particular environmental hazards, and, even when information is available, it is difficult to quantify the level of individual exposure to one or more toxins and then to definitively tie it to an individual's illness. Clusters of illness may be present in communities where there

2 Davianna Pomaika'i McGregor et al., "An Ecological Model of Native Hawaiian Well-Being," *Pacific Health Dialog* 10, no. 2 (2003): 106-28.

is a known exposure, but even a high correlation of exposure with illness does not establish causality.

Military presence affects access to land for food and housing and prevents land use practices that promote community well-being. Depriving an island population of significant land while releasing large amounts of toxins into the water, air, and soil undermines people's ability to thrive. Military land use has also triggered the dispossession and displacement of Native Hawaiian communities. It has done so by interrupting sustainable land tenure systems practiced by Native Hawaiians. Public health research shows that displacement is harmful to public health. U.S. military operations and land use in Hawai'i have resulted in environmental contamination, displacement, and the disruption of Native Hawaiian practices that sustain and restore the environment. These impacts disproportionately affect Native Hawaiians, other Pacific Islanders, recent migrants, and poor and working-class communities.

The U.S. military has been active in Hawai'i since the early 19th century. In 1842, U.S. President Tyler proclaimed the then "Sandwich Islands" in the U.S. sphere of interest (an extension of the Monroe Doctrine). Hawai'i became important for resupply, including coaling in the 19th and early 20th centuries. For instance, Hawai'i served as a resupply base during Commodore Perry's expedition in 1852. Later, after the U.S. acquired a military lease on the islands, naval refueling occurred in Hawai'i at Pearl Harbor on the way to capture the Philippines in 1899. Military use of the islands expanded in the 20th century, as the number of bases

and their uses increased. As a former coaling station, and now as the Indo-Pacific command hub and staging ground, Hawai'i has been central to the military's dependence on fossil fuels.

The military's use of fossil fuels, and operations that harm the ability of the oceans to sequester carbon, contribute to climate change. The islands' ecosystem is extremely sensitive and vulnerable to the effects of climate change — from rising temperatures, to drought, to torrential and unpredictable rainfall, to sea level rise that leads to coastal flooding and erosion.



Explosives in military vehicle. Photo credit: Photo by Ed Greevy.

A health-promoting environment entails access to clean drinking water, fresh air, and land for sustainable food production. Community land stewardship likewise

makes life-giving resources accessible to the public. Returning and remediating military lands to secure Native Hawaiian stewardship for cultural, conservation, agricultural, and housing purposes would mitigate the public health costs of militarism in Hawai'i and promote the health of all the islands' people.

This chapter lays out the relationships of the military to public health, presents maps and case studies, and concludes with policy recommendations.

Environmental Exposures and Public Health Impacts

The land, air, and waters of Hawai'i are the location of a diverse set of military activities including training in amphibious assault, bombardment with live ammunition, firefighting, refueling, equipment maintenance, and the take-off and landing of aircraft. When the U.S. is at war, or is mobilizing for one, Hawai'i also serves as a launching pad for ships, submarines, aircraft, and troops. Thousands of U.S. troops are permanently stationed on the islands, while U.S. allies regularly deploy for multinational naval and live fire exercises, including the semi-annual Rim of the Pacific (RIMPAC).

All of these activities in Hawai'i can introduce a wide range of toxic substances into the land, water, and air, posing

significant risks to the environment and public health. Table 1 lists some of the chemicals found above and below ground, in the air, and in the water at current and former military bases and installations on the islands.

Land contamination from both exploded and unexploded ordnance may pose significant threats to public health. Millions of tons of weapons debris have been left at various training areas across the islands. Ammunition, whether used or unexploded, can contain depleted uranium and lead.³ Depleted uranium used in artillery training at Pōhakuloa Training Area and Schofield Barracks has been associated with pulmonary, neurological, renal, immune, hepatic, reproductive, hematological, and carcinogenic effects, while radioactive waste, including Cobalt-60, has been documented at Pearl Harbor. Unexploded munitions also contain the explosive TNT, itself a possible human carcinogen. When it decays, it turns into trinitrobenzene, another possible carcinogen, and other toxic chemicals. As the U.S. Environmental Protection Agency said, "TNT is still widely used in U.S. military munitions and accounts for a large portion of the explosives-related contamination at active and former U.S. military installations."⁴

Chemicals are also inadvertently released into the environment through leaking barrels, storage tanks, and pipelines on bases and in surrounding areas. Waste from

3 James Morrow, David Faucette, and Helene Takemoto, "Estimating Public Exposure to Airborne Depleted Uranium Outside the Pohakuloa Training Area, Hawai'i," presented at the 104th Annual Conference & Exhibition of the Air & Waste Management Association, Orlando, Florida, June 22, 2011,

https://home.army.mil/hawaii/8115/5961/1870/EstimatingPublicExposureToDU_2011.pdf.

4 U.S. Environmental Protection Agency, Technical Fact Sheet, 2,3,6-Trinitrotoluene (TNT) (January 2014), https://19january2017snapshot.epa.gov/sites/production/files/2014-03/documents/ffrrofactsheet_contaminant_tnt_january2014_final.pdf.

chemical weapons has been deliberately dumped into the ocean.⁵

The water has also been contaminated. At Red Hill, jet fuel contamination of the water system in 2021 immediately led to headaches, migraines, and skin and gastrointestinal problems. Ongoing monitoring through the Red Hill Registry is needed to assess longer-term outcomes.

Per- and polyfluoroalkyl substances (PFAS) chemicals used in firefighting have also been released during training exercises, some of which have caused fires that have burned thousands of acres of Hawaiian land. PFAS exposure is associated with decreased antibody response, dyslipidemia, impaired fetal and infant growth, and increased risk of kidney cancer. The Red Hill site has also been linked to PFAS contamination.

Table 1. Contamination and Effects of Military Bases and Operations

Toxin	Location/Source	Potential Health Effects
Arsenic	Pearl Harbor ⁶	Short-term exposure: vomiting, abdominal pain, diarrhea, numbness and tingling of extremities, muscle cramping, death; Long-term exposure: carcinogenic, skin lesions, cardiovascular disease, diabetes; In utero and early childhood exposure: negative impacts on cognitive development, increased mortality of young adults due to cancer, lung disease, heart attacks, kidney failure ⁷
Chemical munitions (mustard, lewisite, cyanogen chloride, hydrogen cyanide)	8,000 tons dumped off Pearl Harbor and the Wai'anae Coast in 1944 and 194 ⁸	Mustard and lewisite: Blistering, pain, burning, digestive and respiratory symptoms; ⁹ cyanogen chloride, hydrogen cyanide: cellular asphyxiation, neurological/heart damage ¹⁰

5 Jan TenBruggencate, "Dumped Toxic Weapons Still Lurk in Sea off O'ahu," *The Honolulu Advertiser*, November 3, 2005, <https://the.honoluluadvertiser.com/article/2005/Nov/03/In/FP511030313.html>.

6 U.S. Environmental Protection Agency, "Pearl Harbor Naval Complex; Pearl Harbor, HI Contaminant List," <https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.contams&id=0904481>.

7 World Health Organization, "Arsenic," December 7, 2022, <https://www.who.int/news-room/fact-sheets/detail/arsenic>.

8 TenBruggencate, "Dumped Toxic Weapons."

9 Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, "Emergency Response Card: Mustard agent (H, HD)," May 12, 2011, https://www.cdc.gov/niosh/ershdb/emergencyresponse-card_29750006.html; Centers for Disease Control and Prevention, "Mustard Gas," September 6, 2024, <https://www.cdc.gov/chemical-emergencies/chemical-fact-sheets/mustard-gas.html>; Johns Hopkins Center for Health Security, *Cyanide*, November 2, 2022, <https://centerforhealthsecurity.org/sites/default/files/2023-02/cyanide.pdf>.

10 Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, "Cyanogen Chloride (CK): Systemic Agent," May 12, 2011, https://www.cdc.gov/niosh/ershdb/emergencyresponsecard_29750039.html.

Toxin	Location/Source	Potential Health Effects
Depleted uranium	Used in artillery rounds at Pōhakuloa Training Area and Schofield Barracks ¹¹	Pulmonary toxicity, neurotoxicity, nephrotoxicity, immunotoxicity, hepatotoxicity, reproductive toxicity, cancer, bone toxicity, and hematological toxicity ¹²
Heavy metals (lead, mercury, cadmium)	Throughout Pearl Harbor, ¹³ remnants of exploded ordnance at various firing ranges, including Mākua Valley, Pōhakuloa Training Area, and Schofield Barracks	Lead is associated with neurodevelopmental harm in children, cardiovascular disease, kidney damage, and reproductive toxicity; mercury causes neurological and developmental impairment, particularly in fetuses and children; and cadmium is linked to kidney damage, bone demineralization, pulmonary toxicity, and increased cancer risk ¹⁴
Jet fuel	Red Hill ¹⁵	From Red Hill studies and broader literature: headaches/migraine, skin issues, gastrointestinal issues acutely. The Red Hill Registry will be used to determine if long-term issues will occur.
Nitrates, sulfuric acid and organic solvents	Ocean dumping near Pearl Harbor	Carcinogenic

11 Hawai'i State Department of Health, *The Facts About Depleted Uranium in Hawai'i* (Honolulu: State of Hawai'i, 2003).

12 Hong Wang et al., "Implications of Depleted Uranium: An Update," *Journal of Applied Toxicology* 45, no. 7 (July 2025): 1165–75, <https://doi.org/10.1002/jat.4720>.

13 U.S. Environmental Protection Agency, "Pearl Harbor Naval Complex; Pearl Harbor, HI Contaminant List," <https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.contams&id=0904481>.

14 Agency for Toxic Substances and Disease Registry, *Toxicological Profile for Lead* (Atlanta: U.S. Department of Health and Human Services, 2020); Agency for Toxic Substances and Disease Registry, *Toxicological Profile for Cadmium* (Atlanta: U.S. Department of Health and Human Services, 2022).

15 Red Hill Registry, "Home," <https://redhillregistry.org>.

Toxin	Location/Source	Potential Health Effects
PCBs (polychlorinated biphenyls)	Pearl Harbor, Lualualei Naval Annex, Naval Computer and Telecommunications Area Master Station Eastern Pacific in Wahiawa, Kāneʻohe Marine Corps base ¹⁶	Immune suppressant, neurological damage, carcinogenic, reproductive and developmental effects, thyroid damage ¹⁷
PFAS (per- and polyfluoroalkyl substances)	Red Hill, Pōhakuloa, Kilauea Military Reservation ¹⁸	Decreased antibody response, dyslipidemia, decreased infant and fetal growth, and increased risk of kidney cancer (in adults) ¹⁹
TNT ²⁰	Unexploded ordnance	Associated with cancer
Radioactive waste (including Cobalt-60)	Pearl Harbor and ocean dumping	Carcinogenic, cataracts, cardiovascular disease, and heritable effects ²¹

16 U.S. Environmental Protection Agency, "Pearl Harbor Naval Complex," Superfund Site Information, <https://cumulis.epa.gov/supercpad/cursites/csinfo.cfm?id=0902904>; Hawai'i Department of Health, "Hawaii Department of Health Issues Fish and Shellfish Advisory," December 6, 2017, <https://health.hawaii.gov/news/files/2017/12/17-102-DOH-issues-fish-advisory.pdf>; U.S. Environmental Protection Agency, "U.S. Navy Agrees to Clean Up Wahiawa and Lualualei Superfund Sites," April 2, 2009, https://www.epa.gov/archive/epapages/newsroom_archive/newsreleases/74fe6dad69b042d58525758c006726ff.html.

17 David O. Carpenter, "Polychlorinated Biphenyls (PCBs): Routes of Exposure and Effects on Human Health," *Reviews on Environmental Health* 21, no. 1 (January 1, 2006): 1–23, <https://doi.org/10.1515/reveh.2006.21.1.1>.

18 Pat Elder, "PFAS at the Pōhakuloa Training Area and the Kilauea Military Reservation, Hawai'i," *Military Poisons*, January 14, 2026, <https://www.militarypoisons.org/latest-news/pfas-at-the-phakuloa-training-area-and-the-kilauea-military-reservation-hawaii>.

19 National Academies of Sciences, Engineering, and Medicine, *Guidance on PFAS Exposure, Testing, and Clinical Follow-Up* (Washington, DC: The National Academies Press, 2022), <https://doi.org/10.17226/26156>.

20 U.S. Environmental Protection Agency, *Technical Fact Sheet, 2,3,6-Trinitrotoluene (TNT)*.

21 National Research Council, *Health Risks from Exposure to Low Levels of Ionizing Radiation: BEIR VII Phase 2* (Washington, DC: The National Academies Press, 2006), <https://doi.org/10.17226/11340>; United Nations Scientific Committee on the Effects of Atomic Radiation, *Sources and Effects of Ionizing Radiation* (New York: United Nations, 2008).

Toxin	Location/Source	Potential Health Effects
Uranium, lead, mercury, nitric acid, diethylamine, triethylamine, etc.	Unexploded ordnance at various military sites	Carcinogenic, neurotoxic
Very low frequency (VLF) and extremely low frequency (ELF) electromagnetic waves	Lualualei	Potentially carcinogenic (leukemia and brain), particularly among children ²²
Wildfire smoke (PM2.5, carbon monoxide (CO), and volatile organic compounds (VOCs))	Pōhakuloa, ²³ Mākua ²⁴	General respiratory health effects, specifically exacerbations of asthma and chronic obstructive pulmonary disease. Growing evidence suggests associations with increased risk of respiratory infections and all-cause mortality ²⁵

Finally, power generation and vehicle emissions in and near military bases can release toxic chemicals into the air as well as significant amounts of greenhouse gases. More visible, smoke in areas where the military sparks forest fires releases coarse and fine-grain particles

into the atmosphere. In July and August 2022, munitions testing sparked a fire at Pōhakuloa Training Area on Hawai'i that burned over 17,000 acres. About 1,261 wildfires were recorded at Pōhakuloa by PTA firefighters over a 50-year period, an average of more than 25 fires per year.²⁶

22 John R. Goldsmith, "Epidemiologic Evidence Relevant to Radar (Microwave) Effects," *Environmental Health Perspectives* 105, suppl. 6 (1997): 1579.

23 The Army acknowledges setting fires in 2018, 2021, and 2022 that burned over 19,000 acres. The 2022 fire alone burned approximately 17,712 acres and affected 5,254 acres of threatened and endangered species habitat at Pōhakuloa Training Area. See U.S. Army Corps of Engineers, Honolulu District, *Army Training Land Retention at Pōhakuloa Training Area: Final Environmental Impact Statement*, vol. 1 (April 2025), 3-34-3-35, https://d34w7g4gy10iej.cloudfront.net/pubs/pdf_73028.pdf.

24 U.S. Army Garrison-Hawaii, *Final Environmental Impact Statement for Army Training Land Retention at Kahuku Training Area, Kawaihoa-Poamoho Training Area, and Mākua Military Reservation, Island of O'ahu, Hawai'i* (2025), <https://home.army.mil/hawaii/OahuEIS/documents>.

25 Colleen E. Reid, Michael Brauer, Fay H. Johnston, Michael Jerrett, John R. Balmes, and Catherine T. Elliott, "Critical Review of Health Impacts of Wildfire Smoke Exposure," *Environmental Health Perspectives* 124, no. 9 (2016): 1334-43, <https://doi.org/10.1289/ehp.1409277>.

26 Pat Elder, "Hawaii Votes Down Army's Environmental Impact Statement on Pōhakuloa Training Area," *Military Poisons*, May 16, 2025, <https://www.militarypoisons.org/latest-news/hawaii-votes-down-armys-environmental-impact-statement-on-phakuloa-training-area>.

Mapping Military Base Presence and Public Health Outcomes

Due in part to the pollutants discussed above, military land use produces health burdens for surrounding communities. The map below shows the relationship between proximity to military bases and general health “hotspots.” The Centers for Disease Control and Prevention defines “health status” or “general health” as self-reported overall health.²⁷ A general health hotspot represents areas where the percentage of people reporting “fair” or “poor” health is unusually high and statistically significant.

In Hawai‘i, these hot spots correspond to areas where the military has high environmental impact. Areas of poor health can be visualized as orange or red “hot spots” in the map below (Figure 1). This map shows two major hotspots. One is located on the Wai‘anae Coast of O‘ahu, where military bases occupy approximately 34 percent of the land, including Mākua Military Reservation and Lualualei Naval Radio Transmitting Facility and Naval

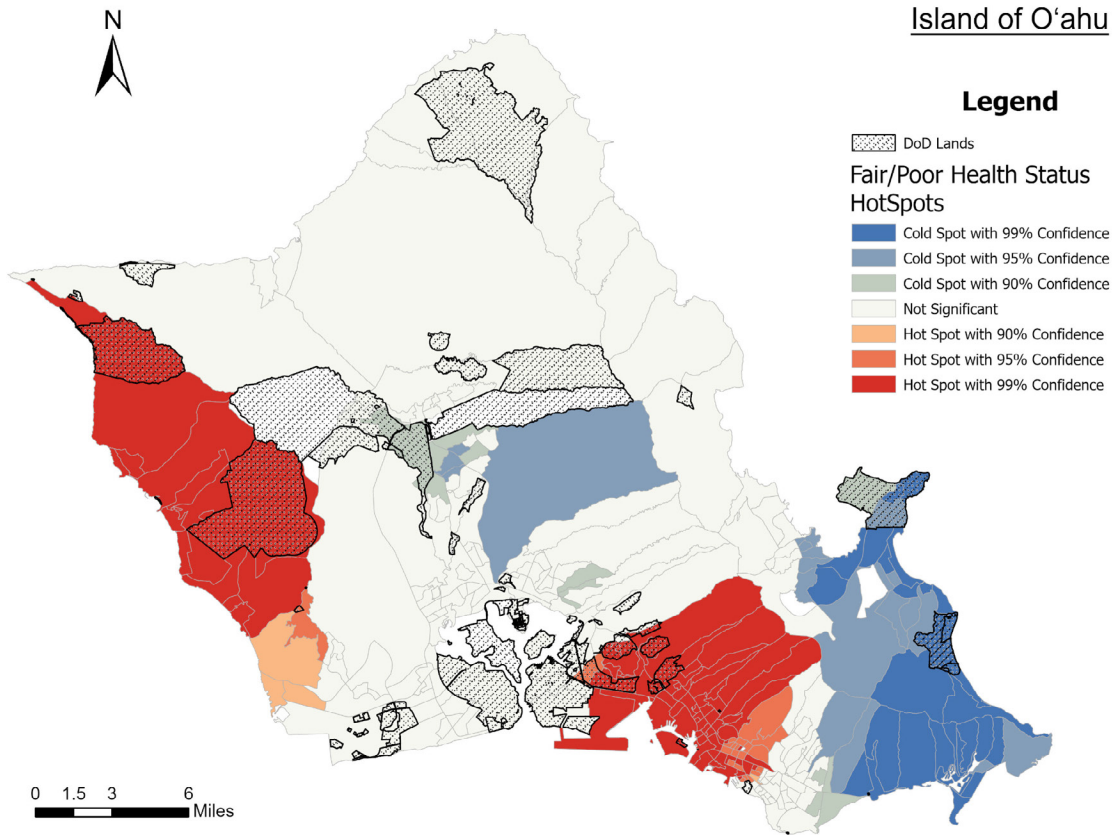
Magazine. The other hotspot is located east of Pearl Harbor on the southeastern coast, in the area encompassing Salt Lake, Moanalua, and much of urban Honolulu, including Sand Island, Kalihi, Ala Moana, and Mo‘ili‘ili. In addition to Joint Base Pearl Harbor-Hickam, this hotspot surrounds or is adjacent to the Red Hill Fuel Storage Facility, Aliamanu Military Reservation, and Coast Guard Base Honolulu.



An August 6, 2010 photo of wildfires in Mākua Military Reservation caused by military activities. Credit: US Army photo, obtained from army.mil (The appearance of U.S. Department of Defense (DoD) visual information in this report does not imply or constitute DoD endorsement)

²⁷ Centers for Disease Control and Prevention, “Health Status,” <https://www.cdc.gov/cdi/indicator-definitions/health-status.html>.

Figure 1. Map of Hot Spots of Poor Health in O‘ahu



Although this map shows a correlation between large military bases and higher rates of fair or poor self-reported health in surrounding areas, the pattern is not uniform. Areas such as Mililani and Waipio south of Schofield Army Base, and communities near Kāne‘ohe Marine Corps Base and Bellows Air Force Station, report comparatively better health outcomes. While contaminants have been documented at Kāne‘ohe and Bellows, their types and severity differ from those

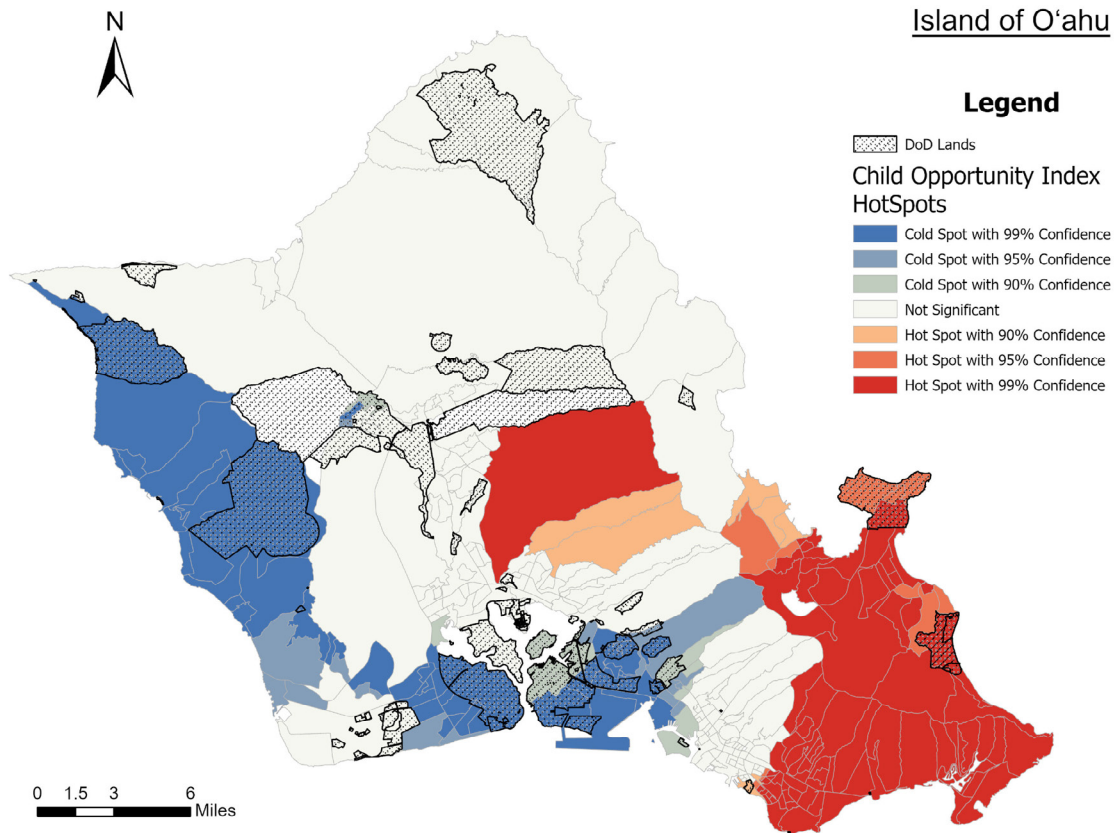
identified at Pearl Harbor. Further, the Wai‘anae Coast is predominantly Native Hawaiian and Pacific Islander, and this population faces significant socioeconomic vulnerability, while urban areas east of Pearl Harbor have more varied race and socioeconomic status. There is a direct relationship between racial and ethnic background and health outcomes, which we discuss further in the “Wai‘anae Coast” section of this report. Differences in health outcomes across the island likely

reflect the interaction of environmental exposure with socioeconomic status and demographic sorting by region. Proximity to a base does not produce a singular health outcome; rather, health patterns emerge from interacting environmental risk, economic stability, and access to resources. As such, rather than showing that military bases cause poor health outcomes, these maps depict a relationship between military bases and place-based vulnerability.

Children living near bases tend to lack the

neighborhood conditions and resources that research shows are essential for healthy development.²⁸ The map below (Figure 2) shows a negative relationship between proximity to military bases and the Childhood Opportunity Index (COI), which measures access to quality schools, safe housing, healthy food, parks, clean air, and economic opportunities — factors that are linked to overall well-being.²⁹ In this case, and in contrast to the previous figure, a red hot spot indicates a better outcome or greater resources for children.

Figure 2. Map of Childhood Opportunity Index in O’ahu



28 Jordan Tyriss et al., “The Child Opportunity Index and Children’s Health: A Meta-Analysis,” *Pediatrics* 155, no. 4 (2025): e2024067873, <https://doi.org/10.1542/peds.2024-067873>.

29 Clemens Noelke, Nancy McArdle, Brian DeVoe, Madeline Leonardos, Yang Lu, Robert W. Ressler, and Dolores Acevedo-Garcia, *Child Opportunity Index 3.0 Technical Documentation* (Waltham, MA: Brandeis University, 2025), https://www.diversitydatakids.org/sites/default/files/file/COI%203.0%20Technical%20Documentation%2020250724_0.pdf.

Military presence diverts resources from uses that might otherwise support community health. For example, in Lualualei Valley located on the Wai‘anae Coast, the U.S. military controls approximately 9,000 acres of land.³⁰ The largely abandoned base provides little benefit to surrounding communities, while neighboring waste disposal sites continue to pollute the land and waterways, further eroding environmental and public health.³¹ As the maps indicate, there is a correlation between military bases and broader place-based vulnerability.

We cannot explain this relationship causally. Rather, we suggest that military bases can multiply existing vulnerabilities. Bases degrade land, release toxins, and prevent land usage for other means. They are sometimes located in economically depressed areas such as the Wai‘anae Coast, where land transitioned from plantations and ranches to military development. In Wai‘anae, military dominance constrained the development of other viable industries. As a result, environmental contamination, economic marginalization, limited access to health care, and restricted land-based livelihoods interact with and compound one another, contributing to place-based

vulnerability and thus negatively impacting health outcomes.

Military Emissions, Climate Change, and the Marine Environment

As noted above, the greenhouse gases — including carbon, methane, and nitrous oxide — that cause climate change are released through combustion of fuel for power at military bases and by military vehicles, including ships, aircraft, and trucks.³² Climate change directly and indirectly harms human health and exacerbates health vulnerabilities caused by the military. The UN’s Intergovernmental Panel on Climate Change documents health risks tied to climate hazards, including heat stress, physical and psychological harm from extreme weather events, respiratory and cardiovascular risks from reduced air quality, and a range of health problems from reduced water supply and degraded water quality.³³ The panel advocates for climate-resilient development, meaning economic growth tied to land-use and governance decisions “with the goal of transformative change for the integrated protection of human, animal and ecosystem health.”³⁴

30 Gregg K. Kakesako, “The Navy Owns More than 9,000 Acres in the Waianae Valley,” *Honolulu Star-Bulletin*, October 5, 1998.

31 Ku‘u Kauanoë and Christina Jedra, “The Next Community to Host Oahu’s Landfill Can Learn from the Westside,” *Honolulu Civil Beat*, October 25, 2021, <https://www.civilbeat.org/2021/10/the-next-community-to-host-oahus-landfill-can-learn-from-the-westside>.

32 Neta C. Crawford, *The Pentagon, Climate Change, and War: Charting the Rise and Fall of U.S. Military Emissions* (Cambridge, MA: The MIT Press, 2022).

33 Intergovernmental Panel on Climate Change, “Health,” fact sheet, in *Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*, ed. Hans-Otto Pörtner et al. (Cambridge: Cambridge University Press, 2022), https://www.ipcc.ch/report/ar6/wg2/downloads/outreach/IPCC_AR6_WGII_FactSheet_Health.pdf.

34 Guéladio Cissé et al., “Health, Wellbeing and the Changing Structure of Communities,” in *Climate Change 2022: Impacts, Adaptation and Vulnerability*, ed. Hans-Otto Pörtner et al. (Cambridge: Cambridge University Press, 2022), 1041–170, <https://doi.org/10.1017/9781009325844.009>.

The United States military remains the world's largest institutional greenhouse gas emitter, and its operations in Hawai'i are a significant source of emissions.³⁵ Bases are powered by fossil fuels, and aircraft, ships, and tactical and non-tactical vehicles emit substantial greenhouse gases during operations and transport.

Military exercises conducted in and around Hawai'i also use large amounts of fossil fuel and contribute to climate change.³⁶ For example, many U.S. allies transport their troops to Hawai'i for annual and biannual naval and land exercises, such as Rim of the Pacific (RIMPAC). The military does not regularly release fuel consumption data from its military exercises. However, in the 2016 RIMPAC, the Defense Logistics Agency reported that it supplied 142 million U.S. gallons of F76 naval fuel and 139.1 million U.S. gallons of JP5 jet fuel.³⁷ Using total fuel supplied, in 2016, a typical year in most respects in terms of number of participants, RIMPAC emissions for naval and jet fuel delivered by the U.S. Defense Logistics Agency were over 2 million metric tons of carbon dioxide equivalent (CO₂e).

Greenhouse gas emissions both contribute to air pollution and drive climate change, with immediate and long-term effects. Beyond direct respiratory and

cardiovascular harms from air pollutants like particulate matter and ozone, fossil fuel combustion exacerbates climate-related health risks, including heat-related illness, vector-borne diseases, malnutrition from crop failure, and mental health impacts associated with extreme weather events and displacement.³⁸ While U.S. military emissions have declined since the conclusion of the U.S. wars in Iraq and Afghanistan, rising military spending is correlated with increased greenhouse gas emissions.³⁹

Naval exercises and operations are not included in a full assessment of the impact of the military on the environment. The world's oceans, which cover more than two-thirds of the earth's surface, store about 50 times more carbon than the atmosphere, and in any one year, the oceans absorb about 20 percent of anthropogenic carbon emissions. When carbon is turned into organic matter, some portion of it sinks into the ocean's depths, the "biological carbon pump," turning into sediment, removing carbon from the atmosphere for thousands of years. Naval exercises affect marine life and the ability of the oceans to take carbon dioxide out of the atmosphere. Acoustic and physical damage to marine life reduces the long-term capacity of the ocean to store carbon.

35 Crawford, *The Pentagon, Climate Change, and War*.

36 Neta C. Crawford, "The Contribution of Armed Forces to Climate Change," *One Earth*, December 19, 2025, [https://www.cell.com/one-earth/abstract/S2590-3322\(25\)00284-2](https://www.cell.com/one-earth/abstract/S2590-3322(25)00284-2).

37 Irene Smith, "Biofuel Propels Rim of the Pacific Exercise," *Defense Logistics Agency*, August 5, 2016, <https://www.dla.mil/About-DLA/News/News-Article-View/Article/905647/biofuel-propels-rim-of-the-pacific-exercise>.

38 Intergovernmental Panel on Climate Change, "Health."

39 Wenjie Dong et al., "Rising Military Spending Jeopardizes Climate Targets," *Nature Communication*, May 2025, <https://www.nature.com/articles/s41467-025-59877-x>; Scientists for Global Responsibility, "Military Spending Rises and Greenhouse Gas Emissions: What Does the Research Say," September 2025, <https://www.sgr.org.uk/publications/military-spending-rises-and-greenhouse-gas-emissions-what-does-research-say>.

Large baleen and sperm whales play important roles in the carbon cycle.⁴⁰ Whales store significant amounts of carbon in their rather large bodies. Great whales can live between 40 and 200 years. When they die, whales fall into the deep ocean, where their carbon is stored in their carcasses. Further, “whale pump” — buoyant fecal plumes — contains a high concentration of nutrients that support phytoplankton, which in turn sustain fisheries. Whale pump also contains iron, which fixes carbon.⁴¹ Thus, “observations that overall ecosystem productivity has declined in regions with depleted whale populations (e.g., the Southern Ocean) suggest that the role of whales in nutrient cycling is critical to ecosystem functioning and their associated carbon sequestration potential.”⁴²

Because whales on balance remove more carbon from the atmosphere than they respire, industrial whaling, which dramatically reduced the total whale population, contributed to a decline in carbon sequestration by whales.⁴³ While they do not do as much harm as commercial whaling, naval operations and

exercises pose several threats to marine mammals, including whales, through the use of sonar (although this is disputed by some) and the danger of marine mammal strikes. The Marine Mammal Protection Act (MMPA) of 1972 protects marine mammal populations from declining. It prohibits the “take” (killing) of marine mammals, albeit with certain exceptions, namely the incidental, but not intentional, taking of “small numbers” of marine mammals. Authorization for some “taking” may be granted if the National Marine Fisheries Services (NMFS) finds that the taking will have a negligible impact on the species. Further, the NMFS could prescribe permissible methods of taking and mitigation measures. Naval operations and exercises have been allowed to “take” marine mammals, including whales.

Like most sea life, whales are sensitive to underwater noise, including sonar. Since its inception in 1971, RIMPAC exercises have consistently included anti-submarine warfare, where ships use sonar to detect submarines. On July 3, 2004, between 150 and 200 melon-headed whales stranded off the beach of Kaua‘i, Hawai‘i, at Hanalei

40 National Oceanic and Atmospheric Administration, “Carbon Cycle,” <https://www.noaa.gov/education/resource-collections/climate/carbon-cycle>.

41 Trish J. Lavery et al., “Iron Defecation by Sperm Whales Stimulates Carbon Export in the Southern Ocean,” *Proceedings of the Royal Society*, June 16, 2010, <https://royalsocietypublishing.org/doi/10.1098/rspb.2010.0863>.

42 Heidi C. Pearson et al., “Whales in the Carbon Cycle: Can Recovery Remove Carbon Dioxide?” *Trends in Ecology and Evolution* 38, no. 3 (March 2023): 241, <https://www.cell.com/action/showPdf?pii=S0169-5347%2822%2900279-8>.

43 Although whaling declined dramatically after the 1946 International Convention for the Regulation of Whaling and the 1986 global moratorium on commercial whaling, some populations of whales have recovered, but others, such as the blue whale, have not. The first American whaling ship to visit Hawai‘i in 1819 was called *Maro*; a whale born then might still be alive today, though this is doubtful, since whaling in the Pacific was an intense activity. In 1852, 373,450 barrels of whale oil were collected. Peter von Buol, “Victorian Architecture in Hawaii: Abner Pratt and the 19th-Century Honolulu House,” January 31, 2024, <https://brewminate.com/victorian-architecture-in-hawaii-abner-pratt-and-the-19th-century-honolulu-house>.

Bay. One calf died. The National Oceanic and Atmospheric Administration (NOAA), which ruled out algal blooms or other natural causes, found that the whales could have been within hearing range of the sonar during nearby RIMPAC exercises on July 2.⁴⁴ According to the NMFS, “The analysis is by no means conclusive evidence that exposure to tactical sonar on 2 July resulted in the pod of whales stranding in Hanalei Bay on July 3. However, based on these results, NMFS concludes that it was possible that sonar transmissions caused behavioral responses in the animals that led to their swimming away from the sound source, into the sound shadow of the island of Kaua‘i, and entering Hanalei Bay (a shallower environment than they usually inhabit). Further, it is possible that sonar transmissions during the official RIMPAC exercise on July 3 could have prevented some of the whales from leaving the Bay (witnesses observed whales attempting several times to depart the Bay, only to return rapidly once just outside it).”⁴⁵

The 2004 National Defense Authorization Act removed the “small numbers” limitation of the MMPA and defined harassment as it applies to “military readiness activities.” The new law defined two levels of harassment: (i) any act that injures or has the significant potential to injure a marine mammal or marine mammal stock in the wild [Level A Harassment]; or (ii) any act that disturbs or is likely to disturb a marine mammal or marine mammal stock in the wild by causing disruption of natural behavioral patterns, including, but not limited to, migration, surfacing, nursing, breeding, feeding, or sheltering, to a point where such behavioral patterns are abandoned or significantly altered [Level B Harassment].”⁴⁶ With specific Letters of Authorization, lasting five years, some “taking” could be allowed. Table 2 lists the estimated abundance of cetacean species, and the corresponding permissible takings.

44 “Whale Stranding: Sonar Cited,” *Science*, May 5, 2006, <https://doi.org/10.1126/science.312.5774.671c>.

45 James H. Lecky, “Small Takes of Marine Mammals Incidental to Specified Activities,” *Federal Register* 71, no. 78 (April 18, 2006): 20995.

