

Portraits of the Islands

What does a map of Hawai'i tell us?
It depends on who makes it.

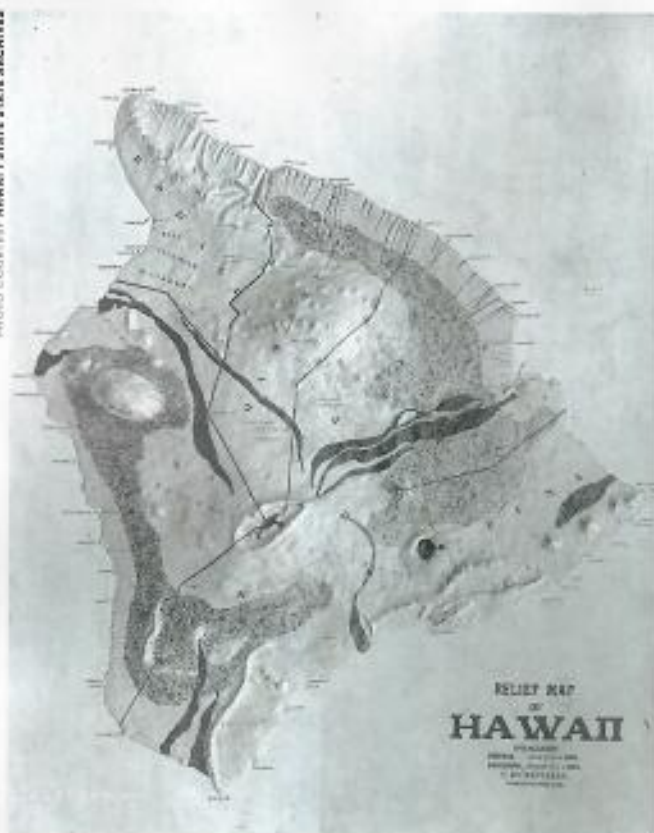


Tom Patterson likes to joke that he spent a decade of his life on loan to Hawai'i Volcanoes National Park. As one of four cartographers for the National Park Service from 1992 to 2018, Patterson created thousands of maps for the nation's parks and historic sites, but a big smile would break across his face anytime he received assignments in Alaska or Hawai'i.

"I think of Hawai'i as being a cartographer's dream. I mean, Hawai'i has it all," the former president of the North American Cartographic Information Society says from his home in northern Virginia. "Beautiful cliffs, mountains, ridges, seascapes, craters, the volcanic landscapes, jungle sides, dry sides. It's a cornucopia of environments. And yes, it in some ways is a challenge conveying all of that information to a

reader, but on the other hand, it's really a joy to actually do it successfully."

If you've ever been to a national park or historic site in Hawai'i, you've likely paid an entrance fee to a friendly ranger, who then handed you a free park map. Patterson has mapped them all: Hawai'i Volcanoes, Haleakalā, Pu'u'honua o Hōnaunau, Honokōhau, Pu'ukoholā, Kalaupapa. Nature enthusiasts may even have several of Patterson's maps



ABOVE / Missionary schools produced some of the earliest and most comprehensive maps of the Hawaiian Islands. The first principal of St. Louis College Honolulu, now Saint Louis School, drew these relief maps of Maui and Hawai'i Island in 1893.

LEFT / By the turn of the twentieth century, clients—including the US military and Coast and Geodetic Survey—had enlisted students and professional surveyors alike to map points of interest, including the volcanoes on Hawai'i Island.

all crumpled up at the bottom of their hiking backpack. One, of Haleakalā National Park, proved especially handy for this writer during an overnight stay in the park's historic cabins. Without cell service, an aerial map pointed out each pu'u (hill) of interest, while the topographic detail led us to taking the Halemau'u Trail over the more strenuous Sliding Sands (Keonehe'ehe'e) Trail.

Patterson began his career as a graduate student in geography at the University of Hawai'i at Mānoa under the tutelage of longtime professor Everett Wingert. Patterson recalls that Wingert managed a coterie of enthusiastic students eager to map the Pacific. There, he was introduced to the style of mapmaking in vogue at the time, a technique called shaded relief. "Shaded relief is these modulated shadows and illumination that depict the terrain, not with contour lines but with grayscale tones, and it looks very three-dimensional," Patterson explains. "None of us knew how to do it, of course."

