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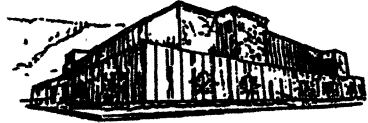
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**WAIF ELEMENTS:**

**A NATURAL HISTORY OF RESTORATION IN HAWAI'I**

by

Katharine I. Hyzy

B.A., Linfield College, 1997

Presented in partial fulfillment of the requirements

For the degree of

Masters of Science

The University of Montana

May 2004

Approved by:

Phil Coulson  
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**Waif Elements: A Natural History of Restoration in Hawai'i (101pp)**

Director: Phil Condon pc

A remote outpost of land in the greatest expanse of ocean on the globe, Hawai'i is remarkable for both its biological and cultural diversity and history. A polyglot of skin tones, customs, cultures and habits has rooted in a location that already harbors a significant population of people who identify themselves quite powerfully as "native." The plants and animals native to the islands exist, by and large, nowhere else on the planet, and the very rock of the islands is still being born. At the same time, the familiar homogenizing forces of the modern world are at work there, both in culture and ecosystems.

I rely on my experiences as a restoration ecology intern in the park to explore the meaning and history of ecological restoration, while also questioning what it means to "be native" to a place. The inextricable twining between the efforts to protect and preserve culture and ecological restoration illustrate how incomplete our understanding of this incredibly complex island ecosystem is if the human element of the local natural history is absent—and how crucial it is for each of us to have an intimate relationship with our home place. Restoration—of hope, humility, stories and landscapes—is essential to Hawai'i's future, if it is to have a future at all, just as it is for so many wild places.

**Waif Elements:**  
A Natural History of Restoration in Hawai'i

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## Introduction

A postcard decorates my computer monitor, pinned up where my eyes rest when they leave the screen. It's a photograph taken of the Hawaiian Islands from the space shuttle. A fuzzy, curved line of ultraviolet separates the gleaming blue Pacific from the blackness of space. That fuzzy line looks like thin protection from the cold of near-absolute zero. Sandwiched between the blanket of atmosphere and the ocean mirror are a few dark, lumpy silhouettes, spread in a graceful arc reaching diagonally across the field of view. Hawai'i, commonly referred to as the Big Island, is the largest but most distant, its dimensions shrunk in the photo by the curvature of the earth. Thin white clouds arrayed like surf breaking on a coral reef are the only other disturbance to the watery field. This photograph astonishes me daily, and I am grateful for the way it captures the balance of fragility and strength inherent to all life, and for the way it shows Hawai'i as a microcosm of the Earth, the islands within the island.

These islands are a long way from anywhere else. They are, literally, the most isolated land mass in the world, with about 2,400 miles of Pacific Ocean separating the chain from any continent-sized chunks of rock, a thousand miles from any other islands. Because of this distance, visitors to the islands through the millennia have largely been accidental tourists. Of the birds, stray seeds, spores and insects who made it ashore from distant mainlands, scientists estimate that on average, only *one* arrival every 35,000 years had the moxy to adapt, survive and flourish<sup>1</sup>. Isolated from the rest of the world by the watery wilds of the Pacific, they



evolved into new forms, uniquely suited to the mountain slopes, ocean-borne storms and volcanic soils of the Hawaiian island chain.

Scholars of island biogeography call these accidental tourists “waif elements.”<sup>2</sup> It’s also a term that readily applies to many of the people who find themselves on the islands, for one reason or another. Ask the hippies who live on the beaches year-round, and they will tell you that the Hawaiians believe many old souls of the world are from Hawai’i, but somehow came back to earth in the wrong place. These people often search their whole lives for *one banau*, the homeland, and it is the beach-dwelling hippies who are the lucky ones, having discovered the salve to all their yearning. Given the disdain with which many traditional Hawaiians greet the steady influx of people to their lands, I’m doubtful that it’s an ancient myth. Still, like all myths old or newly minted, it has a ring of truth to it: the islands have a powerful effect on some, more than merely that of a pretty place with nice weather.

The first time I came to Hawai’i, I too was something of a waif element, in more ways than one, and did not expect anything more than a few days of R&R. Feeling trapped in a less-than-challenging job, I was itching to go somewhere, to get away from a city life that was full of concrete and sitting behind desks, sitting behind computers, boxed up in walls and panes of glass. The predictable urban landscape matched my predictable life, and both were stifling my sense of wonder about the world. My knowledge of Hawai’i extended to the edge of the set of *Magnum PI* (a favorite TV show of childhood) and the lively descriptions my friend Emahlie sent in her letters. Mostly, Hawai’i was simply elsewhere, a getaway that sounded like it might be interesting—different, anyway, from where I was.

That turned out to be a substantial understatement. Nowhere did I encounter the stereotypical Hawai’i of pretty plastic tourists and ridiculous opulence cluttering the edges of sandy beaches. The Hawai’i I fell in love with was rustic and genuine, the land and people full

of stories, lives I wanted to know. I stayed with Emahlie, who was living with her sister and brother-in-law for a year, and volunteering in Hawai'i Volcanoes National Park just up the road. Together we wandered the park, and I sensed the uniqueness of the plants and animals who had colonized this remote island chain through the millennia.

When my vacation came to an end, I was surprised to find tears racing down my cheeks as the peaks of Mauna Kea and Mauna Loa receded outside the plane window. Grateful for the time I had there, I was already hungering for more. Almost a year to the day from when I'd first visited Hawai'i, I returned to the Big Island to spend three months as a restoration ecology intern at Hawai'i Volcanoes.

I've long been a believer in the need to protect wild, natural places from the effects of humans, a concern reflected in my education and resume. But years of non-profit office work in a city had provided the means to a paycheck far more than a means to relate to the wild on a regular basis. It's a common struggle among those who work on conservation and preservation issues: do we continue to push papers and change things for the better in practice, or do we need something more tangible than poll results and legislation? And are we losing some element of the love that brought us to this work by staying inside all the time? If that element becomes lost in the daily battles of environmental protection, will we be as effective, as passionate? I wanted to be on the other side of the wall for a while, out in the field getting my hands dirty doing straightforward, honest work.

According to the Society for Ecological Restoration International, ecological restoration is, "the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed." True enough—the work I was to do in the park was very much along those lines. As an intern, my time would be divided between seed collection, nursery work and field work—sort of a life cycle assistant for native plants. Everything and anything

will grow in the gentle yet diverse climates of Hawai'i, and so much of the work in the park revolves around fighting invasions of exotic plant species and taking action to protect the native ecosystems. I would be out gathering seeds of native plants for propagation in the greenhouses, tending the plants in the nursery, and eventually planting them out in various sites in the park.

A packet containing a few academic papers related to the work I'd be helping with arrived in the mail about a month before I was to begin, and I read them with great interest but limited comprehension. I'm not a botanist by training, and I know more about crafting a grammatically correct sentence or a survey that will produce verifiable results than I do plant taxonomy. But there's a certain affinity for plants within my soul, expressed through a fascination with woodland wildflowers as a kid and a compulsive gardening habit as an adult. I was also looking forward to learning what it meant to restore a landscape—a task that seemed to me one of insurmountable complexity.

What I learned was much more than arcane knowledge about weird Hawaiian plants and a small field of ecology. Hawai'i is a place where it is impossible to disentangle the history of the place from its present state, where the voices of ancient cultures don't seem to be ancient just yet, where there is cause for great despair and even greater hope that humans may not turn out to be Mother Nature's worst-ever invention. I learned that the definition of ecological restoration I'd read is incomplete and only looks in one direction down the path. The process of restoration works on its practitioners as much as it does on the land, and it is most successful when it manages to weave elements of culture and community into every possible step.

## Change in Pele's Land

*In my mental map, society no longer stops at the borders of shorelines, or of species. The world is no longer large enough for that. The implication of finiteness is not merely of limits but also of potential, and the opportunity to create a better world.*

*-Carl Safina, "Eye of the Albatross"*

From 33,000 feet on a clear day, the Pacific is like a deep blue eye, so vast its curvature defines the edges of your peripheral vision. After hours of a world rendered in varying shades of blue, a speck appears, resolves, becomes a dark pupil that enlarges as the plane drops.

Clouds catch on several great peaks of red and black, one of which is faintly dusted with snow and dotted with several squat observatory buildings that twinkle in the sun. Every imaginable hue of green covers impossible, steep cliffs, valleys, nearly everything.

Closer, and the Pacific becomes a relentless, crushing force of brilliant foam breaking on the beaches, some glistening black, some thin strips of white. Roads of red dirt and blacktop, farmhouses, canefields and the rusting, crumbling roofs of downtown Hilo lining the bay briefly resolve before they disappear behind a dense forest of *bala* and vines. Several bumps later, you have become a part of the pupil of the eye. The door opens, and air redolent with rain and the scent of growing things pours in, so rich the first deep breath feels like a meal.

For those of us from the mainland, the way in which this vision of a lush tropical paradise so quickly transitions from dense greenery to snow-capped peaks is startling, almost

unsettling. Move from the windward to the leeward side, a thousand feet up or down, and you'll leave lush rainforest for rocky desert. The island is an amalgamation of five different shield volcanoes, so a walk of more than couple of miles in any direction is likely to lead to an elevation change and hence different plants and birds. In the rare instances of relatively flat land, it's only a matter of time before you come across the top of a previously invisible bluff, sink into a crevasse along one of the rift zones, or trip over a hidden hummock of basalt left by a lava flow.

The Big Island is home to a mischievous landscape, one that relies on grand, breathtaking vistas to hide thousands of smaller, intricate tales: the soft, rust-brown fur buried deep in the heart of a tree fern. Petroglyphs etched into hardened lava, revealed only by angles of storm light on damp rock. Iridescent, glassy strands of Pele's hair, the broken-off tails of flying droplets of molten lava from a nearby crater, collected in drifts against a boulder. It saves those stories, the ones that make Hawai'i utterly unique, for those who bring their quiet respect and genuine willingness to listen. To know this land, one must be willing to sit at the feet of the elders, who may come in the form of shimmering beetles, jagged fists of rock, or looming clouds, heavy with rain.

Nowhere is this more true than along the Chain of Craters Road in Hawai'i Volcanoes National Park, which begins in the rainforest surrounding Kilauea's summit around 4,000 feet, then twists through extinct craters and cinder fields to the edge of Holei Pali, where it drops rapidly to the grassy coast. *Palis*, the Hawaiian word for "cliffs," form when the weight of the accumulating outflow of volcanic rock becomes too great for the underwater foundation of rubble. As happened with Holei Pali thousands of years ago, sections of land miles long can drop hundreds of feet—1,500 in this case—downward and into the ocean with very little warning, leaving behind what geologists call a slump scarp<sup>3</sup>.

The views from atop those fractured slopes astonished me. Looking out at a horizon that's over 180 degrees worth of ocean, heading down Chain of Craters for the first time, my mind struggled to make sense of the scale of what lay before me, and I was acutely aware of being as far from a continent as you can get while still standing on dry land. "Vastness" took on a new meaning—a blue-tinged, ephemeral line in the distance that hinted at things I couldn't comprehend all at once.

"That's amazing..." was all I could muster, unable to tear my eyes away from the cliffside view long enough to converse.

"Huh? Oh, yeah, it's pretty clear today. No vog." Matt, the nursery manager for the park, was driving and scanning the inland vegetation at the same time, and not much in the mood for conversation. Verena, my housemate and fellow volunteer, smiled politely but said nothing.

We were searching for a *wiliwili*—a native tree that grows in the dryland forests which once covered the leeward sides of all the islands. In the springtime, the spiny yellow-barked branches burst into clusters of orange-red, cream or pink flowers, each shaped like a parrot's bill. Many locals grow them as ornamentals in their yards, both for the flowers and for the shiny orange seeds, which are used in *leis*. When strung by a master of the craft, *leis* featuring *wiliwili* seeds can fetch hundreds of dollars. The trees themselves were once treasured by the Hawaiians too: before missionaries put an end to surfing in the mid-1800's, the lightweight wood of *wiliwili* trunks was often used for surfboards.<sup>i</sup>

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<sup>i</sup> Surfing was a favorite pastime of both men and women in pre-contact Hawai'i. Mark Twain observed Hawaiians surfing during his visit in 1867, but missionaries, horrified by the sight of scantily-clad youth frolicking in the surf, soon put an end to the practice. Much like modern surfers, they used boards of different lengths for different conditions. Boards were usually made of *wiliwili* or the heavy, mahogany-like *koa*, and "waxed" with many applications of *kukui* nut oil.

However, as European and American settlers and missionaries transformed Hawai'i to suit their purposes, the dryland forests where *wiliwili* grow were replaced by cattle pastures and canefields. Less than five percent of the original dryland forest remains, little of which lies within the park boundaries. In order to grow more *wiliwili* for the park, we needed to find a local seed source. On Hawai'i, "local" is pretty narrowly defined: a few meters of elevation change or a difference in the direction a slope faces can create a distinctly different climate. As a response to inhabiting such well-defined niches, the plants are extremely adapted to their homes. Fetching *wiliwili* seeds from the neighbor's yard might lead to more trees in the park, but those trees would lack the advantage of generations of genetic modifications to these particular cliffsides overlooking the sea.

Matt looked frustrated, a furrowed brow visible beneath the brim of the khaki visor that held both unruly blond curls and tropical sunlight in check. "Rhonda said we couldn't miss it, that it was visible from the road..."

"Maybe we've gone past it?" I ventured, too new to have any clue about the lay of the land.

"Yeah, I'll turn around. But keep looking for it up there." Verena and I dutifully squinted up the slope at an unchanging sea of exotic grasses and shiny black lava flows. As we drove over a small rise in the road, I spotted a skeletal tree with golden bark about a half-mile away. "Wait! Could that be it?" I said.

"Could *what* be it?" Matt growled, stomping on the brakes and swerving for the shoulder.

"There, that tree way up there. Beyond the *a'a*. See the yellow?"

"Up there? On top of that *pali*?" He squinted. "That's probably an *'ohi'a*, but I'll look." Verena and I gratefully bailed out of the truck and stretched our legs as Matt

clambered on top, striking a classic explorer's pose as he pointed his binoculars far inland. It was utterly silent, and hot, the heat rising in waves from the pavement-like black *pahoehoe* lava. After a few moments, he leapt from the roof, looking dubious.

"Maybe. I'll go check it out. While I'm at it, why don't you two do some seed collection down here?" We all grabbed our packs and set off, Matt heading upslope along a rough flow of jagged, clinkery *a'a* lava, the two of us remaining on the coastal flats.

"So, what are we looking for out here again?" I gazed helplessly at the brownish expanse of grass and shrubs.

"Um... we are looking for ze *Dodonaea* seeds. They are ah, bushes, like this? *Ja*, and the seeds, when they are ripe, are red." Verena's heavy German accent made the scientific name of the unimpressive-looking shrub sound far more musical than it did in English.

"What's it called in Hawaiian?"

"*A'ali'i*, I think. And we also need *ulei*, these here. Their berries are white when ripe." She pointed her boot at a woody vine studded with small white flowers creeping along a crack in the rock. As she gestured, a gust of wind whipped her long blond ponytail around, momentarily plastering it across her face and sunglasses.

Verena headed eastward, leaving me to take the shrubs along the base of the bluff. In order to get there, I had to cross the *a'a* flow Matt so nimbly climbed. Remembering Emahlie's stories of falling and ripping open clothing and skin on the sharp edges, I set my foot down tentatively, feeling the rocks catch, then give way like beach sand.

*A'a* forms under duress. When any hot lava hits air, it begins to cool, volatile gases escape, and the lava begins to crystallize into rock. If the lava is of a low enough viscosity and doesn't have anywhere it's in a terrible hurry to reach, it stands a good chance of turning into smooth, glassy *pahoehoe*. However, when the lava is cooling and crystallizing while it's also



trying to get down a slope, or is being pushed along by more lava, it begins to shear, crack and crumble into chunks of rock. Big chunks, small crumbs, boulders, all loosely piled atop one another, all jagged-edged from the splintered crystalline forms and the rough pores left by gases. According to witnesses, an *a'a* flow in motion sounds like a huge train rumbling past, and can advance as much as 6 miles in an hour. It is angry, mischievous rock that holds a grudge against the world for having been bullied into existence. I was relieved to reach the other side without falling victim to its treachery.