46 Lecky, “Small Takes,” 20987.

Table 2. U.S. NOAA 2006 Estimated Abundance and Take of Marine Animals During RIMPAC⁴⁷

	Scientific Name	Occurs ¹	Group Size ²	Overall Abund.	Animals/km2		Estimated Takes				Model'd Expos + Abund. (%)	
					Offshore	Inshore	tts	sub-tts	UnID'd	total		
Order Cetacea												
Suborder Mysticeti (baleen whales)												
	North Pacific right whale*	<i>Eubalaena japonica</i>	Rare		-	-			0			
	Humpback whale*	<i>Megaptera novaeangliae</i>	Regular		-	-	0	0	0	0		
	Minke whale	<i>Balaenoptera acutorostrata</i>	Rare		-	-	0	0	0	0		
	Sei whale*	<i>Balaenoptera borealis</i>	Rare	3.4	77	0	-	1	27	1	29	38
	Fin whale*	<i>Balaenoptera physalus</i>	Rare	2.6	174	0.0001	-	3	61	1	65	37
	Blue whale*	<i>Balaenoptera musculus</i>	Rare					0	0	0	0	
	Bryde's whale	<i>Balaenoptera edini/brydei*</i>	Regular	1.5	493	0.0002	-	0	96	1	97	20
Suborder Odontoceti (toothed whales)												
	Sperm whale*	<i>Physeter macrocephalus</i>	Regular	7.8	7,082	0.0029	0.001	34	1,417	1	1,452	21
	Pygmy sperm whale	<i>Kogia breviceps</i>	Regular	1	7,251	0.003	-	14	1,367	1	1,382	19
	Dwarf sperm whale	<i>Kogia sima</i>	Regular	2.3	19,172	0.0078	-	48	3,898	1	3,947	21
	Cuvier's beaked whale	<i>Ziphius cavirostris</i>	Regular	2	12,728	0.0052	0.0006	29	2,428	61	2,518	20
	Blainville's beaked whale	<i>Mesoplodon densirostris</i>	Regular	2.3	2,138	0.0009	0.0009	3	443	11	457	21
	Longman's beaked whale	<i>Indopacetus pacificus</i>	Regular	17.8	766	0.0003	-	0	140	5	145	19
	Rough-toothed dolphin	<i>Steno bredanensis</i>	Regular	14.8	19,904	0.0081	0.0017	49	3,809	205	4,063	20
	Common bottlenose dolphin	<i>Tursiops truncatus</i>	Regular	9.5	3,263	0.0013	0.0103	11	1,137	35	1,183	36
	Pantropical spotted dolphin	<i>Stenella attenuata</i>	Regular	60	10,260	0.0042	0.0407	52	4,129	288	4,469	44
	Spinner dolphin	<i>Stenella longirostris</i>	Regular	29.5	2,804	0.0011	0.0443	37	2,776	80	2,893	103
	Striped dolphin	<i>Stenella coeruleoalba</i>	Regular	37.3	10,385	0.0042	0.0016	26	2,438	292	2,756	27
	Risso's dolphin	<i>Grampus griseus</i>	Regular	15.4	2,351	0.001	-	3	443	25	471	20
	Melon-headed whale	<i>Peponocephala electra</i>	Regular	89.2	2,947	0.0012	0.0021	4	621	1	626	21
	Fraser's dolphin	<i>Lagenodelphis hosei</i>	Rare	286.3	16,836	0.0069	-	41	3,212	174	3,427	20
	Pygmy killer whale	<i>Feresa attenuata</i>	Regular	14.4	817	0.0003	-	0	140	1	141	17
	False killer whale	<i>Pseudorca crassidens</i>	Regular	10.3	268	0.0001	0.0017	0	137	1	138	51
	Killer whale	<i>Orcinus orca</i>	Regular	6.5	430	0.0002	-	0	96	1	97	23
	Short-finned pilot whale	<i>Globicephala macrorhynchus</i>	Regular	22.3	8,846	0.0036	0.0237	37	2,938	1	2,976	34
Order Carnivora												
Suborder Pinnipedia (seals, sea lions, walruses)												
Family Phocidae (true seals)												
	Hawaiian monk seal*	<i>Monachus scauinslandi</i>	Regular					1	0		1	
	Northern elephant seal	<i>Mirounga angustirostris</i>	Rare									

Table 1. Estimated Abundance and Take of Animals in OpArea During RIMPAC ASW exercises

47 Lecky, "Small Takes," 20989.

In April 2006, James Lecky, then director of the Office of Protected Resources at National Marine Fisheries Service, stated: “The Navy’s analysis of the RIMPAC ASW exercises concluded that no mortality or serious injury leading to mortality would result from the proposed activities.” Lecky disagreed with that conclusion. “However, NMFS believes, based on our interpretation of the limited available data bearing on this point, that some marine mammals may react to mid-frequency sonar, at received levels lower than those thought to cause direct physical harm, with behaviors that may, in some circumstances, lead to physiological harm, stranding, or, potentially, death.”⁴⁸ The Navy proposed to implement measures that would decrease the likelihood of harm to the potentially affected mammals. The authorization was granted in June 2006.⁴⁹

Three years later, the NMFS changed their position. They said, “NMFS’ investigation of the Hanalei event concluded that there was insufficient evidence to determine causality. There are a number of uncertainties about sonar exposure and other potential contributing factors and assumptions inherent to a reconstruction of events in which sonar was the causative agent that simply preclude this determination.”⁵⁰ It concluded that there

would be “negligible impact” of naval exercises and authorized the “taking.” The next day, the Natural Resources Defense Council sued to halt the use of high intensity, mid-frequency sonar during RIMPAC. Their complaint reviewed several decades of incidents of whale strandings that were associated with naval exercises around the world and argued that the damage of sonar to whales was clear. “The ‘mid-frequency’ sonar systems at issue in this action generate extraordinarily loud underwater sound – sound of such intensity that it is capable of flooding thousands of square miles of ocean with dangerous levels of noise pollution. There is no dispute that the Navy’s use of mid-frequency sonar can kill, injure, and disturb many species, including marine mammals. According to the Navy’s own consultants, the evidence of mid-frequency sonar causation of whale strandings is ‘completely convincing,’ and the Scientific Committee of the International Whaling Commission – the preeminent international body of scientists studying whale populations – agrees, reporting in 2004 regarding the connection between exposure to mid-frequency sonar and whale mortality that the ‘evidence is very convincing and appears overwhelming.’ Nor are whales and other marine mammals the only type of sea life affected by active sonar.”⁵¹

48 Lecky, “Small Takes,” 20990.

49 *Natural Resources Defense Council et al. v. Donald C. Winter et al.*, complaint for declaratory and injunctive relief, U.S. District Court for the Central District of California, June 28, 2006, https://www.nrdc.org/sites/default/files/wat_06062801a.pdf.

50 “Taking and Importing Marine Mammals; U.S. Navy Training in the Hawaii Range Complex,” *Federal Register* 74, no. 7 (January 12, 2009), <https://www.govinfo.gov/content/pkg/FR-2009-01-12/pdf/E9-37.pdf>.

51 *NRDC v. Winter*, complaint, 3, https://www.nrdc.org/sites/default/files/wat_06062801a.pdf; *Conservation Council for Hawaii et al. v. National Marine Fisheries Service et al.*, complaint for declaratory and injunctive relief, U.S. District Court for the District of Hawai’i, December 16, 2013, https://www.biologicaldiversity.org/campaigns/ocean_noise/pdfs/2013-12-16_Complaint.pdf; Center for Biological Diversity, “Lawsuit Seeks to Protect Whales, Dolphins from Deadly Navy Sonar in Pacific,” press release, December 16, 2013, https://www.biologicaldiversity.org/news/press_releases/2013/

In December 2018, the Navy received a five-year final rule allowing the taking of marine animals. The 2019 NDAA further amended the MMPA to allow incidental taking of mammals with Letters of Authorization to last up to seven years, which means that the authorization continued through December 2025.

Naval vessels may also harm whales by directly striking them.⁵² Two fin whales were struck in the Pacific in 2009 by U.S. naval vessels. There were no reported strikes for some years afterward. In separate incidents, U.S. Navy cruisers struck large whales off the coast of Southern California in 2021. On June 29, 95 nautical miles west of San Diego, a floating whale carcass was observed after the strike. On July 11, blood was observed after a strike.⁵³ In May of that year, an Australian Navy destroyer (HMAS *Sydney*) on its way to the U.S. naval base in San Diego to participate in a U.S. Navy-led exercise killed a fin whale mother and her calf. Another strike by the U.S. Navy occurred on May 20, 2023, when either a sei or fin whale was struck by an aircraft carrier and killed 70 nautical miles west of San Diego. None of these strikes occurred during RIMPAC.⁵⁴ Ship strikes are less likely to be fatal to whales when vessels

avoid high-risk areas — where whales are present, and ships are operating — and are traveling at slower speeds (e.g., 10 knots).

From 'Āina to Military Staging Ground: Health Consequences of Dispossession

The expansion of U.S. military presence across Hawai'i disrupted a public health infrastructure that Native Hawaiians had sustained for generations. This infrastructure, rooted in reciprocity and care for 'āina (that which nourishes and feeds), organized natural resources to promote community well-being. The principle that stewardship of shared resources is paramount to health shaped the moku and ahupua'a system, which continues to organize land tenure in Hawai'i today — despite the military's use of a significant portion of the islands.

Moku (see Figure 3) are larger land units containing multiple ahupua'a, each organized into zones (wao) that function interdependently to ensure ecosystem and human health. These zones include: wao

[navy-sonar-12-16-2013.html](https://www.navy.mil/submit/display.asp?story_id=1216).

52 Between 1998 and 2007, 21 blue whale deaths were observed in the Eastern North Pacific (the coast of California), eight of which were confirmed as ship strikes. International Whaling Commission, *Strategic Plan to Mitigate the Impact of Ship Strikes on Cetacean Populations: 2022–2032* (March 2022). Between 2014 and 2018, at least 26 whales were killed in strikes by vessels of all types along the U.S. West Coast. Kevin Knodell, "The Navy vs. Marine Mammals: How Often Do Ship Strikes Happen?" *Honolulu Civil Beat*, October 19, 2021, <https://www.civilbeat.org/2021/10/the-navy-vs-marine-mammals-how-often-do-ship-strikes-happen>.

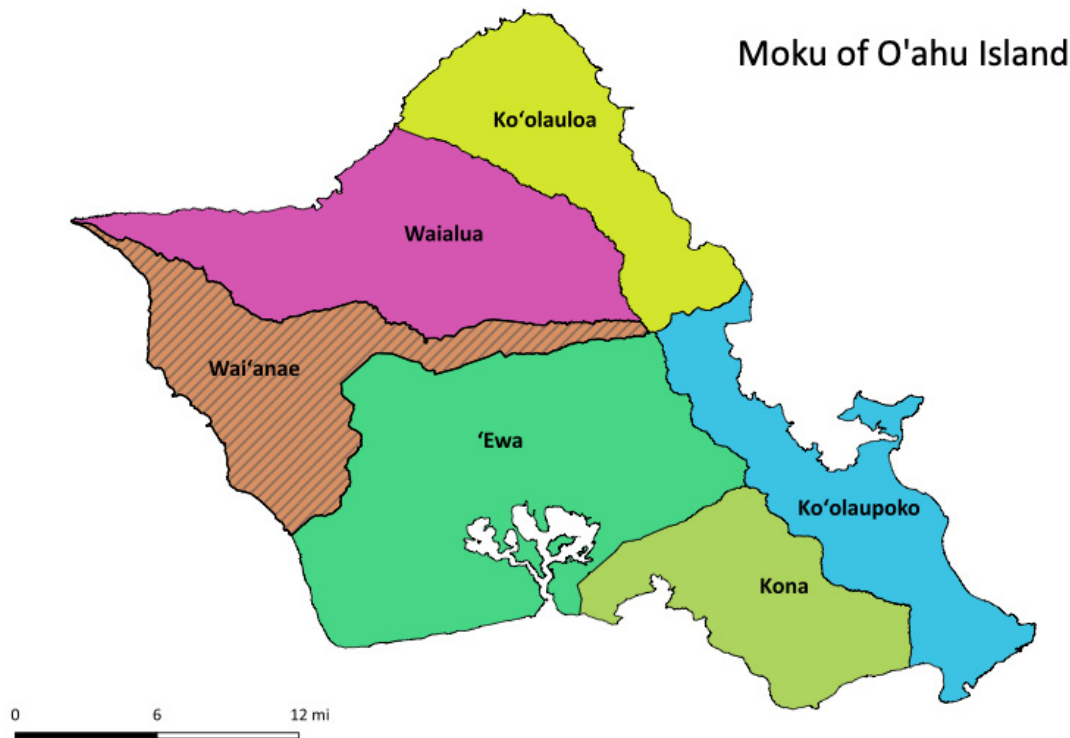
53 "Taking and Importing Marine Mammals; Taking Marine Mammals Incidental to the U.S. Navy Training and Testing Activities in the Hawaii-Southern California Training and Testing Study Area," *Federal Register* 88, no. 190 (October 3, 2023), <https://www.govinfo.gov/content/pkg/FR-2023-10-03/pdf/2023-21499.pdf>; NOAA, "Incidental Take Authorization: U.S. Navy Hawaii-Southern California Training and Testing (HSTT) (2018-2025)," November 3, 2023, <https://www.fisheries.noaa.gov/action/incidental-take-authorization-us-navy-hawaii-southern-california-training-and-testing-hstt>.

54 *Federal Register*, "Taking and Importing Marine Mammals," October 3, 2023; Jonathan Lehrfeld, "US Navy Seeks to Raise Allowed Number of Accidental Whale Collisions," *Navy Times*, November 16, 2023, <https://www.navytimes.com/news/your-navy/2023/11/16/us-navy-seeks-to-raise-allowed-number-of-accidental-whale-collisions>.

akua (distant mountain region, realm of spirits), wao kele (wet forest recharging the aquifer for clean drinking water), wao nāhele (remote forest providing bird habitat critical to ecosystem balance), wao lā'au (agro-forest supplying timber, food,

medicine, weaving materials, and dyes), and wao kānaka (people zone providing food, medicine, and housing). Each zone performed specific functions supporting both environmental health and community well-being.⁵⁵

Figure 3. Moku of O'ahu Island⁵⁶



Within each moku, multiple ahupua'a typically span from mountain ridges to the sea, with watersheds channeling water from mauka (mountain) to makai (ocean). This system enabled integrated food

production: growing fish inland, feeding coastal fishponds, and cultivating taro through irrigation systems fed by springs and streams.⁵⁷ A person who was called the konohiki oversaw each ahupua'a,

55 Kawika B. Winter et al., "The Moku System: Managing Biocultural Resources for Abundance within Social-Ecological Regions in Hawai'i," *Sustainability* 10, no. 10 (2018): 3554.

56 Map by Anna Kato.

57 Lorenz Gonschor and Kamanamaikalani Beamer, "Toward an Inventory of Ahupua'a in the Hawaiian Kingdom: A Survey of Nineteenth- and Early Twentieth-Century Cartographic and Archival Records of the Island of Hawai'i," *The Hawaiian Journal of History* 48 (2014): 32–33, <https://evols.library.manoa.hawaii.edu/server/api/core/bitstreams/12aa1365-53ea-4b5d-9bdc-0510d85ec418/content>.

managing water distribution for public health. This land tenure system enabled communities to, in the words of experts of Hawaiian land tenure, “synergistically harness a diversity of ecosystem services to facilitate an abundance of biocultural resources.”⁵⁸ After the arrival of private property, this way of life largely persisted through a hybrid system that maintained Native Hawaiian habitation, access, and resource rights.⁵⁹ As a public health infrastructure, this system provided clean water, diverse and nutritious foods, medicine, and housing, while sustaining the environmental conditions necessary for population health.

Dispossession resulting from military expansion in Hawai‘i has had lasting public health consequences. The bombing of Pearl Harbor led to martial law in Hawai‘i from 1941 to 1944 — the longest period of martial law in U.S. history — during which extensive land seizures enabled the military to increase its landholdings across the islands by as much as eighteen-fold. By one account, the military acquired up to 328,694 acres.⁶⁰ This rapid expansion displaced countless residents, particularly Native Hawaiians, a reality documented in the oral histories and interviews conducted by the author.

Public health research has extensively demonstrated that displacement is harmful to health. Social psychiatrist

Mindy Fullilove describes the impact of displacement as “root shock,” a process that extends beyond emotional distress to affect the nervous system and the entire body. Root shock results from disruption of the equilibrium between individuals and their physical and social environments, undermining both physiological and collective well-being.⁶¹ Empirical studies link displacement to increased risks of chronic disease, mental health disorders, and premature mortality, particularly when displacement is forced, prolonged, and tied to structural inequality.⁶²

While military occupation has disrupted the land-based systems that historically supported health and well-being in Hawai‘i, restoring these lands through return and community stewardship offers a powerful model for repairing harm and promoting collective health now and in the future.

Case Studies: Military Presence as Public Health Exposure

Red Hill

In November 2021, hundreds of residents in Hawai‘i reported smelling a fuel-like odor coming from their tap water. An underground pipeline at the U.S. Navy’s Red Hill Bulk Fuel Storage Facility had burst and leaked thousands of gallons

58 Winter et al., “The Moku System,” 3554.

59 Kamanamaikalani Beamer and N. Wahine‘aipoahu Tong, “The Māhele Did What? Native Interest Remains,” in *Hūlili: Multidisciplinary Research on Hawaiian Well-Being* (Honolulu: Kamehameha Publishing, 2016), 10.

60 Juliet Nebolon, *Settler Militarism: World War II in Hawai‘i & the Making of US Empire* (Durham: Duke University Press, 2024).

61 Mindy Thompson Fullilove, *Root Shock: How Tearing Up City Neighborhoods Hurts America, and What We Can Do About It* (New York: New Village Press, 2016), 11.

62 Cristóbal Cuadrado, Matías Libuy, and Rodrigo Moreno-Serra, “What Is the Impact of Forced Displacement on Health? A Scoping Review,” *Health Policy and Planning* 38, no. 3 (2023): 394–408.

of jet fuel into O‘ahu’s primary aquifer, contaminating the drinking water of tens of thousands of military personnel and civilians. Although the water was obviously unsafe due to the numerous reports of symptoms from those exposed to the jet fuel, the Navy maintained that the water was safe for nearly three weeks after the pipe burst on November 20.⁶³

A 2023 report by the Hawai‘i Department of Health found that jet fuel was not the sole contaminant; the water contained a toxic cocktail of fuel, the cleaning product Simple Green, chlorine, and an anti-icing agent.⁶⁴ According to surveys conducted by the Centers for Disease Control and Prevention’s Agency for Toxic Substances and Disease Registry, people exposed to the contaminated water said they experienced rashes, nausea, vomiting, burning eyes and throats, diarrhea, headaches, fatigue, and dizziness. Among 20 survey respondents who gave birth during the survey time period, eight reported problems such as preterm delivery, low birth weight, and, in

one case, congenital defects.⁶⁵

Groups including Ka‘ohewai, the O‘ahu Water Protectors, Hawai‘i Peace and Justice, and the Sierra Club organized to demand the immediate closure of the Red Hill facility, protect the island’s main drinking water source, and seek reparations for those harmed by the contamination.⁶⁶ Public outrage prompted the Hawai‘i Department of Health to issue an emergency order on December 6, 2021, calling on the U.S. Navy to defuel the tanks.⁶⁷ The Navy initially refused to comply, but after sustained community pressure, then-Secretary of Defense Lloyd Austin ordered Red Hill to be permanently closed on March 7, 2022. In May 2022, the Navy released a contractor report finding the facility’s pipes and valves were severely corroded and required structural repairs before the tanks could be safely defueled.⁶⁸ These repairs took over a year to complete. Defueling began in October 2023, and the bulk of the fuel was declared removed by the end of the year.⁶⁹

63 Audrey McAvoy, “Navy Didn’t Understand Well-Documented Risks Posed by Hawaii Fuel Tanks, Watchdog Says,” AP News, November 14, 2024, <https://apnews.com/article/navy-hawaii-pearl-harbor-fuel-spill-3143245c80f-f0ac35bd1253cb8d1359b>.

64 Hawai‘i Department of Health, *Exposure Assessment: November 2021 Release of JP-5 Jet Fuel into the Joint Base Pearl Harbor Hickam Drinking Water System* (Honolulu: Hawai‘i Department of Health, 2023), <https://health.hawaii.gov/about/files/2023/06/JBPHH-JP-5-Exposure-Assessment-HIDOH-June-2023.pdf>.

65 Patricia Kime, “80% of Families Who Filled Out Survey on Red Hill Have Had Health Problems They Blame on Fuel Spill,” Military.com, January 18, 2023, <https://www.military.com/daily-news/2023/01/18/80-of-families-who-filled-out-survey-red-hill-have-had-health-problems-they-blame-fuel-spill.html>.

66 Kanaeokana, “Ka‘ohewai Says Navy Must Take Further Steps,” <https://kanaeokana.net/portfolio-items/kaohewai-navy>; Oahu Water Protectors, “Shut Down Red Hill,” <https://oahuwaterprotectors.org>; Hawai‘i Peace & Justice, “Red Hill Protest,” <https://hawaiipeaceandjustice.org/news/red-hill-protest>; Sierra Club of Hawai‘i, “Restore Kapūkaki: Clean up Red Hill,” <https://sierraclubhawaii.org/redhill>.

67 Hawai‘i Department of Health, “Emergency Order,” December 5, 2021, <https://health.hawaii.gov/about/files/2021/12/Emergency-Order-12.05.2021-signed.pdf>.

68 Sophia McCullough, “Confused About the Timeline for the Red Hill Fuel Storage Facility and Contaminated Water? Read This,” Hawai‘i Public Radio, March 1, 2022, <https://www.hawaiipublicradio.org/local-news/navy-red-hill-fuel-timeline>.

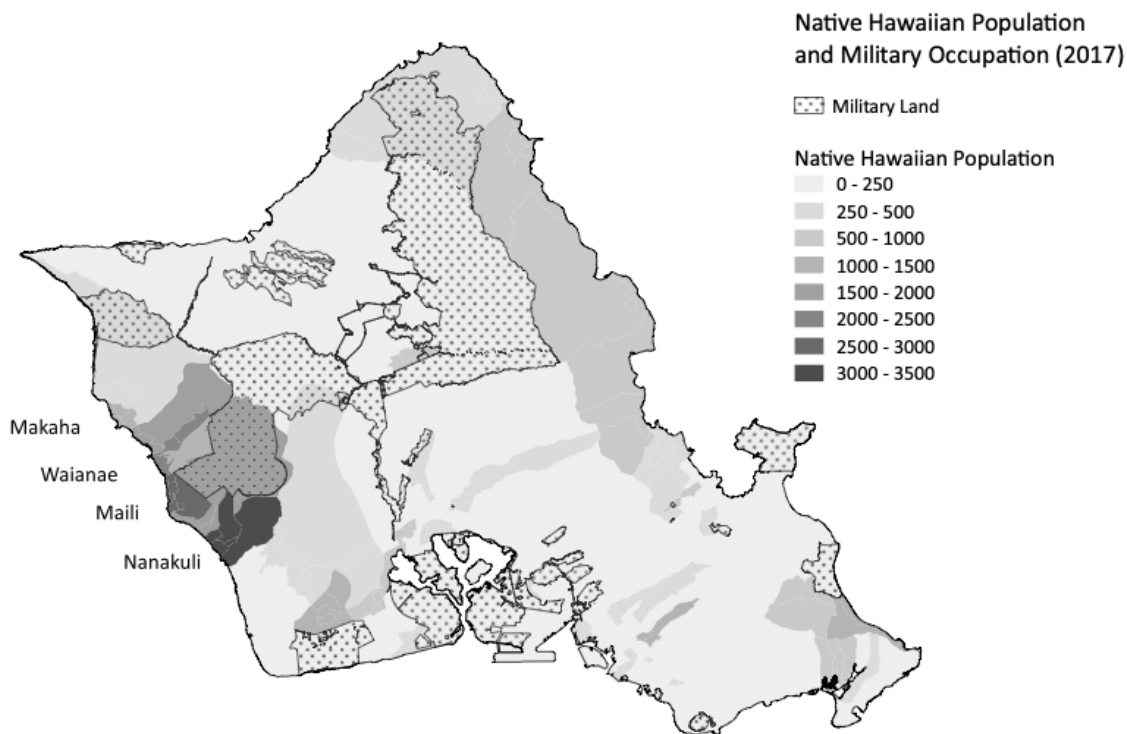
69 Christina Jedra, “Final Shipment of Fuel from Red Hill Tanks Leaves Hawaii, Marking the End of an Era,” *Honolulu Civil Beat*, December 20 2023, <https://www.civilbeat.org/2023/12/final-shipment-of-fuel-from-red-hill-tanks-leaves-hawaii-marking-the-end-of-an-era>.

Wai'anae Coast

The map below (Figure 4) shows the relationship between the number of Native Hawaiians living in particular areas and the location of military land. The Native Hawaiian population is highest on the Wai'anae Coast of O'ahu, an area where 34 percent of the land is used by military bases.⁷⁰ Of the region's approximately 52,000 residents, 72 percent are Hawaiian and Pacific Islander, compared to 24.5 percent on O'ahu as a whole. Eighteen and a half percent of Wai'anae residents

live below the poverty line — the highest rate in Hawai'i and nearly double the statewide rate of 10.2 percent.⁷¹ In addition to military bases, other toxic facilities dot the landscape, including a power plant, landfills, and a waste treatment plant, leading many to describe Wai'anae as a classic environmental justice site. As the previous maps show, this area has statistically significant rates of self-reported "fair" or "poor" health and a lack of access to resources for children that promote overall well-being over a lifespan.

Figure 4. Map showing the relationship between the number of Native Hawaiians living in particular areas and the location of military land



70 Anna Kato, a doctoral candidate at the University of Hawai'i Mānoa in Natural Resource and Environmental Management, calculated fractional military land coverage for the Wai'anae Census County District and Wai'anae Moku using geospatial data from Data.gov, U.S. Census Bureau TIGER/Line Shapefiles, and the Hawai'i statewide GIS Program. Data were processed with QGIS and projected into NAD83, UTM zone N4; polygon areas were calculated in square meters. Because datasets were obtained from multiple sources that were created at different times, polygons were not always perfectly aligned.

71 U.S. Census Bureau, 2022.

As such, we see a strong correlation on the island of O‘ahu between the high density of military land use, Native Hawaiian residents, fair or poor health, and access to health-promoting resources. This suggests that the spatial concentration of military land use overlaps with Native Hawaiian communities in ways that reflect a longer history of displacement and constrained access to land and resources — patterns that continue to shape present-day health inequities. As documented in interviews with Wai‘anae residents, the expansion of military control over land has disrupted intergenerational ties to ‘āina and limited pathways for economic and cultural livelihood. The Wai‘anae Coast exemplifies the relationship between extensive military presence and place-based vulnerability tied to cumulative factors that contribute to adverse health outcomes.

As an example, the Mākua Military Reservation exemplifies how dispossession produces place-based vulnerability. Prior to World War II, Mākua was a thriving fishing village and ranch that stretched from the coastline into an adjacent valley, where people raised horses and cattle, maintained fishponds, and cultivated vegetables.⁷²

Interrupting the mutual exchange between the natural environment and the inhabitants of the valley, the U.S. Army began to acquire parcels of land for military training in 1929. A few weeks after the bombing of Pearl Harbor and

the declaration of martial law in 1941, the Army evicted all of Mākua’s residents, claiming that the land was necessary for war, and promised to return it six months after the war. Instead, following World War II, the Army seized more acreage for training operations in the name of national security. Mākua Military Reservation now occupies more than 4,000 acres.⁷³

Although people no longer lived in the valley, “long-term camping” at Mākua Beach was common in the decades after the evictions. In the 1980s and 1990s, unhoused residents formed a pu‘uhonua — a place of sanctuary for those displaced from the housing market. Many who lived there described it as a place of healing, and public health scholars have characterized it as a culturally relevant and community-based health intervention.⁷⁴ Yet, the State of Hawai‘i, backed by the U.S. National Guard, carried out militarized and highly publicized evictions in 1983 and 1996.⁷⁵ These repeated displacements of predominantly Native Hawaiian communities disrupted social networks, cultural practices, and access to land-based subsistence, compounding stress, housing instability, and long-term vulnerability to poor health outcomes.

Also on the Wai‘anae Coast are two conjoined military bases in Lualualei Valley: the Lualualei Radio Transmitting Facility and the Lualualei Naval Magazine, which occupy 9,239 acres. Lualualei and the adjacent area of Mā‘ili are some of

72 Marion Kelly and Sidney Michael Quintal, *Cultural History Report of Mākua Military Reservation and Vicinity, Mākua Valley, Oahu, Hawaii* (Honolulu: Department of Anthropology, Bernice P. Bishop Museum, 1977).

73 Kelly and Quintal, *Cultural History Report*.

74 Kalamaoka‘aina Niheu, Laurel Mei Turbin, and Seiji Yamada, “The Impact of the Military Presence in Hawaii on the Health of Nā Kānaka Maoli,” *Pacific Health Dialog* 14, no. 1 (2007): 205–12.

75 Kalamaoka‘aina Niheu, “Pu‘uhonua: Sanctuary and Struggle at Mākua,” in *A Nation Rising: Hawaiian Movements for Life, Land, and Sovereignty*, ed. Noelani Goodyear-Ka‘ōpua, Ikaika Hussey, and Erin Kahunawaika‘ala Wright (Durham: Duke University Press, 2014).

the most economically depressed areas in Hawai'i. According to a Department of Hawaiian Home Lands report, the area "has lagged behind the rest of O'ahu and Hawai'i in terms of educational attainment and economic development."⁷⁶

Furthermore, some Lualualei residents believe that the radiotransmitters have contributed to childhood leukemia cases in the surrounding neighborhood, particularly during the 1980s. From 1982 to 1984, the rate of childhood leukemia diagnoses near the base was nearly five times the state

average.⁷⁷ Although it is difficult to prove a direct causal relationship between military activities and adverse health outcomes, the clustering of undesirable land uses in a predominantly Native Hawaiian and economically depressed region is noteworthy. While the U.S. military views Hawai'i as crucial to national security, many in Wai'anae understand the same land as a life-giving resource and military occupation as producing the vulnerabilities they are organizing against.



Approximately 4,000 acres of Mākua remains behind a military fence, separating lineal descendants from ancestral land. Credit: Photo by Ed Greevy

Pōhakuloa

The Pōhakuloa Training Area poses significant public health risks through environmental contamination documented in the Final Environmental Impact Statement (EIS). The Army's six decades of military use of the 132,000-

acre training area have resulted in the release of hazardous substances, including depleted uranium from spotting rounds, per- and polyfluoroalkyl substances (PFAS), unexploded ordnance, and other munitions constituents contaminating soil, groundwater, and air. Historical mismanagement of waste disposal

76 Department of Hawaiian Home Lands, *Wai'anae and Lualualei Regional Plan Regional Plan* (2010), 4.

77 John R. Goldsmith, "Epidemiologic Evidence Relevant to Radar (Microwave) Effects," *Environmental Health Perspectives* 105, suppl. 6 (1997): 1572-73.

— including the Army’s operation of eight large-capacity cesspools that discharged untreated sewage directly into groundwater until EPA enforcement action in 2016 — further threatens the island’s largest aquifer and the water resources communities depend on for drinking water. The aerosolization of contaminated dust during live-fire exercises creates airborne exposure pathways, and training-related wildfires that have burned nearly 20,000 acres produce smoke containing hazardous particulates that affect respiratory health across the island.⁷⁸

Beyond direct environmental contamination, the Final EIS identifies broader public health consequences stemming from military land control and access restrictions. The 23,000 acres of state-owned conservation land leased to the Army for \$1 in 1964 have prevented health-promoting land uses, including sustainable agriculture, housing development, and cultural practices that support Native Hawaiian well-being. In 2019, the Hawai‘i Supreme Court ruled in *Ching v. Case* that the State had breached its constitutional trust duties by failing to monitor contamination and ensure cleanup at Pōhakuloa, demonstrating institutional failures to protect public health.⁷⁹ In May 2025, the Hawai‘i Board of Land and Natural Resources ultimately rejected the Final EIS for inadequately addressing environmental and health

implications, failing to provide complete inventories of hazardous materials and unexploded ordnance, and not fully disclosing cumulative health impacts on surrounding communities.⁸⁰



Photo from an O‘ahu Army Natural Resources Program volunteer day to spray invasive sphagnum moss on Mauna Ka‘ala. Credit: Photo by Laurel Mei-Singh

The Myth of Military Environmental Stewardship

The U.S. military claims to be a responsible steward of Hawai‘i’s land and frequently states that it seeks to strike a balance between war preparation and the conservation of the island’s resources.⁸¹ At over 130,000 acres, the Army’s Pōhakuloa Training Area on the Big Island is the largest military facility in Hawai‘i. Although the area is zoned as conservation land and the Army maintains that it protects endangered species inside fenced areas, the Pōhakuloa

78 U.S. Department of the Army, “Final Environmental Impact Statement for Army Training Land Retention at Kahuku Training Area, Kawaihoa-Poamoho Training Area, and Mākua Military Reservation, Island of O‘ahu, Hawai‘i,” *Federal Register* 90, no. 150 (2025).

79 *Ching v. Case*, 145 Hawai‘i 148, 449 P.3d 1146 (Haw. 2019).

80 Center for Biological Diversity, “Hawai‘i Land Board Rejects Army’s Environmental Report for O‘ahu Training Lands,” press release, June 27, 2025, <https://biologicaldiversity.org/w/news/press-releases/hawaii-land-board-rejects-armys-environmental-report-for-oahu-training-lands-2025-06-27>.

81 For example, see <https://oanrp.com/about>.

Training Area is littered with unexploded ordnance, the water table is stressed and potentially contaminated, and endangered species outside fenced areas remain vulnerable.

The O‘ahu Army Natural Resources Program (OANRP) is the largest military conservation program in Hawai‘i committed to this mission. The program was founded after the community organization Mālama Mākua challenged the Army’s environmental destruction in Mākua Valley. The OANRP officially inaugurated its conservation programs with the publication of the 2001 Mākua Implementation Plan, although it states that the programs began in 1998.⁸² The purpose of these programs was compliance with the National Environmental Policy Act, requiring all federal agencies to assess the environmental impacts of major actions, consider alternatives, and disclose those effects to the public before proceeding.

Despite OANRP’s programs, this report finds that the Army and the U.S. military have significantly harmed the islands’ environment, and the U.S. military remains a significant source of pollution. The notion that these priorities can be balanced obscures the scale of environmental destruction by the military. An OANRP coordinator told one of this report’s authors that the soldiers who volunteer in conservation efforts are “usually learning about bombs and weapons because they’re preparing for war. So learning about conservation is a nice break.”⁸³ The military’s environmental stewardship

claims do not offset cumulative public health harms. Its conservation efforts are primarily for mitigation rather than prevention of environmental and public health damage.

Precautionary Principle

The precautionary principle in public health suggests that action to prevent harm may be warranted even in the absence of conclusive evidence of a causal link between an exposure and a specific health outcome. Under this principle, plausible evidence of potential harm is sufficient to justify preventative measures. For example, even if we don’t know the precise level of jet fuel exposure that causes harm, we ought to minimize our exposure to it.

In the case of high childhood leukemia rates around Lualualei in the 1980s, establishing a direct causal relationship between activities on the base and health outcomes in the surrounding area would be difficult, as other variables such as poverty and diet also pose significant health risks. However, studies show that VLF and ELF electromagnetic waves are potentially carcinogenic, particularly among children.⁸⁴ Yet, empirical models used to examine a direct causal effect between environmental hazards and disease outcomes typically yield inconclusive evidence, and this inconclusiveness results in inadequate protection from unnecessary harm. Even if a causal link is eventually proved, it would be too late for those already exposed. In this context, the question shouldn’t be “Is

82 Mākua Implementation Team, “Implementation Plan: Mākua Military Reservation Island of Oahu,” May 2003, https://manoa.hawaii.edu/hpicesu/DPW/2003_MIP/Sec_1/2003_MIP_edited.pdf.

83 Mei-Singh interview with anonymous OANRP staffperson, January 2015.

84 Goldsmith, “Epidemiologic Evidence,” 1579.

this pollution safe?” but rather “Are these sources of pollution necessary?”⁸⁵



Caption: Pathway in Mākua Valley. Credit: Still from Mālama Mākua documentary

Restoration and Return as Health Policy

To address the public health consequences of military operations in Hawai‘i, we recommend that the military release comprehensive records of past and ongoing contamination and that the State establish a mandated working group of independent public health experts to document health impacts and develop remediation plans for affected communities. The military should apply the precautionary principle by halting potentially harmful activities and refraining from new operations when scientific uncertainty exists about health and environmental impacts, rather than waiting for definitive proof of harm. Finally, the military, the State, and local communities should collaboratively establish a fully funded plan for the cleanup, repair, and return of Hawaiian

lands as a critical public health intervention that addresses both environmental contamination and the restoration of Indigenous land stewardship practices essential to community well-being.

Conclusion and Recommendations

The public health costs of military presence in Hawai‘i constitute what peace researcher Johan Galtung termed “structural violence” — the harm to human potential and well-being, including diminished life expectancy, morbidity, and mortality produced by economic and political structures.⁸⁶ Public health physician Paul Farmer demonstrated how such large-scale social forces translate into personal distress and disease.⁸⁷ In Hawai‘i, military land use which has polluted the environment causes structural violence, harming communities’ physical and emotional well-being. The geographic patterns revealed in our mapping show that military land control creates cascading public health consequences: contaminated water and soil, restricted access to health-promoting cultural practices, displacement from ancestral lands that supported traditional food systems and well-being, and disproportionate burdens on Native Hawaiian and low-income communities. The presence of U.S. military bases hinders climate-resilient development by restricting access to land and water needed for climate adaptation.

85 Mary H. O’Brien, “When Harm Is Not Necessary: Risk Assessment as Diversion,” in *Reclaiming the Environmental Debate: The Politics of Health in a Toxic Culture*, ed. Richard Hofrichter (Cambridge: The MIT Press, 2000): 113–34.

86 Johan Galtung, “Violence, Peace, and Peace Research,” *Journal of Peace Research* 6, no. 3 (September 1969): 167–91, <https://doi.org/10.1177/002234336900600301>.

87 Paul Farmer, “On Suffering and Structural Violence: A View from Below,” *Daedalus* 125, no. 1 (1996): 261–83.

Addressing these health inequities requires recognizing land return as a critical public health intervention. When military land retention has direct health consequences, decisions about land use must center the voices of affected communities. Ultimately, securing Native Hawaiian stewardship of contaminated military lands through cleanup and restoration offers a pathway toward public health and well-being. This will repair historical harms while creating the environmental and cultural conditions necessary for communities to thrive.