This was back in the late 1970s, when everything was done by hand.

Wingert contracted a Scottish cartographer named Michael Wood to draw a shaded relief backdrop to a coastal zone management atlas of American Samoa. Months later, a mailing tube arrived at the cartography laboratory. "Ev Wingert carefully opened this cardboard mailing tube on a drafting table with the entire team looking on, and it was a eureka moment for me," Patterson says.

The earlier style of mapping had emphasized contour lines, which convey elevation and grade through concentric loops that are information-rich but overwhelming to the average viewer. Shaded relief, by contrast, depicts a given region from a bird's-eye view, looking down at an angle on a sunny day. Elevation is instead illustrated by hand with a fine touch, shading cliff faces to indicate steep dropoffs.

Patterson remembers his eyes dancing across the entire map of American Samoa. After months of poring over topographic maps of the region, he felt that he understood the terrain with just a glimpse. "You could

see where the ridge lines are, the valleys and pali (cliffs) and so forth—and that's what a good shaded relief should do," he says. "I just vowed then to learn that arcane craft, and so began a decades-long journey in relief shading for me."

Putting together a shaded relief map starts with what Patterson calls a "digital scavenger hunt." While computer software has streamlined some of the most tedious parts of converting GPS coordinates and point elevations into a legible, visual document, mapmaking still requires a great deal of artistry. Data sources include both federal and state agencies, as well as newer sites like OpenStreetMap, a free and editable map of the whole world built from individual contributions from lay scientists. A challenge, Patterson says, is that the data from these varied sources don't always agree.

"A lot of this data is kapakahi—it's all mixed up," he says. "It's like putting together a hundred-thousand-piece jigsaw puzzle, but all the pieces are made by different organizations and agencies and people, and they don't



At home in Virginia, cartographer Tom Patterson (seen also on page 40) shows off a bivy of National Park Service brochures that feature his maps. He doesn't mind when his maps are phased out due to changing names, landmarks or aesthetics. "I tend to look at maps as being living documents more than something that's static and goes on in perpetuity," he says.

quite fit together right." It's Patterson's job to reconcile these differences and make a compelling map. There's an impulse to view maps as authoritative, when in reality Patterson says each map cannot always be considered in a vacuum, independent from its creator's point of view or preferences.

Consider one of the most common liberties mapmakers take: streams. Hydrographic data for areas often include countless waterways that do not rise to the level of a river for mapping purposes. A brook might not make the cut in a map because it's negligibly small, or because a cartographer wanted to reduce visual clutter. Generalizability is important, too. "A lot of these data are extremely detailed, and so, you may start with a coastline that has every little zig and zag," Patterson says. In the same way skilled portrait artists capture the essence of a subject without putting each nose hair to a canvas, skilled cartographers know when and how much to simplify.

Often, a mapmaker's stylistic decisions have deeper meaning.

Patterson once created a shaded relief visitor's map for Hawai'i Volcanoes National Park, used for over a decade. The map showed the park in three dimensions, looking from the south toward Mauna Loa and Mauna Kea. Above the volcanic vent in Kilauea's caldera, Patterson illustrated a puff of foreboding smoke—subconsciously cautioning visitors to stay on clearly marked paths.

"The map had a note about volcanic vapors being noxious and so forth," he recalls. "But, you could actually see this 'plume of doom' coming out, just as a subtle reminder: Don't get too close."