I began zigzagging from shrub to shrub along the base of the bluff. My feet caught in crevices and stumbled over unexpected knobs hidden beneath the grass. I quickly learned to keep one eye on the ground. The wind sang in my ears as I moved from shrub to shrub, plucking papery reddish clusters of seedy husks from the *Dodonaea* and trying to stuff them into a Ziploc bag before the wind ripped them from my hands. It was easy to see how they'd arrived on the islands, and to understand why they grew everywhere from the coast to the treeline on Mauna Kea and Mauna Loa. The *ulei*, however, was more of a mystery. The blueberry-sized white fruits seemed like they might be able to float, but across thousands of miles of ocean? I squished one open in my palm and found a heavy mass of hard, triangle-shaped seeds. The fruits and seeds probably make a great meal for the *nene*, a Hawaiianized version of the Canada goose and Hawai'i's state bird, I thought. Maybe the *ulei*'s ancestors hitched a ride in someone's gullet.

Today, loss on a heartbreaking scale haunts these islands. Though the plants I sought were not endangered, the *nene* is on the Endangered Species List, and if ecosystems could be listed, these coastal *pili* grasslands would probably be included. Only a few patches of the original plant community survive anywhere on the island. Feral goats and herds of cattle introduced shortly after Captain Cook's arrival in 1779 mowed down the native bunchgrasses,

which were not adapted to live with grazing animals. Introduced European pigs disturbed the ground, eating any succulent native plants and digging deep trenches in the shallow soil as they searched for grubs. All three helped to spread the seeds of exotic grasses and weeds, which rapidly replaced native grasses and flowers.

Like the Indians of the Great Plains, it seems native Hawaiians frequently burned the *pili* grasslands in order to maintain a relatively shrub and tree-free terrain. They favored *pili* for thatching the sides and roofs of their dwellings, and may also have used it to line the steep rock slides used for *holua*—a chiefly sport consisting of pell-mell races down the slides on hard wooden sleds. Yet when the Europeans arrived, bringing their usual host of fatal diseases, missionaries, and a cash economy, it spelled the end for the chief system and for *pili*-thatched huts. While wildfire strikes the grasslands from time to time, such chance occurrences are not the same as frequent, low-intensity human-caused fires. In the past century, invasive non-native grasses, trees and shrubs have crept in, steadily replacing the native plants and causing a buildup of fuels that burn hotter and fiercer. Exotic forests of java plum, lantana and christmasberry threaten to overtake completely this unique ecosystem.

This threat extends to more than a few native plant species. A poor survival rate among goslings of the beloved *nene* is one of the reasons they are on the ESA. Necropsies performed on dead goslings found on the coastal plain reveal many of them suffered from severe malnutrition. Despite the presence of numerous berries and grasses that undoubtedly support wildlife in the places to which they are native, they don't provide the *nene* with the nutrition they need, or are outright poisonous to the birds. The goslings die surrounded by food that does not truly feed them.

This time, Verena and I were only gathering native seeds, but there was a list of about twenty species of both native and exotic plants labeled “to collect” crumpled in my pocket.

The seeds were all destined for a number of randomly selected test plots in the area, which were to be burned at different intensities and frequencies. Rhonda, head of the fight against invasive plant species in the park, hoped the study would tell her whether or not burning helped to eradicate the exotic shrubs and grasses, and how frequent and intense the burns needed to be in order to maintain a healthy *pili* grassland.

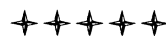
Standing out on the plain, surrounded by miles of prickly, stinky lantana bushes, christmasberry and broomsedge grass, elimination of these exotics seemed like an impossible task. Given the ongoing flood of uninvited immigrants arriving from every corner of the globe each year, it *is* an impossible task. The best hope for the natives of Hawai'i is for scientists to determine how to slow the spread of these invasive species and protect the few remaining patches of pristine habitat. Change over time is an essential part of any ecosystem, but healthy, adaptive change usually comes at a pace measured in centuries. Change on a human scale—rapid change in the space of a decade or two—is unstoppable.

A distant whistle reached my ears. I turned toward the truck and saw Verena and Matt waving me back. My seed bags were both half-full, a decent enough haul for my first day out. The sun and wind had given me a headache, and my eyes felt as though they'd been professionally sandblasted. The shade of the truck sounded more than welcome.

“Good eyes!” Matt exclaimed as soon as I was within earshot. “It was a *wiliwili*!”

I felt a warm blush of pride spread across my cheeks. “Hooray! Did you get any seeds?”

Matt held up a small Ziploc bag containing about twenty red-orange seeds shaped like small kidney beans. I grinned and raised my Nalgene bottle in a toast.



That evening I walked out to Waldron's Ledge to watch the night skies. I don't know who Waldron was, but he had good taste in ledges. From atop a sheer cliff of fractured columnar basalt, I looked out across Kilauea's depths, the swelling bulk of Mauna Loa to the north a shadow against the stars. The ancient truth of the Milky Way was undeniable, splitting a vast velvety blueblack sky in two with a wild splash of stardust. Constellations were not where I'd left them in Portland a few days ago—Orion wheeled directly overhead, and the last star in the handle of the Big Dipper was nearly obscured by the horizon. Lyra and Cygnus sparkled clear and bright, but other constellations were difficult to discern against the bright backdrop of all those other stars.

Most evenings, vog—short for volcanic smog, a mix of water vapor, sulfuric acid and other noxious gases emitting from the crater—obscures the skies, but tonight it was still and the vog hung low in the crater. Starlight alone transformed Kilauea into a luminous, milky lake. For a better view of the sky, I lay back on the dew-covered plastic picnic table—metal infrastructure is scarce in the park, as acid rain from the volcano quickly reduces it to flakes of rust. The cold night air soothed my wind and sun-reddened cheeks. It had been a long day, full of information, and I felt like a sponge nearing saturation. Nearly every common object in Hawai'i has several names: Hawaiian, English, and then Latin names for each plant. Hawaiian only uses twelve letters—all five vowels and a handful of consonants, along with a confusing array of accent marks. Without the rough edges of all those consonants to catch in my synapses, the Hawaiian names seemed to wash right through my mind. Since my job was to help collect, propagate and monitor native plants, this proved to be a problem. Using the Latin name instead of Hawaiian or English didn't help matters. Besides, I especially wanted to learn the Hawaiian names. The cadence of the islands' native tongue seemed fitting somehow,

as if the softer, vowel-laden words with their sudden glottal stops reflected the gentleness of the place, interrupted frequently as it was by tsunamis, endless thunderstorms and Pele's violent spewing of rock.

Pele, the Earth Eater, is the Hawaiian goddess of the volcano. She resides in Halema'uma'u, a sulfurous crater about a half-mile wide and several hundred feet deep contained within the much larger Kilauea Crater. As one of Pele's newest neighbors (my house in the park was at most a quarter mile from the ledge), it seemed only polite to learn to speak her language. I began a stumbling recitation of names and words I'd picked up that day.

“Ooh-LAY-ee...ah-ah-LEE-ee...Hah-lee-MAH-oo-MAH-oooh...ha-lah-PEH-pey...KEY-lah-WAY-uh...nah-OOH-looh...POOH-oooh-UH-oh...” Despite being alone, I quickly stifled the self-conscious giggle provoked by the last name. Although Pele is honored as the goddess of both destruction *and* creation—after all, she's made the state of Hawaii one of only two in the union (Alaska is the other) which are actually *adding* acreage, over 540 acres to date—most stories feature her ability to incinerate anyone who mocks or even dares to disagree with her. Pu'u O'o, Pele's home away from home a few miles to the southeast, has erupted continuously for the past twenty years. It's been quite a show, at times sending fountains of lava 1,500 feet into the air and thick flows of all-consuming molten rock to the ocean.<sup>4</sup> It didn't seem prudent to poke fun at such an arsenal.

Pele was never far from my thoughts. She is everywhere on the island—stories abound of Pele hitchhiking, canoeing across hidden coves, appearing on remote beaches. Sometimes she appears as an old woman dressed in white, others as a seductive young woman with flowing, dark hair. She is the power of molten rock incarnate, carrying both its insatiable appetite and the wisdom of the ages. Encounters with her are always a risk, but if she is pleased, she will tell her secrets, grant wishes, reveal the future. Despite her fearsome

demeanor, Hawaiians often refer to her as “Tutu” Pele, a dear grandmother, and bring offerings of food and flowers (and sometimes bottles of liquor, though nobody’s ever seen her touch a drop) to the edge of Halema’uma’u.

Eventually, Pele reclaims what she has given. Since 1983, she has buried over eight miles of road, closing the eastern entrance to the park with a smooth, ropy layer of *pahoehoe* lava in some places 35 meters deep. Ninety-five percent of Kilauea is surfaced with lava flows less than a thousand years old. Along the eastern boundary of the park, flows have partially buried and completely surrounded Royal Gardens subdivision; despite this, a few intrepid souls continue to live there, generating their own electricity and using catchment tanks for fresh water. Lava has swallowed over 180 structures, mostly houses, and the ancient fishing village of Kalapana, continuously inhabited for hundreds of years, succumbed completely to Pele in 1986.

To live in Pele’s shadow requires a sanguine attitude toward change. In the midst of evacuating his home, one Kalapana resident remarked, “I love my home, live here all my life, and my family for generations. But if Tutu like take it, it’s her land.”<sup>5</sup>

Like most everything else in Hawai’i, Pele came from across the ocean long ago, traveling from Tahiti with her brother Ka-Moho-ali’i, the shark god, and her favorite sister, Hi’iaka, patron spirit of the *bula*. The legends differ regarding the cause of her emigration; some say she merely wished to travel, while others say she fled after stealing Lono, the fire-god, from her sister, Na-maka-o-Kaha’i of the Sea. In all accounts, however, Pele first arrives on the shore of Niihau, a small island off the western shore of Kauai and oldest of the main islands. There she attempts to dig a pit in which to keep her fires, but either strikes water or is chased away by her angry sister. Pele tries each island in turn until finally she reaches the Big

Island and is able to dig a pit deep enough to protect her fires and escape her sister's watery wrath.<sup>6</sup>

Pele's migration is more than legend: it is an accurate account of the Hawaiian Islands' movement off of the magma vent currently building the island of Hawai'i. Somehow, the Hawaiians perceived five million years' worth of geological history over a thousand years before the advent of modern geology. Sitting there next to the crater in the dark and feeling an odd sort of sentience in the shadows around me, I was convinced that Pele had explained it all to the Hawaiians.

I could see her, dressed in a loose skirt of *kapa* cloth dyed red with *a'ali'i*, seducing some handsome youth, her red lips whispering tales into his long curly dark hair as he struggled to find his way through the currents of terror and desire pumping through his red, red heart. I wondered if she had told him too that they must treasure the beauty of the land, from the mountain to the sea, that she had made all of the beautiful birds and richly colored flowers, the foodstuffs of the forests and the fish in the sea—that all of it had been made just for him. Though he might chase the stars across the ocean, he would never find another place like this one, and such a gift from Pele should not be taken lightly. Did she tell him of the coming of the great ships, of stars that would race across the skies and great gleaming seabirds that would spit weak, pale-skinned men onto the shores? I think she did, for Pele is reckless in love. Yet somehow her lover lost the details of her prophesy. Perhaps as he raced down to the sea, astonished at his luck for having survived Pele's ardor, he outran his memories of their encounter. Trying to keep apace, these memories could not stop once they reached the shore, and were dashed to tiny fragments in the ocean. Maybe a gnarled old fisherman, casting his handnet out from the rocks at dawn, caught a few pieces and shared them with the people—but those bits would have made little sense after their night in the waters.

Perhaps, just perhaps. It seemed no less plausible than a handful of stray plants and animals being responsible for the diversity that surrounded me—a compromised diversity hung on in patches, missed by developers, ranchers and farmers, sheltered from invasive species by wide ribbons of lava, fences or belts of herbicide application. After only a few days spent wandering through acres of land utterly transformed by invasive species, it was difficult for me to accept that I would never see what the islands had once been, and that at best, our work would only slow the tides of change.

But my thoughts of Pele and her young lover reminded me that humans ride the crest of the wave of time, our consciousness moving far faster than the pace of the natural world. From that lofty, speedy position, we miss a lot—namely, that change itself is the constant. We will not undo what we've done to Hawai'i in the past two hundred years—not in my lifetime, anyway—but adaptation happens with each new generation. In the space of a million years, a common tarweed, nothing more than a spindly ditch dweller in California, transformed itself into the *abinahina* or silversword, a stunning rosette of fleshy leaves, tinted pink and green beneath a silky, shining fur that protects the plant from high-altitude UV rays on the flanks of Mauna Loa. Left alone, without the introduction of new genetic material from its homeland in South America, who knows what the lantana now invading Hawai'i's grasslands might become? Might the *nene* learn to eat its shriveled berries and nest in its thorny thickets to escape marauding rats? Would it become as essential to a new ecosystem as the *ulei* it threatens to replace?



Ali slowed the truck to allow a herd of Japanese tourists to scamper across the road. About a dozen couples dressed in matching blue rain slickers emerged from a blue and white



tour bus emblazoned with day-glo green kanji characters and headed toward a brown park sign for the Thurston Lava Tube, one of the park's biggest tourist attractions. A laggard grinned apologetically and gave us a sheepish sidelong look through rain-dappled glasses.

“You have to be really, really careful in this spot. The visitors are thick around here, and they're not paying attention to the traffic.” Ali shook her head in an impatient gesture, dark eyes darting in every direction before moving ahead. Having worked on restoration projects in every part of the park over the past five years, she was an authority on both exotic species and tourist behavior. The truck thumped over a cattle guard set into the road, and we continued through a glistening forest of *'ohi'a*, and tree ferns.

The foliage in the *hapu'u* and *'ohi'a* forest along Kilauea's edge is not terribly tall—the ferns don't get higher than thirty feet, and the *'ohi'a* don't seem to break fifty feet. The result is a dense but airy forest, the light close overhead but broken by layers of green, refracted off patches of thick moss and through the arches of fern fronds. On rainy days, everything shakes and shimmers under the weight of water, and the steady patter of drops fills the ears of anyone who cares to listen.

An opening in the verdure provided a passing view of the forest from on high. I noticed how the star-shaped umbrellas of the *hapu'u* fronds waving in the wind looked more like sea anemones than the plants I normally associated with the word “fern.” And for good reason, as they hardly resemble the humble bracken fern most people know, if they are familiar with any fern at all. Three to over seven golden stems the diameter of my wrist shoot up from a “trunk” of aerial roots as much as three meters high, each stem holding aloft a broad cascade of dark green lace. Hidden at the base of this fountain is the heart of the fern, a hard, knobby mass covered with an impossibly soft, rust-colored fur called *pulu* that protects

the unborn fronds. Here, the spine of each fiddlehead curls inward, turns upon itself countless times, sheltering whorls of delicate foliage gathered toward an unknowable center.

*Pulu* almost made these forests an unintended casualty of western expansion in the United States. In the years preceding the Civil War, southern-grown cotton became increasingly difficult to obtain in the West. By 1859, many Californians turned to *pulu* for mattress and pillow stuffing. Hawaiian workers chopped the *hapu'u* down, then pulled the few handfuls of fluff from the fiddleheads, discarding the rest of the tree fern or saving the starchy hearts for pig feed. Nearly four million pounds of *pulu* were shipped to the mainland between 1867 and 1881. The remains of a large *pulu*-processing factory lie rotting along the now-closed trail to Napau Crater in the park. Hawaiians used *pulu* as stuffing, too—for dead bodies. The acids in the *pulu* helped preserve the flesh and skin of the deceased, giving it a durable, leathery texture.

Watching the forest zoom by, my eyes caught on a clump of blood-red tendrils the size of a basketball hanging from the vertical branch of an especially large *'obi'a*. Mystified, I pointed it out to Ali, who explained that they were aerial roots, which the *'obi'a* sprouts in stressful conditions. The roots gather nutrients from the rain and fog—an especially valuable trait here on the downwind side of Kilauea, where volcano-caused acid rain quickly leaches nutrients from the soil.

Ali swung the truck onto Chain of Craters Road, and after less than a mile the tree ferns disappeared and the *'obi'a* thinned to small clumps interspersed between drifts of grey gravel-like cinder. Ali told me we were headed down to Hilina Pali Road—a barely-paved road that winds along the East Rift out to an ocean overlook on the edge of the Ka'u Desert. Within the forest along this road was one of the largest restoration sites in the park. Not long ago, an open forest of dryland *'obi'a* blanketed this area. These dry forests supported a

completely different plant community than the rainforest, full of flowering woody shrubs. But dry 'obi'a forests are what are called stand replacement forests. 'Obi'as need full sun to germinate, and they thrive in the cracks in newly hardened lava, quickly sprouting within a few years of each other. Soon the shade is deep enough to prevent the germination of new 'obi'a; the end result is a forest full of trees roughly the same age.