The military should release its records of past and ongoing contamination and support the establishment of a state-mandated working group of public health experts to document the public health consequences of military-related pollution. This working group should develop a plan to help all those affected by the harms that are identified.

The military should apply the precautionary principle by halting potentially harmful military activities and preventing new operations when scientific uncertainty exists about health and environmental impacts. The military, state, and local communities should establish a plan, including funding for the cleanup, repair, and return of Hawaiian land as a public health intervention.



The True Economic Impact of the Military in Hawai'i

David Vine

The True Economic Impact of the Military in Hawai'i

How the Pentagon's Claims about Economic Benefits Are Grossly Exaggerated

*David Vine*¹

Key Findings

- Frequently cited claims about the economic benefits of military spending in Hawai'i are significantly exaggerated.
- While the Pentagon, the State of Hawai'i, media outlets, and others often claim that Hawai'i benefits from approximately \$10 billion in annual military spending (fiscal year 2023), this chapter shows that the direct economic impact of military spending is conservatively estimated at \$7.2 billion — nearly 30 percent less than the total claimed.
- The military thus contributes 6.4 percent of total Hawai'i GDP rather than the 9.2 percent claimed by Pentagon and state sources. Notably, the 6.4 percent figure is very close to the State of Hawai'i's Department of Business, Economic Development & Tourism's estimate of 6.0 percent.
- The military's presence is far less significant to Hawai'i's economy than has been long believed. The military is not one leg of a supposed “three-legged stool” upholding Hawai'i's economy: Several industries represent larger proportions of state GDP than the military, including real estate, accommodation and food services, state and local government, retail, and health care and social assistance.

¹ David Vine is a political anthropologist and author of the books *Base Nation: How U.S. Military Bases Abroad Harm America and the World* (New York: Metropolitan/Henry Holt, 2015), *Island of Shame: The Secret History of the U.S. Military Base on Diego Garcia* (Princeton: Princeton University Press, 2009), and *The United States of War: A Global History of America's Endless Conflicts, from Columbus to the Islamic State* (Berkeley: University of California Press, 2020).

The Pentagon, the State of Hawai‘i, and others regularly make exaggerated claims about the economic benefits of the U.S. military presence in Hawai‘i. Media outlets, academics, and other observers frequently repeat these claims uncritically. For example, many cite annual military spending in Hawai‘i at around \$10 billion for fiscal year 2023.² However, this chapter shows that the military's actual economic impact in the state is closer to \$7.151 billion — nearly 30 percent less than the total claimed.

Total spending of \$7.2 billion represents 6.4 percent of Hawai‘i's total GDP, rather than the roughly 9.2 percent claimed by the Pentagon and state sources.³ Notably, the 6.4 percent figure is nearly identical to the most recent estimate of 6.0 percent of GDP made by Hawai‘i's Department of Business, Economic Development & Tourism, which has no apparent incentive to over- or underestimate the military's economic impact.⁴

For decades, many in Hawai‘i have claimed that the military is one of two pillars of the state’s economy, along with tourism, or one leg of a “three-legged stool,” including construction. However... the military’s presence is less significant to Hawai‘i’s economy than long believed.

For decades, many in Hawai‘i have claimed that the military is one of two pillars of the state’s economy, along with tourism, or one leg of a “three-legged stool,” including construction.⁵ However, the 6.4 percent estimate reveals that the military’s presence is less significant to Hawai‘i’s economy than long believed. Contrary to what many claim,⁶ several industries

2 Military and Community Relations Office, *Military in Hawai‘i Economic Impact Factbook 2025* (State of Hawai‘i Military and Community Relations Office with Regional Economic Models, Inc., 2025); Hawaii Defense Economy, “Economic Impact,” infographic, <https://defenseeconomy.hawaii.gov>; U.S. Department of Defense Office of Local Defense Community Cooperation, *Defense Spending by State Fiscal Year 2023* (Arlington, VA, n.d.).

3 Hawaii Defense Economy, “Economic Impact”; U.S. Department of Defense Office of Local Defense Community Cooperation, *Defense Spending by State Fiscal Year 2023*; Military and Community Relations Office, *Military in Hawai‘i Economic Impact Factbook 2025*, 2.

4 Note that the Military and Community Relations Office, which makes the inflated claim about GDP, is part of the Department of Business, Economic Development & Tourism. Department of Business, Economic Development & Tourism, *The Economic Impacts of Federal Government Contracts Awarded in Hawaii Fiscal Year 2018–2022* (State of Hawai‘i, August 2023), 3. The Pentagon and State also provide per resident military spending figures that are both misleading and inaccurate. They are misleading because they imply that every resident benefits directly from thousands of dollars in military spending. This is false. They are inaccurate for the reasons detailed in this chapter.

5 See, e.g., Hawaii Defense Economy, “Economic Impact”; Military and Community Relations Office, *Military in Hawai‘i Economic Impact Factbook 2025*, 3; Kevin Knodell, “Can Military Spending Prop Up Hawaii’s Faltering Economy?” *Honolulu Civil Beat*, September 15, 2020, <https://www.civilbeat.org/2020/09/can-military-spending-prop-up-hawaiis-faltering-economy>.

6 Hawaii Defense Economy, “Economic Impact”; Military and Community Relations Office, *Military in Hawai‘i Economic Impact Factbook 2025*, 3.

represent larger shares of the state’s GDP than the military, including real estate, accommodation and food services, state and local government, retail, and health care and social assistance.⁷

This chapter examines the most frequently cited claims about the U.S. military presence in Hawai‘i and explains why each is inaccurate. Table 1 shows, in summary, how this chapter’s new economic impact calculation compares to frequently cited figures.

Table 1. *The Military in Hawai‘i Economic Impact Calculations Compared*

	Revised Calculation	State of Hawai‘i ⁸	Department of Defense [War] ⁹
Military spending in Hawai‘i	\$7,151,406,936	\$9,900,000,000	\$9,963,993,056
Percent of state GDP	6.40%	9.20%	9.20%

Background and Overview

The military clearly has a significant economic effect in Hawai‘i, spending billions of dollars a year in the state. However, as residents of Hawai‘i consider the military’s presence in their islands, they should have a clear understanding of military spending’s true economic impact on the local economy.

Figures about the purported economic benefits of the military presence in Hawai‘i most often comes from the State of Hawai‘i’s Military and Community Relations Office (MACRO), the Hawaii Defense Economy (a project funded by the state and the Pentagon), and the Pentagon’s Office of

Local Defense Community Cooperation (OLDCC). Most of the underlying data for these three entities comes from the Pentagon.¹⁰

MACRO’s 2025 *Economic Impact Factbook* states that it intends to provide a “shared foundation for informed dialogue” by providing information “grounded in data, context, and transparency.”¹¹ The data provided do not, however, accurately reflect the military’s true economic impact. This chapter and other parts of the report show the flaws in MACRO’s claim that military spending simply “nourishes Hawai‘i’s economy.”¹²

7 Construction contributed \$6.7 billion to GDP in 2023. U.S. Bureau of Economic Analysis, “SQGDP2 Gross Domestic Product (GDP) by State,” <https://apps.bea.gov/itable/?ReqID=70&step=1>.

8 Hawaii Defense Economy, “Economic Impact.”

9 U.S. Department of Defense Office of Local Defense Community Cooperation, *Defense Spending by State Fiscal Year 2023*.

10 The first two entities rely heavily on data from the third, so data from the three tend to be similar, although they count slightly different forms of military spending.

11 Military and Community Relations Office, *Military in Hawai‘i Economic Impact Factbook 2025*, 1.

12 Military and Community Relations Office, *Military in Hawai‘i Economic Impact Factbook 2025*, 5.



Construction begins on Dry Dock 5 at Pearl Harbor Naval Shipyard, August 19, 2023. The \$3.42 billion contract — the Navy's largest facilities construction project in history — was awarded to a joint venture led by Dragados USA, a subsidiary of a Spain-based multinational. U.S. Navy photo by Justice Vannatta.

The fundamental problem with commonly used figures is that the Pentagon and state entities frequently claim that *all* Pentagon spending related to Hawai'i benefits the local economy.

This is untrue.

Significant proportions of Pentagon spending do not remain within the local economy; instead those funds are paid to

corporations and people in other states and countries. For example, the state's Department of Business, Economic Development & Tourism estimates that 15 percent of contract dollars awarded to companies based outside Hawai'i leave the state in the form of profits and money spent where the companies are headquartered.¹³ Two of the top five recipients of Pentagon contracts performed in Hawai'i in fiscal year 2023 are, for example, not headquartered in Hawai'i. And the top recipient — a joint venture involving a Spain-based multinational corporation and a Texas-based company partnering with a Hawai'i-based firm¹⁴ — likely paid out approximately \$46.3 million to \$69 million, and possibly more, to the two partners residing outside of Hawai'i's economy.¹⁵

Another major recipient of contracts, Koa Lani Joint Venture LLC, has a Hawaiian name but is based in Florida. That joint venture involves the country's second-largest government services company, Virginia-based Amentum, partnering with a government-certified small business,

¹³ Department of Business, Economic Development & Tourism, *The Economic Impacts of Federal Government Contracts Awarded in Hawaii Fiscal Year 2018 – 2022*, 10

¹⁴ See, e.g., U.S. Department of Defense Office of Local Defense Community Cooperation, *Defense Spending by State Fiscal Year 2023*, 40. The joint venture is Dragados/Hawaiian Dredging/Orion JV. Flatiron Dragados is part of the Spanish ACS Group. Orion Government Services is part of Houston-based Orion Group Holdings, Inc. See <https://dhojv.com>.

¹⁵ USASpending.gov, Department of Defense prime contracts with place of performance Hawai'i award results, <https://www.usaspending.gov/search?hash=cd337c006d7c58d0bf8d204b48565f6f>. In FY2023, the firm received \$463 million in contract obligations from the Pentagon. The state's Department of Business, Economic Development & Tourism estimates that 15 percent of contract dollars awarded to companies based outside Hawai'i leave the state in the form of profits and money spent where the company is headquartered (Department of Business, Economic Development & Tourism, *The Economic Impacts of Federal Government Contracts Awarded in Hawaii Fiscal Year 2018 – 2022*, 10). The lower estimate assumes the three firms split revenues evenly. This is unlikely given the size of the Spanish- and Texas-based companies. The higher estimate assumes that 15 percent of the total award leaves the state, which could overestimate what economists call "leakage" from the local economy, although the actual total could be higher still. In March 2023, the company received a contract reported to be valued at \$2.8 billion, with an initial funding tranche of \$463 million. Department of Defense, "Contracts for Mar. 10, 2023," press release, March 10, 2023, <https://www.war.gov/News/Contracts/Contract/Article/3326241>.

Kūpono Government Services LLC, which is part of a certified Native Hawaiian Organization.¹⁶ In Koa Lani's largest FY2023 award (one of several), an estimated \$22 million left Hawai'i.¹⁷ This chapter shows that a conservatively estimated total of \$301.5 million in contract dollars claimed to benefit the state actually left Hawai'i.

Claims about the impact of military personnel spending are similarly inflated. To start, thousands of military personnel counted as living in Hawai'i actually reside on Navy vessels for large parts of the year or are otherwise deployed abroad. While some portion of their salaries may end up in the state's economy, much of it does not. The same is the case for all military personnel, given that the vast majority are not Hawai'i residents and will leave Hawai'i after their time stationed in the state. The actual economic impact of military personnel spending in Hawai'i (\$3.1 billion), as documented below, amounts to just 50 percent of the \$6.2 billion claimed by the Pentagon and state sources.

This chapter calculates the true economic impact of military spending in Hawai'i. First, it calculates the sum of military contracts and grants. Then, it estimates the portion of personnel spending benefiting the state. In doing so, the chapter shows how major claims made by the Pentagon and state sources are either exaggerated, misleading, or both. This chapter concludes by pointing to ways in which the military is an economic drain on Hawai'i, causing,

for example, expensive environmental and public health damage.

The fundamental problem with commonly used figures is that the Pentagon and state entities frequently claim that all Pentagon spending related to Hawai'i benefits the local economy. This is untrue.

This chapter's calculations use existing methodologies to provide the best available estimate of the true impact of military spending locally. The chapter is conservative throughout to avoid underestimating the military's economic effects. However, there is uncertainty about any calculation involving Pentagon spending because the agency — which the Trump administration refers to as the Department of War — is the only federal department never to have passed a financial audit in the 30 years since Congress began requiring such audits.¹⁸

Hawai'i is not alone. The Pentagon uses the same flawed methodology to calculate — and exaggerate — its economic impact in all 50 states and in Washington, DC. In Okinawa, Japan, where the military occupies around 25 percent of Okinawa

16 See Amentum, "Amentum and Kūpono form Joint Venture, Awarded \$854 Million Contract for Range Operations Support," press release, February 10, 2021, <https://www.amentum.com/news/amentum-kuponos-joint-venture-wins-854m-contract-washingtonexec>; Kūpono Government Services LLC, website, <https://www.kuponogs.com>.

17 USASpending.gov, <https://www.usaspending.gov/search?hash=cd337c006d7c58d0bf8d204b48565f6f>.

18 Mike Stone, "Pentagon Says It Fails Eighth Audit, Targets 2028 to Pass," Reuters, December 10, 2025, <https://www.reuters.com/world/us/pentagon-fails-eighth-audit-targets-2028-pass-pentagon-says-2025-12-19>.

Island and has faced decades of protest, the military makes similarly dubious claims about providing hundreds of millions of dollars in economic benefits as part of a public relations strategy to build support for its presence.¹⁹

Military Personnel Spending: Less than \$3.7 Billion Benefits Hawai'i

The Pentagon and state sources frequently claim that Hawai'i benefits from \$6.2 billion in military personnel spending.²⁰ This figure represents the total amount the Pentagon spent on all forms of personnel compensation in FY2023. Claiming that the entirety of this sum benefits Hawai'i is inaccurate and misleading because significant proportions of this sum do not benefit the state at all.

Unlike other industries in Hawai'i in which the vast majority of employees are residents of Hawai'i, the opposite is true for the military: the vast majority of the military's employees are *not* residents of Hawai'i. The military is akin to a non-Hawai'i business operating in Hawai'i that imports most of its workers rather than hiring locals. This means that unlike industries that employ state residents almost exclusively,

significant proportions of military spending leave the local economy.

Estimating exactly how much military personnel spending does *not* benefit Hawai'i's economy is difficult. This section uses existing methodologies to show that actual total personnel spending entering Hawai'i's economy is \$3.7 billion or less. This is less than two-thirds of the frequently claimed figure. The following sections explain this calculation.

Retirement Benefits: \$1.3 Billion Leaves Hawai'i

The Pentagon's spending on military personnel includes funds for salaries, forms of special pay such as bonuses, and a range of benefits including housing allowances, military health care, pensions and health care for retirement, among others. Some proportion of personnel salaries and the vast majority of housing allowances will benefit the local economy. Many of the other benefits, however, will not.²¹

A 2013 study suggests that around 21 percent of military personnel spending goes to forms of compensation that either do not benefit the local economy or marginally benefit the economy.²² Employing this

19 David Vine, *Base Nation: How U.S. Military Bases Abroad Harm America and the World* (New York: Metropolitan/Henry Holt, 2015), 211.

20 The precise figure is \$6,194,804,529. U.S. Department of Defense Office of Local Defense Community Cooperation, *Defense Spending by State Fiscal Year 2023*, Excel file, n.d. [2024], <https://oldcc.gov/defense-spending-state-fiscal-year-2023>.

21 The economic impacts of military health care spending for current personnel are more difficult to assess. Most spending goes to treatment at on-base facilities in Hawai'i, which likely generates limited benefits for the local economy because the military's TRICARE system is largely an on-base network. At the same time, these facilities employ military and civilian personnel who live locally and procure some supplies from the local economy. Some family members also use off-base healthcare providers, generating direct local economic benefits.

22 Congressional Budget Office, *Costs of Military Pay and Benefits in the Defense Budget* (Washington, DC,

estimate suggests that \$1.276 billion in spending did not immediately benefit the local economy in FY2023.

Pensions and retiree health care benefit the local economy when some personnel retire in Hawai'i and thus spend their pension benefits and receive health care locally. The number of personnel who are likely to retire locally is difficult to estimate in the absence of current or projected demographic data. Data show that veterans in Hawai'i represent 0.57 percent of the national veteran population, with 0.52 percent projected for 2050 (Hawai'i residents were 0.42 percent of the national population in 2025).²³ Veterans'

spending similarly represents 0.53 percent of national veterans spending.²⁴ Native Hawaiians and Pacific Islanders constitute 0.8 percent of the total military workforce (though this overestimates the Native Hawaiian population because it includes Pacific Islanders).²⁵

Because a higher percentage of personnel deployed to Hawai'i are likely to retire there, 1 percent is a reasonable estimate for the percentage of current personnel in the state likely to retire locally. This estimate suggests that \$13 million in today's spending will ultimately benefit the state, yielding \$1.263 billion leaving the state economy (see Table 2).

Table 2. Military Retirement Spending Leaving Hawai'i

Total military personnel spending in Hawai'i in FY2023	\$6,194,804,529
Personnel spending leaving Hawai'i (est. 20.6% going to pensions and retiree health care)	- \$1,276,129,733
Retirement spending benefiting Hawai'i using 1% estimate of personnel retiring locally	+ \$12,761,297
Military personnel spending not benefiting local economy	= \$1,263,368,436

November 2012), 7. See table 2. The percentage focuses on potential direct benefits to the local economy (79.4 percent) from basic pay and other pay and allowances (\$88.7 billion) out of total military personnel appropriations of \$111.3 billion. This calculation ignores money from the war budget and military health care, which are harder to assess.

²³ Department of Veterans Affairs, "Distribution of Veterans by County (FY2023)," June 21, 2024, <https://www.data.va.gov/stories/s/NCVAS-State-Summary-Hawaii-FY2023/hwwu-i9si>; United States Census Bureau, "Quick Facts, United States; Hawaii," <https://www.census.gov/quickfacts/fact/table/US,HI>.

²⁴ National Center for Veterans Analysis and Statistics, "Geographic Distribution of VA Expenditures for Fiscal Year 2023," Department of Veterans Affairs, May 2024.

²⁵ U.S. Department of Defense, "Demographics 2023: Profile of the Military Community Demographics," n.d. [December 16, 2024], <https://download.militaryonesource.mil/12038/MOS/Reports/2023-demographics-report.pdf>.

Social Security and Medicare Withholdings: \$349.6 Million Leaves Hawai'i

The Pentagon's commonly cited spending figures ignore the fact that most military pay is also subject to Social Security and Medicare tax withholdings. These funds immediately leave the local economy. Only a relatively small portion of this money will benefit the local economy to the extent that personnel retire in Hawai'i, spending Social Security checks and using Medicare benefits in the islands.

The government-funded RAND Corporation's 2011 analysis of the military's impact on Hawai'i's economy estimates Federal Insurance Contributions Act (FICA) deductions at 5.7 percent of gross military personnel spending.²⁶ Using this estimate for FY2023 and assuming 1 percent of personnel retire in the state and 99 percent retire outside Hawai'i, this chapter calculates \$349.6 million (\$349,572,820) in FICA deductions that leave Hawai'i's economy.

State, Local, and Federal Income Taxes: \$104.1 Million Leaves Hawai'i

Most state and local taxes paid by military personnel do not benefit Hawai'i because most military personnel and their family members are not legal residents of the state and therefore do not pay state or local taxes.²⁷ Instead, they pay taxes in their declared home state of residence. Because some states have zero income tax or rates lower than Hawai'i's, which can reach 14 percent,²⁸ military personnel have a financial incentive to maintain residency elsewhere.

With an average nationwide state and local tax rate of 7.5 percent,²⁹ this likely means tens or hundreds of millions of dollars are diverted from the local economy and into other states and localities.³⁰ Estimating precisely how much military personnel pay in state and local taxes outside Hawai'i is difficult. The RAND Corporation estimates 2.24 percent of gross earnings going to state taxes, which yields \$138,763,621. Using this estimate (which appears to ignore local

26 James Hosek, Aviva Litovitz, and Adam C. Resnick, "How Much Does Military Spending Add to Hawaii's Economy?" RAND Corporation, 2011, 5–6.

27 Hosek et al., "How Much Does Military Spending Add," 30. The state also loses out on other taxes and fees: Military personnel and the spouses of active duty personnel who are not Hawai'i residents do not have to pay Hawai'i vehicle registration fees for up to one vehicle. City and County of Honolulu Department of Customer Services, "Information for U.S. Military Service Members," n.d., <https://www.honolulu.gov/csd/info-for-military-service-members>.

28 Tax Foundation, "Taxes in Hawaii," n.d. [2025], <https://taxfoundation.org/location/hawaii>.

29 Abir Mandal, "State and Local Sales Tax Rates, 2026," Tax Foundation, January 20, 2026, <https://taxfoundation.org/data/all/state/sales-tax-rates>.

30 Personnel are required to pay state taxes for any part-time work performed in Hawai'i. Military personnel and family members can choose to establish their home residence as Hawai'i and thus would be required to pay state and local taxes. State of Hawai'i Department of Taxation, "Tax Facts 97-2: Income Tax Information for Nonresident Military Servicemembers," May 2025.

taxes) and a very conservative assumption that 75 percent of personnel file state taxes outside Hawai'i, this chapter estimates that another \$104.1 million leaves the state (75% of \$138,763,621; see Table 3).³¹ This is a substantial sum, which is equivalent to 3.4 percent of Hawai'i's FY2023 income tax revenues.³² Given the conservative assumptions involved, this almost surely underestimates the amount of money leaving the state's economy.

Most forms of military pay are also subject to federal income taxes, which means more money leaving the local economy (personnel do not pay any taxes on most benefits they receive, such as housing allowances).³³ Pay in other industries is also subject to federal taxes, of course. To ensure that this chapter's calculation allows direct comparisons to other industries, the chapter does not subtract the estimated \$552.6 million in federal taxes leaving the state.³⁴

Table 3. Taxes Leaving Hawai'i

Deductions from gross earnings for state, local taxes using RAND 2011 est. of 2.24%	\$138,763,621
State taxes forgone using est. 75% filing taxes out of state (75% of \$138,763,621)	\$104,072,716

Military Personnel Afloat and Abroad: \$526.7 Million Leaves Hawai'i

There is another reason the claim that Hawai'i benefits from the entirety of military personnel spending is misleading: Thousands of personnel assigned to Hawai'i are not physically present in the

state; instead, they are deployed on ships ("afloat") to war zones or elsewhere abroad. This contingent likely spends considerable portions of its pay outside Hawai'i, providing no local economic benefit. On the other hand, locally based family members likely spend parts of troops' salaries in the state, and some troops may save money during their time away and spend it upon

31 RAND assumes that all military personnel file Hawai'i state taxes, acknowledging that many surely file in other states. RAND does not appear to account for local taxes. Hosek et al., "How Much Does Military Spending Add," 6, 23, 29.

32 State of Hawai'i Department of Taxation, "Annual Report 2023–2024," June 30, 2024, 2.

33 RAND appears to underestimate the scale of deductions by including in gross earnings an estimate of the tax break personnel receive from not paying taxes on most non-cash benefits. This overstates actual income because these tax benefits are money forgone by federal, state, and local governments rather than cash added to personnel accounts. On the other hand, the report does not account for the economic benefit of Hawai'i state taxes received, which it subtracts as deductions from gross income. Hosek et al., "How Much Does Military Spending Add," 30.

34 RAND's analysis of the military's impact on Hawai'i's economy estimates federal tax deductions at 8.92 percent of gross military personnel spending. Hosek et al., "How Much Does Military Spending Add," 5–6.

returning to Hawai'i.³⁵

Estimating the scale of salaries and other pay spent outside Hawai'i during time afloat or deployed abroad is difficult. Given the large Navy presence in the state, the economic impact is significant. With an estimated 39 percent of Navy personnel

“afloat,” around 12,500 personnel may be at sea for significant parts of the year. Employing the RAND Corporation report’s methodology suggests a reduction in \$526.7 million in spending that might otherwise benefit Hawai'i (see Table 4).³⁶

Table 4. Spending on Personnel “Afloat” Leaving Hawai'i

Total Navy/Marine Corps personnel	31,917
Afloat Navy/Marine Corps personnel (39%)	12,448
Navy/Marine Corps personnel as % of total in Hawai'i	43.6%
Navy/Marine Corps personnel spending assuming the same % of total spending	\$2,700,934,775
Total Afloat personnel spending (assuming Afloat % is the same as % of total Navy pay)	\$1,053,364,562
Afloat spending leaving Hawai'i (assuming half of spending outside Hawai'i)	\$526,682,281

Personnel Personal Savings: \$264.4 Million Leaves Hawai'i

The Pentagon’s characterization of economic impact effectively assumes that all military personnel in Hawai'i spend the entirety of their paychecks locally or that the entirety of their compensation benefits

the local economy. This assumption is unwarranted.

Not all military personnel spend their entire paychecks, especially given the substantial housing and other benefits afforded personnel. Estimating the saving rate of military personnel is difficult. The average national saving rate in 2023 was 5.6 percent.³⁷ While there is good reason

35 Hosek et al., “How Much Does Military Spending Add,” 24, n.12.

36 As of FY2023, the Navy (including the Marine Corps, which is part of the Navy) accounted for 31,917 people, or 43.6 percent of military personnel in Hawai'i. Assuming that the Navy’s proportion of total personnel spending is approximately the same as its percentage of total personnel yields \$2.7 billion in total Navy spending in the state. This chapter follows the methodology of the 2011 RAND report, which indicates that afloat personnel constitute around 39 percent of Navy personnel and that half of afloat personnel earnings do not enter the Hawai'i economy. Hosek et al., “How Much Does Military Spending Add,” 24, n.12.

37 Federal Reserve Bank of St. Louis, “Table Data – Personal Saving Rate,” updated February 20, 2026, <https://fred>.

to believe the saving rate in the military is higher than the national average, 5.6 percent is a useful conservative estimate.

This chapter applies the saving rate to the portion of military compensation received in cash.³⁸ Cash compensation typically represents 75 to 80 percent of spending, with recent data suggesting 77 percent.³⁹ Applying a 5.6 percent saving rate to this 77 percent of total personnel spending — that is, not including funds going to pension and retiree health care — suggests that military personnel nationwide saved approximately \$267.1 million in FY2023.

Personal saving does not benefit Hawai‘i’s economy, or benefits it only marginally to the extent that savings are held or invested with Hawai‘i-based financial institutions. Given that only a small percentage of personnel are generational residents of Hawai‘i and that most will leave the state after their deployment, most money saved will ultimately benefit other state economies. Applying the 1 percent estimate of personnel who will retire in the state reduces this form of leakage by \$2.7 million, to \$264.4 million (see Table 5).

Table 5. Personal Savings Leaving Hawai‘i

Spending received as cash (basic pay, bonuses, housing supplement, etc.) using 77% estimate	\$4,769,999,487
Savings using 5.6% national average saving rate (2023)	\$267,119,971
Savings by personnel estimated to retire in Hawai‘i (1%)	\$2,671,200
Personal savings leaving Hawai‘i	\$264,448,772

On-Base and Online Shopping, Other Sales Revenue: Unknown Sums Leave Hawai‘i

While personnel spending on shopping potentially offers some direct economic benefits to local businesses, the Pentagon and the state fail to account for the ways in which such spending does *not* benefit the

local economy. For example, the military bases where personnel work and often live are in many ways economically insulated worlds. On-base grocery stores (called commissaries), shopping malls (exchanges known as the PX, BX, NEX, and MCX), and restaurants run by the exchanges are tax-free for all military personnel, authorized family members, veterans, retirees, and others. Thus, spending on-base diverts money from the local economy in the form

stlouisfed.org/data/PSAVERT.

38 The RAND report applies this saving rate to total personnel spending. This is inaccurate because personnel cannot generate savings from benefits they do not receive as cash (e.g., healthcare spending). Hosek et al., “How Much Does Military Spending Add,” 23.

39 TheWorldData.com, “Department of Defense Spending in US 2025: Statistics & Facts,” October 31, 2025, <https://theworlddata.com/department-of-defense-spending-in-us>.

of lost state and local taxes.⁴⁰

The tax-free status and other federal government subsidies provided to the commissaries, exchanges, restaurants, gas stations, and other businesses run by the exchanges also harm local businesses because on-base purchases are generally significantly less expensive than off-base purchases.⁴¹ “The commissary sells food and household items at prices that are often below other grocery stores,” writes a government guide for military personnel. “On average, you can cut nearly a third off your grocery bill compared to in-town prices.”⁴²

As a result, military personnel and their families are less inclined to spend their money in the local economy. This is especially true since 2020, as inflation has significantly increased grocery prices and other costs. Because retirees also can shop on-base, local businesses lose out on yet more income.⁴³

The low prices for goods purchased on bases worldwide have generated thriving illegal resale markets for decades. When personnel and family members sell goods such as clothing and electronics to locals unable to buy directly on-base, local retail stores lose business, while state and county governments lose sales tax revenue. The commissaries and exchanges are required to return some portion of their profits to benefit military personnel and

family members; however, those funds go to on-base amenities rather than into surrounding communities.⁴⁴

The main economic benefit to the local economy associated with the commissaries and exchanges comes from their purchases of goods from Hawai‘i-based vendors. In FY2007–2009, for example, the commissary system procured 92 percent of its goods from local suppliers. The commissaries and exchanges also hire some local residents. However, this employment is likely offset by reduced hiring at local stores whose businesses are hurt by the commissaries and exchanges.⁴⁵

Many military personnel (and the general public) also do a significant portion of their shopping online. Purchases from companies based outside Hawai‘i, such as Amazon, largely benefit the states where those companies are headquartered. At the same time, Hawai‘i does benefit from state and county sales taxes such as General Excise Tax and Use Tax collected for online purchases made in the state. Hawai‘i also benefits from income generated by shipping companies, warehouses, and others involved in delivering products bought online.

While estimating the economic losses and benefits of on-base shopping and other in-person and online purchases is difficult, the 2011 RAND report suggests that commissaries and exchanges alone

40 Vine, *Base Nation*, 202–203.

41 Vine, *Base Nation*, 202–203.

42 Military One Source, “Commissaries and Exchanges,” n.d., <https://www.militaryonesource.mil/benefits/commissaries-and-exchanges>.

43 Omar Ocampo deserves special credit for this analysis.

44 Vine, *Base Nation*, 203.

45 Hosek et al., “How Much Does Military Spending Add,” 12, 19.

may reduce the military’s economic impact by 0.7 percent compared to its baseline analysis. Given these ambiguities, this chapter acknowledges these complicated effects but does not attempt to estimate the

resulting reduction in military spending that benefits Hawai‘i’s economy.

Table 6 summarizes the revised calculation of military spending benefiting Hawai‘i.

Table 6. Total Military Personnel Spending Benefiting Hawai‘i

Total military personnel spending as per Pentagon	\$6,194,804,529
Military personnel retirement spending not benefiting local economy	- \$1,263,368,436
FICA deductions using RAND 2011 est. of 5.7% and est. 99% retiring out of state	- \$349,572,820
State taxes forgone using est. 75% filing taxes out of state	- \$104,072,716
Afloat spending leaving Hawai‘i (assuming, as per RAND 2011, that half is outside Hawai‘i)	- \$526,682,281
Savings not benefiting Hawai‘i	- \$264,448,772
Revised total personnel spending benefiting Hawai‘i	\$3,686,659,505

Military Contracts and Grants Fact: Less than \$3.5 Billion Benefits Hawai‘i

The Pentagon and state sources claim that around \$3.8 billion in contracts and grants were performed in Hawai‘i in FY2023.⁴⁶ This is misleading. This figure reflects total military spending obligations for contracts

and grants with a contractual “place of performance” — where most of the work was scheduled for completion — listed as Hawai‘i. However, in reality, a substantial proportion of these contracts and grants went to businesses and entities based outside the state. In FY2023, \$1.598 billion (approximately 42 percent) of obligated contract funds appear to have gone to companies based outside Hawai‘i.⁴⁷

⁴⁶ This chapter uses Pentagon figures because state reports generally rely on the same data; differences between the reports are minimal. U.S. Department of Defense Office of Local Defense Community Cooperation, *Defense Spending by State Fiscal Year 2023*, Excel file, n.d. [2024], <https://oldcc.gov/defense-spending-state-fiscal-year-2023>. See also Hawaii Defense Economy, “Economic Impact”; Military and Community Relations Office, *Military in Hawai‘i Economic Impact Factbook 2025*, 3. Unlike other sources, MACRO includes at least some Department of Veterans Affairs spending in its *Factbook*, totaling \$1.01 billion in contracts and grants.

⁴⁷ The total includes contracts and grants. USASpending.gov, <https://www.usaspending.gov/search?hash=cd-337c006d7c58d0bf8d204b48565f6f>. Slight differences exist between the data available from USASpending.gov in 2026

While companies based outside Hawai'i generally spend large portions of contract revenues in the state, significant sums leave Hawai'i when companies are headquartered elsewhere. The state's Department of Business, Economic Development & Tourism estimates that 15 percent of contract dollars awarded to companies based outside Hawai'i leave the state in the form of profits and money spent where the company is headquartered.⁴⁸ Using this methodology, this report estimates that at least \$239.7 million in contract revenues left Hawai'i.

Note, however, that some joint venture companies with addresses in Hawai'i substantially involve partners that are not headquartered in Hawai'i. As discussed above, the state's largest contract recipient in FY2023 was a joint venture between large companies based in Spain and Texas and a Hawai'i-based company. Among the top

1,000 contracts in the state, joint ventures with partners based outside Hawai'i total at least \$667,518,586.⁴⁹ Assuming conservatively⁵⁰ that revenues are split evenly between companies in the joint ventures, and that 15 percent of contract dollars leave the state for those companies based outside Hawai'i, an additional \$61.7 million in revenues does not benefit Hawai'i. The total leaving the state could be considerably higher because revenues are probably not split evenly in most cases, with Hawai'i-based companies often the junior partner in such partnerships.

In total, contracts awarded to firms headquartered outside Hawai'i and to joint ventures based in Hawai'i but involving partners based outside the state resulted in approximately \$301.4 million leaving Hawai'i's economy (see Table 7).⁵¹ This estimate is conservative; the actual total could be considerably higher.

Table 7. Top 15 Pentagon Contractors Performing Work in Hawai'i and Headquarters

Company Name	Sum of Contracts (FY2023)	Recipient Location with Joint Venture (JV) Company Locations in ()
Dragados/Hawaiian Dredging/Orion JV	\$463,600,000	HI (Spain/VA)
Nan, Inc.	\$326,974,270	HI
IES Downstream, LLC	\$178,610,653	HI
Vectrus Systems LLC [now V2X]	\$108,456,190	CO

and the Pentagon's report published in 2024, likely due to corrections made to the data made since 2024.

48 Department of Business, Economic Development & Tourism, *The Economic Impacts*, 10.

49 The total is slightly higher. This excludes contracts outside the top 1,000 in the state, which omits contracts under approximately \$380,000.

50 This uses the low-end estimate for the Dragados Joint Venture, assuming revenues are split evenly among the three partners. The same assumption is applied to the other joint ventures, making this a very conservative estimate, as firms based outside Hawai'i are generally larger than their Hawai'i partners and thus likely receive a majority of revenues.

51 This includes \$401,451 in grants going to recipients based outside Hawai'i.

Company Name	Sum of Contracts (FY2023)	Recipient Location with Joint Venture (JV) Company Locations in ()
AECOM Technical Services, Inc.	\$100,936,824	CA
Kiewit Infrastructure West Co	\$84,422,919	HI
Hensel Phelps Construction Co	\$75,812,737	HI
Koa Lani JV, LLC	\$74,619,739	FL (HI)
APTIM Federal Services, LLC	\$68,212,447	VA
Booz Allen Hamilton Inc	\$61,835,848	VA
Pacific Shipyards International, LLC	\$53,247,069	HI
Nordic PCL Construction, Inc	\$51,733,415	HI
Insight Pacific, LLC	\$50,021,685	CA
U.S. Marine Management, LLC	\$48,974,060	VA
Pond-Cdm Smith JV LP	\$42,578,765	GA (HI)



Dragados headquarters, Madrid, Spain. The Spain-based construction multinational was the single largest Pentagon contractor performing work in Hawai'i in FY2023, receiving \$463.6 million through a joint venture. Photo: Luis García (Zaqarbal), Wikimedia Commons, CC BY-SA 3.0.

The state's Hawaii Defense Economy website acknowledges that some military spending leaves the state in what economists call "leakage"; however, it does so only in the form of subcontracts going to firms based outside Hawai'i.⁵² For FY2023, Hawaii Defense Economy cites \$184 million in net leakage after subtracting subcontracts earned by Hawai'i-based companies. While subcontracting is another way in which military spending leaves the state, ignoring the larger form of leakage involved with companies headquartered outside Hawai'i underestimates the scale of money leaving the state (see Table 8). Pentagon figures already account for subcontracting, hence this report does not subtract the \$184 million from the total.

⁵² Hawaii Defense Economy, "Economic Impact of Defense Spending," <https://defenseeconomy.hawaii.gov/economic-impact>.