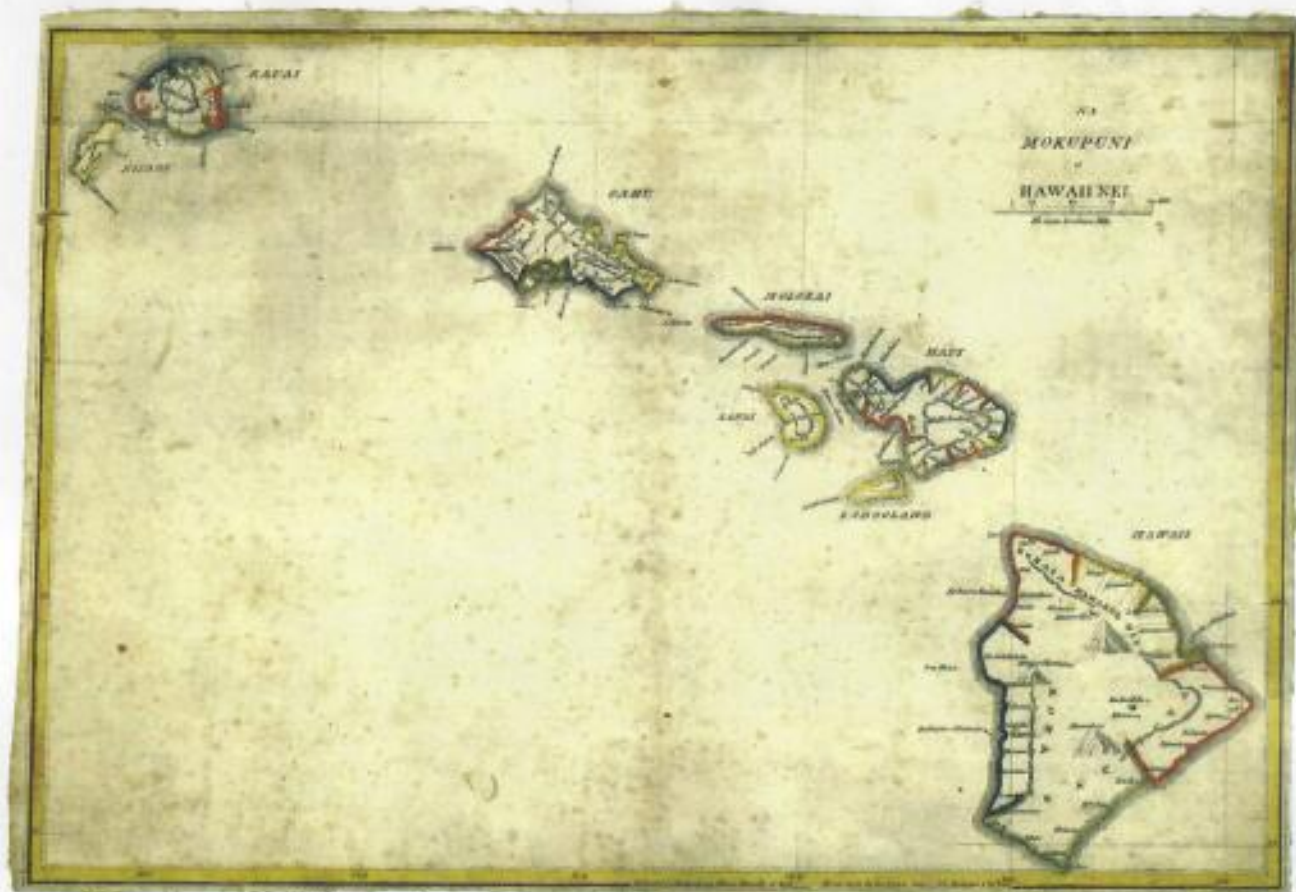
A decade before the actor Moses Goods played an adviser to King Kamehameha I on the Apple TV show *Chief of War*, Goods dressed in period garb and performed the life story of another, lesser-known royal adviser: Simon Peter Kalama.

Recounting the mapmaker's colorful life for nearly half an hour,

Goods as Kalama tells an audience at the Hawaiian Mission Houses Historic Site and Archives how he learned to engrave illustrations into thin sheets of copper and gained renown across the Islands. He was sent as an aide and interpreter on an expedition with an early missionary to map the archipelago. As part of the expedition, Kalama ventured into a crater of Kilauea during an active eruption. Goods, with eyes wide and fingers gesticulating, recounts how Kalama pulled his benefactor back from certain doom, and the pair raced away as fiery jets of lava shot from a vent.

How did Kalama come to be remembered for centuries for his maps and exploits? One explanation might be the moment he mapped, a pivotal period in the nineteenth century, when he was most prolific.