In a normal forest, the 'obi'as all die off of old age around the same time, clearing the way for sunlight and allowing 'obi'a seeds to sprout once again. But sometime early in the 20<sup>th</sup> century, birds deposited faya seeds in the midst of an 'obi'a dieback. Fayas are native to the Mediterranean, adapted to hot, dry terrain, and they are nitrogen fixers, which makes them swift growers. Soon they were everywhere in the forest along Hilina Pali, shading out all the 'obi'a seedlings.

Ali slowed the truck near a clump of trees that looked much like the 'obi'a, short and scrubby, only with deep yellow-green, glossy leaves and no graceful red *lehua* blossoms.

“Here’s a clump of the fayas now. See how they grow? It’s almost impossible to get through them, they’re so close together.”

“How’d the fayas get to the islands?”

“I’m not sure. Some of the Portugese immigrants make wine out of the berries, so maybe they brought them over.”<sup>7</sup>

It must be a human trait, I thought, to be powerfully nostalgic about the foods we ate growing up. Then again, maybe we’re not so unlike the *nene*, refusing to eat unfamiliar things; we just cloak our reluctance in a guise of culture.

Along Hilina Pali Road, the view turned to one of virtual devastation: nothing but weathered grey standing dead trees dotted with small shrubs, exotic grasses and a few clumps of fayas, their dark green leaves stark against the sand and rock. A low, rambling cliff to the

south marked the edge of the East Rift Zone, where the pressure of the magma chamber fueling Pele's fires caused the earth's crust to crack and rise—or fall, if the chamber suddenly emptied due to an eruption.

Some of the dead trees were natural, part of the *'ōhi'a* dieback, but others—fayas and *'ōhi'a* alike—were victims of the two-spotted leafhopper, a little green bug with a big appetite introduced to help slow the spread of fayas in the park. Unfortunately, scientists failed to properly test the two-spotted leafhopper on native Hawaiian plants. It turns out the leafhopper enjoys a hearty meal of *'ōhi'a* just as much as it does the usual fare of faya foliage.

Faya trees—also called firetree—are a fire-adapted species, as are the exotic beardgrass and molasses grass which grows along the road. Not only do these species tolerate fire, they encourage it with foliage and twigs rich in flammable resins. Fire clears out their competitors and provides a flush of minerals and nutrients to plants which can rapidly germinate or resprout. *'Ōhi'as* and any of the dryland forest species do not have such a positive response. When lightning strikes occur, or someone throws a cigarette butt out the window, these exotics gain a stronger foothold, while the *'ōhi'a* and their seeds are all killed off.

All this history was putting a serious dent in my admiration for the *'ōhi'a*, which I'd begun to think was the perfect Hawaiian plant. Many people find them ugly, with their scraggly, twisted branches and small, rounded, dull green leaves. Yet what they lack in beauty they make up for in talent. *'Ōhi'as* are the first trees to grow in a lava flow—looking out across the Kilauea crater floor, a small army of waist-high *'ōhi'as* lines the cracks in the 1974 lava flow, aiding the process of turning rock into fertile soil. There's no dirt to speak of in those cracks, just a little windswept gravel and strands of glassy Pele's hair. They manage fine, though, sprouting those aerial roots to collect what they need from the ever-present rain and

fog. When *'ohi'as* grow in ideal conditions, it takes a couple of people to encircle their trunks, and the branches tower 60-80 feet overhead.

The Latin name for the *'ohi'a* is *Metrosideros polymorpha*—polymorph for their plethora of leaf shapes and colors, and the variety of shades, from yellow to deep crimson, of the blossoms. Hawaiians call these blossoms *lehua*, and use them extensively in traditional lei making. The fluffy flowers, about an inch across, resemble those fiber-optic sprays often used in tacky decorative lights from the 70's, each bright strand tipped with yellow. Pele favors *lehua* leis, red in honor of her fires, and of her sister Hi'iaka, who loves to dance *hula* in *'ohi'a* groves.

When I received my park volunteer orientation, Ed Bonsey, our guide, told us a story about Pele and the *'ohi'a-lehua*. Ed is a lanky, retired Episcopal priest turned volunteer naturalist and historian, and those years in the pulpit made him a skilled orator, with a flair for the dramatic. Apparently there once was a chief's son who fell in love with a common girl—a very *kapu* act, for no physical contact was allowed between *ali'i* and commoners. Pele had noticed the striking young man herself and wished to take him as her lover. Appearing to him as a beautiful maiden, she asked him to marry her. He declined, saying his heart belonged to another, and Pele, in her fury at being rejected, turned him into the scraggly *'ohi'a* tree as punishment. Despondent at the loss of her lover, the girl appealed to Pele's brothers and sisters to undo the transformation. But Pele's siblings feared her wrath, and so instead they turned the girl into the *lehua* blossom, thus ensuring the two lovers would be forever united. It is said that if you pick a *lehua*, it will rain as the gods weep for the parted lovers.

At the end of this romantic tale, Ed mentions there's some question about the legitimacy of the story, since the taboo on fraternization between royalty and commoners was

so pronounced. He also points out that regardless of its authenticity, it's a good way to keep the visitors from picking *lehua* blossoms.

Ali pulled the truck up next several other battered white park vehicles and a throng of people unloading shovels and flats of plants. "We're here! So, the basic idea with this outplanting is to get some native fire-tolerant species established in with the *fayas*. That way, when the fires *do* come through, the post-fire plant community won't just be a bunch of weeds."

"Huh. So how come everything native to a volcano isn't fire-tolerant? You'd think all that lava would sort of make it necessary."

Ali shrugged. "That's the way it is. In most of the plant communities on Hawai'i, it's either too wet for fire to spread quickly—like the rain forests—or like here, relatively low rainfall keeps the forest patchy and difficult for fire to move through."

She donned her battered NPS cap, grinned, and motioned me out of the truck. A light drizzle began to fall as we stepped out, and I wriggled into my rain jacket as I grabbed a shovel.

Clipboard in hand, standing in the midst of the fracas of equipment and flats of plants, Ali looked right at home. "Okay, people!!" Ali clapped her hands. "Here's the plan! Groups of three, and each group takes three transects. Remember to stay close together and check your bearings often!"

Verena and I joined forces with David, a quiet man who usually patrolled the backcountry of the park looking for new populations of invasive species. By the end of the day, we had planted dozens of native plants long scarce or absent in the area, distributing them randomly in circles ten meters in diameter. We would return in a couple of months to check on their survival rates and give them a drink of water. Over time, these pockets of

foliage would hopefully provide seeds for more native plants, replacing or displacing the weeds.

Back at the nursery at the end of the day, I left the bustle of unloading the trucks and went to water seedlings in the hoop houses. They were on an automatic sprinkling system, but on days when the sun broke through the clouds, a little extra water was sometimes necessary. Watering wand in one hand, I absentmindedly weeded some spindly *mamane* seedlings with the other. Focusing in on what I was doing, I realized the tiny reddish sprouts I was scraping out of the pots with my fingernail were baby *'obi'as*. Looking elsewhere, I saw a carpet of *'obi'a* seedlings—under the tables, in the pots, even sprouting out of the old potting table.

Weeds are truly a human creation, as any gardener who has yanked volunteer flowers from their vegetable beds knows. It's a term which better describes the misfortune of location than it does an inherent trait: in the Mediterranean, the faya tree is part of an enduring and dynamic ecosystem. Likewise with the lantana in their native South America.

Yet the term “weed” also recognizes a break with culture. There are no Hawaiian names for faya trees, or most of the introduced plants steadily gaining a foothold on the island. Nobody makes *leis* of carnival-colored lantana blossoms, for Pele or anyone else. In Hawai'i, a state so diverse that nearly everyone is a minority, it's a bit awkward to say we ought to place one vision of belonging above all others, to say unequivocally that something should not be here. But somebody needs to be firm and even-handed about what Hawaiian qualities we value most, and soon. If we fail to honor the symphony of interdependent strains that comprise a healthy landscape, we are at risk of losing all that makes this place like no other.



A few days later, I was working my way along a sun-dappled slope on the flanks of Mauna Loa, enjoying the quiet rustle of *koa* leaves overhead. Another *Charpentaria* slid out of its four-inch pot into my cradled palm, leaving most of the soil behind. I sighed and gently held the baby shrub in a beam of sunlight trying to figure out where its roots had gotten to. In the sunbeam, the waxy leaves glowed with green fire, the veins standing out like searing red coals. It looked healthy, yet beneath the soil line, only few fine, thready roots clung to a abrupt stump of woody stem. There was already a nice hole awaiting it, right in a loamy drift of soil in the lee of a bushy *mamake*, so I planted it and hoped for the best, firming the soil around its base.

Leaning back on my haunches for a moment, I stretched my neck, then looked around. Higher up the slope and on the opposite side of the road were a few granddaddy *manele* or soapberry trees, stately and shaggy-barked, their bright new summer leaves beginning to shade toward a mature dark green. A brown, woody tangle of blackberries and exotic grasses surrounded them—the crews had sprayed with herbicide a couple months ago in order to make way for a new restoration project. I was secretly looking forward to the visceral pleasure of whacking it all out with machetes, bloody and sweaty though the work would be.

Behind me was a glimpse of the future. A healthy stand of vigorous-looking *koa* trees filled the bowl of the lower end of the slope. They creaked and waved in the breeze, the silver-green sickle-shaped phyllodes<sup>ii</sup> gleaming as they caught the sun. Beneath them grew a few waist-high *pilo*, still too young to bear the translucent, bright orange berries favored by

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<sup>ii</sup> Only new foliage on a *koa* is technically a leaf—feathery yellow-green leaves that give away the *koa*'s relationship to lentils, chickpeas, and other legumes. As the foliage matures, the leaf stem gradually flattens and grows perpendicular to the leaf surface, until the actual leaf is subsumed altogether. This is called a phyllode. Relying on phyllodes instead of true leaves for photosynthesis may help the *koa* to regulate water loss and sunlight intake.



many native birds. Several more *mamake* dotted the hillside near me, the peak of their neat bowl-shaped forms already several feet over my head.

Fifty years ago this was cattle range—lots of grass, those old trees, and not much else. Now there was a native forest, the trees twenty feet high and more, some with trunks the diameter of my calf. When I asked Ali at lunch how old the trees were, she thought for a moment, then realized she remembered planting most of them in 1998. We were agape at the speed of the transformation. Such is the promise of the tropics: with an abundance of rain and sun, plants stand poised to flourish. This is especially true of the *koa*, whose leguminous heritage gives them the ability to fix nitrogen from the atmosphere instead of relying on soluble forms already in the soil.

With the *koa* well-established, most of the exotic grasses were having a difficult time maintaining their stronghold. A couple more spot treatments with herbicide, and they might be eliminated altogether. The shade also created good outplanting conditions for more sensitive plants, like the *Charpentaria* I'd just put in the soil. Yet it would be many, many decades before this area even came close to approaching the rich diversity of Kipuka Pualuu, a couple miles down the road from here. The *kipuka*, an island of vegetation left untouched by lava flows, is one of the oldest and least disturbed sites in the park. It, too, suffers the effects of past ungulate invasions and invasive plants, but careful management and restoration efforts support its gradual recovery and enduring diversity. Scientists estimate the *kipuka* has escaped Pele's hunger for more than 700 years, leaving a rich, deep substrate of soil and an ancient forest, home to hundreds of species of plants, trees, and insects. Sometime around the turn of the 19<sup>th</sup> century, locals began calling it "Bird Park" for all the twittering, fluttering life it sheltered, and it became a popular picnic destination among the genteel. Now the locals use

the nearby picnic area for barbecues and birthdays, strolling the path through the great trees with their children.

The young, thriving forest tucked away here along the road, along with Kipuka Pualuu's tenacious presence through the ages, gave me a good deal of happiness—being one who believes in the intrinsic worth of all life forms, I was very glad to see vigorous signs of hope for Hawai'i's plants and animals. Yet in some ways, I found the argument for ecological preservation and restoration in Hawai'i more compelling when cast as an endeavor to preserve and restore what Carl Safina terms, "the most elevating and uniquely human qualities: empathy, foresight, compassion, generosity of spirit."<sup>8</sup> To state the obvious, life keeps on living. The question is, how many varied forms of life? For how long? Do we want to be responsible for the diminishment of diversity? These restoration projects made me believe in humanity's ability to choose the correct answers.

## The Deep Muscle of the World

*What holds the Creation together? Not emptiness.  
Without the health of the smallest among us, we could not exist.*

*-Alison Hawthorne Deming,  
"The Edges of the Civilized World"*

The alarm clock sounded right around sunrise, but I was already awake—not because I'm an early riser, but because of the birds. Compared to my city life, where there's an occasional chirping robin to greet the dawn, the cacophony outside was astonishing. Peering out my window, I saw a flock of brilliant red *apapane* twittering away in the break of 'ohi'a trees along the driveway. A cardinal's piercing chirp sounded out from somewhere on high, and darting flashes of pale green in the brush beneath the 'ohi'a told me that some Japanese white-eye vireos were out there, too. The trees were alive with the sound of music, the players from nearly every continent.

I pulled on my work clothes, the shirt stained with dirt from previous days in the field, and stumbled into the kitchen. Verena stood there making coffee with one eye closed, her long blond hair still a tangled rope down the middle of her back. She wished me a good morning in her heavy German accent.

"So, did *you* ever get used to the birds in the morning?"

She smiled ruefully and shook her head. “*Ja*, a little, but they are very loud. And there’s one, I don’t know what it is, that sounds like my alarm clock. When it goes off, I hear a *zee! zee! zee!* outside, too.”

“Huh! Maybe you’ve got a myna bird for a friend!”

Adding earplugs to my mental shopping list, I waved goodbye to Verena as she took off to work on the bike. A few minutes later, I followed, toast and tea in hand. The half-mile walk to the research station was a very pleasant commute, though on many mornings, heavy dew or rain soaked through my pants before I reached the station. Most of the path follows a portion of the Old Crater Rim Drive through a scrubby forest of *‘ohi’a*, with a few elegant, white-barked *koa* trees towering overhead. Waldron’s Ledge, once a pullout along the scenic drive, provides an opening in the scrub that in the daytime reveals the dark distant rim of Kilauea Crater, more than three miles to the southwest. Tones of pink and lavender still lingered in the sky, contrasting with bluish swirls of shadow and mist obscuring most of the crater floor. A breeze rising up from the crater bore the sour tinge of sulphur. To the north, the rounded swell of Mauna Loa cleared streamers of low-hanging clouds to catch the first warmth of the sun. A still-active shield volcano, its slope is so gradual it seems impossible that the summit soars over the 13,500-foot mark.

The path abruptly turns to a gravel trail through dense *‘ohi’a* and *hapu’u* fern forest where the road crumbles into a few clinging chunks of asphalt, then a sheer precipice that drops fifty meters to the crater floor below. A rusting handrail, also beginning to descend into the void, keeps the unwary from going over. (Some violent eruptions at Kilauea did away with large portions of the old Crater Rim Drive in the late 1960’s. The new Crater Rim Drive is wisely located a good distance back from this side of the crater.) Shortly thereafter, the

forest opens onto the enclave of low brown buildings where much of the research work of the park is headquartered.

It was nursery duty day, so I headed over to the collection of plastic-covered hoop houses and the shed that serves as an office—more like a rain shelter for the two computers that store all the information on plants, seedlings and seeds in the nursery. Mornings don't come easily for me, so when Matt cheerfully said, "We're going to Keauhou to see the crows this morning!" I couldn't muster much enthusiasm. Verena and Faith, another intern, were already in the van, along with a half-dozen other people I'd never seen before. I crammed in alongside them, and we were off.