Table 8. Revised Contracts and Grants Benefiting Hawai'i Minus Economic "Leakage"

Contracts and grants (USASpending.gov)	\$3,766,097,966
Economic "leakage" due to companies based outside Hawai'i as per 15% estimate of DBEDT	-\$239,671,275
Economic leakage due to joint ventures involving partners outside Hawai'i as per 15% estimate of DBEDT	-\$61,679,260
Revised total contracts and grants	\$3,464,747,431

Woman-Owned Business Contracts Fact: \$83.9 Million Benefits Hawai'i

The state's MACRO report makes other misleading claims, although correcting them does not affect the overall calculation of the military's economic impact. For example, MACRO prominently claims that \$190 million in contracts goes to women-owned businesses.⁵³ This is misleading because it implies that the women-owned businesses are based in Hawai'i when the vast majority are not. USASpending.gov data indicates that just \$83.9 million in spending went to Hawai'i-based women-owned businesses in FY2023.⁵⁴ This is significantly less than half the total claimed.

Small Business Contracts Fact: \$620.1 Million Benefits Hawai'i

MACRO makes similarly misleading claims about contracts going to "small businesses."⁵⁵ Again, MACRO implies that small businesses are local when many of the companies aren't Hawai'i-based, leading to significant small business contract sums leaving the state.⁵⁶ While MACRO boasts of \$1.3 billion in contracts going to small businesses, the actual total going to small businesses headquartered in Hawai'i is \$620.1 million, or less than half the total claimed.⁵⁷

53 Military and Community Relations Office, *Military in Hawai'i Economic Impact Factbook 2025*, 4.

54 Pivot table for "women owned small business," USASpending.gov, <https://www.usaspending.gov/search?hash=cd337c006d7c58d0bf8d204b48565f6f>.

55 The Small Business Administration defines a "small business" for government contracting purposes. The definition varies by industry but generally refers to a business with fewer than 500 employees and \$7.5 million in annual receipts. See U.S. Small Business Administration, "Basic Requirements," updated August 1, 2025, <https://www.sba.gov/federal-contracting/contracting-guide/basic-requirements>.

56 Military and Community Relations Office, *Military in Hawai'i Economic Impact Factbook 2025*, 4.

57 Pivot table for "contracting officers determination of business size code," USASpending.gov, <https://www.usaspending.gov/search?hash=cd337c006d7c58d0bf8d204b48565f6f>.

Costs Inflicted on Hawai'i's Economy

The Pentagon and most state sources not only exaggerate the economic benefits of the military's presence, they also fail to mention the ways in which the military causes economic harm. In addition to the environmental and public health damage caused by bases (discussed elsewhere in this report) and the ways bases inhibit other forms of economic investment and activity, military bases occupy tens of thousands of acres of land that are not subject to state or local property taxes because they are considered federal land. In cases where the federal government occupies state lands, such as national parks and Bureau of Land Management lands, the federal government pays counties and states for forgone taxes. In the case of military bases in Hawai'i and nationwide, the federal government rarely compensates states and localities for forgone taxes.⁵⁸

Military personnel also enjoy a range of state benefits, generally without paying state or local income taxes, as discussed above. These include the use of schools, roads, and, in some cases, public assistance benefits, since low-level troops often qualify.⁵⁹

It is troubling, to say the least, that taxpayer-funded entities, federal and state alike, misinform the public. Future Pentagon and state reports on the military's economic impact should present accurate and transparent data and analysis.

Conclusion

The military's economic impact is smaller and relatively less significant to Hawai'i's economy than many believe. The Pentagon and some parts of the state government have consistently exaggerated the economic impact of military spending in Hawai'i. This exaggeration has involved the misleading presentation of data and inaccurate economic analysis. For the year reviewed here, the Pentagon and state bodies have exaggerated the military's economic benefit by almost 40 percent: the real impact was \$7.2 billion, compared to the \$10 billion claimed (see Table 9).

58 The only military bases for which compensation is regularly paid according to Congressional statute are those involving "lands on which are located semi-active or inactive Army installations used for mobilization and for reserve component training" and "lands located in the vicinity of Purgatory River Canyon and Piñon Canyon, CO, that were acquired after December 31, 1981, to expand the Fort Carson military reservation." Congressional Research Service, "The Payments in Lieu of Taxes (PILT) Program: An Overview," R46260, November 19, 2025.

59 In FY2024–2025, the state received approximately \$5.9 million in federal Impact Aid from the Pentagon for its schools based on military personnel using them. This chapter includes this sum in the calculation, given that no attempt is made to calculate the far larger cost of state benefits used by military personnel for which the state is not compensated by the federal government. State of Hawai'i Department of Education, "Annual Report on Federal Impact Aid, United States Department of Defense Funds, and Federal Indirect Overhead Reimbursements," November 2025, https://hawaiipublicschools.org/wp-content/uploads/DOE_REPORT2026_FederalImpactAid.pdf.

Table 9. Final Calculations of Actual Military Spending Benefiting Hawai'i

Contracts and Grants (USASpending.gov)	\$3,766,097,966
Economic "leakage" due to companies based outside the state	- \$301,350,535
Revised Total Contracts and Grants	\$3,464,747,431
Total Military Personnel Spending	\$6,194,804,529
Military personnel retirement spending not benefiting local economy	- \$1,263,368,436
FICA deductions using RAND 2011 est. of 5.7% and est. 99% retiring out of state	- \$349,572,820
State taxes forgone using est. 75% filing taxes out of state	- \$104,072,716
Afloat personnel spending leaving Hawai'i (assuming, as per RAND 2011, that half is outside Hawai'i)	- \$526,682,281
Personnel personal savings not Benefiting Hawai'i	- \$264,448,772
Revised Total Personnel Spending Benefiting Hawai'i	\$3,686,659,505
TOTAL REVISED MILITARY SPENDING BENEFITING HAWAI'I	\$7,151,406,936

Importantly, the state's Department of Business, Economic Development & Tourism presents figures similar to those reported here. The Department and this chapter find that the military's economic presence represents 6.0 percent and 6.4 percent of state GDP rather than the 9.2 percent claimed by the Pentagon and two other state bodies.

It is troubling, to say the least, that taxpayer-funded entities, federal and state alike, misinform the public. Future Pentagon and state reports on the military's economic impact should present accurate and

transparent data and analysis, rather than the kind of exaggeration that appears to be opportunistically employed to build and maintain public support for the military presence in Hawai'i.

This chapter has offered a more accurate view of the impact of military spending in Hawai'i and its relative importance to the state economy. We hope it helps inform consideration of the military's future in Hawai'i.



Employment Effects of Military Spending and Alternatives in Hawai'i

Heidi Peltier

Employment Effects of Military Spending and Alternatives in Hawai‘i

Heidi Peltier¹

Key Findings

- Military and civilian employment through the Department of Defense account for about 10.5 percent of total employment in Hawai‘i.
- Dollar for dollar, military spending generates fewer jobs than investments in sectors such as health care, education, housing, food production, or energy-efficient housing upgrades.
- On average, health care, education, housing, food production, or energy-efficient housing sectors create more than 12 jobs (direct, indirect, and induced) per \$1 million spent; only 5 jobs are produced by the same level of military spending.
- These sectors also keep more spending within the local economy, since many military personnel stationed in Hawai‘i are residents of other states who remain in the islands only temporarily.

¹ Heidi Peltier is a senior researcher at the Watson School of International Affairs at Brown University.

Introduction

Military spending is often touted as an economic stabilizer and a boon to the economy. Billions of dollars are spent by the Department of Defense (DoD) each year in every U.S. state on military and civilian personnel and on subcontractors. Proponents of military spending point to its importance in sustaining employment and creating economic opportunities for the local economy. Yet, an important question is often overlooked: In comparison to what?

While billions of dollars in federal military spending in Hawai'i create thousands of jobs, those same funds would also generate jobs if they were spent in other industries or programs. Therefore, the real question is how military spending compares to non-military spending when it comes to job creation. And for the residents of Hawai'i, it is not only jobs that matter, but also other resources that could be funded through a shift away from military spending — such as health care, education, affordable housing, food production, and making homes more energy efficient.

In this chapter, we compare the employment impacts of shifting spending from the military to these non-military areas. Using an economic model called an input-output model, we find that \$1 million spent on the military creates about 5.3 jobs (including direct, indirect, and induced), compared to an average of about 12.3 jobs generated by spending in these alternative areas. We present detailed estimates for each of these alternative areas and describe the data below. In sum, a shift from military

to non-military spending would create a net increase in employment for residents of Hawai'i and would fund areas that are important to many residents.

On average, health care, education, housing, food production, or energy-efficient housing sectors create more than 12 jobs (direct, indirect, and induced) per \$1 million spent; only 5 jobs are produced by the same level of military spending.

Background – Federal Military Spending and Employment

Spending in Hawai'i by the Department of Defense

In FY2024, DoD spending in Hawai'i was roughly \$11.9 billion, including spending on armed and civilian personnel as well as on local and non-local contractors.² Of this amount, approximately \$5.5 billion was spent on contracts and roughly \$6.3 billion on personnel. Contract and personnel spending was significantly higher in FY2024 than in previous years, largely due to the costs of remediation and cleanup from the damage caused by the 2023 wildfires. In fiscal years 2020 through

² U.S. Department of Defense, Office of Local Defense Community Cooperation, *Defense Spending by State, Fiscal Year 2024*, <https://oldcc.gov/defense-spending-state-fiscal-year-2024>.

2023, DoD spending averaged roughly \$8.6 billion for personnel and contracts.

Military Personnel

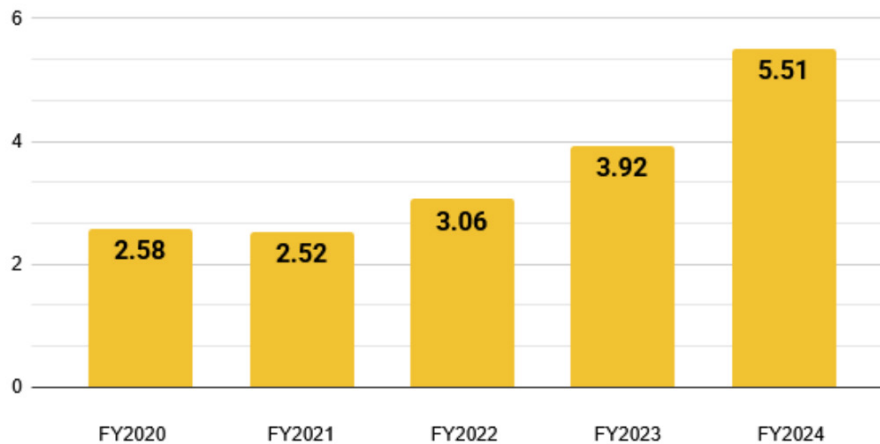
Across all the services, there are roughly 20,000 civilian DoD personnel in the state, with the majority in the Navy, followed by the Army and then the Air Force.³ Active-duty troops across all services total close to 45,000, with a plurality in the Army, followed by the Navy and then the Marine Corps and Air Force. National Guard and Reserve troops total roughly 8,500.⁴ Approximately 73,500 personnel are employed in the state across all services and types of DoD employment.

Contract Spending

Contract spending through the Department of Defense totaled \$5.51 billion in Hawai'i in FY2024. This amount was significantly higher than previous years, since it included quite a bit of funding for wildfire remediation and cleanup due to the 2023 wildfires that primarily affected the island of Maui. DoD contract spending in FY2023 totaled \$3.92 billion.⁵ Over the past five years, contract spending has averaged \$3.52 billion in Hawai'i. Leaving out the most recent year, which is an outlier since it includes funding for wildfire remediation, the average of the previous four years (FY2020-FY2023) was \$3.02 billion (see Figure 1).

Figure 1. Department of Defense Contract Spending in Hawai'i, Fiscal Years 2020–2024

DOD Contract Spending in Hawai'i FY 2020-2024 (in \$billions, not inflation adjusted)



3 State of Hawai'i, *Data Book 2024*, Table 10.11, <https://files.hawaii.gov/dbedt/economic/databook/2024-individual/10/101124.pdf>.

4 State of Hawai'i, *Data Book 2024*, Table 10.2, <https://files.hawaii.gov/dbedt/economic/databook/2024-individual/10/100224.pdf>.

5 U.S. Department of Defense, *Defense Spending by State, Fiscal Year 2024*.

Source: Author's calculations based on U.S. Department of Defense, *Defense Spending by State, Fiscal Year 2024*⁶

Five Companies Receiving the Largest Contracts in FY2025

Dragados/Hawaiian Dredging/Orion JV	\$790,689,582
Environmental Chemical Corp.	\$547,649,006
Hui Huliau	\$216,886,664
Booz Allen Hamilton	\$174,448,431
Hawaiian Native Corp.	\$141,157,313

Dragados/Hawaiian Dredging/Orion JV is a joint venture between contractors with a multi-year contract to replace a dry dock in Pearl Harbor and has received the most contract funding in the past few years.⁷ Environmental Chemical Corporation and Hui Huliau received contracts for environmental remediation and site cleanup in the aftermath of the 2023 wildfires.

In previous years, the top five recipients of DoD contracts in terms of dollar value in Hawai'i included Nan, a construction company that built bachelor quarters on a Marine base; Hensel Phelps, a construction company that repaired administrative facilities; Koa Lani, which provides operations support for a missile range facility; BAE Systems, which performs shipbuilding and repair; and IES Downstream, which handles fuel facilities and supply; among others. While some of these companies are based in Hawai'i, others have corporate ownership in

California, Florida, or other states.

The Non-Militarized Economy of Hawai'i

While military personnel (civilian and armed) account for roughly 73,000 jobs in Hawai'i, the non-military workforce accounts for approximately 620,000 jobs in the state.⁸ Thus, military employment accounts for about 10.5 percent of state employment. Hawai'i has a very low unemployment rate, about 2.2 percent. The state's total population in 2026 is roughly 1.43 million.⁹

As shown in Figure 2 below, non-military employment is spread among a variety of occupations, most notably in food preparation and service (about 83,000), office and administrative positions (about 76,000), followed by sales, transportation, management, and then education and health care.

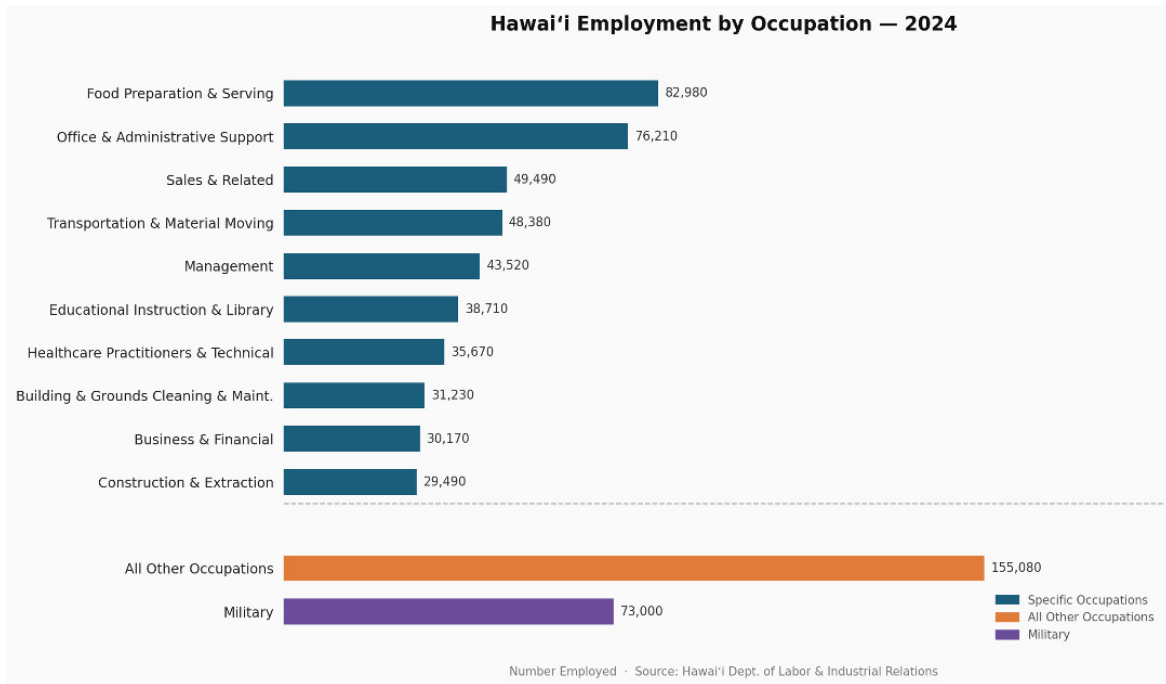
6 U.S. Department of Defense, *Defense Spending by State, Fiscal Year 2024*.

7 Author analysis of Department of Defense contract award data from USASpending.gov, the federal government's database of federal spending. Searches were filtered for FY2024 awards with Hawai'i listed as the "Place of Performance," and individual award records were reviewed to identify the companies receiving the largest contract amounts and the associated activities. Database accessed February 2026.

8 U.S. Bureau of Labor Statistics, Occupational Employment and Wage Statistics, May 2024.

9 Note: The roughly 810,000 people not employed or currently unemployed include youth, retired people, and other individuals not in the labor force.

Figure 2. *Hawai'i Employment by Occupation – 2024*



Source: By author, based on data from the May 2024 U.S. Bureau of Labor Statistics' "Occupational Employment and Wage Statistics" and the 2024 *State of Hawaii Data Book*

Shifting Funds and Employment to Non-Militarized Sectors

Currently, about \$6.7 billion flows into Hawai'i for contracts and personnel payments related to the Department of Defense. While this level of spending certainly creates employment and stimulates the local economy in certain ways, the question that policymakers should be asking is whether this is the best use of these funds and whether the economy would be more vibrant and sustainable, and create more jobs that contribute to the local economy, if some of this funding shifted to other priorities.

Areas such as affordable housing, health

care, food production, and energy efficiency are both important to the local population as well as sources of jobs and economic vitality. In this section, we compare the results of spending in these areas to spending on the military in order to show that even though the military is a job creator, these other areas can create more jobs per dollar. Shifting a portion of military spending to any of these other priorities would create a net gain in employment while serving additional needs of the population of Hawai'i.

We estimate employment impacts in the state of Hawai'i using IMPLAN, an input-output model used to analyze the impacts of changes in spending. Using this model, we calculate the direct, indirect, and

induced effects of military spending in comparison to other types of spending. “Direct” effects are the jobs created in the industry receiving the spending (for example, jobs for soldiers or teachers).

“Indirect” effects are the jobs created through the supply chain (such as jobs in manufacturing weapons or publishing textbooks). “Induced” effects are the jobs generated by the spending multiplier — those in food service, gas stations, retail, and other areas where people employed in the direct and indirect jobs spend their earnings. Using Hawai‘i-specific data for 2024 (the most recent released by IMPLAN as of January 2026), we estimate the employment impacts shown in Table 1.



Nurses at Kapiolani Medical Center for Women and Children conduct neonatal simulation training through the University of Hawai‘i Translational Health Science Simulation Center. Health care generates twice as many jobs per dollar as military spending — 10.64 jobs per \$1 million versus 5.28 — and keeps those wages circulating within Hawai‘i’s local economy. Photo courtesy of UH Nancy Atmospera-Walch School of Nursing.

Table 1. Employment Impacts per \$1 Million Spending (2026\$)

	Direct	Indirect	Induced	Total	Compared to Military
Military spending	3.43	0.30	1.55	5.28	
Education	9.77	1.20	2.36	13.35	+153%
Health care	7.02	1.15	2.47	10.64	+102%
Residential construction	4.46	1.1	2.1	7.66	+45%
Food production	16.82	1.93	3.14	21.89	+315%
Energy-efficient homes	5.08	0.95	2.06	8.09	+53%
Average Non-Military¹⁰	8.63	1.27	2.43	12.33	+134%

As seen here, military spending creates 3.43 direct jobs for each \$1 million in spending.

Adding the indirect (supply chain) and induced (economic multiplier) jobs brings

¹⁰ “Average non-military” refers to the average of the five preceding categories in the table: education, health care, residential construction, food production, and energy-efficient homes.

the total to 5.28 military or military-related jobs for each \$1 million of federal spending on the military in Hawai'i.

By comparison, education spending — including primary, secondary, higher education, and other education such as trade schools — creates 9.77 direct jobs and 13.35 total jobs, including indirect and induced effects. This is two and a half times as many jobs as the military creates for the same amount of spending (or an additional 153 percent). Thus, for every \$1 million shifted from the military to education, there is a net increase of roughly eight jobs (13.35 gained, 5.28 lost).

Health care creates twice as many jobs as the military (10.64 total jobs, or 102 percent more). New construction of residential buildings — including single-family homes and multi-family dwellings — creates 45 percent more jobs than the military (7.66 total per \$1 million in spending). Food production, yet another area that is important to the local economy and its residents, creates over four times as many jobs: 16.82 direct jobs and 21.89 total jobs. A shift from military spending to food production would create 16 net jobs for every \$1 million reallocated. Finally, making homes more energy efficient is both a source of jobs and a strategy to reduce energy use and energy bills. This would create 8.09 total jobs per \$1 million in spending — an increase of 53 percent compared to the military.

Taking an average of these five alternative spending areas, job creation amounts to 12.33 total jobs per \$1 million (including direct, indirect, and induced effects; see Figure 3.). Compared to military spending,

this is 134 percent greater. Thus, every \$1 million shifted from military spending to a combination of these other areas would result in a net gain of about seven jobs. A \$1 billion shift would create a net increase of approximately 7,000 jobs. Importantly, these would be jobs for local residents, rather than for military personnel or contractors who are stationed in Hawai'i but are largely residents of other states. Therefore, a shift from military to non-military spending would keep more funds and jobs within the state.

Are the additional jobs created comparable in quality — in terms of wages, benefits, hours, and permanency — to the military positions they would replace? While this question merits additional research, three points are worth mentioning.

A \$1 billion shift would create a net increase of approximately 7,000 jobs. Importantly, these would be jobs for local residents, rather than for military personnel or contractors who are stationed in Hawai'i but are largely residents of other states.

First, IMPLAN employment estimates are expressed in full-time equivalents (FTEs), meaning part-time positions are converted to FTE units when comparing jobs across sectors. The job totals in

Table 1 are therefore not inflated by the presence of part-time work in sectors like food production or health care services. IMPLAN counts jobs by place of work, not by the worker's state of residence. For the non-military sectors listed, nearly all jobs are held by workers living in Hawai'i versus active-duty personnel who are legal



A solar installation on O'ahu with the Wai'anae mountains in the background. Investment in energy-efficient homes generates 8.09 jobs per \$1 million spent — 53 percent more than the same investment in military spending, while keeping wages circulating within Hawai'i's local economy. Photo: U.S. Department of Energy / public domain.

residents of other states. Under Hawai'i law, a member of the military does not establish legal residence just because they are stationed in the state.¹¹ According to the Department of Business, Economic Development and Tourism (DBEDT) data, only 10 percent of active-duty personnel are residents of Hawai'i; therefore, 90 percent of active-duty service members

have legal residences in other states, with their wages taxed there.

Second, many occupations in Hawai'i earn salaries above the national average. Sectors such as education and health care — which have high job creation potential in comparison to military spending — are not low-wage industries in Hawai'i. Furthermore, these jobs often come with benefits. Registered nurses in Hawai'i, for example, earn an average annual salary of approximately \$123,720¹², which is well above military compensation for most enlisted personnel. In 2024, teachers in Hawai'i on average earned between \$55,600 and \$64,400 per year, with variations depending on the role.¹³ In 2024, electricians in Hawai'i earned on average \$86,690¹⁴, with hourly wages that are competitive or exceed mid-career enlisted military compensation. The weakest case among the alternative sectors is food production, which tends to be lower-wage and more seasonal than jobs in education, health care, or construction.

Third, the wage comparison must account for the fact that the military jobs being counted are largely held by non-residents. Active-duty personnel rotate through Hawai'i on assignment cycles of two to three years, meaning their earnings, including Basic Allowance for Housing (BAH), Basic Allowance for Subsistence (BAS), and base pay, are substantially spent and saved with

11 State of Hawai'i, Department of Taxation, *Tax Facts 97-2: Tax Information for Military Personnel*, rev. May 2025, <https://files.hawaii.gov/tax/legal/taxfacts/tf97-2.pdf>.

12 State of Hawai'i Department of Business, Economic Development & Tourism, *Occupational Employment and Wages 2024* (September 2025), 14.

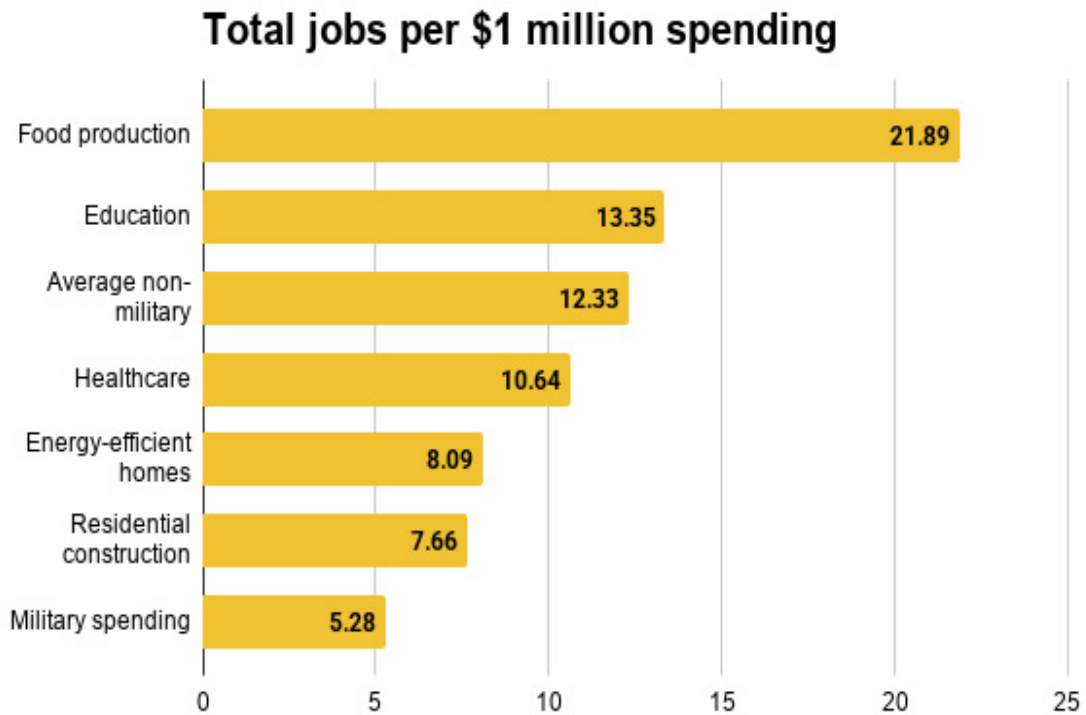
13 USAFacts, *Education: How Much Do Teachers Get Paid in Hawaii?* accessed April 2026, <https://usafacts.org/answers/how-much-do-teachers-get-paid-in-the-us/state/hawaii/>

14 State of Hawai'i Department of Business, Economic Development & Tourism, *Occupational Employment and Wages 2024* (September 2025), 18.

the expectation of relocation. According to the Congressional Research Service, in 2025, a mid-grade service member (E-5) earned on average \$47,838 in basic pay, but with BAH and BAS, earned an average of \$85,872.¹⁵ By contrast, the jobs created in education, health care, housing, and food production would be held by Hawai'i

residents whose incomes would be spent locally, whose children would attend local schools, and whose careers would contribute to the state over the long term. Job quality cannot be assessed solely by comparing per-job compensation figures because the durability of those benefits to the local community also matters.

Figure 3. Total Jobs per \$1 Million Spending



15 Kristy N. Kamarck and Nicholas M. Munves, *Defense Primer: Regular Military Compensation* (Washington, DC: Congressional Research Service, July 7, 2025), <https://www.congress.gov/crs-product/IF10532>.

Conclusion

A shift in federal spending priorities — including a reduction in military spending and increased investment in the types of programs that are important to residents of Hawai‘i — would yield a net increase in employment in the state. Currently, 73,000 people, or 10.5 percent of the state’s population, are employed by the military. Meanwhile, fewer than 40,000 people are employed in either health care or education.

For every \$1 million shifted from military spending to education or health care, five jobs would be lost, but between 10 and 22 jobs would be created, for a net gain of five to 17 jobs. Even in the sectors with the lowest job creation — energy-efficient homes and new housing construction — job growth would still outweigh losses. Every \$1 million shifted from military spending to either of these areas would create a net increase of about two to three jobs. On average, the five non-military sectors would create a total of 12.33 jobs. Thus, every \$1 million shifted from the military to a combination of these programs would result in a net increase of about seven jobs. A \$1 billion shift would create a net increase of about 7,000 jobs.

While the military takes up a significant part of Hawai‘i’s land, and receives a large amount of federal dollars, it is not particularly good at creating jobs — especially for the local population. A reduction in military spending, paired with an increase in spending in areas such as education, health care, clean energy, housing, and food production, would not only lead to a net increase in employment

but would also better meet the needs of the residents of Hawai‘i.

While the military takes up a significant part of Hawai‘i’s land... it is not particularly good at creating jobs — especially for the local population. A reduction in military spending, paired with an increase in spending in areas such as education, health care, clean energy, housing, and food production, would not only lead to a net increase in employment but would also better meet the needs of the residents of Hawai‘i.

The Impact of the U.S. Military on the Housing Market in Hawai'i

Omar Ocampo and Brag Selvarajan

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Key Findings

- Military housing demand caused rents to increase by 7.1 percent in 2024, thereby causing non-military tenants of Hawai‘i to spend an estimated \$234.8 million more in rent that year. This is equivalent to an additional \$154 per month, or \$1,848 annually, per renter household.
- Military personnel occupied 10.3 percent of the 142,130 units in the O‘ahu rental market in 2024.
- In 2024, the Department of Defense spent an estimated \$1.1 billion on Basic Allowance for Housing (BAH) for active-duty service members on O‘ahu. The average monthly BAH payment was \$3,703 per service member.
- An estimated \$648.9 million in BAH entered the private rental market in Honolulu County, with an average monthly payment of \$3,679 per service member.
- The percentage of renter households in O‘ahu who are cost-burdened, meaning they spend 30 percent or more of their income on housing-related expenses, is 54.7 percent. If we apply the traditional metric of 25 percent of income, this number balloons to 66.3 percent.
- A market-based solution will not solve the housing affordability crisis since private developers do not have the financial incentive to build truly affordable, low-cost rentals. The crisis is political, and an expansion of a permanently affordable green social housing sector is the only way to guarantee and expand access to low-cost housing.

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Introduction

The story of Hawai'i's housing market is one characterized by an affordability crisis caused by two unique factors that differentiate it from other expensive metropolitan areas: land scarcity and military demand.²

Military housing demand caused rents to increase by 7.1 percent in 2024, thereby causing non-military tenants of Hawai'i to spend an estimated \$234.8 million more in rent that year. This is equivalent to an additional \$154 per month, or \$1,848 annually, per renter household.

Year after year, median rents and housing prices on the island chain climb upward while wages fail to keep up with rising costs. This unrelenting environment for renters and prospective homebuyers has displaced middle- and low-income households. Many

Native Hawaiians are forced to leave their ancestral homeland in search of cheaper housing. And that displacement has not been confined to the state. Migration to the continental United States has increased in recent years, particularly to Nevada, which is now informally nicknamed the "Ninth Island."³ Those who remain in Hawai'i experience significant financial strain. The number of cost-burdened households continues to grow, as does the houseless population, which is disproportionately Native Hawaiian.

In an effort to address the state's ongoing housing crisis, Governor Josh Green declared a public emergency eight months into his term.⁴ His stated goal was to expand housing production at all costs, but after a wave of criticism and a string of lawsuits, he moderated his ambitions.⁵ His subsequent proclamations seek to fast-track the construction of new affordable units by offering private developers regulatory relief and financial incentives.⁶

However, Governor Green's approach to the housing crisis has two major problems: first, it relies primarily on the market to provide housing; second, it fails to account for how military demand contributes to the affordability crisis.

2 Our report focuses on military rental demand in Honolulu County since more than 98 percent of active-duty service members reside on O'ahu. It is important to note that land scarcity and military demand are not the only two reasons for the affordability crisis in Hawai'i.

3 Eliza Fawcett, "There's No Ocean in Sight. But Many Hawaiians Make Las Vegas Their Home," *New York Times*, May 20, 2023, <https://www.nytimes.com/2023/05/20/us/hawaii-las-vegas-migration.html>.

4 Office of the Governor, State of Hawai'i, *Proclamation Relating to Housing*, 2023, <https://governor.hawaii.gov/wp-content/uploads/2023/07/2307072-1.pdf>.

5 Blaze Lovell, "Hawai'i Supreme Court Puts Guardrails on Governors' Executive Powers," *Honolulu Civil Beat*, September 11, 2025, <https://www.civilbeat.org/2025/09/hawai%CA%BBi-supreme-court-puts-guardrails-on-governors-executive-powers>.

6 Stewart Yerton, "Green Says 64,000 New Affordable Homes Are in the Pipeline. Can He Deliver?" *Honolulu Civil Beat*, October 14, 2025, <https://www.civilbeat.org/2025/10/green-says-64000-new-affordable-homes-are-in-the-pipeline-can-he-deliver>.

The economic principle of supply and demand asserts that businesses will supply more of a good or service when prices are high. But if supply is not provided, the assumption is that a regulatory barrier, such as zoning restrictions, may be preventing businesses from meeting consumer demand. Market-based solutions may very well increase the total supply of housing, but they will do so only at a marginal level.⁷ They do not address the needs of those at the lower end of the income distribution because real estate developers do not have the financial incentive to build low-cost rentals. Developers are profit-maximizing businesses, meaning they will build new units only if there is a return on investment. Therefore, if demand remains constant or grows, a market-based approach is likely to only slow the rate of median rent increases or negligibly lower them, primarily for households that are not in need of truly affordable rentals in the first place.

When housing is commodified and treated as an asset, the rental market's goal is not to provide housing for the largest number of households but to generate profits and increase the value of their asset.⁸ For landlords, the market is currently working as intended: They extract profits from military personnel with housing allowances and cost-burdened working-class tenants via rental income while their wealth grows through rising property values.

The result is that Hawai'i, and particularly urban Honolulu, are consistently ranked among the most expensive real estate markets in the country, alongside major economic and global hubs like New York City and San Francisco. While high rates of out-of-state and foreign demand make Hawai'i similar to other housing-stressed metropolitan areas in the U.S., its market differs from the rest of the country in two fundamental ways.

Hawai'i Is Unique

The first way that Hawai'i's housing market differs from the rest of the country is that land is at a premium. Compared to large U.S. states like Texas, the islands have limited space available for development.

Unlike many other goods and tangible assets, land cannot be produced on a large scale, moved, or imported. In other words, land is a zero-sum asset, which explains why its value differs greatly depending on market demand and the kinds of socioeconomic activities that surround it.⁹ As a result, Hawai'i's residents are constrained in a way not familiar to most in the U.S., where land shortages rarely prevent building new housing in or around greater metro areas. Because of space constraints, residents of Hawai'i do not have the luxury of living in a nearby town or a bordering state and commuting to work to save money on housing costs.

7 Brian Callaci and Sandeep Vaheesan, "The Market Alone Can't Fix the U.S. Housing Crisis," *Harvard Business Review*, September 12, 2024, <https://hbr.org/2024/09/the-market-alone-cant-fix-the-u-s-housing-crisis>.

8 Ricardo Tranjan, *The Tenant Class* (Toronto: Between the Lines, 2023).

9 Mike Bird, *The Land Trap: A New History of the World's Oldest Asset* (New York: Portfolio, 2025).



Aerial view of Honolulu and Diamond Head, illustrating the geographic constraints that make land scarce on O'ahu. Photo from Pixabay.

The second unique feature of Hawai'i's housing market is the strong presence and rental demand of the U.S. military. The presence of the U.S. armed forces is somewhat paradoxical since “the military is everywhere in Hawai'i, and yet it is hidden in plain sight.”¹⁰ More than a century of U.S. imperialism and colonialism has deprived Native Hawaiians of both sovereignty and self-determination.¹¹ Wealthy American sugar planters engineered the overthrow of Hawai'i's constitutional monarchy in 1893. Without the consent of the native

population, the country was annexed by the U.S., first incorporated as a territory and later admitted as a state in 1959.¹² In place of a sovereign constitutional monarchy, the most militarized state per capita in the U.S. was established, with a network of military installations scattered throughout the islands.

Nearly a quarter of O'ahu, the state's most populous island, is currently under military occupation.¹³ This makes an already fixed resource — land — even scarcer, yet much of the academic literature on Hawai'i's housing market conspicuously does not factor in the military's potential impact on land prices. Land is typically a housing developer's largest expense. Studies have examined Hawai'i's regulatory regime and its contribution to housing cost growth.¹⁴ Yet, it is curious that there is a lack of similar analyses that examine the potential price impacts of military occupation or consider how opening military lands to development could help reduce land prices.

10 Kyle Kajihiro and Terrilee Keko'olani, “The Hawai'i DeTour Project: Demilitarizing Sites and Sights on O'ahu,” in *Detours: A Decolonial Guide to Hawai'i*, ed. Hokulani K. Aikau and Vernadette Vicuña Gonzalez (Durham: Duke University Press, 2019), 249–60.

11 Kamanamaikalani Beamer, “Seeds of Occupation: A Brief History of How the US Military Took Root in Hawai'i,” Dr. Kamanamaikalani Beamer [website], September 22, 2025, <https://kamanabeamer.com/post/seeds-of-occupation-a-brief-history-of-how-the-us-military-took-root-in-hawaii>; Kyle Kajihiro, “Nation Under the Gun: Militarism and Resistance in Hawai'i,” *Cultural Survival*, April 2, 2010, <https://www.culturalsurvival.org/publications/cultural-survival-quarterly/nation-under-gun-militarism-and-resistance-hawaii>.