The policy that defined the era was known as the Māhele of 1848. It set the stage for private landownership in the Hawaiian Kingdom on a massive scale and amounted to a paradigm shift not only in how ownership was construed



Only two copies of this large wall map by Lahainaluna School student Simon Peter Kalama exist today. Historian Gary Fitzpatrick calls it "one of the most significant maps of Hawai'i ever produced," for it corrected major errors in contemporaneous maps and it contained vital information about ahupua'a (traditional land divisions).

but how it was exercised. And its enforcement required precise boundary-setting, which had not existed before in Hawaiian society.

"Native Hawaiians did not make maps," writes map librarian Gary Fitzpatrick in his foundational work, *The Early Mapping of Hawai'i*, describing the practice as *haole*, or foreign. "The concept of drawing an image of the land was foreign to them even though they carried very detailed knowledge of the land and adjacent waters in their heads."

Kalama, then, was one of the earliest cartographers of Hawai'i, from Hawai'i—the fact that he was Hawaiian made his trajectory all the rarer. Kalama's teachers and classmates noted his talent from a young age: According to his 1875 obituary, "He was famous among all the children for his intelligence and his skill in arithmetic and penmanship, and he was very

skilled in cartography in globe form or in sections." Kalama was top of his class at Lahainaluna College, but because of a *kolohe* (mischievous) spirit, his teachers placed him in seminary. His time in the church ostensibly set him straight: Not a decade later, he served as the clerk for the commission that enacted the Māhele under King Kamehameha III.

Kalama drew up the first comprehensive map of Hawaiian ahupua'a (land divisions) in 1838, a milestone for a society that would soon split up lands for sale to private owners. The map is visually striking due to the vibrant reds, yellows, greens and blues that Kalama uses to demarcate each moku, or district. Some contemporary scholars have tried to tease apart Western influences in Kalama's map, but scholars Kamanamaikalani Beamer and T. Kā'eo Duarte see it as a profound act of self-determination.

"Kalama seems to have taken the theory of mapping and created a product that reflects an 'Ōiwi [Native] approach or view of place and boundaries," the authors write. "The originality of creating a color coding for moku and different lettering for ahupua'a was truly an act of agency, in a way taking traditional palena [borders] and attempting to put them, for the first time, into a language that could be understood by other states and cultures of the world."

Nearly two centuries after Kalama created his landmark map with hundreds of named ahupua'a, a team led by Drew Kapp is working their way around the Island of Hawai'i to create a modern-day ahupua'a map.

Kapp, an associate professor of geography at Hawai'i Community College, began working with University

Kalaupapa Nation
Moloka'i

Only last year did the United States Geological Survey release the digital elevation models of Moloka'i needed for precise cartography. Patterson immediately got to work and released a digital version of the map seen above, which means he can update and correct it with ease.

both poignant reminders of the past and kernels of Indigenous wisdom to predict the future. For example, the 2018 eruption of Kilauea originated in an ahupua'a of Puna known as Keahialaka. "Ahi" may refer to volcanic fire; "Laka" is the goddess of hula whose kinolau (manifestations) include the maile vine used in lei making. "If it's named Keahialaka, you gotta expect that there's gonna be volcanic activity there one day," Kapp says. But many today know the neighborhood as Leilani Estates. "It's a beautiful name, but there's no reference to the environment there."

"Place-names have so much power," Kapp says. "If we keep calling the island

in Hilo Bay Coconut Island instead of Mokuola, we're strengthening that meaning. But if we keep saying Mokuola and referencing this tiny little island that is all about life and flourishing and health, it strengthens that mana [spiritual power] instead."

Patterson's last map of Hawai'i was a 3-D oblique map of Moloka'i's Kalaupapa National Historical Park. Over the past half-century, National Park Service maps have trended from the highly stylized to much more realistic, eschewing a hand-drawn aesthetic for a computer-polished one. This map, showing the Kalaupapa Peninsula stretching out into the Pacific and shielded

from the rest of Moloka'i by the highest sea cliffs in the world, was one Patterson had long dreamed of making. But the necessary data were inadequate until last summer, when the US Geological Survey released fine-grain geospatial data.