I shared half a seat with Annie, a perky, apple-cheeked blonde girl from Ohio. She informed me the vanful of strangers were all *palila* project technicians from the Biological Resource Division in the park. We were all headed up to Keauhou, a rare bird rehabilitation and breeding center a few miles out of the park, to get a good look at the birds they worked to protect. Started by a partnership between the Peregrine Fund, US Fish and Wildlife and other organizations, the center represents the last and only hope for some of Hawai'i's longest residents. Merely fifty percent of Hawai'i's original bird species remain, the others victims of extinctions that have come as ripples in the wake of human immigrations over the past 1600 years<sup>9</sup>. Twenty-three of those bird species, found nowhere else on the planet, have been pushed to extinction since Captain Cook's arrival. Of those that remain, more than a third are endangered. David Quammen, writing about island speciation, gives Hawai'i the dubious distinction of being, "the world's foremost site of bird extinctions since the age of European exploration began."<sup>10</sup> They may hold this honor for pre-contact times as well: fossil records show at least half of Hawai'i's native land birds went extinct before the 1800's.<sup>11</sup>

The *palila* is a shy, medium-sized finch that lives in the dryland *mamane* forests that used to cover the low- to- mid-range slopes of the island. Theirs is a familiar story among Hawai'i's birds: as pastures and agricultural fields have gradually replaced native habitat, their numbers have plummeted. The *palila* now cling to tattered patches of forest on the slopes of Mauna Kea, much of it within park boundaries. For many decades, feral sheep threatened to mow those patches to the ground, leaving the *palila* homeless. A court order in 1979 forced land managers to remove the wild sheep, but the *mamane* forests have been slow to recover, and the *palila* are just hanging on, their numbers in the few thousands. The mission of the *palila* project is to track wild populations of the bird in the park and adjacent public lands and to do what they can to help chicks survive to adulthood.

“I haven't seen a live *palila* yet! I can hardly wait!” Annie said.

“How long have you been working on this project?” I asked.

“Oh, about three weeks. But they're hard to see in the forest canopy, and there aren't that many of them out there. It's early in the nesting season, too, so seeing one is really hit-or-miss. Mostly we've been out trapping.”

“Trapping? The birds?”

“No, mongoose, and some feral house cats and rats. We try to clear out all the predators in a possible nesting area before the *palila* begin breeding. Otherwise, they don't stand a chance. The eggs and chicks just get eaten.”

Mongoose provide another tale of good intentions gone wrong on the islands. When the Polynesians first arrived in Hawai'i over a thousand years ago, a few Polynesian rats crept out onto the shore, too, and likely contributed to many bird extinctions. However, the Polynesian rat is fairly small, as rats go, and not arboreal; seabird nests are their primary target. When Cook arrived in the late 1700's, the much larger and arboreal black rat also

disembarked. With no native terrestrial predators of any kind, tree-dwelling Hawaiian birds evolved with little notion that danger could come from below, and so the black rats have had an easy time picking off native bird species.

With birds and fruit galore, rats flourished on the islands, and quickly became serious agricultural pests. The mongoose was brought from Jamaica in 1883 in an attempt to control rats devouring the sugarcane crops. Unfortunately, rats are predominantly nocturnal, while mongooses are diurnal. Instead of eating the rats, the mongoose merely began eating birds during the day while the rats were sleeping.

We rounded a corner on a gravel road and broke out of the forest into a meadow. A few cattle-shaped shadows moved through the drifts of thick fog, and a low, dun-colored building appeared ahead of us, and I could just make out a few dim outlines of smaller structures. It's unimpressive-looking, at least for a \$3.5 million, state-of-the-art rare bird breeding facility.

Once we were inside, it was clear that Keahou was all about birds. A hushed foyer with hospital-like white-on-white walls and floors was disturbed only by muted chirping noises. A small hand-lettered sign by the door politely requested that we remove our shoes. On another wall there was a large poster of a crow—the *'alala*, or Hawaiian crow—accompanied by a brief writeup of the history of the center. The hall opened up on the other side onto a warmly-lit, carpeted room with a brightly colored hand-painted mural of Hawaiian plants, birds and history covering most of the three walls. A large window looked out onto a large enclosure, in which a half-dozen birds flitted and darted about. I looked hopefully for an *'alala*, but they were all songbird-sized.

Annie walked softly over to the window and pointed at a large finch with a small black mask over its eye, a striking gold hood and white breast, and a thick, black, slightly curved bill. It perched quietly for a moment, then flitted to a small tree on the far side of the enclosure.

“There’s one! That’s a *palila*,” she said in a hushed tone.

“Wow. That’s some beak. What do they eat?”

“*Mamane* seeds, and maybe a few insects.”

“That’s it? Picky eaters, huh?”

*Mamane* was among the species on my long list of plant names to learn, one of the species we grew in the nursery. On my first day of work, I’d spent most of the morning doing paperwork and safety training out on the *lanai* of the vegetation office. During a break, I got curious about the contents of several large black trashbags labeled “*mamane*” and opened one. I found thousands of curved, slightly sticky green-brown peapods about the length of my hand. With some difficulty, I peeled off a bit of the husk to reveal a shiny, bright orange bean. I tried denting it with my nail, then my teeth. It was as hard as a piece of gravel. No wonder the *palila* sported those powerful-looking beaks.

Our tour guide introduced herself as Kathleen and invited us to watch a video on the adverse effects of introduced predators on native Hawaiian bird populations. Keauhou’s conservation program started in 1993, and in order to better understand what was destroying wild bird nests, they began videotaping them. As the footage showed, it’s foreign creatures small and furry—rats stealing eggs, cats and mongoose attacking parents and eating nestlings, leaving the bloodied wreckage of tiny carcasses in their wake. One clip showed an *’io*, or Hawaiian hawk, swooping down on a nest of two fledgling *’alala*, so small their skin was still visible beneath a thin fuzz of feathers. A flash of wings crossed the screen and there was only one chick, flattened into the nest in fright. The *’io* is a natural predator of the Hawaiian crow,



and is also endangered, though not so much as the *'alala*. The camera captured a bittersweet moment—this is the way things ought to be, but there's so few of both that a loss of any becomes a difficult setback.

The *'alala* is the primary reason Keauhou exists. Fossils show there may have been at least three species of native crows on the islands before the first wave of humans arrived, but the *'alala* are the only survivors, and they are on the brink of extinction<sup>12</sup>. The number of breeding pairs remaining in the wild dropped below ten in 1985; by 1992, only eleven birds remained. Alarmed by their swift decline, scientists began stealing eggs from nests and rearing chicks in captivity at Keauhou in 1993. The captive flock now numbers around 27 birds.<sup>13</sup> Only three *'alala* are known to survive in the wild.

Conservation biologists who monitor rare species determine how threatened a population is by what's known as the 50/500 guideline.<sup>14</sup> It's derived from the experience of domestic animal breeders, who noticed that they got a lot more freak-show calves and sickly, mutated yearlings when the breeding population of cows dropped below fifty. Simply put, fifty breeding individuals is the bottleneck, the line between inbreeding and continued genetic diversity. After a couple of generations, the population begins to lose more than 1% of its genetic diversity, "bad" genes that wouldn't have a chance of getting activated within a healthily diverse gene pool begin rising to the surface. Hence the circus side-show animals. Geneticists use an oddly innocuous-sounding term for the loss of genetic diversity through inbreeding: "genetic drift."

New genes do gradually form through natural mutation—that's a significant portion of how plants and animals evolve and adapt to new conditions over time. However, mutations are largely driven by chance. Many of them are pointless, some are bad, and a few help a

species adapt to the changing times. With so much left to luck, you need plenty of opportunities for DNA to get nudged hither or thither by the hand of chaos.

That's where the 500 comes in. When there are at least 500 breeding individuals in a population, there's enough room for mutations to happen at a rate that matches the loss of genetic material from inbreeding. New genes are being created at roughly the same rate as genes are being lost.

Eleven *'alala* is approximately 20% of what's needed to prevent deadly losses of genetic diversity and 2% of what's needed for a balance between genetic drift and mutation. The result has been chicks with club feet, cataracts, possibly reduced fertility and increased sensitivity to avian diseases. In a fast-changing world, the *'alala* simply do not have the building blocks to adapt.

The final segment of the video showed a series of predations by feral housecats. One after another, nest after nest, baby *palila*, baby *nene*, little feathery puffs of hope, disappeared to the casual swipe of a paw or a quick nab with sharp teeth as the parent birds flapped away, helpless. At the end of the grim saga we were all silent, the gentle chirping outside the window the only noise in the room. It felt like the moment in a funeral where the audience is invited to speak, and nobody can pull themselves together enough to rise and break the silence.

Finally, Matt raised his hand and asked, "So where did the *'alala* used in the captive breeding program come from?"

Kathleen's face brightened considerably. "Well, they're either from eggs we collected from wild breeding pairs, or the descendants of those hatchlings. But at the beginning of the program, we had a couple that came to us as adults, which we tried to use as elders who would

help us to raise the captive-reared birds. They are amazingly smart, and learn very fast. Each bird has its own personality.”

She smiled and laughed a little, tugging blonde hair back from her face into a ponytail. “There was one bird who had lived in captivity for years as a pet before coming to Keauhou. His owner had taught him how to talk a little, and he would flirt with all the women staffers. He recognized us all, and would preen the hair of his favorites with his beak, and hop up and look you right in the eye and pay you a compliment. He seemed almost human, like a dirty old man in a crow’s body.”

“So did it work? Did the younger birds learn from the older ones?” Matt asked.

“Not as well as we’d hoped. Most of the older birds we received had been pets either all their lives or for so long that they really couldn’t pass on any survival skills. Adult birds tend to be very territorial, too, so the older ones would often just harass the juveniles. So we’ve tried releasing juveniles near the remaining three wild birds, but so far they’ve just chased the juveniles out of their territory.”

“Well, shall we go see the birds?” Kathleen asked, clearly excited to show us her charges. We followed her down the hallway past an alcove filled with dioramas, predator skulls, and posters of plants and insects. Part of Keauhou’s mission is to educate youth about the perils faced by native Hawaiian birds: most sixth-graders on the island have passed through their doors.

Opening a door into a small room, she gestured a few of us inside. “Here’s the *‘alala*.” Inside there was a bank of monitors, the kind used for security camera displays, each with a hand-written name label beneath. Most of them were pairs.

“It’s the beginning of breeding season, so we try not to disturb them at all. This is as close to them as you’ll get.” She gestured to the far side of a field outside the window, its

edges lost in mist. “Their aviary is over there, behind some trees. We set it away from the other buildings to keep it quiet, and to keep them from getting used to humans as much as we can.”

I was disappointed that we wouldn’t get to meet the *‘alala* in person, but a peek into their personal lives was a good substitute. The monitor nearest to me read *Keli’i/Puanani*. On the screen, in fuzzy black and white, was a view of a black crow sitting quietly on a nest of twigs in a concrete and wire enclosure. Hopping in and out of the view was a slightly larger crow dragging a small stick along with him.

“Those two are pretty far along with the courtship. Puanani is sitting on the nest, and Keli’i keeps trying to impress her. We hope she’ll lay a clutch of eggs, but sometimes they get this far and nothing happens. We don’t really know why.”

“How do they end up with their mates if they’re always in those cages?” I asked, a little disturbed by the sterile-looking environment.

“Oh, they have larger outdoor enclosures, too. The camera just shows the nesting boxes. They get chances to socialize and to be outside, and when they’re hatched out, the chicks are often reared with other hatchlings—it seems to improve their chances for survival. But when it gets to be breeding season, we pair birds we think might produce viable eggs, looking at how closely related they are, age, personality, and past breeding success. After a period of getting accustomed to one another in adjacent but separate aviaries, if things are going well, we’ll put them both in one aviary and hope for some chemistry.”

It was somehow heartening to hear that romance in some form still factored into the *‘alala*’s future, even without a readily available venue for picking out the best stick-dragger in the crowd. They are social, like other species of crows. When there were more *‘alala* in the wild, they formed small flocks, hopping along together through the branches of the forest

searching for berries and insects. Although they're quite capable of flight, they seem to prefer this mode of transportation. Unlike their North American counterparts, however, the *'alala* did little to earn the hatred of farmers and gardeners, showing little interest in cultivated landscapes. But old habits die hard, and more than one *'alala* has met its end in a shower of shotgun pellets.

The room was too small to fit our entire group, so I filtered out the door and across the hall to a large kitchen with lots of cupboards and stainless-steel counters. Several freezers and refrigerators, each nearly large enough to walk into, took up one wall of the room. A dark-haired woman in a white lab coat was at the sink, mashing up fruits and vegetables in a stainless steel dish and talking with a few members of our group. A stainless steel scale full of carrot chunks sat on the counter next to her.

“Each species of bird get its own special diet. We use different mixes of grains, fresh plant materials, grubs, some cut up, some whole. Everything is cleaned beforehand to reduce the risk of importing an avian disease or bacteria.” Opening a refrigerator door to put the carrots back, she revealed row after row of neatly labeled containers. “We keep close track of what each bird is eating, sometimes weighing the leftovers.”

“What’s in the freezers and refrigerators?” I asked.

“Oh, a little bit of everything. Bags of mouse pups—we mostly feed those to the *'alala*—blood and fecal samples from the birds, mealworms. It takes a lot of raw materials to feed all these birds.”

The other half of our group was done with the *'alala*, so we moved on to see the rest of the birds. An alarm-rigged door led into a small airlock, then a wide concrete corridor lined with more heavy grey doors and windows of double-paned glass. Having been warned to disturb the birds as little as possible, we moved cautiously down the grim, gulag-like hallway

one window at a time, peering in on the lives of these rarities. There were ten different species in all, and maybe sixteen doors.

The first window revealed a room, maybe 8 by 15 feet, with solid concrete side walls and fine wire mesh closing the rear wall and part of the top. A few small plants grew in gravel on the floor of the enclosure, and a tangle of deadwood branches provided many perching options. A small shelf directly to the left of the window held a metal cup containing some unidentifiable lumps. The sign under the window said “Maui Parrotbill, *Pseudonestor xanthophrys*.” No birds of any sort appeared to be inside. Then a flutter of wings from a low branch revealed an olive-green bird about five inches long, with a large, dull-yellow bill shaped like a parrot’s—a pointy, sharply hooked upper beak with a distinct overbite, and a thick lower bill. They use their massive beaks like a vise to split apart branches in search of grubs.

The parrotbill flew to the perch by the food and cocked a dark eye directly at me, though I couldn’t have been more than a dim shadow behind the dark glass. It watched closely, fearfully, for any sign of motion—all the apprehension of a wild thing apparent in that dark orb, those tensed wings. I dared not breathe under that gaze, wishing myself elsewhere, wishing in fact that *all* humans were elsewhere and had never come here to put that gaze behind glass and wire for its own benefit. Only 500 parrotbills remained, at most, clinging to a patch of relatively pristine forest on the eastern flank of Haleakala, Maui’s giant, mostly dormant volcano.

Each window presented a variation on that theme—a small bird with dark eyes, peering deeply into half-shadows of things it couldn’t see. Some cohabitated in a small flock, while others were only a pair. We looked back, we watched. We marveled at their colors, the fine feathers, the variety of bills, each shaped and shaping, over time, the needs of one particular species. We felt incredibly lucky to get to see these rare and elusive tufts of feathers,

and we tried to figure out how to live with being part of both their curse and their only hope of redemption.



On rainless nights, I inevitably wandered out to Waldron's Ledge to enjoy the stars. That evening, a barely-waning moon shone so brightly I wanted to squint when looking directly at it. Stars winked dimly in the sky, and the forest was painted in ghostly, muted versions of its daylight colors. Kilauea was clear from rim to rim, and the steam vents in the crater floor issued luminous blue-white plumes hundreds of feet straight up into the darkness. Moonlight flooded every crevice, creating sharp-edged shadows that looked like they were cut from steel. Though I listened closely for *pueo*, the Hawaiian owl, nothing but a vibrant chorus of cricket song echoed off the walls of the crater. I sat on the stonework foundation of the railing, watching as the headlights of an occasional car driving along the far rim caught in the tendrils rising from the crater. Settling into my surroundings, their wildness called to the wildness within me, providing space and an odd sense of safety I had not experienced in such depth since childhood. I felt deeply grateful for such comfort.

Visiting the birds left me questioning the ultimate intent of ecological restoration, wondering if our best intentions, our desire to save a species, are sometimes more about *us* than about preserving biodiversity. Conservation biology is a relatively new field, its birth concomitant with that of ecology roughly sixty years ago. Most scientists agree that the goal of conservation biology is to preserve biodiversity, but beyond that, its intentions are up for grabs. Though landscape architects and range managers began undoing human-caused damage to ecosystems as early as the mid-1800's, the modern practice of ecological

restoration—with an explicit ecological focus—is even younger than conservation biology, more applied, its borders more nebulous.<sup>15</sup>

Did attempting to save the *'alala* and its feathered friends amount to some significant piece of a restoration effort? To better answer that question, I needed to start at the beginning, looking at the etymology of the terms themselves. Like paleontologists carefully dusting off the mineralized bones of an ancient ancestor, digging a bit into the source of a word exposes the structure upon which the present is hung. Sometimes it unearths long-lost common lineages; other times, tightly woven interdependencies long forgotten by the efficiency-minded speakers of the modern tongue. The grinding wheels of culture may steer the transformation of language, but language remains our guide. When we cease paying attention to the old signposts saying from whence our words came, we have, in some way, lost our way on the cultural landscape.