12 Noenoe K. Silva, *Aloha Betrayed: Native Hawaiian Resistance to American Colonialism* (Durham: Duke University Press, 2004).

13 Kamanamaikalani Beamer, “Hawai'i at a Crossroads: Past, Present, and Future of U.S. Military Occupation,” Dr. Kamanamaikalani Beamer [website], September 12, 2025, <https://www.kamanabeamer.com/post/hawaii-i-at-a-crossroads-past-present-and-future-of-u-s-military-occupation>.

14 Rachel Inafuku, Justin Tyndall, and Carl Bonham, “Measuring the Burden of Housing Regulation in Hawai'i,” The Economic Research Organization at the University of Hawai'i, 2022, <https://uhero.hawaii.edu/wp-content/uploads/2022/04/MeasuringTheBurdenOfHousingRegulationInHawaii.pdf>.

Military Demand and Basic Allowance for Housing

In the summer of 2024, 42,503 active-duty service members were stationed in Hawai'i, with more than 98 percent of them residing on O'ahu. The mean household size of military personnel was 2.03.¹⁵ These military personnel are entitled to housing by the federal government.¹⁶ The U.S. Department of Defense (DoD) considers the provision of adequate shelter an effective way to attract new recruits, guarantee a decent quality of life, and ensure high-quality performance in both military exercises and operations.

The federal government guarantees housing to active-duty service members either by providing on-base military housing — reserved primarily for unaccompanied junior ranks — or by disbursing a tax-free monthly Basic Allowance for Housing (BAH), which allows military personnel to access privatized military family housing (on-

base) or the private rental market. In 2024, the DoD spent an estimated \$27.9 billion to fund the BAH program.¹⁷ The amount a service member receives depends on their geographic location, rank, and dependency status (i.e., whether they are accompanied by a spouse and/or children).¹⁸ Every year, the DoD sets the BAH rates equal to median rents plus average utility costs of a given location around military housing areas (see Table 1).¹⁹ There are BAH price floors and ceilings and added protections for service members who enter multi-year contracts in case there is a downturn in the rental market.²⁰ In 2024, the County of Honolulu had a monthly BAH floor of \$2,256 and a ceiling of \$4,648.²¹

In practice, the DoD relies heavily on the private sector to house its service members. While housing for unaccompanied and lower-rank military personnel is largely government owned and operated, 99 percent of on-base military family housing has been privatized over the past 30 years via the Military Housing Privatization Initiative (MHPI).²² These military households use

15 Authors' calculations; Department of Business, Economic Development & Tourism, *2024 State of Hawai'i Data Book* (Honolulu: State of Hawai'i, 2025), <https://dbedt.hawaii.gov/economic/databook/db2024>.

16 Pamela C. Twiss and James A. Martin, "Military Housing," in *Introduction to Housing*, 3rd ed., ed. Katrin B. Anacker, Andrew T. Carswell, and Sarah D. Kirby (New York: Routledge, 2025), 231–48.

17 This figure is the total amount provided by the DoD to all active-duty service members stationed in the country. U.S. Department of Defense, "DoD Releases 2024 Basic Allowance for Housing Rates," December 14, 2023, <https://www.war.gov/News/Releases/Release/Article/3617400/dod-releases-2024-basic-allowance-for-housing-rates>.

18 Beth J. Asch, Jason M. Ward, and Samuel Absher, *Reassessing the Basic Allowance for Housing for Army Personnel in a Rapidly Changing Housing Market* (Santa Monica: RAND Corporation, January 27, 2025), https://www.rand.org/pubs/research_reports/RRA2412-1.html.

19 Military housing areas are the zip codes that surround a military base; active-duty service members are not required to live in an MHA. Veteran.com Team, "2024 Military Housing Area Names," *Veteran.com*, January 9, 2024, <https://veteran.com/military-housing-area-names>.

20 Veteran.com Team, "2024 Military Housing Area Names."

21 Defense Travel Management Office, "Basic Allowance for Housing Rate Lookup," U.S. Department of Defense, <https://www.travel.dod.mil/Allowances/Basic-Allowance-for-Housing/BAH-Rate-Lookup>.

22 Andrew Tilghman, *Military Housing*, Report No. R47728 (Washington, DC: Congressional Research Service, 2023), https://www.congress.gov/crs_external_products/R/PDF/R47728/R47728.4.pdf.

their BAH stipend to pay their rent to the 14 private housing companies that participate in MHPI programs. Private businesses now directly operate and own military family

housing under 50-year lease agreements — public-private partnerships that transform federal taxpayer dollars into corporate revenue.

Table 1. Rates for Basic Allowance for Housing by Rank in O’ahu, 2024

Rank	With Dependents	Without Dependents
E1 to E4	\$3,009	\$2,256
E5	\$3,321	\$2,508
E6	\$3,669	\$2,751
E7	\$3,831	\$3,024
E8	\$4,008	\$3,396
E9	\$4,194	\$3,492
W1	\$3,690	\$2,907
W2	\$3,906	\$3,393
W3	\$4,122	\$3,507
W4	\$4,221	\$3,705
W5	\$4,341	\$3,870
O1	\$3,369	\$2,694
O2	\$3,666	\$3,219
O3	\$4,116	\$3,540
O4	\$4,380	\$3,840
O5	\$4,563	\$3,939
O6	\$4,599	\$4,101
O7/O7+	\$4,638	\$4,176

Source: Defense Travel Management Office, *Basic Allowance for Housing Lookup*

Part of the initial logic behind MHPI was for the DoD to access private capital to build new housing units and renovate its deteriorating housing stock.²³ But the evidence suggests that MHPI programs are

failing to meet these expectations. In an October 2025 survey, 97 percent of participating active-duty service members reported at least one significant issue with their privatized military housing, such as

23 Thongchai Punja and Gabor Kerek, *Assessment of Costs and Benefits of the Military Housing Privatization Initiative in Selected Areas*, MBA Professional Report (Monterey, CA: Naval Postgraduate School, 2004), <https://apps.dtic.mil/sti/tr/pdf/ADA424906.pdf>.

mold, pest infestation, or water damage.²⁴ Seventy-six percent said these living conditions had a negative effect on the health of a family member, and more than half said their issues go unresolved.

The poor quality of privatized military housing has driven many service members to seek off-base housing, using their BAH to rent in the civilian market. But the BAH has drawn criticism from housing activists in Hawai'i because it contributes to inflationary pressures on rental prices.²⁵ Local salaries cannot compete with a tax-free military housing stipend — on top of service members' base salaries — that hover above median rents. While working-class tenants in O'ahu increasingly struggle to afford rental housing, a mid-level E-5 Sergeant with dependents can easily manage to pay for a one-, two-, or three-bedroom home, and an E-5 Sergeant without dependents can comfortably afford a one- or two-bedroom unit (see Figure 1).²⁶

Landlords are arguably the biggest beneficiaries of military personnel entering the civilian housing market. Though they may not admit it publicly, landlords prefer renting to institutions rather than to individual tenants²⁷ — and they have every incentive to do so. Service members are often considered reliable and low-risk tenants because property owners are guaranteed a steady flow of

rental income through the military's BAH program. Landlords also have an additional incentive to charge slightly higher rents to military households because BAH rates are higher than median rents.

Though they may not admit it publicly, landlords prefer renting to institutions rather than to individual tenants — and they have every incentive to do so. Service members are often considered reliable and low-risk tenants because property owners are guaranteed a steady flow of rental income through the military's BAH program.

On its own, the BAH does not set rental prices; it simply doesn't have the market power to do so. But the BAH does contribute to market tightness — where rental demand begins to outstrip supply — and this constraint drives prices upward.

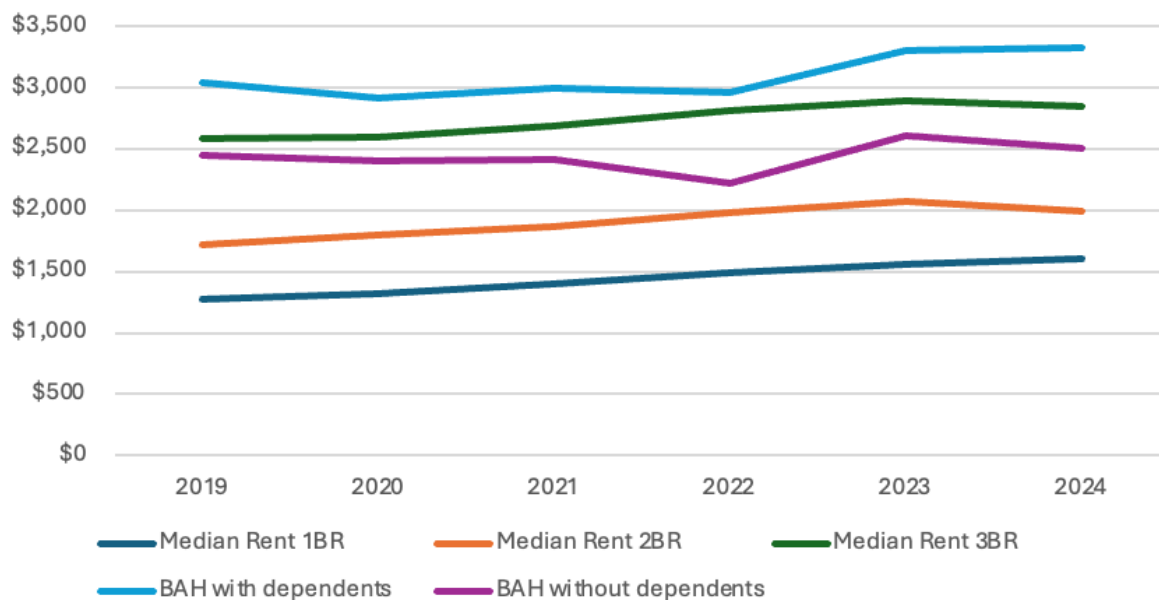
24 Change the Air Foundation, *Unsafe and Unheard: Military Service Members and Their Families Sound Off on Dangerous Living Conditions* (Change the Air Foundation, 2025), <https://changetheairfoundation.org/mold-in-the-military>.

25 Eric Pape, "Living Hawaii: How Military Policies Drive Up Rents on Oahu," *Honolulu Civil Beat*, June 17, 2015, <https://www.civilbeat.org/2015/06/living-hawaii-how-military-policies-drive-up-rents-on-oahu>.

26 U.S. Census Bureau, *American Community Survey 1-Year Estimate*, Table B25031, "Median Gross Rent by Bedrooms," 2019-2023; U.S. Census Bureau, *American Community Survey 1-Year Estimate*, Table 25031, "Median Gross Rent by Bedrooms," 2024; and Defense Travel Management Office.

27 Interview with Ricky Cassidy, real estate analyst, by Omar Ocampo, December 2025.

Figure 1. The BAH of an E-5 Sergeant Is Above the Median Rents of a 1BR and 2BR in O’ahu



Source: U.S. Census Bureau *American Community Survey 5-Year Estimate, 2019-2023*, *American Community Survey 1-Year Estimate, 2024*, and Defense Travel Management Office

In December 2024, the DoD published a report providing an analysis of the U.S. military’s impact on Hawai’i’s housing market.²⁸ While the report acknowledged that the military presence in the private rental market is “not negligible,” with 14,700 members of the armed forces occupying 13.9 percent of the 105,868 civilian rentals in O’ahu, it did not quantify how military demand drove up rents.²⁹ U.S. Congressional Representatives Edward Case (HI-01) and Jill Tokuda (HI-02) denounced the re-

port as uninspiring and lacking any tangible solutions.³⁰

The BAH also puts local prospective homebuyers at a competitive disadvantage. According to the DoD’s report, approximately 2,150 service members are homeowners in O’ahu. Eligible service members can access the home loan program through the Department of Veteran Affairs (VA) to buy a home with zero down payment and can use their BAH to make mortgage payments.

28 U.S. Department of Defense, *Joint Housing Requirements and Market Analysis for Certain Military Installations in Hawaii* (2024), <https://www.dropbox.com/scl/fi/i64arf99i345v4ioue89y/05-TAB-B-FY-2024-NDAA-Section-2874-HI-HRMA-80.pdf?rlkey=2km57837c2rcawxhsgm9op37&e=2&st=c4i73p1u&dl=0>.

29 The DoD cited 2023 data from the U.S. Census Bureau to determine the total number of renter-occupied units and the percentage of military occupancy. For 2024, the number of renter-occupied units increased to 142,130, which reduced the military occupancy share from 13.9 percent to 10.3 percent.

30 U.S. House Representative Jill Tokuda, “Rep. Tokuda, Rep. Case Issue Statements on DoD Hawai’i Housing Report,” press release, January 17, 2025, <https://tokuda.house.gov/media/press-releases/rep-tokuda-rep-case-issue-statements-on-dod-hawaii-housing-report>.



Military family housing near Schofield Barracks, O'ahu. Photo by Staff Sgt. Christopher Hubenthal, April 30, 2014.

Thus, the BAH allows service members to build equity or rent their homes, even as short-term rentals, if they are permanently relocated to another station outside of the county or state. Even though active-duty service members make up a very small share of the owner-occupied market, military-backed mortgages surged by 206 percent in the first few months of the Covid-19 pandemic compared to the same time the year before, demonstrating how the benefits derived from VA home loans outcompete the residents of Hawai'i even during market downturns.³¹

Data on Hawai'i and O'ahu's Housing Market

A 2024 report by SMS Research and

Marketing Services found that the State of Hawai'i will need 632,548 total housing units to meet projected demand by 2027.³² The report looked at 2022 housing data from the U.S. Census Bureau, population projections from Hawai'i's Department of Business, Economic Development & Tourism, and units currently in the pipeline to determine that 64,490 new housing units need to be built to alleviate the state's housing shortage. As of 2024 — the most recent year where Census Bureau survey data were available — there was still a shortage of 59,724 units.³³

The SMS report noted that 65 percent of the new units need to be affordable for households earning 80 percent or less of the area median income. However, it is unlikely that the private sector will provide permanently affordable housing to low-income and working-class families, given current trends in military demand, the influx of BAH into the rental market, and the appreciation of real estate prices due to high demand and land scarcity.

In O'ahu, the total housing stock increased from 354,719 units to 377,848 units between 2019 and 2024 (see Table 2). Renter-occupied and vacant units available for rent expanded by 5.3 percent and 30.5 percent, respectively.³⁴ Military personnel occupied 10.3 percent of the 142,130 units

31 Kevin Knodell, "Hawai'i Is Seeing a Boom in Military-Backed Mortgages," *Honolulu Civil Beat*, October 1, 2020, <https://www.civilbeat.org/2020/10/hawaii-is-seeing-a-boom-in-military-backed-mortgages>.

32 Authors' calculations based on the total number of housing units (568,058) stated in the report and the total number of units needed (64,490) to meet demand. SMS Research and Marketing Services, Inc., FSR Consulting LLC, and Ward Research, Inc., *Hawai'i Housing Planning Study 2024* (Honolulu: Department of Business, Economic Development and Tourism, 2025), https://dbedt.hawaii.gov/hhfdc/files/2025/05/FINAL_2024-HHPS-State-Report_Ward-Research.pdf.

33 This number does not include any new projects added in the pipeline since the publication of SMS' report. U.S. Census Bureau, *American Community Survey 1-Year Estimate*, Table DP04, "Selected Housing Characteristics," 2024.

34 U.S. Census Bureau, *American Community Survey 1-Year Estimate*, Table DP04, "Selected Housing Characteristics," 2024; U.S. Census Bureau, *American Community Survey 1-Year Estimate*, Table B25004, "Vacancy Status," 2024.

on the O’ahu rental market in 2024.³⁵ This military presence exceeded the number of units unavailable due to seasonal use (vacation homes and short-term rentals) as well as units that had been sold but remained vacant.

Table 2. Growth in the O’ahu Housing Stock, 2019 and 2024

O’ahu, Hawai’i	2019		2024		Growth	
	Number	Percent	Number	Percent	Number	Percent
Total available housing stock	354,719	100.0%	377,848	100.0%	23,129	6.5%
Total occupied housing units	316,456	89.2%	338,627	89.6%	22,171	7.0%
Owner-occupied units	181,534	51.2%	196,497	52.0%	14,963	8.2%
Renter-occupied units	134,922	38.0%	142,130	37.6%	7,208	5.3%
Total Vacant Units	38,263	10.8%	39,221	10.4%	958	2.5%
Vacant available	10,556	3.0%	14,321	3.8%	3,765	35.7%
For rent	6,976	2.0%	9,104	2.4%	2,128	30.5%
Rented, not occupied	732	0.2%	1,260	0.3%	528	72.1%
For sale only	2,169	0.6%	1,538	0.4%	-631	-29.1%
Sold, not occupied	679	0.2%	2,419	0.6%	1,740	256.3%
Vacant unavailable	27,707	7.8%	24,900	6.6%	-2,807	-10.1%
Seasonal use	13,679	3.9%	11,564	3.1%	-2,115	-15.5%
For migrant workers	0	0.0%	22	0.0%	22	N/A
Other Vacant	14,028	4.0%	13,314	3.5%	-714	-5.1%

Source: U.S. Census Bureau, *American Community Survey 1-Year Estimate, 2019 and 2024*

35 The DoD report estimated that roughly 14,700 military personnel occupied private rental units on O’ahu, representing about 14 percent of the total. However, this estimate was based on 2023 housing data. We have applied the same number of service members to 2024 housing data, which yields a lower share (10.3 percent) due to the larger number of rental units.

The number of renters in Honolulu County who were cost burdened in 2024 was very high. Over half, 54.7 percent, of renter households spent more than 30 percent of their income on rent and utilities.³⁶ The commonly used threshold of 30 percent for defining cost-burdened households is arbitrary. If the threshold is lowered to 25 percent of income — roughly the equivalent of one week's wages — then the share of cost-burdened renter households in O'ahu balloons to 66.3 percent.³⁷

Estimating the BAH in O'ahu

While we have data on the total number of active-duty service members stationed in Hawai'i, we do not have exact numbers on the distribution of military personnel by rank. The DoD releases an annual report showing pay grades by state, but ranks are grouped into septiles (seven categories). For example, 11 percent of active-duty service members in Hawai'i are ranked as E7-E9, making it difficult to determine the exact headcount of personnel in each individual rank (E7, E8, and E9).³⁸ Without this exact information, we cannot determine the mean BAH.³⁹

To make up for the lack of precise data, we looked at active-duty service members by rank at the national level for 2024 and applied their distribution by pay grade to Hawai'i.⁴⁰ For example, commissioned officers ranked O3 made up 5.7 percent of all military personnel in the United States. Applying this percentage to Hawai'i's 42,503 service members results in an estimated 2,433 O3 officers. Since 98.6 percent of all military members are based in O'ahu, we estimate that there are roughly 2,399 O3 officers in Honolulu County.

According to the DoD's report, there are 16,707 on-base housing units (known as barracks) provided by the U.S. federal government on O'ahu. If 14,700 service members rent in the private market and 16,707 live in barracks, we assume that the remaining 10,509 service members reside in privatized on-base military housing (MHPI). Thus, 25,209 active-duty service members receive BAH in Honolulu County.⁴¹

Junior enlisted personnel (E1-E4) are typically required to live on-base.⁴² Our calculations estimate that 17,294 junior rank members occupy all of the military's

36 Authors' calculation; U.S. Census Bureau, *American Community Survey 1-Year Estimate*.

37 In the beginning of the 20th century, a common measure of affordability was "a week's wages for a month's rent." In other words, households were expected to spend about 25 percent of their income on housing. This standard was codified in 1969 with the Brooke Amendment, but the threshold was increased to 30 percent in the 1980s when the U.S. Congress decided to cut federal housing spending.

38 U.S. Department of Defense, *2024 Demographics Profile of the Military Community* (Military OneSource, 2024), <https://www.militaryonesource.mil/data-research-and-statistics/military-community-demographics/2024-demographics-profile>.

39 The authors submitted Freedom of Information Act requests to each branch of the military asking for this and related housing data; however, at the time of writing, the requests had not been answered.

40 U.S. Department of Defense, Defense Manpower Data Center, *Selected Reserve Personnel by Reserve Component and Rank/Grade* (DoD Workforce Report, December 2024), <https://dwp.dmdc.osd.mil/dwp/app/dod-data-reports/workforce-reports>.

41 We assume that all military families not in the private rental market participate in the MHPI program.

42 Military OneSource, "Military Housing: First Time Living on an Installation," February 5, 2026, <https://www.militaryonesource.mil/moving-pcs/housing/military-housing-living-on-an-installation-for-the-first-time>.

barracks (16,707 units). We assume the remaining 587 junior enlisted members receive BAH at the lower “without dependents” rate (\$2,256), given that they tend to be single and/or unaccompanied. We also assume that the remaining service members have a spouse, child, and/or other dependents since the mean household size for military personnel in O’ahu is 2.03.

Therefore, in our calculation, all Warrant Officers (W1-W5), Commissioned Officers (O1-O10), and the remaining enlisted personnel (E5-E9) receive BAH at the higher “with dependents” rate. Based on these assumptions, total expenditures for BAH on O’ahu was more than \$1.1 billion in 2024 (see Table 3), with a mean monthly payment of \$3,703.

Table 3: Military Personnel and their Annual BAH by rank in O’ahu, 2024

Rank	Total DoD Personnel	Total Hawai'i Personnel (est.)	Total O'ahu Personnel (est.)	Total Annual BAH Disbursed in O'ahu (est.)
E1	43,434	1,464	1,444	\$0
E2	67,740	2,283	2,251	\$0
E3	166,264	5,604	5,527	\$0
E4	242,826	8,185	8,072	\$15,891,264
E5	216,867	7,310	7,209	\$287,293,068
E6	163,601	5,514	5,438	\$239,424,264
E7	90,463	3,049	3,007	\$138,237,804
E8	26,783	903	890	\$42,805,440
E9	10,487	353	348	\$17,514,144
Unknown enlisted rank	1	0	0	\$0
W1	4,562	154	152	\$6,730,560
W2	7,906	266	262	\$12,280,464
W3	4,601	155	153	\$7,567,992
W4	2,359	80	79	\$4,001,508
W5	738	25	25	\$1,302,300

Rank	Total DoD Personnel	Total Hawai'i Personnel (est.)	Total O'ahu Personnel (est.)	Total Annual BAH Disbursed in O'ahu (est.)
O1	24,664	831	820	\$33,150,960
O2	32,529	1,096	1,081	\$47,555,352
O3	72,182	2,433	2,399	\$118,491,408
O4	43,871	1,479	1,459	\$76,685,040
O5	27,395	923	910	\$49,827,960
O6	10,911	368	363	\$20,033,244
O7/O7+	370	28	27	\$1,502,712
Unknown officer rank	0	0	0	\$0
Total	1,261,008	42,503	41,916	\$1,120,295,484

Source: Authors' calculations. Department of Defense, Defense Manpower Data Center (December 2024). There are only 587 active-duty service members ranked E4 who receive BAH in our calculation. See Table 4 for our calculation on the total number of military personnel (by rank) who receive BAH.

According to the DoD, 14,700 BAH recipients entered the private rental market on O'ahu, accounting for approximately 10.3 percent of the 142,130 renter-occupied units in Honolulu County. However, it is not possible to precisely determine their rank. To overcome this limitation, we assume that the 587 junior enlisted members rented in the private market since it is unlikely they accessed MHPI military family housing. We then allocated the remaining 14,113 personnel proportionally by rank. Based on these assumptions, we estimate that \$648.9 million in BAH entered the private rental market in 2024 (see Table 4). The mean monthly BAH for these 14,700 households was \$3,679.

Based on our estimates, the vast majority of BAH recipients on O'ahu (97.7 percent) are mid-level enlisted members and high-ranking officers. Within the formal hierarchy of the military, 67 percent are ranked E5-E9; 30.7 percent are ranked officers. The junior ranks who receive BAH and rent in the private market experience financial hardship. In our calculation for 2024, the BAH stipend distributed to the junior enlisted ranks is not enough to cover their housing costs, requiring them to pay out of pocket to make up the difference. These pressures are reflected in the broader housing challenges they face in Hawai'i. In early 2026, an influx of roughly 690 additional troops, as well as

ongoing barracks renovations, required many personnel to double up in their barracks. At the same time, the high cost of off-base housing, coupled with the low salaries and relatively small BAH provided to junior-ranked personnel, puts them in a financially precarious housing situation.⁴³

Military Demand in O’ahu’s rental market raises living costs by \$154 per month, costing residents approximately \$234.8 million annually

With 14,700 military members in the private rental market, an estimated 127,430 renter households are non-military. On O’ahu, both military and non-military renters pay an average gross rent of \$2,323, based on U.S. Census Bureau contract rent data and average utility costs (approximately \$409 per month).⁴⁴ Given our estimated mean monthly BAH of \$3,679, the U.S. military’s housing stipend exceeds the average gross rent by as much as \$1,356 per month, or 58.4 percent.

Since military BAH recipients represent a statistically significant proportion of the renter population (10.3 percent) and spend 58.4 percent more than the typical resident, we decided to determine what would happen to average gross rents if BAH recipients paid the average gross rent of

\$2,323 instead of their mean BAH payment of \$3,679.

There are 142,130 renter households on O’ahu. They pay an average gross rent of \$2,323, a total of approximately \$330 million in rental payments each month, or close to \$4 billion per year.

There are 14,700 military households in the private rental market who account for 10.3 percent of all non-owner-occupied rentals, with a mean BAH of \$3,679. This equates to more than \$54 million in rental payments per month and close to \$649 million per year (see Table 4). When we subtract this \$54 million from the total \$330 million in monthly rental payments, the difference is more than \$276 million paid by non-military renters each month.

If the 14,700 military tenant households paid the average gross rent of \$2,323 instead of the current BAH of \$3,679, their total monthly rental payments would decrease by \$34 million. Adding this \$34 million back to the \$276 million paid by non-military renters results in more than \$310 million per month in total rental payments across all 142,130 rental-occupied units on O’ahu. Dividing this \$310 million by the total number of renter households (142,130) results in a new average gross rent if military households paid the average gross rent instead of the current average BAH.

According to our calculations, average gross rent would decrease from \$2,323

43 Patricia Kime, “Army Doubling Up Soldiers in Hawai’i Barracks to Meet Housing Demand,” *Military Times*, January 21, 2026, <https://www.militarytimes.com/news/your-military/2026/01/21/army-doubling-up-soldiers-in-hawaii-barracks-to-meet-housing-demand>.

44 Authors’ calculation; U.S. Census Bureau, *American Community Survey 1-Year Estimate*, Table B25056, “Contract Rent,” 2024; and estimates based on Zillow and Redfin data on utility costs.

to \$2,170 if military personnel paid the average market rate. This is a difference of \$154 per month, or 7.1 percent – the amount that military demand through BAH inflates rental prices.⁴⁵ As a result, non-military renter households in 2024

paid approximately \$1,842 more in rent. Multiplying the number of non-military tenant households (127,430) by the extra amount of money they paid in 2024 (\$1,842) yields an estimated \$234.8 million in additional rent payments.

Table 4. Total Amount of BAH Disbursed in the Private Rental Market in O’ahu

Rank	BAH Recipients in O’ahu	Military Personnel in the Private Rental Market	Total BAH Entering the Private Rental Market
Junior Ranks (E1-E4)	587	587	\$15,891,264
E5	7,209	4,132	\$164,668,464
E6	5,438	3,117	\$137,235,276
E7	3,007	1,724	\$79,255,728
E8	890	510	\$24,528,960
E9	348	199	\$10,015,272
W1	152	87	\$3,852,360
W2	262	151	\$7,077,672
W3	153	88	\$4,352,832
W4	79	45	\$2,279,340
W5	25	14	\$729,288
O1	820	470	\$19,001,160
O2	1,081	620	\$27,275,040
O3	2,399	1,375	\$67,914,000
O4	1,459	836	\$43,940,160
O5	910	522	\$28,582,632

⁴⁵ The difference of \$154 is rounded up from \$153.53.

Rank	BAH Recipients in O'ahu	Military Personnel in the Private Rental Market	Total BAH Entering the Private Rental Market
O6	363	208	\$11,479,104
O7/O7+	27	15	\$834,840
Total	25,209	14,700	\$648,913,392

Source: Authors' calculations

Based on the value of BAH payments, we project that military BAH recipients occupy over 36 percent of the 38,299 high-value rental units on O'ahu (i.e., units with gross rent above \$2,500 per month). This places significant upward pressure on the average gross rent in the area.

Based on the value of BAH payments, we project that military BAH recipients occupy over 36 percent of the 38,299 high-value rental units on O'ahu (i.e., units with gross rent above \$2,500 per month). This places significant upward pressure on the average gross rent in the area. As relatively high earners (when BAH is included as part of income) with a greater willingness to pay than the local average renter, military households directly affect rents by pushing up prices in desirable, high-den-

sity areas (increasing demand), incentivizing owners to convert lower-cost units to higher-end rentals (supply diversion), and displacing lower-income renters and reducing the availability of affordable units (gentrification). The BAH also leads other high-earning renters to directly compete with lower-income renters for affordable and lower-cost rentals.

Recommendations

In order to provide housing security and affordability for all people living in Hawai'i, we recommend the following actions and policy interventions. This list is not exhaustive, nor does it supersede the demands and wishes of Hawai'i residents and Native Hawaiians:

- Data transparency from the U.S. military
- A requirement for a zero percent vacancy rate in on-base housing units
- Tenant protections
- Vacancy tax in the private market
- The development of permanently affordable social housing

Data Transparency from the U.S. Military

One of the challenges of conducting this research is the lack of available data. The U.S. military should, on a yearly basis, disclose to state lawmakers and the public the following information: (a) the distribution of active-duty military personnel by rank/grade; (b) the number of on-base housing units that the DoD owns and operates and their vacancy rate; (c) the total number of privatized military family housing units that the DoD oversees and their vacancy rate; (d) the amount the DoD spends in BAH in the state of Hawai'i; (e) the total number of active-duty service members who receive BAH, along with their rank/grade; and (f) the number of military personnel who rent in the private rental market, along with their rank/grade. Making this data available will allow researchers to conduct yearly analyses and accurately assess the impact of the U.S. military on the private rental market.

A Requirement for a Zero Percent Vacancy Rate in On-Base Housing Units

To help combat the inflationary impacts caused by military rental demand, the U.S. armed forces need to require all active-duty service members to live on base. Not only should the U.S. military disclose the total number of on-base housing units they

own and oversee, but they should build high-density military housing if there is a shortage so they can accommodate all of their active-duty service members. Until this is accomplished, residents and lawmakers of Hawai'i should require that on-base housing units (both barracks and MHPI) maintain a zero percent vacancy rate before any active-duty service member uses BAH to enter the private rental market.

Tenant Protections

Hawai'i is one of the most expensive real estate markets in the country, with a high number of renters who are cost burdened. Since military demand is unlikely to decrease in the short and medium term, one way to bring immediate relief to tenants is through the implementation of rent control. Rent control limits the speculative behavior of investors and landlords in the market and protects tenants from arbitrary and dramatic rent increases, especially increases driven by military demand and BAH.⁴⁶ Another policy intervention is the right to counsel. More than two dozen jurisdictions in the United States currently entitle tenants to free legal representation, empowering them and delivering housing security by providing a tool to fight and limit mass evictions.⁴⁷ Any laws on the books that protect a renter's right to form or join a tenant union and prevent retaliatory evictions must be enforced.

46 Tram Hoang and Ameer Chew, *The Truth about Rent Control* (Oakland, CA: PolicyLink, Popular Democracy in Action, and Right to the City, July 2025), https://www.policylink.org/sites/plorg/files/2025-08/The%2520Truth%2520About%2520Rent%2520Control_0.pdf.

47 Emily A. Benfer et al., "Disrupting the Eviction System: Tenant Right to Counsel," EvictionLab, April 25, 2025, <https://evictionlab.org/disrupting-the-eviction-system>.

In addition, lawmakers should consider drafting legislation that prohibits landlords from giving preferential treatment to military tenants or refusing to rent to non-military tenants.

Vacancy Tax in the Private Market

The number of homes that were sold but remain unoccupied has more than tripled in O’ahu between 2019 and 2024. The purpose of a vacancy tax is not to fill the state’s coffers with a windfall in new revenue (though it may accomplish this) but to give homeowners an incentive to put their property into productive use. The owner would either sell the residential property or add it to the available rental stock. Vancouver, Canada, instituted an Empty Homes Tax in 2017. It not only succeeded in raising revenue that the city then used to support affordable housing initiatives, but it also caused vacancies in the city to reach a record low.⁴⁸ However, a vacancy tax is not a panacea. Vancouver remains one of the most expensive real estate markets in the world. This fact highlights the importance of increasing the overall supply of the housing stock, particularly the development of a robust social housing sector.

The Development of Permanently Affordable Social Housing

To guarantee housing as a human right for all residents, regardless of income, we need to create a housing sector that is permanently and truly affordable. This can be accomplished through the development of social housing, where units are under public or democratic control, insulated from the speculative market, and cannot be resold at a profit.⁴⁹ Permanently affordable social housing units could be built on habitable lands currently occupied by the U.S. military.⁵⁰ There is precedent for the conversion of former military sites into thriving communities with residential housing — for example, Lowry Air Force Base in Colorado.⁵¹ The City of Seattle is currently redeveloping Fort Lawton and adding 500 affordable housing units.⁵² Twenty percent of the units will receive permanent support from the city.

Conclusion

The solution to the affordability crisis experienced by Native Hawaiians (Kānaka Maoli) and working-class tenants in Honolulu County and Hawai’i is necessarily political. The market will never

48 City of Vancouver, “Empty Homes Tax Drives Vancouver’s Housing Vacancies to Record Low,” December 1, 2025, <https://vancouver.ca/news-calendar/eh-t-drives-housing-vacancies-record-low-dec-2025.aspx>.

49 PolicyLink, *Building Our Future: Grassroots Reflections on Social Housing* (Oakland, CA: PolicyLink, 2024), <https://www.policylink.org/resources/publication/building-our-future>.

50 The global capital of social housing is Vienna, Austria, where the majority of the city’s renters live in a decommodified home. Daniel Aldana Cohen et al., *Green Social Housing: Lessons from Vienna* (Climate and Community Institute, 2025), <https://climateandcommunity.org/research/vienna-green-social-housing>.

51 Sara B. Hansen, “Explore Denver’s Lowry Neighborhood: Former Military Base Transformed,” *The Denver Post* (sponsored content), March 1, 2024, <https://www.denverpost.com/2024/03/01/explore-denvers-lowry-neighborhood-former-military-base-transformed-real-estate-voices>.

52 City of Seattle Office of Housing, “Fort Lawton Redevelopment,” Seattle.gov, n.d., <https://www.seattle.gov/housing/programs-and-initiatives/fort-lawton-redevelopment>.

succeed in meeting the housing needs of low-income residents or making homes available to the unhoused. The answer is to enshrine housing as a human right. This can be accomplished through the decommodification and democratization of the housing system, giving tenants the power to organize and take control of their own housing.⁵³ Any new units added to the housing stock should prioritize households most vulnerable to displacement or housing insecurity in Hawai'i.⁵⁴

Only a political solution will be able to confront the elephant in the room: the pressure that U.S. military demand puts on the rental market, which contributes to housing insecurity and higher rents in O'ahu. This demand is undoubtedly worsening the affordability crisis in Honolulu County. Lowering the military's footprint in the rental market is one of the first steps to making housing more affordable. We estimate that the military inflates average gross rents by 7.1 percent. As a result, non-military tenant households spent an extra \$234.8 million in rental payments in 2024 alone, eroding the purchasing power of residents of Hawai'i and aggravating the affordability crisis. Exactly how much local residents have cumulatively overspent in rental payments because of military demand will remain murky until the Department of Defense is transparent and shares relevant data with the public.

The current situation benefits landlords who accumulate more wealth through

the extraction of rental income from tenants and BAH from military personnel. Landlords are incentivized to take advantage of the status quo and raise rents or overcharge since current trends point toward residential real estate becoming more expensive. Non-junior ranked military tenants are unlikely to experience long-term housing insecurity or financial strain, since BAH increases every year alongside rising median rents.

Market-based solutions also benefit private developers, who receive tax benefits, subsidies, and exemptions. The goal of such solutions is to ensure profitability. It is important to note that military land acquisition and for-profit housing development have been accompanied by the dispossession and forcible removal of Native Hawaiians from their ancestral lands.⁵⁵

The construction of new housing affordable to low- and medium-income households and the cooling of the rental market by withdrawing military demand can be achieved, but it will not occur through the logic of supply and demand. It will be achieved politically by enacting policies proven to work — making robust public investments for the construction of new social housing and requiring the military to house all of their service members on base to ease the pressure on the rental market. It is the surest way to deliver a victory to the Hawaiian people, working-class tenants, and residents of Hawai'i.

53 Interview with Dylan Pilger, membership committee coordinator of the Honolulu Tenants Union, conducted by Omar Ocampo, January 2026.

54 Interview with James Koshiba, co-founder of Hui Aloha, conducted by Omar Ocampo, November 2025.

55 Interview with Dylan Pilger.



The Value of Military-Leased Land in Hawai'i

David Vine

The Value of Military-Leased Land in Hawai‘i

Calculating Unpaid Back Rent and Potential Future Rental Prices

David Vine

Key Findings

- The land in Hawai‘i leased by the U.S. military since around 1964 is worth far more than the \$1 paid by the federal government for 65-year leases.
- Proper valuation of the land indicates that 65 years of back rent totals \$32.8 billion to \$133.7 billion (in 2025 dollars), with the upper-end estimate likely to be more accurate than the lower-end estimate.
- By providing these figures, this chapter does not advocate for new leases but instead provides financial context; it highlights the magnitude of the state and federal governments' mismanagement of these lands. The future of land in Hawai‘i is for Native Hawaiians and the residents of Hawai‘i to decide.
- If the federal government seizes currently leased land through an eminent domain or condemnation process, this analysis offers a basis for determining proper compensation. This would reasonably include both the land's current (2025) value of up to \$68.5 billion and back rent owed.