Patterson retired in 2018 after three decades in government service. He looks back on it fondly but clear-eyed. "I had a dream job, but I did not like the bureaucracy one bit," he says. "I kind of chafed under it."

When he and his cohort retired, they were tasked with hiring the next four cartographers for the National Park Service. Patterson trained the four recent college graduates daily for an entire year to get them up to speed

of Hawai'i at Hilo undergraduate Kaylyn Ellis-Ho'okano out of a shared passion for the place-names of the Puna district. "A lot of the place-names in this district are not Indigenous, and so Kaylyn and I really wanted to elevate Hawaiian place-names," Kapp says. Developers renamed their subdivisions to sound enticing and exotic without much knowledge of the district's history, which is how they ended up with neighborhoods like Hawaiian Paradise Park and Kapoho Vacationland.

"So many of the place-names that we use on a regular basis just to describe where we live or where we're going or where we work are place-names that were imposed from outside in the 1950s, '60s and '70s for the particular function of treating land as a commodity, basically," Kapp says.

But unearthing the Indigenous place-names of Puna's ahupua'a forced Kapp and Ellis-Ho'okano to make the same judgment calls that cartographers make when faced with conflicting data. Archival sources frequently disagreed on the spelling of words in 'ōlelo Hawai'i (the Hawaiian language)—not a surprise, considering missionaries first put the language to paper using the English alphabet in the 1820s. Changing a diacritical marking in their map could change the meaning of an entire ahupua'a's name.

"We had a number of issues trying to figure out which spelling we should choose," Kapp says. "If there was the particle 'ala' in the place-name, we had to figure out if it maybe referred to a pathway or a fragrance or even part of another larger unit of meaning." Apart from consulting language experts, Kapp's solution relies on experiential learning. "What we did was actually go to these different places and personally experience them together. So just be in a place and allow that place to maybe suggest to us if one name is more fitting than the other."

So far, Kapp and his collaborators have finished mapping the ahupua'a of both Puna and Hilo, totaling roughly 160 unique ahupua'a. Their goal is to start from the east and head around Hawai'i Island to create a resource that helps residents relate to the 'āina (land) as Hawaiians a thousand years ago would have.

In researching traditional Hawaiian place-names, Kapp has happened upon



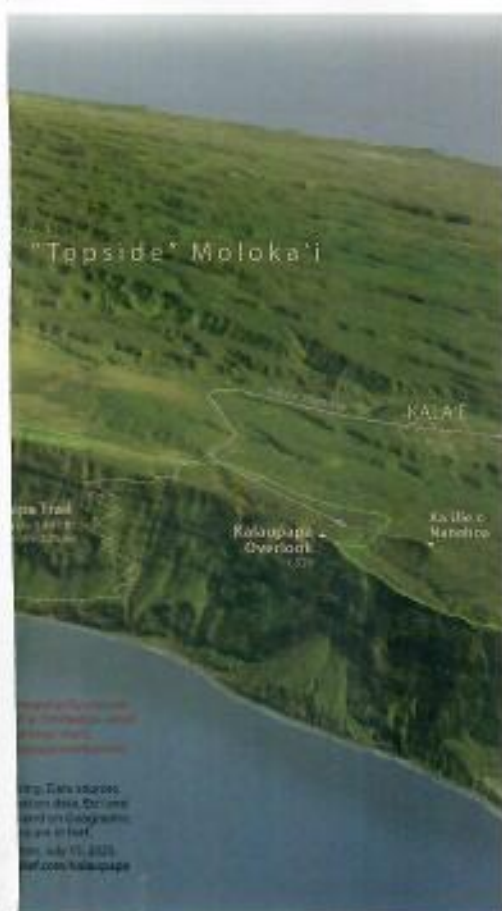
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Historical Park Hawaii



on the latest mapping techniques, many of which are evolving with the use of artificial intelligence. Far from fearing this next stage in the field, Patterson says there is no better time to be a mapmaker. One can imagine those youngsters putting pen to paper for the first time and pulling up a map of Volcanoes, Haleakalā or Kalaupapa for reference. Tracing their fingers over the shaded contours of Hawai'i's rich geography, they may very well have a eureka moment of their own. **hh**

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