Back at the house, my huge yellow Langenscheidt dictionary gave me this:

**Res.to.ra.tion 1:** an act of restoring or the condition of being restored: as a: a bringing back to a former position or condition: REINSTATEMENT <the ~ of peace> **b:** RESTITUION **c:** a restoring to an unimpaired or improved condition <the ~ of a painting>  
[from the Latin *restaurare* to renew, rebuild, alter]

**Ecol.o.gy 1:** a branch of science concerned with the interrelationship of organisms and their environments **2:** the totality or pattern of relations between organisms and their environment  
[from the Greek *oikos*, house]

So, ecological restoration fits under a broad umbrella. It's the work of returning the original pattern of relations to an earlier state. At the root level, it's fundamentally the alteration of the house. We're remodeling, and we think we're going to make it better, but the original blueprints moldered away in the basement long ago. We no longer know the answer to the question, *better than what?* The definition also lacks any sense of values or ethics,



providing only a direction: back in time. However, within the definition, there sat

RESTITUTION, unexplained, in bold, biblical, this-is-YHWH-letters.

**Res.ti.tu.tion 1:** an act of restoring or a condition of being restored: as **a:** a restoration of something to its rightful owner **b:** a making good of or giving an equivalent for some injury  
[from the Latin *restituere* to restore + *statuere* to set up]<sup>16</sup>

This sounded like the unspoken element of restoration work: the desire to make good, to offer up compensation, an apology to Nature. Not that she has the capacity to listen per se, but appeasing that internal desire to make amends is often what motivates apologies of any sort. Outside of the deep ecologists, who often seem more intent upon talking amongst themselves than on communicating with the public at large, or even the secularly-inclined environmental activist at large, the desire to say “I’m sorry” to the planet isn’t a regular topic of conversation.

Even if we don’t talk about it explicitly, what else has spurred on the steady sales of *50 Things You Can Do to Save the Planet*, the proliferation of environmental science and environmental studies programs at universities, ecotourism vacations to save the sea turtle, American schoolkids buying chunks of Brazilian rainforest with their pennies? You can find a cute “I’m Sorry!” card from Hallmark at the grocery store, but there’s nowhere to send it. The language of the natural world is action and reaction, not English.

William Jordan argues for thinking of restoration as a ritual means of dealing with the shame we collectively experience when faced with the environmental destruction wrought by our species. In a similar vein, conservationist and author Michael McGinnis writes that, “Ecological restoration and artistic performance are partners in the struggle against cultural and biological homogeneity. Community-based restoration—in the form of dance, poetry, theater, other arts, and ritual—is a means to recover a wild sensibility so that we can learn lost social and community values.” Whether you agree with their assertions or not, the emphasis

on fostering an ongoing and immediate relationship with the natural world rings out powerful and true.

Once we've admitted we want to make good with Mother Nature somehow, how far can we take this desire? Do we offer restitution for the damage caused by our entire species? Should that be the goal? Part of me wished humans had never come to these islands, but we did, beginning 1600 years ago. Each new wave of immigrants brought its own host of exotic species—some, like the small Polynesian pig, intentionally, others, like the black rat, by accident. These exotics, combined with our own hunting and agricultural habits, have so transformed the islands that undisturbed native habitat is more a dream than a viable goal.

In Hawai'i, the battle to prevent further degradation of native habitat in the moment is overwhelming enough. Invasive exotic species remain the biggest threat to the remaining indigenous ecosystems, and it's estimated that approximately 50 new species reach Hawai'i (usually by boat or airplane) every year. While it's true that every life form on Hawai'i today got there from somewhere else, those introductions occurred at a much slower pace: about every 10,000 years, with successful landings of viable populations—enough seeds to interbreed successfully, a pregnant female or small flock of birds—occurring about every once every 35,000 years over the course of more than 70 million years.<sup>17</sup>

Scientists estimate that all the bird species on Hawai'i evolved from no more than 20 separate landing events over the course of 25 million years. While much of evolution remains a mystery, we know enough now to understand that 50 new species per year in a place originally populated only by plants, birds, bugs, land snails and one land mammal—a bat—is likely to entirely overwhelm much or all that is native. And that's just what's happening: approximately one-third of the life forms on the Endangered Species List reside in Hawai'i. According to the U.S. Geological Survey, fossil records indicate that 35 species of birds went

extinct before Captain Cook arrived. This figure is probably much lower than the actual number of extinctions—young volcanic islands tend to have poor fossil records—and it says nothing of the plants which may have gone extinct once they lost their pollinators or seed dispersers. Over twenty more birds species are now gone. *Gone extinct*. Say it enough times, and it begins to sound like an exotic destination.

The *'alala* seems to be next in line. While their numbers continue to increase, efforts to release them into the wild have largely failed, as birds succumb to alien predators and introduced diseases like toxoplasmosis, carried everywhere in the forest by the now-ubiquitous rats and cats. They are very nearly a relic species of our age, surviving only in captivity.

And who, of the millions who visit Hawai'i, who live and work here, cares? Many locals will express outrage at the expense, even though funding for the recovery effort comes largely from the coffers of foundations and the federal government. Especially on the Big Island, poverty is as rampant as feral pigs, and people want jobs, food, money, shelter. The *'alala* is a crow—sure, if you compared its picture to other crows, it looks different, with browner wings and a thicker bill, maybe a little smaller. But it's still a crow, not a terribly well-loved bird. Determining their past abundance is difficult. Journal entries from Captain Cook's voyage comment on the relative rarity of the *'alala*; perhaps it was already on its way to extinction before 1778, a victim of Hawaiian bird hunters, climatological shifts, or simple loss of fitness in the natural order. After all, species decline and extinction are perfectly natural. So how far back into history should our Herculean restoration efforts reach?

For some critics of ecological restoration projects, the mere assumption that human meddling in nature could lead to positive outcomes—to restoration—is justification enough for doing away with them altogether. The basic argument is simple: we've done enough damage as it is, and if we begin to believe that we have the ability to recreate what's been lost,

what's to stop humanity from ripping up the few remaining patches of pristine nature? Moreover, because it's humans trying to remake a place into something they desire, it fundamentally makes that place not "natural": no matter how many native plants carpet the earth and birds twitter about, it is more garden than wilderness, tainted by intentionality. Eric Katz, one of restoration's most vocal critics, writes, "Once we see that the introduction of human intentionality and purpose fundamentally changes the character of a natural system, we cannot say that we are restoring nature. Instead, we are creating artifactual systems—or, at best, hybrid systems of natural entities and artifacts—that are designed to achieve some set of human purposes or benefits."<sup>18</sup>

On the surface, his argument makes a great deal of sense. It's true that the belief that we can recreate nature's design could, in the wrong hands, be used to justify all manner of evils. Anyone who has ever seen the dumping of entire Appalachian mountaintops into the nearby valleys in the relentless quest for coal might be inclined to shudder at the thought of mining companies who think they can properly reassemble it all when they're done. Katz fears that ecological restoration efforts are, "an expression of human hubris regarding our technological power and mastery of the natural world."<sup>19</sup>

Perhaps Katz is right, given the dismal track record of humans, and there's little cause to hope for the future. But in order to maintain such a position, you've got to believe that humans have crossed over that nebulous line between nature and culture, and in so doing, have outsmarted nature, rendered it little more than a resource. You've got to believe that there is no place for people in nature, anywhere. While it's depressing how little time humans on average spend outside anymore, we've not yet managed to abandon the natural world. As far I can tell, there's nowhere else to go. Nature, however altered, endures.

Dig deeper into the swirl of controversy surrounding ecological restoration, and the impassioned rhetoric makes it clear that the participants aren't merely arguing about what to *do*; they are discussing values, ethics, and where we choose to draw the nature/culture distinction—or if we choose to draw it at all. Academics figure there are three predominant views of nature, each of which has held sway in western culture at different times.<sup>20</sup> The first, typically referred to as the utilitarian view, regards the natural world largely as a useful source of raw materials for building the artifacts of culture. This perspective demands nature be controlled and channeled to best serve humanity. The Bush, Jr. administration, with its push to expand drilling and increase mining and logging, exemplifies this worldview quite nicely, though it's typically associated with the Industrial Age (and is wildly out of step with the wishes of your average American, according to a slew of opinion polls). A utilitarian worldview is what Katz most fears is legitimized by ecological restoration. It's an understandable fear.

John Muir, founder of the Sierra Club and author of many a rhapsodic passage about wilderness, is an excellent example of the romantic view of nature. For him, nature was awe-inspiring, breathtaking, pure. It was free of all the terrible traits of humanity, and, in fact, the presence of humans (Native Americans didn't count—being primitives, they were closer to nature than to culture) sullied the perfection of wild landscapes. In Muir's time, it became popular among the elite to go out into the countryside—the wilder the better—with a device known as a Claude Glass, named for its inventor. The user held the murky mirror, framed in gilt, so as to frame a particularly appealing scene from the countryside. The image held within that frame never included humans. It was to be appreciated like fine art, an instant oil painting framing and containing nature for the well-bred cultural elite to appreciate. Katz's

reluctance to taint nature with human control in the form of restoration also harbors threads of this worldview.

With the organic or holistic worldview, there's a less static view of the nature/culture divide. The lines become blurry; because humans have a place in the ecosystem, culture is intrinsically linked to nature. Alison Hawthorne Deming expresses such a relationship most eloquently. "To use nature beyond its capacity to restore itself is to destroy the force and process that have given us our lives. We have not fallen from nature, we have risen from it; all human accomplishments, feeling and belief along with flesh and blood are rooted in that generative power."

The arrival of humans in a new habitat inevitably leads to irrevocable change, yet so does the successful introduction of any new species. Nature is ephemeral, too. Change—driven by life's prime directive, to survive and flourish—is the only constant in nature. What lies within our grasp is the possibility to mitigate human-caused change so as to prevent the eradication of all the original inhabitants.

In his environmental history of the Western U.S., Dan Flores both articulates the tragic losses typically associated with the arrival of humans and offers up a beacon of hope, suggesting that we are at a singular moment in our evolution as a species. He writes, "Evolution prepared us to survive; it did not prepare us to penetrate to real self-awareness of our motives, and now they come as a shock... embracing our animalness, recognizing and confronting the role our long evolution plays in modern human behavior, is a critical step."

The dark gaze of the parrotbill elicited that gut-level feeling of shock in me, and the endeavor to save the *'alala* represented a collective moment of self-awareness. Sure, it's just a crow, a generalist that feeds on lots of different foods in several different types of habitat on the islands. Unlike the *palila*, upon which *mamane* and *nai'o* forests depend to spread the seeds

and fertilize the soil with their droppings, the *'alala* fills no such specialized niche as far as biologists can tell. The loss of robust flocks of *palila* has crippled an entire ecosystem: *mamane* aren't growing well even in places where cattle and wild sheep and pigs have been fenced out because the trees have lost their main mode of transportation and one of their primary sources of nitrogen. Without roaming flocks of *'alala*, all the forests have lost is one among many possible prey for the *'io* and the echoes of a strange cry, like a lost Mardi Gras reveler.

For the most part, restoration work is premised on points of research linked together by slender bridges of hope and guesswork. We attempt to save what we know, and hope the rest gets swept up in the effort. What we know is that the *'alala* speaks to us with its uncanny intelligence and its fierce *belonging* to Hawai'i. The poet Mary Oliver describes crows as, "the deep muscle of the world" and the *'alala* is Hawai'i's sole remaining representative of the nearly-ubiquitous grace and flexion crows lend to the planet. Like us, it is a social creature, one that must pass on much of its understanding of home to its young if they are to survive. It, too, gets fed up with teenagers and kicks them out. It, too, needs to like its mate if their union is to work. The *'alala* reminds us that being human is natural. The least we can do is exhibit what Deming has named "a faith in the power evolution has vested in us" and show it some human kindness.

## Going Native

*We also are going to travel, we say let's be  
Oblivious to all, save  
That we travel, and we say  
When we reach the place we'll know*

*We are in the right spot, somehow, like a breath  
Entering a singer's chest, that shapes itself  
For the song that is to follow*

- Alicia Ostriker, "Move"

It doesn't take long for the bustle of life in the rest of the world to fall away when you're in Hawai'i. The newspapers present an occasional morsel of global affairs, but you read largely of local disputes, developments, sales, scandals, thefts and car accidents. All of the trappings of mainland life are available—the same brands of peanut butter on the shelves in the stores, TV and movies the same, but head to the Wal-Mart in Hilo and a few aisles over from the peanut butter you'll find racks of *muumuu*s, squishy lavender bags of *poi*, and a cooler case full of *leis*.

Hawai'i's tumble of cultures fascinated me, and the landscape was unfailingly stunning. Yet at times that remoteness turned to a feeling of isolation from the rest of the world, and the endless stretches of ocean sometimes engendered strange fits of claustrophobia in me. Locals call such restlessness "island fever." All the hiking and exploring I could pack into a day failed to eliminate that feverish twinge.



One day, I was out in the field trying to plant seedlings in a deluge. It was like working underwater. Rain was everywhere—lubricating the shovel, trickling down my back, soaking my rain pants till they threatened to fall off. I was working alongside Reuben, a Hawaiian in his mid-30's whose family had lived on the lush, rain-drenched Honoka'a coastline for generations. Our progress slowed to a crawl by the rain, we fell to talking about living in Hawai'i. I asked if he ever experienced island fever, or if he missed the rest of the world.

“Oh, I traveled before. Been to Oregon with a fire crew plenty, yeah? California too, one time. Met lots of nice people, but da Samoan guys on da crew, not so good. Drinking all da time. I was glad to come home. Like my uncle say, ‘Go east, there’s the ocean. Go west, there’s the ocean. North and south, ocean. Why need go anywhere else?’” With that he broke into a smile. “You evah been to da falls north past Akaka? Dey near my home. You should come visit sometime. Most beautiful spot in da world. And da fishing on da coast dere, can’t be beat. You fish? I go out after work, sometimes, or fish from da rocks. Out on da water is best, for catching *ono* fish.”

I realized then that what seemed to me a forbidding barrier was to him and other island dwellers a rich extension of the substrate of daily life, not all that different from rock and soil. The ocean’s virtual limitlessness was irrelevant: he didn’t need what lay on its opposite shore. Here he was surrounded by a beautiful landscape with rich soil, good for growing food and raising animals, an ocean in which to swim, fish and explore, and family and friends.

I couldn’t help being jealous of his contentment. Despite the constancy of my deep love for the Pacific Northwest, I can never seem to stay put, to commit myself to the sole nurturance of that place, my circle of friends there, and all the beauty therein. My wonderings

take me a-wandering, whereas his turned him undeniably toward home. For all we crow about the improvements of modern life, I wonder if the freedom enjoyed by the affluent of the globe to be anyone, anywhere, won't ultimately prove to be the unraveling of the whole of humanity.



I first saw the ocean at age twelve—a dark, storm-tossed Pacific that filled my ears and washed numbingly against my ankles. Despite the cold, I stood in it for long minutes, utterly transfixed by its grace and foreign, watery rhythms. Never before had I seen the edge of my world so clearly. But “edge” didn't capture everything I sensed: it was also a frontier, a place worth exploring and knowing not just for passage to the other side, but in its own right.

Well over a decade later, I still found the ocean as captivating as that first time. Seeing it nearly every single day made me itch to immerse myself in its salty rhythms. So when Verena came home from her first day of canoe practice and flopped down exhausted, I could hardly wait to hear her report. Grinning, she said, “Oh! It was so fun! You must try it!” It was all the encouragement I needed.

Early the next morning, I stuffed myself into the cab of a truck with five other people, a dog named Angel and a couple surfboards riding in the back, and sped down the volcano to Hilo. Pulling into town, we wound through a park filled with massive, ropy banyan trees and lush banks of exotic flora down to a row of metal-roofed canoe sheds a short distance from the grey sand beach of the bay. Peachy-pink morning light lingered on the glassy waters, and Mauna Kea's rumpled, snowcapped peak soared to the west, a few observatory buildings at the summit winking at the dawn. A thick belt of clouds obscured the volcano's base. I'd left the house wearing a fleece jacket and pants, but Hilo was already sultry, the coconut palms behind the canoe sheds barely stirring in the warm, humid air. Fifteen or so people were

gathered on the sand, dressed in board shorts and bikinis, talking quietly and stretching. I recognized most of them from around the park.