Introduction

When the U.S. military began leasing tens of thousands of acres from Hawai'i for \$1 around 1964, the agreements clearly did not reflect the true value of the land, especially since the islands are home to some of the most expensive real estate on Earth. While the value of land cannot be fully measured in monetary terms alone, this chapter calculates a lower bound — in dollar terms — of unpaid rent owed for the leased lands.

The chapter's calculations also show what proper rental payments would be if the people of Hawai'i decide to enter into new lease agreements for any of the currently leased land. The calculations are summarized in Table 2 (below) with rounded figures. Precise figures and full calculations appear in the sections that follow. By providing these figures, this chapter does not advocate for new leases but instead provides financial context; it highlights the magnitude of the state and federal governments' mismanagement of these lands. The future of land in Hawai'i is for Native Hawaiians and the residents of Hawai'i to decide.

The calculations below do not include the costs of environmental remediation to clean up extensive damage the military has caused to the land. These costs are estimated in Chapter 3 ("PFAS Contamination by the U.S. Military in Hawai'i") of this report.

Land Value Calculations

Valuing the land leased by the military is

complicated because there is no public real estate market in Hawai'i or elsewhere where one can buy and sell military base land. This is not a unique situation as valuing land is rarely straightforward. Proper land valuation thus requires looking for comparable transactions that can serve as a fair basis for valuing a piece of land.

Specifically, proper land valuation requires a record of arm's-length transactions between relative equals. For example, the military base leases that required the federal government to pay \$1 for Hawaiian land were clearly not a fair valuation of the land. They were instead a token fee imposed on the state by the federal government, which possesses the constitutional power to seize land without consent through processes of condemnation and eminent domain.¹

When the U.S. military began leasing tens of thousands of acres from Hawai'i for \$1 around 1964, the agreements clearly did not reflect the true value of the land, especially since the islands are home to some of the most expensive real estate on Earth.

To calculate the proper value of leased lands in Hawai'i, this chapter uses the Human Rights Standards Damages Model²

1 Cornell University Law School Legal Information Institute, "Eminent Domain," https://www.law.cornell.edu/wex/eminent_domain.

2 David Vine, Philip Harvey, and S. Wojciech Sokolowski, "Compensating a People for the Loss of Their Home-

— a methodology for calculating the value of land taken from and other financial damages owed to victims of human rights violations. The model was first developed to assess the value of land taken from, and other damage inflicted on, the Indigenous Chagossian people, who were forcibly removed from their homeland by the creation of the U.S.-U.K. military base on Diego Garcia in the Indian Ocean.³

Importantly, the model calculates not just the fair market value of land but also a people's connections to land that can't be easily quantified across all measures of loss. This is important because the value of Hawaiian land is different for a Native Hawaiian than for, for example, a wealthy person from the U.S. continent interested in buying a second home for vacation purposes. Thus, the model also assesses the political, economic, sociocultural, and psychic value of land.⁴

Given the complexity of valuing land belonging to Indigenous Peoples and occupied as a military base, the Human Rights Standards Damages Model seeks comparable land transactions involving

the leasing (renting) or purchase of land for U.S. military bases that reflect the different types of value noted above.



U.S. Marines conduct training at Kahuku Training Area, O'ahu, July 2016. The military's lease on the land expires in 2029. Photo courtesy of getarchive.net.

This chapter uses the model's two comparable land transactions (in Okinawa, Japan, and Kwajalein, Republic of the Marshall Islands) and adds a third Hawai'i-specific comparison (the Navy's sale of land to local groups) to produce a range of valuations.⁵

The leases involve 38,932 acres of land leased by the Army, Navy, and Air Force, and an additional 7,539 acres in easements

land: Diego Garcia, the Chagossians, and the Human Rights Standards Damages Model," *Northwestern Journal of International Human Rights* 11, no. 1 (2012): 159–61.

³ See, e.g., David Vine, *Island of Shame: The Secret History of the U.S. Military Base on Diego Garcia* (Princeton: Princeton University Press, 2009).

⁴ Vine, et al., "Compensating a People," 161.

⁵ One might consider using current land values in Hawai'i to calculate the value of the leased lands. However, there are three problems with this method: First, no clear average land value exists in Hawai'i given the scarcity of land in the state, infrequent sales, and limited public disclosure of transaction terms. Second, the real estate market for residential, commercial, and agricultural land does not provide comparable transactions to assess leased lands given the differing land uses. Third, the history of military occupation and environmental damage caused by bases has distorted nearby land values. The most accurate valuation might be the land's value at the time the leases commenced, around 1964, adjusted for inflation, although this would still likely fail to account for the political, economic, sociocultural, and psychic value of land to Native Hawaiians. If comprehensive, unbiased land values become available, the land valuation model used in this analysis can be updated.

(land and waters available for use by the military) leased by the Navy and Air Force. All the leases are expiring in 2029/2030.⁶ Table 1 summarizes the size of the leased

land, noting acreage without Mākua Valley, where the Army occupies land it has already said it intends to leave.⁷

Table 1. Military Leased Lands in Hawai‘i (acres)

Total leased land and easements	46,471
Total leased land	38,932
Total easements	7,539.09
Total leased land and easements without Mākua Valley (782 acres)	45,689

Valuing easements, in which one party has privileged access to use property without full lease rights, is especially complicated. Some courts and appraisers consider an easement’s most profitable use as its proper value. In other cases, easements are valued as a fraction of comparable land. To be conservative, this chapter treats the value of easements as *one-half* of the value of each comparison land transaction. One could easily adjust this valuation higher or lower within this chapter’s methodology.

The three land valuation estimates (Table 2) show that proper rent for the full 65 years of occupation of the leased lands ranges from \$32.8 billion to \$133.7 billion, with an intermediate estimate of \$50.5 billion. Following the Human Rights Standards Damages Model, this chapter treats the higher-end estimate as the most accurate and unbiased because it is based on a comparable case involving relative equals in which Japan effectively bought back land used for U.S. military bases in Okinawa.⁸

6 Note that the total amount of land leased by the Department of War is 38,932 acres. US Indo-Pacific Command, *Hawai‘i Military Land Use Master Plan 2021*, 2021 Interim Update/Final, April 2021, 9. Note that the figure confusingly appears as 39,369 acres on p. 13.

7 Mahealani Richardson, “Activists Surprised by Army’s Willingness to Let Go of State-Land Lease,” *Hawaii News Now*, May 19, 2025, <https://www.hawaiinewsnow.com/2025/05/20/activists-surprised-after-army-willing-let-go-Mākua-state-land-lease-2029/>.

8 Vine et al., “Compensating a People,” 169.

Table 2. Summary: Leased Land Unpaid Back Rent and Future Rent Estimates (2025 \$)

Land Valuation Method	Unpaid rent due Hawai'i for 65 years for all military-leased lands (38,932 acres + 7,539 easement acres valued at ½ rent)	Annual rent per acre, with easement acres valued at ½ rent
Okinawa Estimate	\$133.6 billion	\$48,155
Kwajalein Estimate	\$32.8 billion	\$11,807
Navy Land Sales Estimate	\$50.5 billion	\$18,193

By contrast, the low-end estimate involves a transaction that almost certainly understated the value of land because of the power differential between the parties — the governments of the United States and the Republic of the Marshall Islands — given that the latter is in a dependent, semi-colonial Compact of Free Association relationship with the former.

The third, intermediate estimate is also likely a significant underestimate because the transaction was not between relative equals: it involved several nonprofit entities buying base land from the U.S. government. To be clear, the transaction between the U.S. and Japanese governments is also imperfect given the relative power of the former over the latter; however, the power relation is relatively equitable compared to the other cases.

Sums like \$133.7 billion and even \$32.8 billion may seem large, but the market value of land in Hawai'i is among the highest in the country — and the world. While average land prices are sometimes in the tens of thousands of dollars per acre across Hawai'i, values in particularly desirable locations can reach hundreds of thousands and even millions of dollars.⁹ Those higher valuations would generate estimates significantly larger than those in this chapter.

Okinawa Estimate

The first estimate — which this chapter believes to be the most accurate — employs the price of land Japan effectively paid to the U.S. to get base lands back in Okinawa beginning in 2006. In that year, the U.S.

9 John Csiszar, "10 Most Expensive States to Buy an Acre of Land," GoBankingRates, May 25, 2023, <https://www.gobankingrates.com/investing/real-estate/most-expensive-states-to-buy-an-acre-of-land>; Bart Walden, "How Much Is One Acre of Land Worth in Hawaii?" LandBoss.com, n.d., <https://www.landboss.net/post/how-much-is-one-acre-of-land-worth-in-hawaii>.

and Japanese governments signed an agreement, updated in 2013, in which Japan regained 2,589.664 acres of land occupied for decades by U.S. military bases in exchange for \$2.8 billion (2008 \$).¹⁰ This effective sale price updated for inflation translates to \$1.6 million per acre in 2025 dollars.



Members of the Okinawa City Landowners Association peer through a fence at Kadena U.S. Air Base, November 2025. Photo: U.S. Air Force / public domain.

This chapter considers this calculation the most accurate because it is based on a transaction between the U.S. and Japanese governments — two parties with reasonably comparable bargaining power (important

to in determining fair market value). The Okinawa transaction also involved land in Okinawa being used for U.S. military facilities of a similar size and scope as bases in Hawai'i. Importantly, the Okinawa transaction also captures all three aspects of land value: economic value, sovereignty, and the social, economic, and cultural benefits derived from land use. "Japan was not just purchasing a tract of land," the Human Rights Standards Damages Model explains. "It was buying back its full sovereignty over that land and the right of Japanese citizens to live there."¹¹

This comparison land transaction thus provides a fair way to estimate today's *total value* of military leased land in Hawai'i—that is, today's effective sale price—as well as potential rental values. Multiplying the \$1.605 million per acre figure for the 38,932 acres of leased land and half that valuation (\$802,460 per acre) for the 7,539 easement acres yields a total value of \$68.53 billion (2025 \$). Table 3 summarizes these calculations.

10 This calculation updates the price and acreage used in the original published version of the Model due to subsequent amendments to the original agreement between the U.S. and Japan. U.S. Department of State, "United States and Japan Sign Protocol to Amend the Guam International Agreement," fact sheet, 2013, <https://2009-2017.state.gov/r/pa/prs/ps/2013/10/215071.htm>; Okinawa Prefecture, Department of Planning, *Wide Area Framework for Site Utilization of the Former U.S. Military Bases in Central and South Okinawa Urban Areas*, January 2013, revised March 2014, https://www.pref.okinawa.jp/futenma-mirai/011_002.pdf.

11 Vine et al., "Compensating a People," 169, further discusses the complexities of whether the Okinawa comparison may over- or undervalue the land: "There is one aspect of the Okinawa transaction, however, that could cause it to overstate the value of the land Japan is acquiring. On one hand, Japan is acquiring title to the facilities the U.S. has constructed on its Okinawa bases since World War II.... On the other hand, the value of the military facilities Japan is acquiring depends on how it intends to use the land in question and on the cost of any environmental remediation required to render them suitable for that use. If Japan were to use the U.S. bases for military purposes, the facilities constructed by the U.S. could have significant value, but there is no indication that any such use is planned, and given the harmful environmental impacts associated with the construction and use of military bases, there is good reason to doubt that the land Japan is acquiring qualifies as economically 'improved.' That being the case, we see no reason to believe that the Okinawa transaction significantly overstates the value of the land it is acquiring."

Table 3. Land Value Calculations: Okinawa Comparison

Acres Japan de facto purchased	2,589.664
Price Japan paid (U.S. 2008 \$)	\$2,800,000,000
Price Japan paid per acre (2008 \$)	\$1,081,221
Price Japan paid per acre (in 2025 \$ using BLS inflation calculator ¹²)	\$1,604,920.00
Value of Hawai'i leased land based on Okinawa purchase price (2025 \$): \$1,604,920/acre x 38,932 acres	\$62,482,600,000
Value of Hawai'i easements based on Okinawa purchase price, valued at ½ other land (2025 \$): \$802,460/acre x 7,539 acres	\$6,049,818,161
Value of total Hawai'i leased land and easements based on Okinawa purchase price (2025 \$): \$62,482,600,000 + \$6,049,818,161	\$68,532,418,161

The methodology then allows for the calculation of unpaid rent owed Hawai'i. *Unpaid rent* refers to the back rent due assuming proper valuation of the leased lands, including easements valued at half other land. Because the unpaid rent is expressed in 2025 dollars, this sum should be updated for inflation until payment is actually made by the federal government. Strictly speaking, here and in the other rental calculations below, \$1 should be subtracted from the unpaid rent total for each lease for which the federal government paid that token sum.

The methodology uses the effective sale price determined above to calculate annual rent by employing a conservative 3 percent rent-to-value ratio.¹³ In other words, annual rent is assumed to be 3 percent of the total value of the land (total value x .03). As detailed in Table 4, the rent for all the leased land and easements is calculated at a rounded \$2.06 billion per year. Multiplying this annual rental arrears total by the entire 65-year lease period produces total unpaid back rent of \$133.64 billion (2025 \$).¹⁴

¹² U.S. Bureau of Labor Statistics, CPI Inflation Calculator, https://www.bls.gov/data/inflation_calculator.htm.

¹³ Because there is no strict rent-to-value rule, the methodology could be altered by employing a higher or lower rent-to-value ratio (e.g., 2 or 4 percent).

¹⁴ These sums would need to be adjusted downward by the \$1 paid for each lease.

Table 4. Unpaid Annual Rent Calculations (2025 \$): Okinawa Comparison

Annual rental arrears for all leased land based on 3% rent-to-value ratio: \$68,532,418,161 x .03	\$2,055,977,390
Total unpaid rent owed Hawai'i for all leased land for 65-year lease occupation: \$1,874,482,845 × 65	\$133,638,530,319

The annual rental arrears figures above allow for the calculation of the *current annual rent per acre* by dividing the annual rental arrears by the number of acres leased. To do this, the methodology counts only half the number of easement acres

because the methodology values easement acres at half the value of other acres. Table 5 details these calculations, which yield a current rental value of land (\$48,148/acre in 2025 \$) and easements (\$24,074/acre in 2025 \$).

Table 5. Current Annual Rent Calculations (2025 \$): Okinawa Comparison

Annual arrears (as calculated above)	\$2,055,977,390
Total leased land and easement acres (valuing easement acres at ½ other acres and thus counting only ½ easement acres): 38,932 acres + (7,539.09 acres ÷ 2)	42,701.56 acres
Annual rent per acre for leased land: annual arrears ÷ 42,701.56 acres	\$48,148
Annual rent per acre for easements, at ½ other land	\$24,074

These annual rent figures could potentially be used to calculate future rent for any new lease(s) if – and only if – the state chooses to enter into one or more new leases with the federal government for any quantity of base land. Because the annual rent per acre is expressed here in 2025 dollars, any new lease should update this calculated sum for inflation at the time of signing the lease.

Table 6 provides examples of potential rent that would be owed on a yearly basis under this valuation if Hawai'i chooses to enter into a new lease or leases for the entirety of the land currently leased excepting the 782 acres in Mākua Valley that the Army has already indicated it will leave. Like the other figures, the total future annual rent should be updated for inflation at the time of signing any new lease agreement.

Table 6. Potential Future Rent Calculations Based on Current Annual Rent (2025 \$): Okinawa Comparison

Total annual rent for all leased land without Mākua Valley based on annual rent per acre figures:	\$1,874,482,845
Total annual rent for easements (2025 \$)	\$181,494,545
Total annual rent for all leased land without Mākua Valley plus easements (2025 \$)	\$2,055,977,390

In sum, the Okinawa comparison estimate applying the Okinawa land valuation to the leased lands in Hawai‘i generates the following land values, in 2025 U.S. dollars:

- \$133.6 billion in *unpaid rent* for all military-leased lands over 65 years;
- \$48,148 in *annual rent per acre* for any future lease(s);¹⁵
- \$2.06 billion in *total future annual rent* for any future lease(s) for all military-leased lands (excluding Mākua Valley);
- \$68.5 billion in the *total current value* of all military-leased lands.

Kwajalein Atoll Estimate

The second estimate of unpaid back rent and proper annual rent employs another land transaction involving military base land: the effective rent paid by the U.S. to the Republic of the Marshall Islands for use of Kwajalein Atoll as a missile testing range. While this case provides a useful

comparison, it likely provides a floor, or low-end valuation, because U.S. payments likely underestimate the fair market value of the base land and other components of the land’s value.

The Kwajalein estimate is a low-end valuation because of the context of the land transaction and the relationship between the two parties involved. The Kwajalein rental payments were part of the 2003 renewal of the Compact of Free Association between the two countries, which gives the U.S. full control over all military and defense matters in the Marshalls.¹⁶ From the end of World War II until 1986, the Marshall Islands were administered by the United States as a U.S. colony (“trust territory”).¹⁷

While the Marshall Islands are now nominally an independent nation, the country exists in a Compact of Free Association with the United States and remains in many ways a U.S. dependency. The difference in bargaining power

¹⁵ Calculations assume 38,932 total acres leased and 7,539.09 acres of easements (US Indo-Pacific Command, *Hawai‘i Military Land Use*, 9; note that the total land appears as 39,369 acres on p. 13, where easements are listed separately in an “other” category).

¹⁶ U.S. and Republic of the Marshall Islands, “Joint Communiqué on the Kwajalein Military Use and Operating Rights Talks between the U.S. and the Republic of the Marshall Islands,” press release, January 16, 2003.

¹⁷ See, e.g., Vine et al., “Compensating a People,” 165; David Vine, *The United States of War: A Global History of America’s Endless Conflicts, from Columbus to the Islamic State* (Berkeley: University of California Press, 2020), 182–83.

between the two governments means that this transaction was not one between equals. Indeed, a group of Kwajalein landowners displaced by the base after World War II have argued that the agreement underestimates the proper value of their land by roughly half. As the Human Rights Standards Damages Model explains, the power disparity in the land transaction means that this estimate almost certainly underestimates the value of land in the Kwajalein Atoll.¹⁸

The Kwajalein estimate uses the same

methodology as the Okinawa estimate except that it starts with a rental value, rather than a sale price as in the Okinawa case, to determine unpaid back rent and other components of the value of leased base lands in Hawai'i.

The 2003 U.S.-Marshallese agreement involved the U.S. leasing 2,409 acres for \$17.1 million per year (2004 \$). Updating this amount to account for inflation, the Kwajalein rental price in 2025 is \$11,806.63 per acre. Table 7 summarizes these figures.

Table 7. Land Value Calculations: Kwajalein Comparison

Acres leased by U.S. in Kwajalein	2,409
Total Kwajalein lease payment (rent) in 2004 (2004 \$)	\$17,100,000
Total Kwajalein rent in 2004 (chained 2008 \$)	\$19,158,677
Annual Kwajalein rent per acre in 2004 (chained 2008 \$): \$19,158,677 ÷ 2,409 acres	\$7,953
Annual Kwajalein rent per acre (in 2025 \$ using BLS inflation calculator)	\$11,806.63

The methodology then uses the \$11,806.63 per acre Kwajalein rental value to calculate annual lease payments for the leased land and easements in Hawai'i (again valuing easements at half the value of other land). With annual lease payments of \$504.17 million across 65 years, total unpaid rent

reaches \$32.77 billion. Table 8 details these figures and shows how the annual lease payment total (\$504.17 million) also allows another estimate of the total value of the land (\$16.81 billion) using the same 3 percent rent-to-value ratio.

¹⁸ Vine, et al., "Compensating a People," 165, 169.

Table 8. Unpaid Annual Rent Calculations (2008 \$): Kwajalein Comparison

Annual lease payment for all leased land and easements (2025 \$): (\$11,807 × 38,932 acres) + (\$5,903.42 × 7,539.09 acres)	\$504,170,001
Total unpaid rent owed Hawai'i for all leased land and easements for 65-year lease occupation (2025 \$): \$504,170,001 × 65	\$32,771,050,040¹⁹
Value of total Hawai'i leased land and easements based on Kwajalein annual rent for all leases and 3 percent rent-to-purchase ratio (2025 \$): \$504,170,001/Value = 3/100	\$16,805,666,687

Lastly for this estimate, the current annual rent per acre determined above (\$11,806.63 for land and half that, \$5,903.42, for easements) can calculate future rent if the state chooses to enter into a new lease with the federal government for any amount of base land. For example, as shown in Table

9, total annual rent for all the currently leased land except Mākua Valley plus easements would be \$494.94 million (2025 \$). Again, any new lease should update this 2025 sum for inflation at the time of lease signing.

Table 9. Potential Future Rent Calculations Based on Current Annual Rent: Kwajalein Comparison

Annual rent per acre (2025 \$)	\$11,806.63
Annual rent per acre for easements, at ½ other land (2025 \$)	\$5,903.42
Total annual rent for all leased land without Mākua Valley based on annual rent per acre figures (2025 \$): \$11,806.63 x 38,150 acres	\$450,430,683
Total annual rent for easements (2025 \$): \$5,903.42 x 7,539.09 acres	\$44,506,377
Total annual rent for all leased land (without Mākua Valley) plus easements (2025 \$): \$450,430,683 + \$44,506,377	\$494,937,060

In sum, this low-end Kwajalein estimate suggests the following values for Hawai'i's land in 2025 U.S. dollars:

- \$32.8 billion in *unpaid rent* for all military-leased lands over 65 years;
- \$11,807 in *annual rent per acre* for any future lease(s);

- \$494.9 million in *total future annual rent* for any future lease(s) for all military-leased lands (excluding Mākua Valley).

- \$16.8 billion in the *total current value* of all military-leased lands.

¹⁹ Figures do not sum because of rounding. The annual lease payment is precisely \$504,170,000.62.

Navy Land Sales Estimate

Land valuation is a contentious issue in disputes involving U.S. bases in Hawai'i in part because land values can reach millions of dollars per acre. One land transaction involving base land in Hawai'i provides an additional data point for estimating the value of leased land in the state.

In this case, private organizations in Hawai'i purchased Navy-controlled land from the

U.S. government. Between 2013 and 2019, six churches, a veterans organization, and a private school purchased around 20 acres from the Navy for around \$9 million. This yields a purchase price of about \$450,000 per acre in current terms and \$606,428 per acre in 2025 dollars.²⁰ Table 10 shows how this price produces a total leased land value of \$25.90 billion (\$23.61 billion for land and \$2.29 billion for easements at half the value of land).

Table 10. Land Value Calculations: Navy Land Sales Comparison

Sale price per acre (2016 \$) using 2016 as average of 2013–2019	\$450,000
Sale price per acre (in 2025 \$ using BLS inflation calculator)	\$606,428
Value of Hawai'i leased land based on Navy Land Sales price (2025 \$): \$606,428 × 38,932 acres	\$23,609,450,838
Value of Hawai'i easements based on Navy Land Sales price, valued at ½ other land (2025 \$): (\$606,428 ÷ 2) × 7,539.09 acres	\$2,285,956,655
Value of total Hawai'i leased land and easements based on Navy Land Sales price (2025 \$): \$23,609,450,838 + \$2,285,956,655	\$25,895,407,493

As in the Okinawa estimate, the purchase price allows the calculation of unpaid rent using the same 3 percent rent-to-value ratio. Again, annual rent is assumed to be 3 percent of the total value of the land

(\$25,895,407,493 × .03). This yields annual back rent of \$776.86 million. Across 65 years, rental arrears thus total \$50.50 billion (Table 11).

²⁰ Rob Perez, "Promised Land: The U.S. Owes Hawaiians Millions of Dollars Worth of Land. Congress Helped Make Sure the Debt Wasn't Paid," *Honolulu Star Advertiser*, May 7, 2021, <https://www.staradvertiser.com/2021/05/07/breaking-news/promised-land-the-u-s-owes-hawaiians-millions-of-dollars-worth-of-land-congress-helped-make-sure-the-debt-wasnt-paid>.

Table 11. Unpaid Rent Calculations: Navy Land Sales Comparison

Annual rental arrears for all leased land and easements based on 3% rent-to-value ratio (2025 \$): \$25,895,407,493 x .03	\$776,862,225
Total unpaid rent owed Hawai'i for all leased land and easements for 65-year lease occupation (2025 \$): \$776,862,225 x 65	\$50,496,044,612

The methodology again also allows the calculation of potential future rent if Hawai'i chooses to enter into a new lease or leases with the U.S. government. Dividing the total annual rent by the total acres leased yields annual rent per acre figures of \$18,193 for leased land and half that, \$9,096, for easements (2025 \$).

Table 12 shows the current annual rent per acre figures and then calculates the total owed on a yearly basis under this valuation if Hawai'i chooses to enter into a new lease or leases for the entirety of the land currently leased excepting the 782 acres the Army will vacate in Mākua Valley. Like the other figures, the total future annual rent should be updated for inflation in any new lease agreement.

Table 12. Potential Future Rent Calculations: Navy Land Sales Comparison

Annual rent per acre (2025 \$)	\$18,193
Annual rent per acre for easements, at ½ other land (2025 \$)	\$9,096
Total annual rent for all leased land without Mākua Valley based on annual rent per acre figures (2025 \$): \$18,193 x 38,150 acres	\$694,056,730
Total annual rent for easements (2025 \$): \$9,096 x 7,539.09 acres	\$68,578,700
Total annual rent for all leased land (without Mākua Valley) and easements (2025 \$): \$694,056,730 + \$68,578,700	\$762,635,430

In summary, this Navy Land Sales estimate suggests the following values in 2025 U.S. dollars:

- \$50.5 billion in *unpaid rent* for all military-leased lands over 65 years;
- \$18,193 in *annual rent per acre* for any future lease(s);
- \$762.6 million in *total future annual rent* for any future lease(s) for all military-leased lands (excluding Mākua Valley);
- \$25.9 billion in the *total current value* of all military-leased lands.

Conclusion

This chapter calculates the proper value of Hawai'i's land occupied by the U.S. military since 1964, for which Hawai'i has received \$1 per lease. Applying the established Human Rights Standards Damages Model to Hawai'i, the analysis finds the state is owed \$32.8 billion to \$133.7 billion in unpaid back rent, with an intermediate estimate of \$50.5 billion for all the leased land and easements. These figures do not include what are likely to be billions of dollars in additional costs to clean up environmental damage caused by the military over decades.



Residential properties on O'ahu, where land values reach hundreds of thousands to millions of dollars per acre. Photo: Wikimedia Commons.

The upper-end estimate is likely the most accurate and unbiased because it is based on a land transaction between parties with relatively equal bargaining power. Again, proper land valuation requires a record of arm's-length transactions between relative equals; the parties in the Okinawa case were relative equals to a greater extent than in the two other cases.

Hawai'i is owed \$32.8 billion to \$133.7 billion in unpaid back rent, with an intermediate estimate of \$50.5 billion for all the leased land and easements.

Because the methodology and assumptions used in this chapter are transparent, others can adjust the model and its calculations — for example, by assigning a different value to the military's land easements than the chapter's assumption that easements are worth half the value of comparable land. The model also allows additional calculations using comparison land transactions other than the three used here.

This chapter takes no position on how the people of Hawai'i should approach negotiations over the leased lands. If Native Hawaiians and other residents of the state choose to enter into new leases with the U.S. government, this chapter's calculations indicate potential future annual rent payments ranging from \$11,807 to \$48,155. Once more, this analysis suggests that the upper-end estimate is the most accurate and unbiased for the reasons explained above.


If the federal government instead seizes currently leased land through an eminent domain or condemnation process, the calculations detailed above offer a basis for determining proper compensation. This

would reasonably include both the current (2025) value of the land, ranging from \$25.9 billion to \$68.5 billion; back rent owed; and environmental clean-up costs.

Table 13, below, summarizes the chapter’s major findings using the three land valuation estimates and rounded figures.

Table 13. Summary: Leased Land Unpaid Back Rent, Future Rent, and Current Value Estimates (2025 \$)

Land Valuation Method	Unpaid rent due Hawai'i for 65 years for all military-leased lands (38,932 acres + 7,539 easement acres valued at ½ rent)	Annual rent per acre, with easement acres valued at ½ rent	Future annual rent for all military-leased lands (excluding Mākua Valley) (38,150 acres + 7,539 easement acres valued at ½ rent)	Current total land value
Okinawa Estimate	\$133.6 billion	\$48,155	\$2.06 billion	\$68.5 billion
Kwajalein Estimate	\$32.8 billion	\$11,807	\$494.9 million	\$16.8 billion
Navy Land Sales Estimate	\$50.5 billion	\$18,193	\$762.6 million	\$25.9 billion



A Future Beyond Bases

Davis Price and David Vine

A Future Beyond Bases:

Converting Bases into Places that Benefit the People of Hawai‘i

Davis Price and David Vine

Key Findings

- Hundreds of military bases in the United States and around the world have been closed and converted into spaces that benefit local communities. Examples of “base conversion” include housing, schools, hospitals, parks, farms, cultural sites, business incubators, entertainment centers, renewable energy projects, and more.
- These examples show that base conversion in Hawai‘i is possible and could benefit local communities.
- Indigenous Hawaiians and others are best positioned to develop ideas for transforming bases into new non-military uses.
- Principles for base conversion should be shaped by Native Hawaiian-led Indigenous leadership, governance, and sovereignty, which can serve as economic pathways to prosperity for all residents.
- Base conversion could allow the people of Hawai‘i to build a future rooted in love of the land (aloha ‘āina), economic dignity, and self-determination.
- In nearly all base conversion cases, some degree of environmental testing, clean-up, and remediation of land, water, and other natural resources is necessary to ensure the land is safe for human use. This work can also create opportunities for local training, job creation, and economic development.

Introduction

When military leases expire on Hawai'i's land, how could Hawai'i's people benefit? How could the transformation of base lands into non-military uses — known as “base conversion” — improve life in Hawai'i?

Hundreds of military bases in the United States (including in Hawai'i) and around the world have been closed and converted into spaces that benefit local communities. While the process and effects of base conversion are diverse, examples include:

Public Infrastructure

- Schools and universities
- Hospitals and other medical facilities
- Housing
- Employment and training centers
- Solar farms, wind farms, and other renewable energy projects

Parkland

- Public parks
- Public forests
- Hiking and biking trails
- Grasslands
- National parks
- Wildlife refuges

Business Development

- Restaurants and food halls
- Hotels
- Entertainment centers
- Tourist destinations
- Shopping malls
- Business campuses and business incubators

- Office and retail space
- Factories and warehouses
- Exhibition and event spaces
- Conference centers
- Wedding venues
- Movie studio and production facilities
- Airports (local, regional, national, international)

Research, History, and Culture

- Scientific research facilities
- Archaeological excavations
- Museums
- Historical monuments and historical preservation sites
- Cultural preservation sites
- Artist studios
- Art galleries

This is a small sample of potential conversion opportunities, but there are many other possibilities. These examples show that land currently occupied by bases in Hawai'i can be converted for the benefit of the local community.

Especially in places like Hawai'i, where land is scarce, closing military bases opens large plots of land to new uses. The physical infrastructure of bases — military housing, buildings, runways, warehouses, and more — also creates valuable opportunities for creative reuse. At the same time, bases often cause serious environmental damage, creating challenges for non-military uses. In almost all base conversion cases, some degree of environmental testing, clean-up, and remediation of land, water, and other natural resources

is necessary to ensure the land is safe for human use. Different uses also require different levels of cleanup — for example, food production or residential use requires more environmental remediation than a shopping mall.

Structurally and logistically, base conversion can assume many forms along a spectrum:

- 1) Conversion of existing base infrastructure — such as buildings, warehouses, or runways — into civilian uses;
- 2) Partial conversion of existing base infrastructure combined with partial removal for land reuse and/or redevelopment;
- 3) Complete removal of base infrastructure for land reuse and/or redevelopment.

The key questions then become:

- How else could the people of Hawai‘i use leased lands?
- How could leased lands improve the lives and well-being of residents of Hawai‘i?
- What models of conversion would be most helpful for Hawai‘i?
- How could Hawai‘i become a model of conversion for the world?
- What processes are needed to develop ideas, planning, and action toward conversion?
- What protections and structures are needed to ensure that Native Hawaiians drive decisions about how base lands are

converted and benefit from the return of land originally taken from them and the Kingdom of Hawai‘i without compensation?

***H*ow could Hawai‘i become a model of conversion for the world?**

The remainder of this chapter offers specific examples of base conversion and discusses some of the challenges involved. It concludes with ideas for conversion proposed by Native Hawaiians and their allies.

Base Conversion in Hawai‘i

There are already examples of bases in Hawai‘i that have been closed and transformed into non-military uses. One of the first U.S. bases occupying Hawai‘i, Fort Ruger, has largely been converted into Diamond Head State Monument, along with Kapi‘olani Community College, a state Emergency Operations Center, and a school for children with special needs. In the process, the Hawai‘i Army National Guard helped remove military infrastructure and conduct environmental conservation work.¹

Another former base, Fort DeRussy, on the Waikiki waterfront, is an example of partial conversion: it is now Fort DeRussy Beach Park, which is almost entirely open to the public. The 71-acre site, however, remains a “military reservation” under Pentagon control, with a hotel for military personnel only.²

1 State of Hawai‘i Department of Defense, “Fort Ruger and the State of Hawaii Department of Defense,” April 18, 2025, <https://dod.hawaii.gov/blog/fort-ruger-and-the-hawaii-national-guard>.

2 Fort DeRussy Hawaii, “Fort DeRussy & History,” <https://www.fortderussyhawaii.com/fort-derussy-history>; Hale



Members of Hui Kālai Ki'i O Kūpā'aikē'e present a ki'i of Kāne, the Hawaiian god of freshwater, at Headquarters Commander, U.S. Pacific Fleet, following the 2021 Red Hill fuel spill that contaminated O'ahu's primary aquifer. The ki'i (carved image) — placed atop a ko'a (a sacred shrine) and presented with ho'okupu (traditional offerings of reverence) — signifies the spiritual connection Native Hawaiians have with the land and water, offering prayers for restoration of health from generations of contamination by the U.S. military. Photo courtesy of Kanaeokana.

The former Barbers Point Naval Air Station, on the west side of O'ahu, is scheduled for redevelopment into the Kalaeloa Community Development District, with a planned school, film and TV studio, Kalaeloa Airport, thousands of housing units, commercial and arts

spaces, and solar power generation. The planning process has already taken two decades because of continued military and civilian use of the airport and limited infrastructure, according to the Hawai'i Community Development Authority, which is leading the project.³

Koa Hotel, "Frequently Asked Questions," <https://www.halekoa.com/about-hale-koa-hotel/faq#LINE>.

3 Matthew Leonard, "State Development Agency Pitches Final Plan for Westside's Walkable City," *Honolulu Civil Beat*, September 16, 2025, <https://www.civilbeat.org/2025/09/state-development-agency-pitches-final-plan-for-west-sides-20-minute-city>.

Base Conversion in the United States

Across the United States, there are dozens of examples of conversion. On the Pacific coast, the Presidio of San Francisco was a military base for more than 200 years under Spanish, Mexican, and U.S. control. In 1994, the Pentagon closed the Presidio in the face of protests and the consolidation of bases after the dissolution of the Soviet Union. Since that time, the Presidio has been converted into almost 1,500 acres of verdant parkland, forests, hiking trails, beaches, playgrounds, and a rare coastal prairie grassland, integrated with residential housing, schools, museums, offices, restaurants, hotels, a campground, and a National Park Service tourist site commemorating the base — all with views of the Golden Gate Bridge.⁴

In Orlando, Florida, the conversion of a naval training center created a neighborhood that has won design awards from the Environmental Protection Agency and others, as well as generated an estimated 6,000 jobs, \$335 million per year in wages, 5,139 residential housing units, and \$12.75 million per year in local

tax revenue. Property values now near \$3 billion. Baldwin Park emphasizes community building and features shopping, office space, parks, lakes, biking and walking trails, and wetlands.⁵

“Now that the Naval Training Center is gone, the fabric of the community has been knit together,” said city planner and local resident Dean Grandin. “People in Baldwin Park really do sit on porches and chat and talk and walk. I know everybody on my block and I’ve been there only 2 years. People make a point of introducing themselves.”⁶

In Illinois, 10 times more jobs were created compared to when a naval base was operational after it was converted into The Glen, a residential and commercial development.⁷ In South Carolina, the Charleston Naval Station and Naval Shipyards has become an industrial hub for over 40 companies that have produced an estimated \$960.1 million in annual economic impact and 3,694 jobs with average wages of nearly \$75,000.⁸ Outside Denver, a former Army medical center has been converted into a University of Colorado Anschutz Medical Campus

4 See, e.g., David Vine, *The United States of War: A Global History of America's Endless Conflicts, from Columbus to the Islamic State* (Berkeley: University of California Press, 2020), 99–100; Presidio.gov, <https://presidio.gov>. The Presidio Trust, the nonprofit entity that runs the Presidio, was targeted with elimination by a February 2025 executive order by President Donald Trump.

5 The wage estimate updates the 2005 figure of \$200 million per year using the Bureau of Labor Statistics Inflation Calculator. Tax revenues are as of 2023. Richard R. Burgess, “Surviving BRAC: Communities Point the Way to Successful Transformation,” *Seapower*, June 2005, 52–53; Jennifer McKee, “Orlando’s 2025 Great Neighborhoods: Traditional Spotlight on Baldwin Park,” *Orlando Magazine*, July 1, 2025, <https://www.orlandomagazine.com/orlandos-2025-great-neighborhoods-traditional-spotlight-on-baldwin-park>.

6 Congress for the New Urbanism, “Baldwin Park,” <https://www.cnu.org/what-we-do/build-great-places/baldwin-park>.

7 Burgess, “Surviving BRAC,” 54–55.

8 Joseph C. Von Nessen, “The Economic Impact of the CMMC Navy Yard Industrial Campus,” *Navy Yard Industrial Complex*, October 2023, 2; Burgess, “Surviving BRAC,” 52.

and a medical research park, employing thousands.⁹ Nearby, a former Air Force base has become a major mixed-use housing development, repurposing former hangars, military housing, and office space.¹⁰

In New York City, the Brooklyn Navy Yard is now home to more than 550 businesses, with over 11,000 employees and more than \$2.5 billion in economic impact per year, according to its nonprofit management entity.¹¹ In Texas, the former Bergstrom Air Force Base has been transformed into Austin-Bergstrom International Airport, providing a foundation for rapidly growing Austin. In New Hampshire, Pease Air Force Base has become the Pease International Tradeport, featuring an international airport, industrial park, and the Great Bay National Wildlife Refuge.¹²

Base Conversion Around the World

Beyond the United States, there are many examples of base conversion over the years. In Okinawa, Japan, the closure of a U.S. Army base provided seaside land for the creation of an entertainment and shopping area, which came to employ about 3,000

people and attract around one million visitors annually. The new development's impact on the local economy was roughly 215 times greater than that of the base, according to a 2007 study. In Okinawa's capital, Naha, U.S. military housing was transformed into a shopping mall and office complex that has produced 16 times greater economic benefit than when the land was under military occupation.¹³ A former military golf course has become a mall attracting 10 million visitors annually.¹⁴ Across Okinawa, developments on land formerly occupied by the military have produced a direct economic impact 28 times greater than under military occupation, 72 times the number of local jobs, and 30 times the local tax revenue, according to Okinawa's government.¹⁵

These findings should not be surprising: The occupation of land by U.S. bases "is a huge economic loss," explains local economist Moritake Tomikawa. "Bases are not corporations that accumulate capital and contribute to the growth of the local economy." Instead, bases inhibit economic development and growth. The return of base land has allowed Okinawa's economy to diversify away from the U.S. military presence, making it one of Japan's fastest-growing economies.¹⁶

9 U.S. Environmental Protection Agency, "Turning Bases into Great Places: New Life for Closed Military Facilities" (Washington, DC, January 2006), 27–29, 35–37; Colorado Encyclopedia, "Fitzsimons General Hospital," <https://colorado-encyclopedia.org/article/fitzsimons-general-hospital>.

10 VisitLowry.com, "Museums in Lowry," <https://www.visitlowry.com/play-in-lowry>.

11 Brooklyn Navy Yard, "Who We Are," <https://www.brooklynnavyyard.org/mission>.

12 U.S. Environmental Protection Agency, "Turning Bases Into Great Places," 13.

13 Chiyomi Sumida and Travis J. Tritten, "Ready or Not, Okinawa Aims to Wean Itself Off of Military Dollars," *Stars and Stripes*, August 20, 2011, <http://www.stripes.com/news/ready-or-not-okinawa-aims-to-wean-itself-off-of-military-dollars-1.152708>.

14 Karube Kensuke, "Okinawa's Continuing Economic Burden: Will Okinawa Ever Realize Equality with the Mainland?" *Nippon.com*, May 20, 2022, <https://www.nippon.com/en/in-depth/a08203>.

15 Okinawa Prefectural Government, "U.S. Military Base Issues in Okinawa," <https://dc-office.org/basedata>.

16 Alexander Martin, "Okinawa's Reinvention Enters Next Phase; Prefecture Seeks to Exploit Location in New

In England, a Royal Air Force base in Greenham Common faced nearly 20 years of a women's peace encampment protesting the base and the presence of U.S. nuclear weapons there. Since its closure, the former base is now a peace garden,¹⁷ a wildlife area,¹⁸ a center for business and the arts,¹⁹ and more.

In Germany, communities have converted former U.S. bases into schools, housing, offices, and retail space, among other uses. The small city of Ansbach, for example, transformed the Hindenburg Kaserne into the Ansbach University of Applied Sciences, plus a shopping mall and office space.²⁰ Across Europe, former bases belonging to multiple powers, some dating back centuries, have become universities.²¹

In the suburbs of the Philippines capital, Manila, the former U.S. Fort William McKinley (which later became Philippine military installations) has been converted into Bonifacio Global City, a nearly 600-acre mixed-use development featuring housing, embassies, corporate offices, the Philippines Stock Exchange, green space, and more.²²

Conversion Challenges

As with most base conversion worldwide, there will be challenges to converting bases in Hawai'i. Cleaning up environmental damage caused by bases and military occupation to make land safe for civilian use has been a major challenge in the return of Kaho'olawe and at other closed military installations worldwide. The presence or potential presence of archaeological and other human materials can add to the challenge of clean-up and the preparation of sites for redevelopment.

Conversion projects must thus ensure that the conversion process is organized democratically to ensure locals direct conversion and are its major beneficiaries.

Ways and Move Beyond Military Bases," *Wall Street Journal*, November 13, 2014, <https://www.wsj.com/articles/okinawa-reinvention-enters-next-phase-1415912139>; Kensuke, "Okinawa's Continuing Economic Burden."

17 See, e.g., Great British Gardens, "Greenham Common Peace Camp Garden," <https://www.greatbritishgardens.co.uk/berkshire/item/greenham-common-peace-camp-garden.html>.

18 See, e.g., Greenham Common, "Welcome to Greenham and Crookham Commons," <http://www.greenham-common.org.uk>.

19 Greenham Common Trust, "The Enterprise Centre," <https://www.greenham-common-trust.co.uk/entcent>.

20 Karin Obermillacher, "Brücken-Center Ansbach: Die Chronologie der Erfolgsgeschichte," *Fränkischer*, August 8, 2017, <https://fraenkischer.de/bruecken-center-ansbach-die-chronologie-der-erfolgsgeschichte>.

21 Federico Camerin, Nicola Camatti, and Francesco Gastaldi, "Military Barracks as Cultural Heritage in Italy: A Comparison Between Before-1900 and 1900-to-1950-Built Barracks," *Sustainability* 13, no 2: 782 (2021), <https://doi.org/10.3390/su13020782>.

22 Bjorn Biel M. Beltran, "From Military Bases to Economic Hubs: A Legacy of Transformation," *Business World*, March 31, 2025, <https://www.bworldonline.com/special-features/2025/03/31/663943/from-military-bases-to-economic-hubs-a-legacy-of-transformation>.

In short, environmental remediation tends to be expensive and technically challenging work. Still, it can and must be done. The U.S. government caused the environmental damage and thus should repair the damage it caused, as it has across the country. In the past, the U.S. and other governments have successfully dedicated the necessary funding and technical expertise to clean up contaminated bases and convert them to non-military uses. One should also note that conversion creates opportunities for employing and training locals in environmental remediation and archaeological work.

Even without large-scale environmental damage, conversion can require large-scale up-front investments to convert bases into, for example, housing, schools, office space, museums, and other uses that benefit local communities.²³ Given the money needed to convert bases, conversion processes are generally development projects of one kind or another. This means there is a danger that corporations and wealthy individuals will seize control of conversion as an opportunity to make money at the expense of local communities and local community control. Conversion projects must thus ensure that the conversion process is organized democratically to ensure locals direct conversion and are its major beneficiaries. This remains true after initial decision-making processes are completed. Long-term governance of and oversight over conversion projects are

similarly important.

The federal government has successfully helped communities convert former bases by providing grants to locals through the Pentagon's Office of Economic Adjustment and the Department of Labor and Small Business Administration among other agencies. The state of Hawai'i, the Office of Hawaiian Affairs, and local governments also could help fund and support the conversion process in a variety of ways. Foundations, nonprofit organizations, and individuals could help advance conversion by funding Native Hawaiian-led groups developing conversion plans.

In Okinawa, Japan, where U.S. military bases have occupied similarly large amounts of land as on O'ahu, the state-level prefectural government has helped coordinate conversion processes. In recent years, the government conducted a planning competition to generate ideas for reusing returned base lands. The Okinawan government also held workshops at local junior high schools and a student summit "to have students draw a future dream through utilizing the returned land."²⁴

Possibilities for Converting Base Lands in Hawai'i

Native Hawaiians and their allies already have ideas about ways to convert base land. The ideas below are shared to provoke

23 Unlike base lands returned through the federal Base Realignment and Closure (BRAC) process, there will be no costs associated with gaining title to the land given that lands leased by the state of Hawai'i are owned by the state.

24 Okinawa Prefectural Government, Department of Planning, Planning and Coordination Division (Site Utilization Measures Team), *Wide Area Framework for Site Utilization of the Former U.S. Military Bases in Central and South Okinawa Urban Areas* (Naha City, Okinawa, Japan, March 2014), 1.

dialogue and imagine new possibilities; they are not intended to supersede the desires of local communities who are best positioned to steward these resources.



Kukui Maunakea-Forth, founder of MA'O Organic Farms, leads a tour of the organization's fields in Wai'anae, O'ahu, alongside a youth participant in the farm's leadership program. MA'O is an acronym for Mala 'Ai 'Opio, which translates to youth food garden, trains young people from one of Hawai'i's most underserved communities in sustainable agriculture, connecting them to ancestral land practices while building local food systems. Programs like MA'O offer a concrete model for what converted military lands could become: productive, community-rooted, and guided by Native Hawaiian values. Photo by Christine Ahn, April 2024.

Leaders in Mākua Valley, such as the late Leandra Wai, have started developing plans for a University of Mākua. They envision the university as a center for learning, care, and environmental repair. Specifically, the university could be a place to (re)learn Native Hawaiian knowledge

and culture. It could also be a place to learn the technical skills of environmental remediation needed to repair land that has suffered significant environmental damage. In the words of Kyle Kajihiro, a report co-author who has been involved in this planning, Mākua Valley can be “a *piko* (navel or center, source) of peace and *ea* (life, breath, sovereignty, rising).”²⁵ Solar farms could also be developed at Mākua Valley and other military sites, which could reduce energy costs for West O'ahu residents.

Near Mākua Valley, Ma'ō Farms provides an example of how base lands can be converted into agricultural uses while training youth and reconnecting Native Hawaiian and others with 'aina (the land).²⁶ 'Āina-based economic models based on traditional Hawaiian food systems offer a powerful alternative to military-dominated economics.²⁷ Traditional agricultural systems — established centuries ago as part of the traditional Hawaiian land management (ahupua'a) system — are still a foundation for the development of modern communities in Hawai'i and should continue to be so for food production in Hawai'i. These systems, which embody agroforestry practice and principles, are labor intensive, climate resilient, and capable of supporting large workforces. They improve food security, reduce dependence on imports, protect

25 Kyle Kajihiro email to David Vine, December 2025. Our thanks to Dr. Kajihiro for his help in understanding plans for Mākua University.

26 Trust for Public Land, “MA'O Organic Farms Lualualei,” <https://www.tpl.org/our-work/mao-organic-farms-lualualei>; Farm Link Hawai'i, “MA'O Organic Farms,” <https://farmlinkhawaii.com/pages/producers/mao-organic-farms>; Ma'ō Organic Farms, “Social Enterprise,” <https://www.maoorganicfarms.org/social-enterprise>.

27 Noa Kekuewa Lincoln, Thomas P. Haensel, and Tiffany M. Lee, “Modeling Hawaiian Agroecology: Depicting Traditional Adaptation to the World's Most Diverse Environment,” *Frontiers in Sustainable Food Systems* 7 (March 16, 2023), <https://doi.org/10.3389/fsufs.2023.1116929>; Noa Kekuewa Lincoln et al., “Restoration of 'āina Malo'o on Hawai'i Island: Expanding Biocultural Relationships,” *Sustainability* 10, no. 11 (October 31, 2018), <https://doi.org/10.3390/su10113985>.

our environment and communities, and keep wealth circulating locally rather than extracting it outward. Today, Hawai'i imports an estimated 85 to 90 percent of its food, representing significant economic loss to the islands. Thus, rebuilding local food systems at scale is economically strategic.²⁸

Camille Kalama, executive director of Ko'i honua, a nonprofit focused on revitalizing Hawaiian land and cultural practices, has encouraged people to imagine converting waters controlled by the military into traditional fishing grounds and places to enjoy and connect with the ocean. She recounts how during a flight that passed over Pu'uloa/Pearl Harbor, her son said to her, "Can you imagine if we could fish there again? You know what this was like back then."²⁹

"It's hard to imagine because it makes me want to cry. I think about [how] I want to see our people back in that water. I want to see canoes back in there. I want to see fishermen back in these waters. I want to see food."

"It's hard to imagine because it makes me want to cry," Kalama acknowledged. But, she said, "I think about [how] I want to see our people back in that water. I want to see canoes back in there. I want to see fishermen back in these waters. I want to see food."³⁰ In short, Pu'uloa/Pearl Harbor is a massive estuarine system that is still capable of providing economic and deep cultural benefit, assuming necessary environmental remediation and return to community use for restoration and food production.³¹

Like leaders in Mākua Valley, Kalama insists that people cannot wait for the land and water to be completely cleaned up before using it given the time scale of cleanup. "We need to see ourselves in these places, *and* they still need to clean up. You know, it's not an either/or where we got to wait until how many years in the future, because we know from Kaho'olawe that it might not happen in our lifetime." Instead, the question becomes one for the present: "How can we use these places and keep our people safe? I think that just being back in those places, whether it's for uses that you know we can't eat yet, but we can still go paddle."³²

"We have to show them these places are *living* still to us," Kalama says. "And they're not for throwaway. They're not for abusing anymore. We want to be there. We want

28 State of Hawai'i Office of Business, Economic Development & Tourism, *Increased Food Security and Food Self-Sufficiency Strategy* (October 2012), ii.

29 Kanaeokana, "'āina Back: Military Leases & Demilitarizing Hawai'i," Council for Native Hawaiian Advancement Conference, Hawai'i, September 17, 2024, video uploaded October 4, 2024, 1:27:23–1:27:31, https://www.youtube.com/watch?v=o_Q6ZXx5pe4.

30 Kanaeokana, "'āina Back," 1:27:32–1:27:58.

31 Sandy Ward, "Mālama Pu'uloa: Fostering Innovative Collaboration to Restore Pearl Harbor to Abundance," University of Hawai'i at Mānoa, February 24, 2023, <https://www.wrrc.hawaii.edu/malama-puuloa-fostering-innovative-collaboration-to-restore-pearl-harbor-to-abundance>.

32 Kanaeokana, "'āina Back," 1:28:00–1:28:30.

to take care of them, and we want them back.”³³

Painfully for many residents of Hawai‘i, the military’s Morale, Welfare and Recreation (MWR) stations provide spaces where only military personnel and their families and some veterans can enjoy Hawai‘i’s natural riches. In addition to other conversion proposals, these stations could immediately be transferred to public use by the people of Hawai‘i.³⁴

Shelley Muneoka, a Native Hawaiian environmental activist and scholar, has asked Hawaiians to imagine how it would feel to get base lands back and what might become possible. “What would it be like if we lived here without the constant threat of impending harm to places that we love? What would that feel like to be free of that weight ... To have our imagination back for all the things that could be possible.”³⁵

Muneoka urges Hawaiians to imagine land being given to community groups for the same price the military paid for 65-year leases: \$1. “It’s almost unimaginable that a 65-year lease for a dollar would be offered to a community group that wanted to take care of a place, that wanted to use it for community,” she said. “But those are the kinds of things that we need to imagine and put forth.”³⁶

33 Kanaeokana, “‘āina Back,” 1:28:32–1:28:48.

34 Hawaii Senate Concurrent Resolution no. 101, 31st Leg., S.R. 1, H.R. 1 (2021), “Requesting the United States Military to Return Unused Land that Becomes Available at Bellows Air Force Station to the State of Hawaii,” https://www.capitol.hawaii.gov/sessions/session2021/bills/SCR103_HD1_HTM.

35 Kanaeokana, “‘āina Back,” 1:28:55–1:29:12.

36 Kanaeokana, “‘āina Back,” 1:29:17–1:29:37.

37 The State of Hawai‘i’s current requirement is the hiring of 80 percent Hawai‘i residents for construction procurement contracts. Some would call for 100 percent local hiring, making 85 percent a reasonable improvement on state law. Hawai‘i Revised Statutes § 103B-3, “Requirements of Contractor,” Hawai‘i State Legislature, https://www.capitol.hawaii.gov/hrscurrent/vol02_ch0046-0115/HRS0103B/HRS_0103B-0003.htm.

Recommendations

Ultimately, we hope this chapter helps people imagine how military base land could be used by the people of Hawai‘i. Beyond imagining new futures, we hope it helps people join the work of making those futures a reality. The following are key recommendations to help guide the conversion process.

- Return lands and waters to a state that is safe for usability.
- Lands that are currently under lease should be immediately returned to the people of Hawai‘i, with fully funded environmental remediation plans in place.
- Locally hired employees must make up no less than 85 percent of all workers conducting environmental remediation.³⁷
- Returned lands should be converted and repurposed in ways that create economic benefits primarily for local communities.
- Damages that have been and will continue to be incurred by the people of Hawai‘i must be accounted for and repaired.
- Lands should be returned to surrounding communities that have borne the burden of military activities.

- A democratic community planning and engagement process must be undertaken to determine viable uses for military lands, how to best repurpose resources the military currently occupies, and how to navigate the ongoing relationship with the military.

Conclusion: ‘Āina-Based Futures and Economic Possibilities Beyond the Military

Transitioning land from militarization to regeneration would provide clear economic benefits. Returned lands can serve as sites of reparative justice, sustainable development, and climate adaptation. Across Hawai‘i, Native Hawaiian communities have already developed these models. The question is political will and control over resources.

A critical step toward a just transition is reframing what we mean by economic productivity. For too long, productivity has been equated with extraction, militarization, and external control. From a Native Hawaiian perspective, this framing is deeply flawed. ‘Āina is not a commodity; it is a source of life. Restoration, cultivation, and stewardship are forms of economic production that sustain people and place simultaneously. There are nearly 300 ‘āina-based organizations across Hawai‘i representing a growing population that centers the needs of community and environment.³⁸



Kalo farmer, educator, and actor (Chief of War) Kaina Makua shares traditional kalo farming practices in Waimea on West Kaua‘i. As Executive Director of Kumano I Ke Ala, Makua is working to shift West Kaua‘i’s economy — long dominated by multi-national agricultural corporations and the U.S. military — toward local models rooted in Native Hawaiian values. Kumano I Ke Ala is restoring over 100 acres of traditional agricultural land, producing nearly 100,000 lbs of poi annually, and planning to scale dramatically. Their work exemplifies an ‘āina-based future where restored lands feed communities, heal ecosystems, and transmit ancestral knowledge to future generations. Photos by Kumano I Ke Ala.

Military spending contributes an estimated 6.4 percent of Hawai‘i’s GDP (see Chapter 5, “The True Economic Impact of the Military in Hawai‘i”). However, this figure

38 Dawn Mahi et al., “‘āina as Resilience: Mapping Community Networks and Collaborative Care in Hawai‘i,” *Frontiers in Sustainability* 5 (2024): 1456437, <https://doi.org/10.3389/frsus.2024.1456437>.

does not account for costs associated with the military's presence, such as environmental remediation, public health expenses, infrastructure risk, and long-term liabilities. It also obscures who controls the value generated. An 'āina-based economic sector led by Native Hawaiians is intrinsically connected to their self-determination as reestablishing pilina (relationships) with the 'āina is critical to governance of Hawai'i's natural resources.³⁹ An 'āina-based sector guided by 'ike kūpuna (ancestral knowledge) and adequately resourced could rival or exceed this contribution while building long-term resilience.⁴⁰ Pathways include reclaiming underused and militarized lands, redirecting subsidies, training an 'āina-based workforce, and investing in supply chains that support locally produced food and energy industries. Governance of these resources should be restored to Native Hawaiian organizations.

Unlike military employment, which depends on federal priorities and geopolitical tensions, 'āina-based jobs are rooted in place and intergenerational. They span agriculture, regenerative conservation and energy production, food production, education, and cultural transmission. Their economic multipliers tend to strengthen communities rather than export revenue.

Environmental restoration itself must be understood as economic infrastructure. Healthy watersheds reduce disaster costs. Elements of functional ahupua'a enhance resiliency and food security. Living soils sequester carbon. In contrast, military infrastructure carries high maintenance costs, significant risk, and enduring environmental liability. Hawai'i's newly enacted conservation fee, projected to generate approximately \$100 million annually for green infrastructure, demonstrates that alternative investment pathways already exist.⁴¹

Critically, this future must be grounded in 'ike kūpuna and Native Hawaiian-led Indigenous governance to ensure long-term accountability, place-based decision-making, and resistance to speculative extraction. Native Hawaiians cannot be relegated to labor roles within systems that they do not control. Native Hawaiian leadership, governance, and sovereignty are economic pathways to prosperity for all residents.

Hawai'i does not need to accept environmental sacrifice and social harm as the price of economic survival. A future rooted in aloha 'āina (love of the land), economic dignity, and self-determination is possible and is already being built.

39 Mahi et al., "'āina as Resilience."

40 Mahi et al., "'āina as Resilience."

41 State of Hawai'i Office of the Governor, "Historic Green Fee Launched to Combat Climate Change in Hawai'i," June 2, 2025, <https://governor.hawaii.gov/main/historic-green-fee-launched-to-combat-climate-change-in-hawai-i-CA%BBi>.

Case Studies:

Kapūkaki/Red Hill

Mākua Valley

Pōhakuloa

Kaho‘olawe

Kyle Kajihira

Case Study:

Kapūkaki/Red Hill

Kyle Kajihiro⁴²

The Red Hill Bulk Fuel Storage Facility is an underground military fuel storage facility located in Kapūkaki in the Ko‘olau mountain range near Pearl Harbor. Constructed in secrecy in the early 1940s,⁴³ Red Hill consists of 20 large tanks capable of holding up to 250 million gallons of jet fuel and is the Department of Defense’s largest underground fuel storage facility.⁴⁴ The tanks sit just 100 feet above the Southern O‘ahu Basal Aquifer — O‘ahu’s sole-source aquifer — which supplies 25 percent of the island’s drinking water.⁴⁵

According to Ernie Lau, the Honolulu Board of Water Supply’s chief engineer, the Navy’s records show at least 72 documented fuel releases from the facility, releasing “probably over 180,000 gallons of fuel of different types” over its 80-year history. But according to a November 2023 report

conducted by the Red Hill Water Alliance Initiative, a coalition of Hawai‘i state and local officials, the actual amount of fuel leaked from the facility is closer to 1.94 million gallons.⁴⁶

The first major warning came in January 2014, when 27,000 gallons leaked from a newly maintained and repaired tank.⁴⁷ Rather than close the facility, the Navy and regulators signed an Administrative Order on Consent (AOC) that gave the Navy 22 years to implement a secondary containment solution — a decision strongly condemned by the Honolulu Board of Water Supply and community groups.⁴⁸

The nightmare scenario many feared came true in November 2021, when a Navy worker’s cart struck a drain pipe, releasing approximately 19,000 gallons

42 Kyle Kajihiro is an assistant professor in the Department of Ethnic Studies at the University of Hawai‘i at Mānoa.

43 Historic American Engineering Record, National Park Service, *U.S. Naval Base, Pearl Harbor, Red Hill Underground Fuel Storage System*, HAER No. HI-1016 (Washington, DC: Library of Congress, 2015), <http://lcweb2.loc.gov/master/pnp/habshaer/hi/hi1000/hi1016/data/hi1016data.pdf>.

44 Commander, Navy Region Hawaii, “Red Hill Bulk Fuel Storage Facility,” U.S. Navy, September 13, 2024, <https://cnrh.cnrc.navy.mil/Operations-and-Management/Red-Hill>.

45 Honolulu Board of Water Supply, “Protect Oahu’s Sole Source Aquifer at Red Hill,” <https://www.boardofwatersupply.com/protectoahuwater/news/red-hill>.

46 State of Hawai‘i and City and County of Honolulu, *Red Hill Water Alliance (WAI) Report*, November 2023, 4, <https://www.boardofwatersupply.com/bws/media/files/red-hill-water-alliance-initiative-report-2023-11-28.pdf>.

47 U.S. Environmental Protection Agency, “About the Fuel Releases at the Red Hill Bulk Fuel Storage Facility,” EPA, January 16, 2026, <https://www.epa.gov/red-hill/about-fuel-releases>.

48 U.S. Environmental Protection Agency and Hawai‘i State Department of Health, *In the Matter of the United States Department of the Navy and Defense Logistics Agency, Respondents: Red Hill Bulk Fuel Storage Facility, Oahu, Hawai‘i, Administrative Order on Consent, EPA Dkt. No. RCRA 7003-R9-2015-01, DOH Dkt. No. 15-UST-EA-01; and Statement of Work (SOW)*, September 28, 2015, http://health.hawaii.gov/shwb/files/2015/09/Red-Hill-AOC_Final_29SEP151.pdf.

of jet fuel directly into the water system serving 93,000 residents on Joint Base Pearl Harbor-Hickam.⁴⁹ The Navy initially insisted the water was safe to drink, but residents reported fuel odors from their taps and a wave of symptoms, including nausea, cognitive impairment, rashes, and vomiting.⁵⁰ Viral videos showed tap water with an oily sheen that sparked when lit. More than 4,000 military families were displaced from their homes for four months.⁵¹

The Navy had ample warning the facility was at risk of leaking. Its own risk analysis had calculated a 27.6 percent probability “of an initiating event resulting in a fuel release between 1,000 and 30,000 gallons.”⁵²

Only nine of the 18 active storage tanks had been inspected for their condition and integrity in the last 20 years, and two tanks hadn’t been inspected in 38 years, while another hadn’t been inspected in 40 years.⁵³

In the immediate aftermath of the spill, community members — not government agencies — stepped forward. In the fall of 2021, two organizations, Hawai’i Peace and Justice and the Sierra Club of Hawai’i,



Organizers stand in front of the U.S. Navy headquarters during an action in response to the leaching of the Navy’s bulk fuel storage facility in Kapūkākī, O’ahu (Red Hill). Photo courtesy of Kanaeokana

launched a campaign to shut down Red Hill. They convened an initial organizing committee of key leaders and activists from across the island representing Native Hawaiian, environmental, labor, interfaith, and peace and social justice groups. This organizing committee later grew into the O’ahu Water Protectors (OWP),⁵⁴ which formed around three points of unity:

1. Water is life. Access to clean drinking water is a basic human right.

49 U.S. Government Accountability Office, “Red Hill Fuel Storage: DOD’s Contract Approaches and Oversight before and after the 2021 Fuel Leaks,” GAO-25-106572, November 2024, <https://www.gao.gov/assets/880/873881.pdf>.

50 Christina Jedra, “Navy Investigating ‘Chemical Smell’ in Military Housing Drinking Water,” *Honolulu Civil Beat*, November 29, 2021, <https://www.civilbeat.org/2021/11/navy-investigating-chemical-smell-in-military-housing-drinking-water>.

51 U.S. Department of Defense Office of Inspector General, “Press Release: The DoD OIG Releases Reports and Management Advisory on Hawaii’s Red Hill Fuel Incidents,” November 14, 2024, <https://www.dodig.mil/In-the-Spotlight/Article/3963988/press-release-the-dod-oig-releases-reports-and-management-advisory-on-hawaiis-r>.

52 Commander, Navy Region Hawaii, “Risk and Vulnerability Assessment for the Red Hill Administrative Order on Consent (AOC) Statement of Work (SOW) Section 8,” May 29, 2019, 7, https://www.epa.gov/sites/default/files/2019-06/documents/risk_assessment_letter_and_summary.pdf.

53 Mark Ladao, “Approval of Red Hill Fuel Storage Permit Recommended Despite Risks,” *Stars and Stripes*, September 12, 2021, <https://www.stripes.com/branches/navy/2021-09-12/navy-red-hill-fuel-storage-hawaii-permits-2860722.html>.

54 O’ahu Water Protectors, “Ola I Ka Wai – Water Is Life,” <https://oahuwaterprotectors.org>.

2. The Red Hill fuel tanks are a threat to O‘ahu’s drinking water and must be retired as soon as possible.

3. We demand that local, state, and federal officials take urgent action to shut down the Red Hill fuel tanks in order to protect drinking water on O‘ahu.

The OWP, along with military housing advocates, organized water distribution to impacted families.⁵⁵ Centering their politics on wai (water) as the source of all life allowed the coalition to embrace diverse political beliefs and move fluidly between tactics without losing focus.

Native Hawaiian voices were central to the movement’s cultural reframing. In December 2021, the newly formed coalition Ka‘ohewai — named for the bamboo water carrier — led approximately 80 kia‘i (protectors) in a pre-dawn direct action at Pacific Fleet Command headquarters. Protectors brought stones from their home territories across the island and built a ko‘a (stone altar) dedicated to Kāne, deity of fresh water and heat, as a site for ongoing ceremony and political gathering. This action reframed the terms of debate from military operational priorities to the vital necessity of water for life on O‘ahu. These actions, along with sustained rallies, “die-ins,” and “eviction” actions at military headquarters, connected the poisoning of O‘ahu’s water to broader patterns of U.S. military harm across the Pacific.⁵⁶

The movement drew a remarkable coalition. Kūpuna (elders) at the retirement community 15 Craigside gathered 200 signatures for a letter to President Biden. The Shimanchu Wai Protectors mobilized the Okinawan diaspora around shared experiences of military environmental harm. Ernie Lau, the chief engineer at the Board of Water Supply, spoke openly to the media while the Navy stayed silent. In November 2022, Lau broke down in tears at a press conference after an additional 1,300-gallon PFAS foam spill, which galvanized the Walk for Wai — over 1,500 residents marched to Navy headquarters. The University of Hawai‘i’s Red Hill Task Force developed rapid water-screening methods, filling a critical gap left by the absence of any EPA-certified testing lab in the islands. After months of the Navy refusing to shut down the tanks, on March 7, 2022, Secretary of Defense Lloyd Austin III suddenly directed the permanent defueling and closure of Red Hill.

Although the Navy removed the majority of fuel from the facility and its pipelines, approximately 4,000 gallons of fuel and 28,000 gallons of fuel sludge remain in the tanks and pipes, and full closure, cleanup, and aquifer remediation remains an open and urgent question. A 2022 EPA consent order was roundly condemned for lacking deadlines, meaningful penalties, or transparency⁵⁷ — repeating

55 Kevin Knodell, “Local Activists Deliver Water to Kapilina Residents Affected by Red Hill,” *Stars and Stripes*, November 20, 2022, https://www.stripes.com/theaters/asia_pacific/2022-11-20/water-kapilina-residents-red-hill-8123358.html.

56 Kyle Kajihiro, “Environmental Justice in Hawai‘i and Oceania,” in *Environmental Justice in North America*, ed. Paul C. Rosier, (New York: Routledge 2023).

57 Christina Jedra, “Regulators Were Watching the Navy’s Red Hill Fuel Facility. What Went Wrong?” *Honolulu Civil Beat*, February 25, 2022, <https://www.civilbeat.org/2022/02/regulators-were-watching-the-navys-red-hill-fuel-facility-what-went-wrong>.



Artwork by AJ Feducia used by the O'ahu Water Protectors coalition to capture how U.S. military warships, submarines, and fuel tanks contaminates both the land and water in Hawai'i and is used to fight wars.

the same structural failures as the 2014 AOC that preceded the disaster — and PFAS contamination from the November 2022 foam spill may cause long-term environmental damage.⁵⁸ The Board of Water Supply has stated it cannot confirm whether it will ever safely restart three wells shut down as a precautionary measure, precipitating an ongoing water shortage on O'ahu.⁵⁹

58 Hawai'i State Department of Health, "DOH Investigating Red Hill AFFF Fire Suppressant Spill," November 29, 2022, health.hawaii.gov/news/newsroom/doh-investigating-red-hill-aff-fire-suppressant-spill.

59 Sophie Cocke, "Board of Water Supply Says 3 Oahu Wells May Never Reopen After Latest Navy Contamination," *Honolulu Star-Advertiser*, January 4, 2022, <https://www.staradvertiser.com/2022/01/03/breaking-news/board-of-water-supply-says-3-oahu-wells-may-never-reopen-after-latest-navy-contamination>.

60 Mahealani Richardson, "Military Members Fight Government's Claim that Red Hill Toxic Exposure Was Service-Related," *Hawaii News Now*, March 4, 2026, <https://www.hawaiinewsnow.com/2026/03/05/red-hill-fuel-leak-military-members-fight-governments-claim-that-toxic-exposure-was-service-related>.

61 Chloe Jones, "Red Hill: Fears Linger over Navy Reopening Water Shaft," *Honolulu Star-Advertiser*, February 26, 2026, <https://www.staradvertiser.com/2026/02/26/hawaii-news/red-hill-fears-linger-over-navy-reopening-water-shaft>.

Affected families continue to face Navy delay tactics, regulatory failure, and unresolved health impacts: over 1,000 military members have filed claims against the federal government for health-related illnesses due to toxic exposure, but the government has characterized their injuries as "incident to service," an occupational hazard.⁶⁰

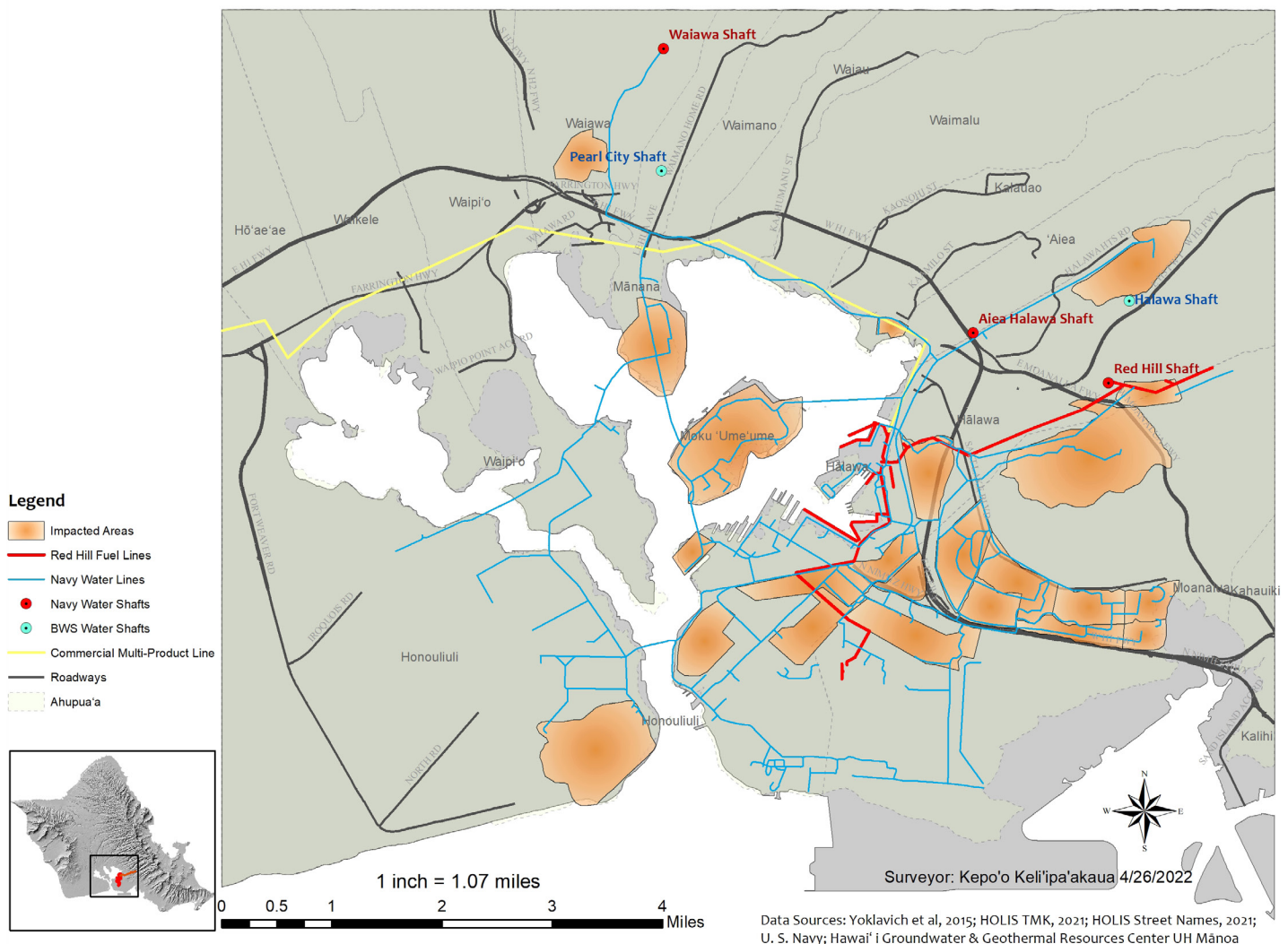
The full composition of the fuel mixture has never been disclosed, long-term health monitoring remains inadequate, and O'ahu's aquifer — a sacred source of life stretching back thousands of years — faces contamination threats that may take generations to fully assess. As of February 2026, the Navy's pattern of evasion continues: the EPA dropped its requirement for the Navy to meet with the elected Community Representative Initiative — a group of 10 community members tasked with holding the Navy accountable — with both the EPA and the Navy concluding the meetings were not meeting their objectives.⁶¹

What the Red Hill crisis has laid bare is both a failure of institutions and a story of extraordinary community resilience. It revealed the cost of placing control over an island's most vital resource in the hands of a distant federal military institution with no accountability to the people it harms. It exposed how Native

Hawaiian communities, community organizers, military families, scientists, kūpuna (elders), and everyday residents — people with very different backgrounds and relationships to the land — can find common cause when the fundamentals of life are threatened. Centering the politics of water enabled the movement to bridge diverse communities and sustain pressure until Red Hill was shut down.