Soon Aku, our canoeing coach, appeared. A shiny, deeply tanned Hawaiian man with a loose ponytail of unruly grey hair cascading down his back, Aku snapped with energy. He carried a turquoise sea kayak tucked beneath one arm, dwarfed by his Buddha-shaped bulk, and strode purposefully toward the knot of paddlers. A pair of wraparound sunglasses bounced off his chest with every step. Without a word, we quieted down and focused on Aku.

In the park, Aku was a vegetation technician and fence crew leader, spraying weeds and mending mile after rugged mile of fence along the park boundaries. Here he was a *kupuna*, an experienced master paddler whose ancestors had plied these waters for generations. Even standing on land, his love for the sea was evident in the way he glanced at the bay—an appraising glance that read the wind and currents with a single flick of his gaze. Turning his attention to us, he nodded his head slowly in approval at the large turnout, then beckoned with his free arm. “Okay! Everbody reddeh to paddle? Les’ go! We use dah double firs’.”

We filed into the nearest shed, filled with about a dozen brightly-colored fiberglass-hulled outrigger canoes. Each measured roughly thirty feet long and a foot and a half wide. A double-hulled canoe, around which everyone gathered, rested toward the far end of the shed. Essentially two canoes joined together by rough-hewn booms, this massive, blunt-nosed hulk rested on a protective base of old tires. It took all of us straining and grunting, including a half-dozen powerfully-built young Hawaiian men, to carry it to the water.

Standing in the water beside us, Aku again surveyed the troops. He pointed at a few, who waded back to shore, then rearranged the remaining dozen to his satisfaction. When the strongest paddlers, mostly Hawaiian-blooded men and women, were toward the front, and us

novice *haoles* filled the back seats, Aku loosed us into the bay with a few words of Hawaiian. We pushed forward through the waves, leaping into the canoe as we picked up speed and the bottom dropped away. Up in the right-hand prow, Paul, a Hawaiian with cascades of curly black hair and the powerful torso of an experienced paddler, cried out in a booming voice, “*Hup!*” and plunged his paddle fiercely toward the water, the stroke matched by everyone in his canoe. John, his cousin, sitting first in the other canoe, replied with a throaty, “*HO!*” our signal to dig in. I belatedly stabbed downward and back, missing all but the very surface of the water.

But soon the heartbeat rhythm of the cries sank into my arms, my breath. “*Hup!*” ready the paddle, a 45-degree angle, right hand firm on the “T” of the top, left a handspan from the meeting of the blade and handle. Back straight, feet braced against the sides and bottom of the canoe. Inhale bright, salty air. As the paddle blades of the opposite side lift, dripping diamonds of ocean, cry “*HO!*” and simultaneously sink the paddle straight down into the waters, rushing by unbelievably fast now, pulling against currents of our own making with back, bicep and tricep. Spray from the wavelet created by the paddler in front of me sprinkles my skin. Again, and again, and though it is very hard work, I could imagine doing this across miles of ocean, sails filled with wind. It wouldn’t be the worst fate a person could face, after time to lose your own identity in the thrall of speed and coordinated motion, wind and surf, thoughts evaporating away with your sweat beneath the tropical sunlight.

“You! Numma six! You hol’ paddle backward! Oddah way! An hol’ da paddle higher up! You don’ wanna bend sofah!”

Zippering around out on the water in his kazoo-shaped sea kayak, Aku had caught up to us, and was pointing his paddle right at me. Intent on improving our technique, he cried out

more instructions in rapid-fire pidgin, pointing at others with his paddle, occasionally dipping it in the water to keep apace.

“Work *wi*’da water. Nummah five, you putting out fire in da back? Leave some ocean for ever’one else! Remembah, ever’one, match da paddle in front of you!”

Blushing, I straightened my already aching back and curiously examined my paddle, trying to figure out what *was* the correct way to hold it. Our steersman, sitting behind me in the stern, gently explained, “You want more resistance, not less, when you’re pulling through the water.” He rotated the paddle in my hands so the head was angled slightly forward. “And try to twist your body more on the stroke. It’ll give you more power.”

After a brief time, John called out, “Paddles *UP!*” and we glided to a stop. I was surprised to look up and realize we were nearly two miles out in the bay. Hilo was just a concrete-colored strip in the distance, and the water had changed from a suspicious brown-green to a deep Pacific blue. A breeze full of clean, open ocean smell ruffled my hair, drying the sweat on my brow.

A couple of people dove out for a quick swim, and after a few moments of quiet, a mischievous glint crept into Aku’s eyes. “You evah see tiger shark? Mean, worse than great white. Oh yeah, dey come in here all time. Big tiger sharks, long as dis kayak.” He spread his arms in the classic “one that got away” pose, indicating the immense nature of these sharks.

Looking to the swimmers, he casually remarked, “Just be careful don’t lose an arm, make it hard to paddle back in.” Aku chuckled as we blanched, the kayak bobbing in time with his laughter.

After a swift return to shore, I sat on the beach with a small cluster of paddlers, watching as Aku coached several crews at once, now in the single-hulled outrigger canoes used in racing. Aku’s ancestors plied the open reaches of the Pacific in double-hulled canoes quite

similar to the one we'd just paddled over *a thousand years* before the Vikings even stuck their toes in the Atlantic. Oceania, as the island regions of the Pacific are collectively known, received its first influx of humans from the islands of Southeast Asia 3-5,000 years ago.<sup>21</sup> As the centuries passed and their sailing and navigation skills grew, they colonized islands over successively greater expanses of ocean, developing distinctive cultures and customs as the ties between distant islands faded away—a kind of cultural speciation.<sup>22</sup>

Like the spiraling ladders of DNA, cultures often bear the mark of their origin. Polynesia, a roughly triangular region covering hundreds of thousands of square miles of open ocean, with New Zealand, Easter Island and Hawai'i defining its three points, is a fairly cohesive cultural group. Though physical anthropologists have used gene markers in recent years to prove the close relationship between these people<sup>23</sup>, linguistic commonalities gave them away long ago: when Captain Cook came to the Hawaiian Islands in 1779, he and his crew marveled that the natives spoke essentially the same language as the Tahitians, over 2,400 miles to the southeast.

Hawai'i's first human transplants arrived around 400 A.D., sailing and paddling their canoes from the Marquesas and the Society Islands, of which Tahiti is a part. These specks of land lie at the heart of the triangle, and it seems they were the points of origin for Easter Island's (300 A.D.) and New Zealand's (1000 A.D.)<sup>24</sup> Polynesian colonists. Linguistic clues and Hawaiian legends suggest there were several waves of immigrants, the first coming from the Marquesas, then several others arriving from Tahiti a few centuries later.<sup>25</sup>

Both the Marquesas and the Society Islands are large enough to support forests and fields alike, with fresh water and bountiful oceans. Archaeological evidence suggests the archipelagoes suffered the occasional drought, and in later years, supported dense populations. Either of these may have been enough to inspire the Polynesians to load up and set off into

the uncharted seas, but we'll never know exactly why they chose to disappear over the rounded horizon.

Though anthropologists and archaeologists continue to speculate, one thing is clear: those first canoes were not waif elements. Given the remoteness of the islands and the nature of equatorial ocean currents and wind patterns, it wasn't a storm-tossed canoe that first stumbled across Hawai'i. The Polynesians *meant* to go somewhere, even if they didn't know exactly where that somewhere lay. They brought pigs, dogs, chickens, rats (inescapable even on a canoe), seeds and cuttings of dozens of their favorite plants—a lot more luggage than anyone out on a mere lark would pack.

The speculation I favor, along with many who are better-versed in Polynesian pre-history, is that a quest for power motivated these migrations. Early Polynesians tended to live in loosely-organized tribes of several families, each led by a chief.<sup>26</sup> Land was probably passed down through the generations. As the population on these diminutive islands grew, inherited divisions of land gradually shrank in size. Though still large enough to provide a comfortable living, an ambitious son of a chief might have looked at his paltry allotment of taro field, its productivity diminished by a dry year, and instead turned his hopes beyond the horizon.<sup>27</sup>

Then again, maybe they just took off because they could, because in the past, there had always been more islands waiting. The frontier seems to have the same effect on cultures worldwide: it thrills the pulse of a few hardy individuals, who disappear into the wild without looking back. And why would they look back, with the roll of the open ocean beneath the twin dugout canoes, riding on the wide plank platform resting between them, trimming the inverted triangle-shaped sails of woven *bala* fronds to best catch the trade winds? Headed north from the Societies, it was straightforward traveling, if one had a seaworthy vessel; the winds blow steady from the northeast until you close on the equator, at which point the

doldrums confuse your sails. But once you've paddled across the equator, the steady easterly winds begin again. A good navigator would have known the zenith star of his home island; if the *poi* ran low and the fishing was poor, one could turn for home well before perishing.

For years modern scholars scoffed at the idea that Polynesians intentionally colonized remote islands like the Hawaiian archipelago and Easter Island. But in 1975, the maiden voyage of *Hokule'a* proved them wrong. Named for Hawai'i's zenith star (Arcturus in English), *Hokule'a* is a double-hulled canoe built to ancient design specifications, using a few modern materials, like canvas sails and fiberglass instead of dugout logs. She measures over sixty feet in length, and sports the inverted-triangle sails characteristic of traditional Polynesian craft. *Hokule'a's* silhouette would have looked quite familiar to Captain Cook.

Since she first hit the ocean, *Hokule'a* has sailed over 24,000 nautical miles. She has taken Hawaiians to Tahiti and back three times, without any modern navigational tools. Her pilots, well-versed in the night skies, relied on the stars and minute attention to the details of ocean swells, animal behavior, and distance traveled to navigate over 2,500 miles of open ocean each way.<sup>28</sup>

Building *Hokule'a* required significant sleuthing and creativity. Hawaiians had no written language, the ancient chants offer few design clues, and nobody has ever found an ancient canoe. Sketches and descriptions from Captain Cook's expedition and those of his contemporaries provide the only substantial records of traditional Hawaiian canoe design. These observations came at least 300 years after trans-oceanic voyaging between Hawai'i and Tahiti ceased. The Hawaiians Cook encountered relied primarily on paddle power for travel throughout the Hawaiian archipelago, and it's unlikely their vessels would have been capable of long voyages.<sup>29</sup> Records of ancient Hawaiian navigational techniques are similarly lacking. *Hokule'a's* creation put the "poly" back in Polynesian, filling in the gaps with borrowings from



other parts of Polynesia and Micronesia where long-distance sailing managed to stay alive into modern times. She is, in some ways, more mythical than the myths she set out to prove. This begs a difficult question: is this cultural restoration at work, or something altogether different?

Ben Finney, one of the anthropologists involved in the *Hokule'a* project, writes that it was always planned as, “one of cultural revival as well as experimental archaeology.”<sup>30</sup> The project’s success depended on the leadership and sweat equity of many natives, who served as craftsmen, designers, organizers and crewmembers. Nainoa Thompson, a Hawaiian who piloted several *Hokule'a* voyages, studied extensively with an elderly resident of the Carolinian Islands, where the art of trans-oceanic canoeing was still alive. Researchers unearthed as best they could the traditional canoe blessings and launching rituals, and wherever possible, they used the same construction materials as ancient Hawaiians.

Though utterly unnecessary to prove whether or not Hawaiians could have sailed to and from Tahiti, those efforts effectively bridged the past and present, investing an intellectual exercise with cultural and spiritual portent. Proving their ancestors *had* been some of the most skilled seamen in the world was deeply rewarding; learning they *still* could sail into the deep blue waters awoke many Hawaiians to the abiding importance of their own long-suppressed and forgotten culture.

The Polynesian Voyaging Society, created to support the construction of *Hokule'a*, still thrives today and has crafted several more ancient-style canoes, incorporating more traditional materials with each new canoe. Instead of sailing the high seas in order to prove to historians that Hawaiian oral traditions are more than fanciful myths, these vessels take new generations across the ocean, creating new stories based on the old ways.<sup>31</sup>

*Hokule'a* and her kin powerfully illustrate a fact so obvious and devastating that we rarely pause to give it consideration: modernization comes at the expense of indigenesness. We are experiencing a new kind of Dark Ages, more subtle because the flood of information we continually confront masks what we no longer know. Constantly assured that technology and progress are the salve to all our woes, we lose sight of the ways that ancient knowledge was so crucial to our well-being. There is no technological substitute for or improvement on the experience of navigating across thousands of miles of ocean using little more than wood, wind, water and keen observation. Launching a hand-carved canoe in solemn ceremony, calling upon the ancestral spirits who once made similar voyages, is not the same as puttering out of Pearl Harbor in a fiberglass yacht. It never will be.



Writer Alison Hawthorne Deming calls culture, “our key survival strategy as a species.” I agree with her; it’s the way our big brains have managed to encapsulate generations of learning about our habitat. But as we’ve moved away from thinking of ourselves as part of the natural world, culture as a survival mechanism has had less to do with the particulars of a given location and more to do with global commerce. The creeping globalization and homogenization of our post-industrial, post-modern era easily bleeds together into a morass of post-tions where place itself is a secondary consideration, if it is a consideration at all.

Hawai’i’s current cultural polyglot is a conglomeration of the Polynesians who first arrived here, the Caucasians who came next, and the thousands who came from the Philippines, Japan, China and other parts of Asia to work the mostly American and British-owned sugarcane and pineapple fields. Poorly educated and treated as little more than slaves, these peoples’ cultures were a lifeline for them. Unlike the immigrants who arrived on the mainland during the same period, the field workers were not encouraged to learn English or

otherwise integrate into broader society. The strength of those imported cultural identities is still evident: younger generations, now third or fourth to be born on the islands, will often speak Japanese, Vietnamese, or Filipino at home, though the same interests that seem to captivate American youth everywhere prevail in their public lives.

Racial divisions in Hawai'i are strong among old and young alike, and while friendships across color lines are not unheard of, allegiances tend to be among those of the same or similar ethnic groups: Hawaiians stick together, as do those of southeast Asian or Japanese descent. After a generation or two, anyone may be considered a "local", which makes crossing those lines much easier. But even a *haole* with such status may still experience substantial disdain at the hands of other ethnic groups, especially in rural areas or parts of town not frequented by tourists. The friendliness and generosity of Hawaiians so lauded in the tourist brochures is genuine; it's just that away from the tourist centers, it must be earned, and not every island dweller cares to give a newcomer a chance. Living and working in the park, I was largely sheltered from the racism some of my Caucasian friends experienced—particularly men—out and about on the island.

Hilo's Farmer's Market is a microcosm of Hawaiian pluralism. On Wednesdays and Saturdays, two aisles of tables groaning with produce, flowers, fish, honey, and baked goods huddle beneath a roof of heavy tarps downtown, just across the street from the bay. Throngs of people circulate, greeting friends, admiring the wares, buying. Most of the vendors seem to be tiny elderly Polynesian or Asian folks flashing big white teeth and gray hair, with a few sun-weathered, hippie-type *haoles* thrown in here and there for good measure.

I tried to get there as often as I could, drawn by the homey community of vendors and their array of produce. Rambutan, plum-sized fruits encased in a sea urchin-like shell, were piled next to bags of plump red tomatoes and bundles of long, skinny Japanese eggplants.

Across the aisle, four different kinds of choy lay above boxes of purple, white, yellow and orange sweet potatoes. A tiny Filipina woman peered out from behind a fortress of yard-long beans the diameter of my pinky finger and gleaming white foot-long daikon radishes. Farther down, brilliant nosegays of yellow pumpkin flowers wrapped in newspaper lay next to a bucket full of emerald green *warabe*, edible fern fiddleheads, which sat next to boxes of big golden-green papayas and avocados, all five for a dollar. Perfectly aligned schools of dead mackerel and tilapia resting on crushed ice pointed their sightless gaze across the aisle at a man in an aloha shirt rearranging his tangerines. Pails of fake-looking red anthuriums, tiny yellow orchids, and ghostly white and pink moth orchids decorated the edges of the market.

I invariably returned home from the market with a backpack stuffed till the seams puckered, dreaming of cross-cultural culinary fusion and in love with Hawai'i's melting pot. It wasn't until I unloaded my haul that I thought about how many of those foods could possibly be considered "native." Amidst an array of over a dozen fruits and vegetables, only three even had a chance at the title: a cluster of small bananas, the *warabe*, and a large purple sweet potato. And of those three, the *warabe* was the only one I could be certain belonged—they are the fiddleheads of *Pteridium aquilinum*, or bracken fern, which is native to virtually every corner of the planet. I had no idea if Hawaiians originally cultivated this particular variety of sweet potato, or if the tasty little apple bananas were among the hundreds of species of *maia* once raised by Polynesians across Oceania.

And even if they were, did that make them native? When botanists talk about plants in Hawai'i, they sort them into three general categories: exotic, indigenous, and endemic. Endemic plants are those found in the Hawaiian archipelago and nowhere else. Indigenous plants are species considered part of the native plant community, yet found in other parts of

the world. Exotic plants, as you know by now, are the enemy: typically introduced by humans, invasive and disruptive to the ecosystem.

Being good farmers helped Polynesians to spread across Oceania. They traveled with seeds and cuttings from their favorite crops, and used their plant companions for everything from food to fiber to fish poison. Many of these, like kava, and sweet potato, are so highly cultivated they require human intervention to propagate well. Others, like the *kukui* nut tree, are less dependent on human intervention and have naturalized to suitable habitats all over the archipelago. Regardless of their reproductive habits, botanists consider all of these indigenous, not exotic. Yet unlike the sweeping changes wrought by more recently introduced species, the “canoe plants” seem to have settled into the existing plant communities without triggering a downward spiral of extinction and simplification. The tameness of the canoe plants may have lent itself well to the continuation of Hawai’i’s existent ecosystems.

I loved the Hilo Farmer’s Market because it meant I could bring all of Asia and the New World right into my kitchen. And I loved Hawai’i in part because of its easy pluralism—no one race or ethnic group was top dog, especially not Caucasians. It was unique, like no other place I’d ever lived or visited. But did that uniqueness constitute a *culture*, a survival strategy particularly suited to a Hawaiian place? Was it bunch of independently co-existing dislocated cultures? In either case, was it endemic, indigenous or exotic? When does a human become a Hawaiian?

In the 1940’s, pioneer ecologist and philosopher Aldo Leopold wrote, “a thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community.”

Another way of phrasing this, with an eye toward change over time, is: if an event or introduced species doesn’t make an ecosystem unravel, then there is a good chance it is okay. Leopold was ahead of his time in many ways, but he wrote in a different age, when ecology

was only beginning to reveal how mind-bogglingly complex and dynamic ecosystems really are. In Leopold's era, most scientists believed ecosystems progressed gradually toward a perfect state. Today, the grace and simplicity of Leopold's statements lives on among conservation biologists and ecologists, but with the understanding that integrity and stability are complex terms encompassing substantial fluctuation and change.

Before the Polynesians arrived in the Hawaiian Islands, *koa* and *maneke* trees, with a few massive, ancient 'obi'a mixed in, dominated the dry forest canopy at higher elevations. A rich array of dozens of woody shrubs like *pilo* and *mamake* grew beneath them, along with smaller trees like the endemic *Hibiscadelphus* and the dark, waxy-leaved *Pittosporum*. Waist-high patches of lacy *palapalai* ferns and ankle-high carpets of sticky, spicy-scented *Peperomia* dotted the forest duff. Finchlike honeycreepers darted everywhere, carrying their long, curved beaks before them like scimitars, and flocks of flightless gooselike birds patrolled the forest floor in search of berries and insects. A steady hum of insect life provided a backdrop to the birdsong, and an occasional breeze wafted the sweet scent of *koa* blossoms through the trees.

With the Polynesians came dramatic change in the forests. Like the dodo and nearly every other flightless bird, the ground-patrolling flocks swiftly disappeared into the mouths of hungry people. Over time, as the human population grew and the royalty centralized wealth and power at the top, their demand for the golden feathers borne by honeycreepers drove many species to the brink of extinction. Golden feather leis and capes were the mark of royalty; it could take thousands of feathers to make just one *lei*. Though most people lived near the coast, they often visited the forests to hunt, gather plants, and cut *koa* trees, prized for dugout canoes. In their favorite spots, the people planted *ti*, whose broad leaves they used

for everything from raincoats to food wrappers, along with a few other useful plants. It is likely that, despite all these changes, the forests resembled those of pre-human times.<sup>iii</sup>

A hundred years after Captain Cook's ill-fated voyage to Hawai'i, virtually nothing of the upland forests looked the same. Cattle and feral goats dominated beneath the trees, grazing to nubbins the *palapalai* so treasured for ceremonial *leis*, and defoliating all the woody shrubs. Ranchers planted kukuyu and other grasses well-adapted to grazing; in places the forest floor resembled a well-manicured lawn. The huge *koa*, with their graceful sickle-shaped blue-green leaves, still soared overhead, along with the rough-barked *maneke*. But all the trees were old; hungry ungulates ate seedlings the moment they sprouted. A few honeycreepers remained, but house finches, pigeons, and mynah birds took their nesting sites and drowned their songs.<sup>32</sup> By the 1930's, many of the honeycreepers disappeared altogether, pushed to extinction by egg-eating black rats.

It doesn't take a nuanced definition of Leopold's "stability and integrity" to see the contrast between the introduction of Polynesians and that of Europeans. The Polynesians had a serious impact on the forest and coastal bird populations, and at lower elevations, they altered entire ecosystems. Yet the ravages of nearly a quarter-million Polynesians pale in comparison to the effects of 230 years of European influence.

Is this because the Polynesians became Hawaiians, indigenous to the place, and the Europeans did not? Steamer ships and airplanes, both of which made Hawai'i's geographic isolation a minor impediment to exotic plants and animals, probably carry the greatest blame. If the Polynesians had domesticated goats, cows and sheep, like as not, they would have joined the pig, chicken and dog in the canoe menagerie. It's possible the Hawaiian

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<sup>iii</sup> Pollen records suggest that, despite the loss of pollinators and large quantities of nitrogen caused by reductions or extinctions among bird populations, plant extinctions were relatively rare before the arrival of Europeans. European-bred pigs, goats, and cattle are by far the greatest agents of plant extinction in Hawaiian history. See Loope, 1998 for more information.

archipelago, denuded of vegetation by ravenous ungulates, would have looked more like Easter Island—war-torn, suffering from famine, riddled with gullies—than the well-fed people and verdant slopes Captains Cook, Vancouver and others met in the 1700's.

Yet many features of Hawaiian culture indicate a wealth of respect for the islands they inhabited. Most Hawaiian families honor an *'aumakua*—an ancestor spirit who protects the family and can bring good fortune. *'Aumakua* typically take the form of a plant or animal, which the family treats with great care, offering chants and small bundles of food wrapped in *ti* leaves. Hawaiians refer to themselves as *kama'aina*, the people of the land, and many *bula* dances ancient and modern are dedicated to the beauty and bounty of the islands. Even the state motto reflects the overt nature of Hawaiians' interdependence with the land: "*Ua mau ke ea o ka 'aina i ka pono*"—the life of the land is perpetuated in righteousness.

It is difficult to reconcile the fervent devotion of many modern Hawaiians and the richness of ancient ties to the land with the devastation wrought during the height of the sandalwood trade in the early 1800's. When European sailors learned that Hawaiians used the fragrant heartwood of a tree they called *'iliabi* to scent their *kapa* cloth, they realized sandalwood trees grew on the islands. This discovery came at roughly the same time India and Asia's sandalwood forests neared exhaustion, due to demand for sandalwood incense and carvings. The sailors, quickly realizing they were looking at wealth beyond compare, began purchasing loads of sandalwood from the Hawaiian royalty for European goods and pocket change, then selling it in India for riches untold. The greed of Hawaiian royalty for European products—unlike anything they'd ever seen before—was unquenchable, and with no sense of the actual worth of such items, they paid ridiculous sums. One chief purportedly paid the equivalent of \$800 for a single mirror.



Common Hawaiians paid the price as much as the *'aina*. Driven by chiefs to log the forest round the clock on pain of death, they dragged large logs up and down precipitous cliffsides on their bare backs. William Ellis, an English visitor to the Big Island, described the scene in his journal:

Before daylight...we were roused by vast multitudes of people passing through the district from Waimea with sandal wood. There were between two and three thousand men, carrying each from one to six pieces of sandal wood, according to their size and weight. It was generally tied on their backs by bands made of *ti* leaves, passed over the shoulders and under the arms, and fastened across the breast... almost the whole population [was] employed in the mountains cutting sandal wood."<sup>33</sup>

Essentially enslaved as loggers, Hawaiians had little time to tend their *taro* patches or fish. They suffered at least two major famines during the forty years of sandalwood trade, and were a broken people at its end, their ways of subsistence farming and fishing crippled by the brutal entry into a cash economy brought on by the sandalwood years.

The Hawaiian archipelago is home to at least a half-dozen endemic species of sandalwood, ranging in size from small, rounded trees reaching no more than twenty feet in height to great, broad-trunked trees more than sixty feet tall. All are slow-growing and partially saprophytic—their roots twine with those of nearby plants, stealing some of their nutrients. This allows them to get away with producing less chlorophyll, which in turn saves them considerable energy. It also lets other pigments shine through; the foliage of young sandalwood branches ranges from flame red at the tip down to a striking blue-green, the hue changing gradually from leaf to leaf as in a rainbow. Such branches are a lucky find, as so few sandalwood remain, and rats often eat their black, olive-like seeds before they even touch the ground. Hawai'i, once known in Asia as "The Sandalwood Mountains," has lost its *'iliabi* forests, possibly for good.

Hawaiians today mourn both the passing of the *'iliabi* forests and the suffering of their people. It may be that it is this recognition of past wrongs that identifies them as indigenous.

If the habits and customs of a people change to reflect the lessons learned by their ancestors, haven't they come a step closer to being a part of the biotic community? As William Jordan points out in his musings on ecological restoration, "there are psychological, social and biological barriers around a community, and crossing them is neither easy nor 'natural', but is difficult and involves hard emotional work."<sup>34</sup> Willingness to engage in this hard work—to come to terms with the destruction wrought, and taking steps to repair the damage—may be what identifies a true Hawaiian, more so than the foods they eat or the genes they carry.



At the canoe regatta, the teams from the park fared very well, returning home with several beautiful trophies: two intricate model outrigger canoes nearly two feet long, carved of *koa* and other native woods, and a beautiful honey-colored drum carved from a *koa* stump. Aku hosted a combination victory and 50<sup>th</sup> birthday party and invited all the paddlers and supporters from the park to attend. Several of us drove down together, and when we arrived at his house, near where the ancient fishing village of Kalapana once stood, a couple of party tents full of food and people already dotted the wide lawn. Every new carful of people bore more tinfoil packets, and before long, the picnic tables were covered with good Hawaiian food: several different kinds of *poke*, raw marlin or tuna marinated in a mix of seaweed and soy sauce; *kulolo*, a sweet puddingbread made from shredded coconut, coconut milk and taro root; firm, pale chunks of breadfruit; a variety of meats and rice, wrapped in *ti* leaves and smoked or steamed... and those were just the appetizers.

After wishing Aku a happy birthday, I wandered over to a table next to the house where the trophies sat, ringed with *ti*-leaf *leis* and surrounded by cards and presents. Adding a few photos I'd taken at the regatta to the display, I then turned to enjoy the scene. People crowded around the food, laughing and eating, speaking in pidgin, Hawaiian, English with

American, British and German accents. Aku, shirtless and adorned with several *leis* of *lehua* and plumeria blossoms, strode by, accepting good wishes and congratulations from a flock of iron-haired Hawaiian women in *muumuus*. Clear across the lawn, I heard a woman exclaiming over the mango gingersnaps I'd brought, demanding to be taken at once to their creator.

I wondered what Aku would say if I asked him if these people were Hawaiians. I suspected his answer would be slow in coming, and involve some distinctions between those with a right to claim Hawaiian Homelands (Hawai'i's version of reservation lands) and those who don't. But for those who honored the land in spirit, culture and deed, I imagined his answer might be "yes." And perhaps, if I were to spend many years here, and ceased talking of returning to the mainland, I would also be Hawaiian, local, of the islands.

As the evening wore on, Aku and others drifted to a makeshift stage near the house, where they played *ukelele* and sang songs in Hawaiian and English. One elderly Hawaiian woman in a colorfully patterned *muumuu* stood and danced *hula* as Aku and a middle-aged Caucasian woman in a yellow dress played a duet. The grace of her motion gave no hint of the wear of age, her hips and hands swaying in precise, fluid motions. When they finished playing, before anyone could break into applause, she spoke at length in Hawaiian, addressing Aku with what seemed to be a blessing as she held his shoulders in her hands. Though I couldn't understand her words, the tears rolling down his cheeks were an eloquent enough translation.

## Myths of A Different Kind

*“Nature alone cannot explain this landscape. You need history, too.”*

*-William Cronon*

In the springtime, before the rains of May drench the island, the *koa* forests on Mauna Loa’s slopes come alive with the steady thrum of thousands of bees. The sweet scent of the *koa*’s pale yellow, cotton-tuft flowers, draws the bees to the canopy for weeks, and their industrious buzzing sounds like a distant plane overhead, circling but never drawing closer. It’s a bit unnerving at first, but there are no africanized bees to worry about here—just bees, native and European, drunk on endless quantities of sweet nectar that once drew flocks of honeycreepers and untold numbers of insects.

Sierra and I stood at opposite ends of a 30-meter tape measure, wrapped in the gentle cocoon of sound and dappled with foliage-filtered afternoon sun. She squinted down the tape at me from behind her compass, inching back and forth till she was satisfied that we had precisely aligned the tape with our coordinates. When she hollered, “Okay!” I wrapped the tape reel around a sturdy twig to keep it from retracting and went to meet her at the opposite end. She handed me a thin pole two meters high, and we worked our way down the tape, stopping at regular intervals to record every type of vegetation touching the pole as I held it perpendicular to the tape. Sierra reminded me of names where necessary, but mostly she recorded, the scritch of her pencil a counterpoint to my recitation.

With this monitoring exercise, called pole-intercept, we could record changes over time in the vegetation composition of the forest floor. The area we were in, called Kipuka Ki, had a varied history: as a *kipuka*, an island of vegetation surrounded by younger lava flows, its soils were richer and deeper, and its plant community older, than the surrounding area. But it had been ranchland for many years before becoming a part of the park. After gaining protection, feral cattle still roamed its reaches, grazing and spreading weeds in their manure. When the park installed fences and cattle guards to protect the area, over twenty years ago, vegetation slowly began to return to its former state. Exotic grasses still carpet the forest floor in many areas, creating a parklike atmosphere, but in places where the grasses have been sprayed or never took over, woody, sweet-scented *maile* vines twine their way toward the sun, and young *koas*, *pilo* shrubs and dozens of other native plants are gaining a foothold. Smaller plants like *Styphelia*, Hawai'i's endemic "mintless mint," which shed its sharp taste upon reaching ungulate-free shores, have rebounded, though some species are sensitive to the herbicides used on the grasses and so may experience difficulty reclaiming the soil.

One such species is *Microlepia strigosa*, called *palapalai* by the Hawaiians. These delicate-looking, bright green ferns grow in clumps or in dense stands covering many square meters, their fronds sometimes arching nearly five feet from the base. Traditional *hula* dancers consider this fern essential to their craft, and weave the fronds into lush, feathery-looking wreaths, bracelets and anklets worn when they dance, and cover altars with its hay-scented fronds. Some *hula* dancers recently gained permission to collect *palapalai* fronds within the park to make *leis* for their performances at the Merrie Monarch festival, a worldwide *hula* demonstration and competition held in Hilo each year. Rhonda wanted to know if allowing *palapalai* harvesting would reduce the amount of healthy fern cover in Kipuka Ki, and so we

were monitoring the area just before the harvest period to establish a baseline; six months later, they would do the same thing to detect any changes in cover density.

All too soon it was time to head back to the office. We reluctantly packed up our equipment and headed back toward the road, pausing occasionally to admire some small, poetic feature of our surroundings. Our previous difficulty locating the transects prompted me to suggest we tie some pink flagging near the road to simplify matters the next day.

“We can’t. Park policy.”

“What is? We use flagging to mark locations all the time!”

“Yes, but only in places where it won’t be seen by the public. They aren’t suppose to see signs of management efforts. It detracts from the visitors’ experience, or so we’re told.”

I stuck the roll of flagging back in my cargo pocket and wondered to myself how it was that a bit of flagging here and there would detract from a visitor’s experience. Why did we have to hide evidence of our work from public view? I found it very interesting that Hawaiians were again able to gather plants from their traditional sites—wouldn’t others? True, pink flagging didn’t tell that story, but it could serve as the prompt for a question at the visitor’s center. And shouldn’t we be drawing attention *to* restoration projects? What better way to educate the public about the perils facing Hawaiian ecosystems than to expose how much work goes into protecting and sustaining them?