The work of restoration requires clearing what has been dumped and trusting that healing will follow. For the people of O‘ahu, the fight to protect their wai is not simply an environmental campaign; it is a fight for the continued possibility of life on their island — and a call to the rest of the world to recognize what is at stake when the water that sustains us is treated as expendable.

Impacted Military Housing Areas, Navy Water Lines, and Red Hill Fuel System



Case Study: Mākua Valley

Kyle Kajihiro⁶²

Mākua Military Reservation, on the Wai‘anae coast of western O‘ahu, spans approximately 4,190 acres across three valleys — Mākua, Kahanahāiki, and Ko‘iahi. Together, they are home to more than 50 endangered and threatened species, as well as sacred cultural sites including heiau (Hawaiian temples), burials, and petroglyphs.⁶³ From the 1920s⁶⁴ until 2004,⁶⁵ Mākua Military Reservation was used by the U.S. military for live-fire training, resulting in significant environmental and cultural damage.

Mākua — meaning “parents” in Hawaiian — is a deeply curved valley that is considered the place where Wākea (god of the sky) and Papahānaumoku (goddess of the earth and creation) are believed to have given life to the Hawaiian islands. The greater Mākua valley once sustained a thriving community of farmers, fishermen, and

ranchers, with at least three heiau (temple sites), plus agricultural terraces and rich offshore fisheries.⁶⁶

When Hawai‘i was placed under martial law during World War II, President Roosevelt issued an executive order seizing Mākua for military training.⁶⁷ About 6,000 acres were seized through eminent domain, Native Hawaiian families were evicted, and their church bombed for target practice.⁶⁸ A permit stipulated the land would be returned six months after the war ended, but that promise was never kept. By 1964, the State of Hawai‘i had signed a 65-year lease of 782 acres of Hawaiian trust land for \$1, with an additional 3,236 acres designated by presidential order.⁶⁹

The military occupation deepened Indigenous landlessness. Native Hawaiian families formed a beach community at

62 Kyle Kajihiro is an assistant professor in the Department of Ethnic Studies at the University of Hawai‘i at Mānoa.

63 Earthjustice, “Restoring Mākua Valley,” <https://earthjustice.org/case/Mākua-environmental-impact-statement>.

64 Kevin Knodell, “A Shaky Truce: The Army and Native Hawaiians Both Want Oahu’s Mākua Valley,” *Honolulu Civil Beat*, August 18, 2021, <https://www.civilbeat.org/2021/08/a-shaky-truce-the-army-and-native-hawaiians-both-want-oahu-mākua-valley>.

65 Christina Jedra, “Army Says Mākua Valley No Longer Needed for Live-Fire Training,” *Honolulu Civil Beat*, December 2, 2023, <https://www.civilbeat.org/2023/12/army-says-mākua-valley-no-longer-needed-for-live-fire-training>.

66 Office of Hawaiian Affairs Research Division, Land, Culture and History Section, “Ke Ahupua‘a o Mākua: The Land Division of Mākua,” <https://www.oha.org/wp-content/uploads/Ke-Ahupua%CA%BBa-o-Mākua-l-Mahele-l-Ka-Wa-o-Na-Mākua.pdf>.

67 Knodell, “A Shaky Truce.”

68 Environment Hawai‘i, “First the Cattle, Then the Bombs, Oust Hawaiians From Mākua Valley,” *Environment Hawai‘i*, November 1992, <https://environment-hawaii.org/?p=3901>.

69 The American Presidency Project, “Executive Order 11166 – Setting Aside for the Use of the United States Certain Public Lands and Other Public Property Located at the Mākua Military Reservation, Hawai‘i,” August 15, 1964, <https://www.presidency.ucsb.edu/documents/executive-order-11166-setting-aside-for-the-use-the-united-states-certain-public-lands-and>.

Mākua, calling it a pu'uhonua (place of refuge), but they faced repeated state evictions between 1960 to 1996. The last, in 1996, forcibly removed more than 200 people in a militarized police operation, where 16 residents were arrested. The same forces that had seized the land from Native Hawaiians left its people landless in their own homeland.⁷⁰



Marines and Army Joint Air Assault Training Operation Steel Crucible, a 2-week Battalion military exercise of day and night live fires from Schofield Barracks to Mākua Valley. Photo from September 16, 2021 by Spc. Jessica Scott.

The movement to reclaim Mākua drew inspiration from the Kaho'olawe struggle.⁷¹ In 1976, just weeks after the first activist landing on Kaho'olawe, Wai'anae community members held a solidarity rally at Mākua. In 1992, when the Army's open burn/open detonation operations ceased

under community pressure, the seeds of Mālama Mākua were sown to protect the site from further military harm.⁷² In 1997, three days after scattering the ashes of beloved musician Israel Kamakawiwo'ole off Mākua Beach, the Marine Corps announced plans for amphibious assault training there, but the community mobilized and stopped it.⁷³

Mālama Mākua became a leading voice within Hawai'i's growing movement to confront the military's toxic legacy, advocating for environmental justice, cultural access, and the eventual return and restoration of Mākua to the community. In 1998, Mālama Mākua sued the Army under the National Environmental Policy Act for failing to conduct an environmental impact statement (EIS). A 2001 settlement limited training, required ordnance surface-clearing across a third of the valley, and secured two cultural access days per month plus access twice a year for Makahiki, a ceremony honoring Lono, the deity of agriculture. Under the 2001 settlement, the Army was required to complete an EIS within three years or face a ban on live-fire training. The Army never completed the EIS, and live-fire training at Mākua has been prohibited since 2004.⁷⁴ Thousands of community members have since participated in cultural activities in the valley.

70 Kalamāoka'Āina Niheu, "Pu'uhonua: Sanctuary and Struggle at Mākua," in *A Nation Rising: Hawaiian Movements for Life, Land, and Sovereignty*, ed. Noelani Goodyear-Ka'ōpua, Ikaika Hussey, and Erin Kahunawaika'ala Wright (Durham: Duke University Press, 2014), <https://doi.org/10.1215/9780822376552>.

71 Kalamāoka'Āina Niheu, "Pu'uhonua: Sanctuary and Struggle at Mākua," in *A Nation Rising: Hawaiian Movements for Life, Land, and Sovereignty*, ed. Noelani Goodyear-Ka'ōpua, Ikaika Hussey, and Erin Kahunawaika'ala Wright (Durham: Duke University Press, 2014), 161–79, <https://doi.org/10.1515/9780822376552-014>.

72 Earthjustice, "Court Upholds Ban on Live-Fire Training at Mākua," October 3, 2006, <https://earthjustice.org/press/2006/court-upholds-ban-on-live-fire-training-at-Mākua>.

73 Kyle Kajihiro, "Israel 'Bruddah Iz' Kamakawiwo'ole (May 20, 1959 – June 26, 1997)," DMZ Hawai'i, July 12, 1997, <https://www.dmzhawaii.org/?p=2130>.

74 Earthjustice, "A Landmark Victory for Peace in Hawai'i's Sacred Mākua Valley," March 20, 2025, <https://earthjustice.org/article/a-landmark-victory-for-peace-in-hawaiis-sacred-Mākua-valley>.

In 2021, the Army began environmental impact studies for retaining approximately 6,300 acres of Hawaiian trust lands on O‘ahu, including Mākua, Kahuku, and Poamoho, as 2029 lease expirations approached.⁷⁵ Decades of live-fire training sparked wildfires that destroyed native forest habitat, killing imperiled plants and animals.⁷⁶ Now community groups are organizing to terminate these leases and hold the Army accountable for cleanup and restoration before any renewal. The promise made in 1942 — to return the land — remains the moral foundation of the movement.

A significant development came in August 2025, when the Army’s Record of Decision for O‘ahu indicated it would not seek to renew its state land lease at Mākua, which expires on August 16, 2029.⁷⁷ The fate of Public Lands held by the Army through an executive order and parcels held in fee are still uncertain.



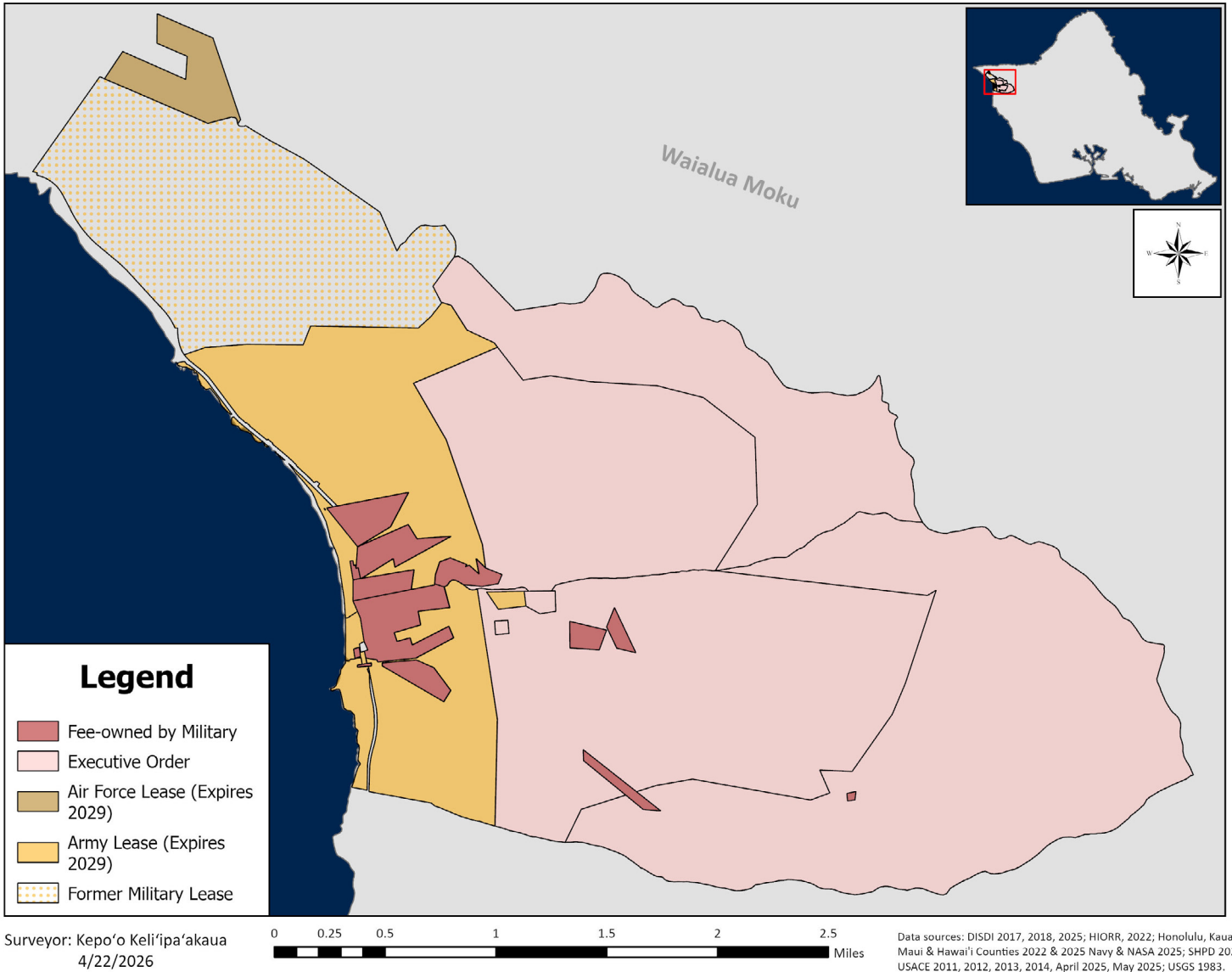
Member of Malama Mākua points to petroglyphs etched into volcanic rock in Mākua Valley. Photo credit: Christine Ahn

75 Department of the Army, “Environmental Impact Statement for Army Training Land Retention of State Lands at Kahuku Training Area, Poamoho Training Area, and Mākua Military Reservation, Island of O‘ahu, Hawai‘i,” *Federal Register* 86, no. 139 (July 23, 2021): 39007–39009, <https://www.federalregister.gov/documents/2021/07/23/2021-15666/environmental-impact-statement-for-army-training-land-retention-of-state-lands-at-kahuku-training>.

76 Earthjustice, “Hawai‘i’s Mākua Valley Forever Protected from Explosive Military Training,” December 1, 2023, <https://earthjustice.org/press/2023/hawaiiis-makua-valley-forever-protected-from-explosive-military-training>.

77 U.S. Army. 2025. *Army Training Land Retention of State Lands at Kahuku Training Area, Kawaioloa-Poamoho Training Area, and Mākua Military Reservation, Island of Oahu - Record of Decision*.

Military Lands in Mākua, Wai‘anae, O‘ahu



Case Study:

Pōhakuloa

Kyle Kajihiro⁷⁸

Pōhakuloa Training Area (PTA) on Hawai‘i Island is the largest U.S. military testing and training installation in the Pacific — sprawling across more than 132,000 acres between two volcanoes, Mauna Kea and Mauna Loa, roughly the size of Guam. The land was part of the Hawaiian Kingdom’s Crown and Government Lands before the illegal overthrow in 1893. In 1964, Hawai‘i’s Department of Land and Natural Resources leased roughly 23,000 acres of state conservation land to the Army for 65 years for the total sum of \$1.⁷⁹ PTA has since grown into the only range in the Pacific capable of supporting battalion and brigade units, used by every branch of the U.S. military — as well as allied and partner nation forces — for everything from live-fire training with mortars, artillery, and rockets to aerial bombardment. B-2 bombers have flown from Guam to drop bombs there.

To station a Stryker Brigade Combat Team

in Hawai‘i, the Army announced plans to expand the Pōhakuloa Training Area by approximately 23,000 acres of land purchased from the Parker Ranch.⁸⁰ Critics noted the bitter irony that as the Navy returned the 28,800-acre Kaho‘olawe to the state after a decade of partial cleanup, the Army was simultaneously acquiring nearly the same amount of land through the Stryker expansion — and unlike Kaho‘olawe, with no comparable commitment to restoration or return.⁸¹

Native Hawaiian organizations won a Ninth Circuit case that the Army had violated the National Environmental Policy Act by failing to consider alternative locations for the Stryker Brigade, resulting in a temporary injunction halting construction — though the Army ultimately proceeded after completing a supplemental environmental impact statement (EIS).⁸² When the Army’s budget was cut in 2015, the Pentagon conceded what opponents had argued all

78 Kyle Kajihiro is an assistant professor in the Department of Ethnic Studies at the University of Hawai‘i at Mānoa.

79 Puanani Fernandez-Akamine, “Pōhakuloa: A Land Besieged,” *Ka Wai Ola*, September 1, 2024, <https://kawaiola.news/cover/pohakuloa-a-land-besieged>.

80 Thomas Freeman, “Reflections on the Connections between the War in Iraq and Hawai‘i: The Stryker Brigade and the Watada Case,” Nuclear Age Peace Foundation, February 5, 2007, <https://www.wagingpeace.org/reflections-on-the-connections-between-the-war-in-iraq-and-hawaii-the-stryker-brigade-and-the-watada-case>.

81 Kyle Kajihiro, “Military Land Use Plan Reveals Challenges and Opportunities,” *Ka Wai Ola*, December 1, 2021, <https://kawaiola.news/aina/military-land-use-plan-reveals-challenges-and-opportunities>.

82 Earthjustice, “Court of Appeals Rules: Army Violated Law in Bringing Stryker Brigade to Hawai‘i,” October 5, 2006, <https://earthjustice.org/press/2006/court-of-appeals-rules-army-violated-law-in-bringing-stryker-brigade-to-hawaii-i>; Earthjustice, “Court of Appeals Orders Army to Stop Stryker Conversion in Hawai‘i,” October 27, 2006, <https://earthjustice.org/press/2006/court-of-appeals-orders-army-to-stop-stryker-conversion-in-hawaii-i>.

along: stationing an armored brigade on an island made no military sense. The Strykers moved to Washington State in 2016, but the Army's land acquisitions remained intact.⁸³ The military has since adapted to growing opposition on Kaho'olawe and O'ahu by shifting much of its training to Pōhakuloa.



Bravo Battery, 2nd Battalion, 11th Field Artillery Regiment, 25th Infantry Division Artillery execute a fire mission in High Mobility Artillery Rocket Systems (HIMARS) on Pohakuloa Training Area, Hawaii Nov. 2, 2025. U.S. Army photo by Pfc. Jose Nunez.

For Native Hawaiians, Pōhakuloa is the piko (navel) and spiritual center of Hawai'i Island — a final resting place for iwi kūpuna (ancestral remains) and home to endangered species believed to be found nowhere else.⁸⁴ In 2014, two Native Hawaiian kūpuna (elders) sued the state for failing to enforce the terms of the Army's lease, arguing that the state was responsible for its tenant's destruction of the natural and cultural environment. In

2019, the Hawai'i Supreme Court ruled that the state had breached its constitutional trust duties by failing to inspect the land or ensure the Army's compliance with lease terms.⁸⁵ Meanwhile, the movement to protect Mauna Kea from the construction of a telescope — situated within the same sacred landscape as Pōhakuloa at the mountain's base — activated and motivated younger generations of Native Hawaiian activists. As one Pōhakuloa activist noted in 2018, the courage that emerged from the Mauna Kea struggle was harnessed to stop live-fire bombing at PTA and protect the water and land of Hawai'i island.⁸⁶ This connection is rooted in the traditional Hawaiian concept of the ahupua'a — a land division running from the mountains to the sea, encompassing all the resources a community needs to sustain itself: freshwater, forest, farmland, and fishery. Within this framework, the bombing of Pōhakuloa and the desecration of Mauna Kea are not separate grievances but wounds to the same living landscape, and the resistance to each draws from the source.

As the lease expiration of August 16, 2029, approaches, the Army seeks to retain nearly 20,000 acres at PTA. In May 2025, at a hearing attended by hundreds, with over 1,500 written testimonials, Hawai'i's Board of Land and Natural Resources (BLNR)

83 Audrey McAvoy, The Associated Press, "Critics Welcome Departure of Stryker Brigade from Hawaii," *Army Times*, July 11, 2015, <https://www.armytimes.com/news/your-army/2015/07/11/critics-welcome-departure-of-stryker-brigade-from-hawaii>.

84 Jon Letman, "Hawai'i Communities Challenge Army's Pōhakuloa Lease Renewal," Inkstick Media, December 8, 2025, <https://inkstickmedia.com/hawaii-communities-challenge-armys-pohakuloa-lease-renewal>.

85 John Burnett, "High Court Rules State Breached Trust Duties at Pohakuloa Training Area," *West Hawaii Today*, August 24, 2019, <https://www.westhawaii.com/2019/08/24/hawaii-news/high-court-rules-state-breached-trust-duties-at-pohakuloa-training-area>.

86 Jon Letman, "Military's Live-Fire Training Ignites Resistance from Some Big Island Neighbors," *Honolulu Civil Beat*, June 7, 2018, <https://www.civilbeat.org/2018/06/militarys-live-fire-training-ignites-resistance-from-some-big-island-neighbors>.

rejected the Army's Final Environmental Impact Statement, citing an incomplete archaeological inventory, inadequate biological data, and insufficient cultural consultation. Without an accepted EIS, the lease negotiation process cannot move forward. Rather than treat the rejection by the BLNR as a mandate to return the land, Governor Green responded with

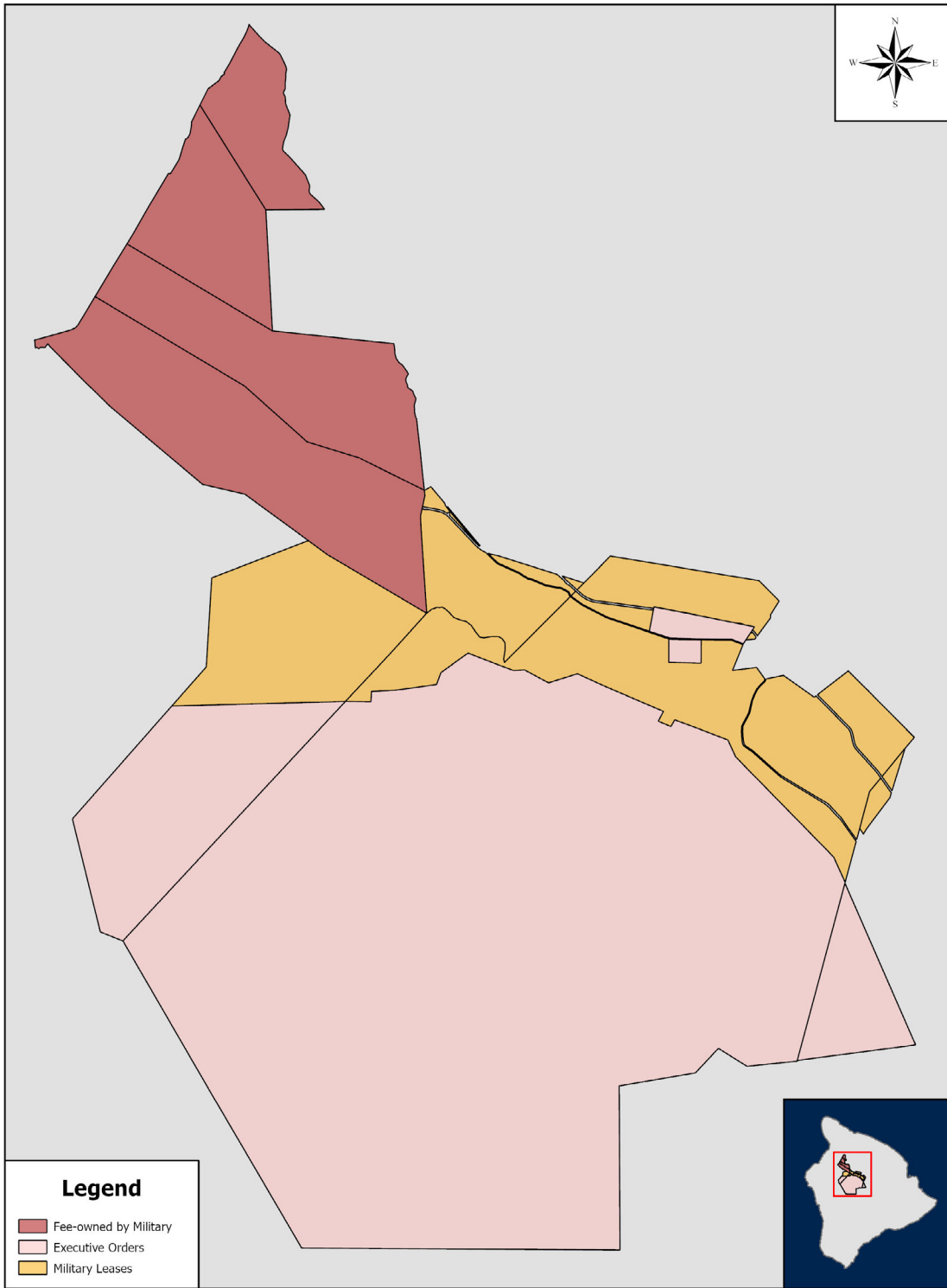
a negotiating proposal asking that the federal government provide \$10 billion for housing, infrastructure, and a \$500 million cleanup endowment in exchange for new leases. The Sierra Club of Hawai'i called this a "paltry sum," far below what military remediation has cost elsewhere in Hawai'i.⁸⁷



U.S. Marines conduct live-fire training at Pōhakuloa Training Area on Hawai'i Island, August 18, 2017. Photo by Lance Cpl. Luke Kuennen, U.S. Marine Corps.

87 Letman, "Hawai'i Communities Challenge Army's Pōhakuloa Lease Renewal."

Pōhakuloa Training Area, Hawai'i



Surveyor: Kēpo'o Keli'ipa'akaua
4/22/2026



Data sources: DISDI 2017, 2018, 2025; HIOORR, 2022; Honolulu, Kaua'i, Maui & Hawai'i Counties 2022 & 2025; Navy & NASA 2025; SHPD 2020; USACE 2011, 2012, 2013, 2014, April 2025, May 2025; USARP 2017; USGS 1983.

Case Study:

Kaho'olawe

Kyle Kajihiro⁸⁸

Kaho'olawe — also known as *Kohemālamalama o Kanaloa*, the sacred body of Kanaloa, deity of the sea — is the smallest of the main Hawaiian islands and an ancient piko (navel or center) of Polynesian navigation. In 1793, goats were introduced as a gift to Chief Kahekili of Maui. Unbridled grazing stripped the island's dryland forest, causing severe erosion and desertification. Over time, this ecological damage produced the widespread misperception of Kaho'olawe as a barren wasteland. In 1918, ranchers Eben Lowe and Angus McPhee leased the island and began to remove the goats and restore vegetation, which was then disrupted by World War II.⁸⁹

Following the attack on Pearl Harbor and the declaration of martial law, the U.S. military seized Kaho'olawe, converting it into a live-fire bombing and training range, earning it the nickname "Target Isle."⁹⁰ The island served as a training range through the U.S. wars on Korea and Vietnam.⁹¹

Between 1968 and 1970, 2,500 tons of bombs were dropped onto Kaho'olawe, according to the *Oxford Journal*.⁹² In 1965, Operation Sailor Hat, three detonations of TNT each simulating nuclear blasts, cracked the island's fresh aquifer and left a water-filled crater that remains to this day.⁹³ Cultural sites were damaged or destroyed, and decades of bombardment left the island littered with unexploded ordnance, much of which remains buried today.⁹⁴

By the 1970s, several forces converged to create the conditions for organized resistance: growing resentment of military occupation, the rise of the Hawaiian sovereignty movement, and inspiration from global anti-colonial struggles. On January 4, 1976, a coalition of activists set out from Maui to stage a symbolic occupation of Kaho'olawe, inspired in part by the Native American occupations of Alcatraz and Wounded Knee. Most were turned back by the Coast Guard, but nine

88 Kyle Kajihiro is an assistant professor in the Department of Ethnic Studies at the University of Hawai'i at Mānoa.

89 Kaho'olawe Island Reserve Commission, "Kaho'olawe History," <https://kahoolawe.hawaii.gov/history.shtml>.

90 Maui Ocean Center, "Kaho'olawe Island: The Story of History and Healing," October 7, 2025, <https://maui-oceancenter.com/vacation-planning/the-story-of-kahoolawe-island-hawaiis-sacred-protected-land>.

91 Cory Graff, "Kaho'olawe: The Pacific's Battered Bullseye," *The National WWII Museum*, <https://www.nationalww2museum.org/war/articles/kahoolawe-island-us-navy>.

92 Graff, "Kaho'olawe: The Pacific's Battered Bullseye."

93 Lacy Deniz, "Operation Sailor Hat: The Tests on Kaho'olawe Meant to Simulate an Atomic Bomb," *Hawaii News Now*, February 27, 2018, <https://www.hawaiinewsnow.com/story/37608706/a-detonation-on-kahoolawe-so-big-it-left-behind-a-crater-thats-now-a-pond>.

94 Graff, "Kaho'olawe: The Pacific's Battered Bullseye."



In 1965, the U.S. navy conducted a series of simulated atomic explosions on Kaho'olawe using TNT. Code-named "Operation Sailor Hat," these tests left a gaping crater as a reminder of the exorbitant environmental costs of militarism. Photo by Kyle Kajihiro

activists landed on the island. Confronted by the devastated landscape and the richness of Native Hawaiian cultural sites, they organized what would become the Protect Kaho'olawe 'Ohana (PKO).

The PKO carried out a series of bold landings to disrupt Navy exercises and sued the Navy under the National Environmental Policy Act and the National Historic Preservation Act. Following a 1976 federal lawsuit brought by the PKO, the

1980 Consent Decree in *Aluli et al. v. Brown* required the Navy to protect cultural sites, clear surface ordnance from 10,000 acres, and grant the PKO monthly cultural access to the island.⁹⁵ When PKO leaders George Helm and Kimo Mitchell were lost at sea off Kaho'olawe in March 1977, their deaths did not extinguish the movement — the 'ohana's work continued, and their sacrifice became part of the foundation of a struggle that ultimately reshaped Hawai'i.⁹⁶ After 14 years of sustained activism, including

95 University of Hawai'i at Mānoa Hamilton Library, *Reference Material: Civil No. 76-0380: Consent Decree & Order, Noa Emmett Aluli vs. Harold Brown, 1980 December*, Senator Daniel K. Inouye Papers, Kaho'olawe, Box KL3, Folder 5, accessed via University of Hawai'i eVols, <https://evols.library.manoa.hawaii.edu/server/api/core/bitstreams/05d261df-088c-4496-8474-4b89975361ff/content>.

96 Mark Carpenter, "From Loss to Legacy: How the Fight to Protect Kahoolawe Reshaped Hawaii," *Hawaii News Now*, March 24, 2026, <https://www.hawaiinewsnow.com/2026/03/25/loss-legacy-how-fight-protect-kahoolawe-reshaped-hawaii>.

island occupations, federal litigation, and public pressure, President George H.W. Bush issued a presidential memorandum in 1990 directing the cessation of all bombing at Kaho'olawe — a watershed moment that set in motion the island's eventual return to the State of Hawai'i in 1994.⁹⁷



Paul Higashino, Restoration Manager for the Kaho'olawe Island Reserve Commission, explains the challenges and successes of controlling erosion and replanting native species on the red hardpan, a task made more difficult by the fact that only 1/10th of the island has been subsurface cleared of unexploded ordnance by the navy. Photo by Kyle Kajihiro

In 1993, Congress appropriated \$400 million for cleanup and established the Kaho'olawe Island Reserve Commission to hold the island in trust for a future sovereign Native Hawaiian entity. By 2004, the Navy had cleared 75 percent of the unexploded ordnance at the island's surface, but less than 10 percent was cleared below the surface. None of the underwater munitions were removed. The remaining 25 percent and all surrounding waters remain unsafe.⁹⁸

The significance of the Kaho'olawe movement extends far beyond the island itself. The PKO revived the 19th-century Hawaiian independence slogan “aloha ‘āina,” meaning a deep love of and political commitment to Hawai'i's land and people, as a living framework for cultural resurgence and environmental justice. The word ‘āina (that which feeds) expresses a worldview in which land is not an inanimate commodity to be owned or exploited but a living ancestor bound to humans in a reciprocal relationship of care. Once dismissed as a wasteland, Kaho'olawe became a modern piko of Kanaka Maoli cultural and political resurgence. Today, thousands of volunteers continue to make the journey there for ceremony, restoration, and the ongoing work of healing.



Ka Palupalu o Kanaloa (*Kanaloa kahoowawensis*). Once abundant across the archipelago based on the archaeological pollen record, only two plants remained when it was rediscovered on a rock spire of Kaho'olawe in 1992. After decades of intensive conservation efforts, the population of Ka Palupalu o Kanaloa has increased to twenty. One day plant conservation leaders hope to restore this symbol of Kaho'olawe to its former habitat. (Photo: Kyle Kajihiro)

97 Kaho'olawe Island Reserve Commission, “Kaho'olawe History.”

98 Anita Hofschneider, “Promised Land: The Navy and the Damage Done,” *Honolulu Civil Beat*, October 22, 2014, <https://www.civilbeat.org/2014/10/promised-land-the-navy-and-the-damage-done>.

Conclusion

Conclusion

The chapters of this report tell a story that has been obscured from public view. Taken together, they reveal that the dominant narrative about the U.S. military in Hawai‘i — that it is an indispensable economic engine, a guarantor of security, and a responsible steward of the land — is false.

The historical chapter by Kyle Kajihiro reminds us that the military’s presence in Hawai‘i grew from the illegal overthrow of the Hawaiian Kingdom in 1893 and the subsequent conversion of Crown and Government Lands into instruments of imperial projection. That foundational dispossession has never been adequately acknowledged, let alone remedied. Every policy choice that has followed — from leases negotiated to land left contaminated and families priced out of a rental market distorted by military demand — has compounded it. Since 1964, the military has leased more than 46,000 acres of public trust land for the nominal sum of \$1 — lands intended, under Hawai‘i’s own laws, for the betterment of Native Hawaiians.

The rationale used to justify the military’s current footprint in Hawai‘i does not withstand scrutiny. As Neta Crawford points out, U.S. Indo-Pacific doctrine is built around offensive strike capabilities and the possibility of nuclear escalation. Rather than deterring conflict with China, this posture intensifies the security dilemma that increases tensions and the likelihood of war. The case for a radically

new approach — centered on deterrence by denial, diplomacy, and de-escalation — is strategically sound and deserves serious attention. Such a shift would not only lower geopolitical tensions but also open the possibility of returning Hawaiian land and resources to uses that could better support the well-being of the islands and their residents.

The environmental and public health costs documented in this report are staggering and, in many ways, irreversible. Wayne Tanaka’s assessment of per- and polyfluoroalkyl substances (PFAS) contamination at just three military installations — Bellows, Schofield, and Mākua — produces conservative remediation estimates that exceed \$493 million, with statewide costs likely reaching into the billions. These “forever chemicals” have contaminated soil, groundwater, coastal waters, and the bodies of Hawai‘i’s residents. True remediation of PFAS contamination at scale is technically impossible with current technology. What is achievable is management, containment, and ongoing monitoring at great and indefinite expense. The military’s systematic failure to disclose operational data has made precise cost estimation difficult and accountability impossible.

Laurel Mei-Singh and Neta C. Crawford’s public health analysis adds a human face to that environmental harm. Geographic patterns show a correlation between

proximity to military installations and elevated rates of self-reported poor health, as well as diminished scores on the Childhood Opportunity Index — a composite measure of access to schools, clean air, safe housing, and economic possibility. These conditions — contaminated water and soil, restriction of access to cultural and subsistence practices, displacement from ancestral lands, and the concentration of these burdens on Native Hawaiian and low-income communities already made vulnerable by prior dispossession — reflect patterns of structural violence.

The Pentagon, state officials, and some local businesses have long argued that the military is good for Hawai‘i’s economy. The economic chapters show that the figures that have anchored pro-military narratives for decades are *not* rooted in careful analysis of the true costs and benefits of the military’s presence in Hawai‘i. David Vine’s analysis finds that the widely cited claim of a \$10 billion annual economic contribution overstates the military’s impact dramatically: correcting for various forms of economic “leakage,” including contracts awarded to companies based outside Hawai‘i, retirement benefits paid to retirees living off-island, FICA deductions, and other outflows, the figure is closer to \$7.2 billion — approximately 6.4 percent of state GDP, not the 9.2 percent routinely asserted. The military is not one leg of a three-legged stool; at least five other industries account for larger shares of the state’s economy. Heidi Peltier’s employment analysis compounds this finding: military spending generates fewer jobs per dollar than virtually any alternative use of those

funds. Every \$1 million redirected from military spending to education, health care, clean energy, housing, or food production would produce a net gain of between two and 17 jobs — depending on the sector — compared to the five that would be lost.

Research by Omar Ocampo and Brag Selvarajan found the military’s impact on the housing market inflated average gross rents in Honolulu County by an estimated 7.1 percent in 2024 alone. Military demand, subsidized by the Basic Allowance for Housing, which allows service members to pay above-market rents, drove this inflation, costing non-military renters an additional \$234 million in 2024. This increase in housing costs has been a significant driver of the outmigration of Native Hawaiians and working-class families from the islands they call home. Land scarcity in Hawai‘i is not merely a natural constraint; it is a politically shaped condition, intensified by the allocation of 25 percent of O‘ahu’s acreage to military use. The military’s footprint in the rental market isn’t just incidental to Hawai‘i’s affordability crisis; it is a major driver of it.

The land value chapter by David Vine provides a stark accounting of what the current arrangement has cost. The \$1 the military has paid for leases since 1964 is not a discount but a measure of who held power in those negotiations. Applying the Human Rights Standards Damages Model — a methodology designed to determine the value of U.S. military base land worldwide — Vine’s analysis finds that unpaid back rent on leased Hawaiian lands is as high as \$133.7 billion in today’s

dollars, not counting the costs of cleaning up the military's environmental damage.

Against this accounting of costs, Davis Price and David Vine's final chapter offers something equally important: the demonstration that viable alternatives exist. Hundreds of former military installations across the United States and globally have been converted into affordable housing, agricultural land, renewable energy facilities, schools, hospitals, cultural sites, and community economic anchors. Hawai'i has its own conversion history and its own models for transformation, including nearly 300 'āina-based organizations statewide building food systems, restoring watersheds, and creating place-based livelihoods that do not depend on federal military appropriations. The 'āina-based economy is not a vision — it is already underway.

The expiration of military land leases around 2029 is a moment without recent precedent. It does not resolve the political or legal complexities ahead, nor does it automatically transfer land, restore ecosystems, or rebuild displaced communities. But it opens a door that has been closed for over 60 years and an opportunity to revisit the terms on which these lands are held.

With this report, policymakers and the public can make decisions about military leases with full knowledge of the costs, risks, and benefits of the military's large presence in Hawai'i. The people of Hawai'i, especially Native Hawaiians, deserve to make this decision on those

terms. The framework of aloha 'āina — the understanding that land is not a commodity to be exploited but a living relationship to be honored and sustained — offers a grounding principle for what could come next.