What I had forgotten is that the national parks strive to educate only insofar as it helps to provide a “natural” experience for visitors. Writing about a report prepared for the National Park Service in 1963, William Jordan calls attention to some of the historical antecedents of this management principle:

Treating the parks rather like exhibits in a museum, the committee suggested that each park should be managed as ‘a vignette of primitive America,’ providing a ‘reasonable illusion’ of the pre-contact landscape. Thus they conceived of the parks in theatrical terms, as an illusion, like a stage set...the work of creating the illusion was to be carried out discreetly backstage by a

corps of professional specialists. They noted specifically that ‘observable artificiality in any form must be minimized and obscured in every possible way...the sights and sounds of [management] activity should be hidden from visitors insofar as possible.’<sup>35</sup>

It startled me to realize that for at least forty years now, national parks have been very consciously managed as “reasonable illusions.” Such language hearkened back to the users of the Claude Glass in the 1800’s, best able to appreciate nature when it was rendered as a murky reflection, framed prettily in gilt.<sup>36</sup> Like most visitors, I’d long believed the national parks were managed primarily to their own benefit; my presence was allowed as a gracious, though temporary, act of benevolence on the part of those working to protect and preserve the wilderness I photographed and hiked. I savored hiking in national parks because it offered such an “authentic” experience of nature, but never realized how much effort went toward managing *my* experience to make it seem untainted by any human touch other than my own.

Daniel Graber, a senior advisor to the National Park Service, phrases this management principle a bit more delicately: “By long-standing custom... national parks endeavor to provide visitors with an experience of nature as devoid of artifice and manipulation as possible consistent with NPS policies.”<sup>37</sup> What exactly are they defining as “artifice”? Concealing evidence of the restoration work happening throughout Hawai’i Volcanoes National Park seemed well within the bounds of “artifice” to me. I wondered if Eric Katz and other restoration critics ever read that 1963 report; certainly it shows that the artifactuality of restoration projects pales in comparison to the sleight-of-hand practiced in what most consider the wildest of America’s lands.

Struggling with similar themes, Eric Higgs and his colleague Julie Cypher turned to Disneyland, reasoning that its unabashed artificiality offered an excellent setting for laying bare our expectations for a “natural” experience. They visited the Wilderness Lodge, a huge hotel surrounded by redwoods and other flora, decidedly more Sierra than swampland. The

hotel, though made of cast concrete, appears to be crafted from logs and sandstone; a bubbling creek meanders through the lobby and leads outside to a carefully designed landscape which includes an Old Faithful-like geyser. It comes complete with interpretive materials that provide a fictional frontier-era history for the Lodge. Higgs writes, “It reinforces the ideas of nature without people, wild and dangerous unknowns, noble Indians, gritty settlers, and the soul of the American people who sought to preserve beauty against rapacious developments.”<sup>38</sup>

This is the natural experience desired by most visitors to national parks—myself included, until I began to engage in the work of restoration. Is the desire an innate, natural longing for immersion in the wild, as John Muir and so many others have argued from the Romantic Era on? Or is it due to the fact that, “Disney’s imaginers and designers working at other institutions are not merely regulating impressions of experience, they are reconfiguring people’s imaginative capacities”?<sup>39</sup>

There is no way to parse out the exact sources for our longing to see places devoid of human constructions, seemingly untouched. Be it the pull of the unknown, a need to alleviate guilt inspired by all the altered landscapes we’ve created, or a commercial contrivance, the longing is a real and powerful force in Western cultures. However, the way in which people choose to honor that longing varies wildly. For some, Disneyworld’s Wilderness Lodge may seem sufficient. But as Freeman House observes, “When the stories of vernacular culture are replaced by the stunningly crafted televised myths of consumer culture, then people will tend to lose the direct sense of relation to local places.”<sup>40</sup> It’s one thing to carefully craft a visitor’s experience of the natural world, leaving out the behind-the-scenes stories; carefully crafting a facsimile of the natural world and passing it off as genuine exchanges a “storied wilderness” for a wilderness story.<sup>41</sup>





Perched overhead in an '*obi*'a tree, a brilliant red *apapane* chirped and whistled his appreciation to the sunset at the Kilauea Iki overlook in the park. As I watched, he poked his beak into a red pompom-shaped *lehua* blossom, sipping nectar through his pointy, curved, rather un-finchlike beak, one dark eye returning my gaze. The *apapane* was among the over thirty species and subspecies of finches endemic to the islands. Descended from a single common ancestor species, they shapeshifted over the ages, taking advantage of the lack of competition from other bird species to become insect eaters, nectar-sippers, fruit-eaters, seed-crackers—an incredible array of life forms sprung from one small source, each tricked out in different beaks, colors and sizes reflecting the needs of their particular lifestyle.

As the last few rays slipped behind the huge cinder-and spatter cone left behind by Kilauea Iki's 1959 eruption, a breeze wafted across the crater, filling my nostrils with the thick, sulphurous scent of vog. I rose from my sheltered spot beneath the guard rail and turned to the path toward home. The parking lot, which had been nearly full when I arrived, was now empty except for one white Dodge Neon. A couple of *kalij*, pheasant-like game birds introduced to the islands from India by hunters, were pecking up bits of junk food and trash scattered across the asphalt. These birds are so plentiful along the upper reaches of the Summit Road leading up Mauna Loa's flanks that it is often necessary to drive slowly, allowing them to scatter into the brush as the vehicle approaches. Sometimes a brightly-plumed male chases a hen right down the middle of the road, oblivious to any traffic, and engages in lurid acts inches from the fender.

I was about to leave when one lingering tourist, dressed in khaki shorts, white knee socks, sandals and a green-and-navy aloha shirt, emerged from a trail through the forest on the opposite side of the lot. The *kalij* came into his line of sight as he rounded the rear of his car.

As I watched unseen, he froze in his tracks, instinctively dropping low to avoid being seen by the birds, who continued to peck away, oblivious. The man removed the lens cap from his SUV-sized camera and crept toward the kalij, hardly daring to breathe till he was less than ten feet away. In slow motion, he kneeled, then lay prostrate on the pavement, steadying the camera with his elbows. The birds had found a half-eaten bag of Cheetos and were attacking it with abandon. They didn't even hear the staccato whirr of the one-man paparazzi.

I nearly stepped from my concealment to tell the guy he'd just shot an entire roll on the local equivalent of chickens, but the *apapane* trilled again, distracting me, and he left before I had a second chance. I wondered if he'd taken similar pains to photograph the *apapane*, which he'd likely seen and heard everywhere that day. I also wondered if knowing the kalij were an exotic nuisance would alter his impression of them. He's right, the kalij are beautiful birds. That they happen to be exotic and as dumb and common as rocks doesn't change that experience of beauty for him in the way it changes it for me. Were I to encounter them in a zoo or their native habitat, they probably would have stopped me in my tracks, too. I envied his ability to connect with a sense of wonder at the natural world that I must work a little harder to attain.

Yet it troubled me that so few of Hawai'i's visitors cared to make the distinction between native Hawai'i and the one in tourist brochures. Much like visitors to Disneyland's Wilderness Lodge, the vast majority of what they photographed, bought, and ate on vacation in Hawai'i came from other parts of the world. The park presented one of the few places anywhere in the state where it was possible to have a different experience—if one read up in advance. In that regard, the park would do well to take a page from Disneyworld: a few facts about invasive species were tucked away on worn kiosks and in self-guided touring materials, but the *story* of invasion and restoration was absent.

In the Apostle Islands, a soon-to-be wilderness area high up along Wisconsin's Lake Michigan shoreline, managers have grappled with the visible presence of settlement—something which would normally exclude an area from wilderness designation.

Environmental historian William Cronan writes, “To acknowledge past human impacts upon these islands is not to call into question their wildness; it is rather to celebrate, along with the human past, the robust ability of wild nature to sustain itself when people give it the freedom it needs to flourish in their midst.”

This story is also present within Hawai'i Volcanoes, but it is carefully hidden from view. Humans excel at myth-making; we don't need a script, just a few interesting and informative prompts. What if curious visitors came across pink flagging bearing a metal tag briefly explaining its purpose? Or if some of the interpretive hikes led by rangers toured through restoration sites? Could one of the eco-tour programs on the island work with the park to create native flora planting tours? Obviously there's a relatively small number of people for whom any of this would have much appeal. But with over a million visitors a year passing through the gates, there's significant potential for many people to come away from the park knowing a very different Hawai'i than the one seen from a tour bus.



On a Sunday a few weeks later, I woke late to a day flushed with early heat. Earlier in the spring, the morning breezes carried the cool, damp promise of afternoon rains, but now I only caught the warm, dusty scent of dry *uluhe* fern as I walked along the path through the forest to the visitor's center. A tangle of the vines, both live and dead, closed briefly over my head, forming a tunnel of dense, ferny foliage. In places their slender purple fiddleheads, climbing for the canopy, caught stray sunbeams and seemed to radiate an amethyst light of

their own. Nearer to the Volcano House, the sounds of automobiles and human chatter rose against the backdrop of birdsong.

Emerging from the forest onto the flagstones at the rear of the historic hotel, I encountered groups of people, gazing out over the steaming, blackened wasteland of Kilauea Crater through the pay-per-view spotting scopes. When Mark Twain viewed the volcano from a similar vantage point in 1866, he, too, marveled at the sight: “I have seen Vesuvius since, but it was a mere toy, a child’s volcano, compared to this. Here was a yawning pit upon whose floor the armies of Russia could camp, and have room to spare... You could not compass it—it was the idea of eternity made tangible—and the longest end of it made visible to the naked eye!”

Twain visited during one of Kilauea’s more active phases; at the time, most of the crater was a cauldron of molten lava, thinly capped by a skin of hardened basalt, and a roiling lake of liquid rock filled Pele’s home in Halema’uma’u. Yet Twain was so taken with the volcano that he set out across its barely-solid surface at night, determined to view Pele’s fires up close. Sitting on a precipice overhanging the lake, he described the scene:

Under us, and stretching away before us, was a heaving sea of molten fire of seemingly limitless extent. The glare from it was so blinding that it was some time before we could bear to look upon it steadily. At unequal distances all around the shores of the lake were nearly white-hot chimneys or hollow drums of lava, four or five feet high, and up through them were bursting gorgeous sprays of lava spouts and gem spangles, some white, some red and some golden—a ceaseless bombardment, and one that fascinated the eye with its unapproachable splendor. The most distant jets, sparkling up through an intervening gossamer veil of vapor, seemed miles away; and the further the curving ranks of fiery mountains receded, the more fairylike and beautiful they appeared.<sup>42</sup>

Given a history of such spectacles, it’s little wonder Hawaiians consider Kilauea a sacred place. A *pa hula* dedicated to Pele has stood on the northeastern rim of the crater for generations, though the crumbling edge has proven a poor construction site in at least one instance. *Pa hulas* are platforms used exclusively for performances of *hula kabiko*, the

traditional *bula* which is as much prayer and history recital as it is a dance. The *pa bula* currently in a clearing near the Visitor's Center is made of rough, rounded basalt rocks, fit together so neatly they require no mortar. It rises several feet to form a level platform topped with a living thatch of soft, short grass. Sacred *ti* plants line the base, and other useful Hawaiian plants fill nearby beds. The *pa bula* faces Halema'uma'u, though a screen of '*obi'a* has grown up since its construction, obscuring most of the view.

When the original *pa bula* fell into Kilauea, many years passed before the park, working with nearby Volcano Art Center, decided to replace it. Park officials selected a site, then thought to consult with a local *kumu bula*, a master of the sacred dance. The director of the art center contacted Edith Kanaka'ole, who counted Pele among her ancestors, a family '*aumakua*.

Auntie Edith came to the park and visited the site they'd chosen, but shook her head and led them to the place where the *pa bula* now stands. She told them this was the place, and no other would do—she had seen it in a dream. However, an ancient tree stood precisely where she pointed, and park regulations forbade felling trees of that stature for construction purposes, especially when other sites were readily available. The officials told her it was an unsuitable location. Not long after, the tree fell over in a great storm. The *pa bula* was built in 1980, mostly by native Hawaiians, exactly where Auntie Edith indicated it belonged.<sup>43</sup>

A few weeks ago I'd watched an historic *bula* ceremony take place on the platform. For the first time in decades, *kumu bula* from the Big Island, Maui and Kauai performed together. The only type of *bula* I'd seen before was the cheesy Don Ho style, all sashaying hips and lilting arms, performed to songs with lyrics like, "I want to go back/ to my little grass shack/and eat some fish and *poi*." The *bula kabiko* compared to the *bula* I was familiar with as evening vespers sung by monks in a small chapel do to a Britney Spears concert. The crowd remained transfixed for nearly three hours as the *kumu*, two women and a man, backed by

four younger men and women, performed the ancient chants, thumping and shaking polished gourds decorated with elaborately woven strings of seeds and shells to provide rhythm for their speech and motion. They took care to explain many of the chants and dances to the audience, though the prayers dedicated to Pele, whose *pa hula* they performed upon, remained untranslated. I respected their ability to educate the public while also holding back a few things as mystery, sacred, meant only for the gods and their devotees.

The scene I'd witnessed at the *pa hula* and the history of its creation struck me as a very positive, if subtle, challenge to the way Hawaiian culture—as well as any other indigenous culture—is often presented to and interpreted by the public. One of the most common mistakes we make—in schools, media, art—when discussing the interactions between indigenous cultures and nature is to step into Mister Peabody's wayback machine and view things only as they were (as best as archaeologists can discern), while ignoring the way things are. We go back, to primitive times when there were no options beyond stone, sinew and plant fibers, so astonished at what they accomplished with such simple materials that we fail to notice the vibrant and continuous relationship between the people and place. Their ancient accomplishments deserve our curiosity and respect, but contemporary indigenous cultures too often live in the shadows of this great romance. Contemporary native Hawaiians, preparing for *kahiko hula* ceremonies, gathered *palapalai* fronds, *lehua* blossoms and sweet-scented *maile* vines from ancestral collection areas in the park, yet this was rarely mentioned to visitors.

Despite decades of oppression by missionaries, the *hula* survived to modern times not as an artifact, but as a living, essential component of Hawaiian culture. It honors a relationship to the natural world that, somehow, survived beyond the stone age, and continues to sustain and be sustained by its people. Today, *kumu hula* do not lack for students, and they come from every age, ethnic background and income bracket. Sierra, one of the vegetation

technicians I frequently worked with, had been taking *bula* lessons from one of the most revered *kumu* on the island for over a year. Originally from Colorado, she loved learning *bula*. The lessons often left her muscles sore and strained the next day, but the connection to Hawai'i she experienced—learning history, religion, plants and animals through song and dance—proved well worth the minor discomfort. She and the other students of *bula* are recreating the connection of people to the unique place that is Hawai'i, adding the layers of their own stories and experiences as they go.

It is possible that traditional Hawaiian practices may grace restoration projects as well, connecting ancient ways of knowing and caring for the land to modern practices. On the island of Maui in Haleakala National Park, restorationists invited a local *kumu*, teacher of traditional ways, to bless their first major outplanting of rare trees in Auwahi, an area once renowned on the island for its medicinal plants. For Art Medeiros, the program leader and a local (“local” in the vernacular means born in the islands), the blessing called forth the human history of the *‘aina*, reminding him of the role Hawaiians once played in the forests:

Framed by the rusty-red *liko* (leaf buds) of the *kaunila*, Bully Kapahulehua trumpeted the *pu'ole'ole* (conch shell) for each of the four cardinal directions. The loud brave cry filed the emptied forest, echoing off its rocky ridges. I found myself wondering how long it had been since the *pu'ole'ole* had sounded at Auwahi. One hundred years? Two hundred? Three hundred? More? Maybe that was why the dryland forest at Auwahi had fallen on such hard times!<sup>44</sup>

Oftentimes, non-indigenous people wishing to form connections to their natural surroundings also find their way obscured by simplified notions of how wild the world once was. The NPS practices and policies defend a Claude Glass view of the natural world, framed to exclude the active human presence. As William Jordan writes, “Since the preservation—that is, the long-term survival of actual ecosystems—*ultimately depends on restoration*, the choice is not whether to preserve the old meaning or create new ones. It is, rather, whether we will

find new ways for the old species and ecosystems to survive and take on new meanings, or whether we will sacrifice them to the mistaken idea that we can preserve the old meanings.”<sup>45</sup>

One of the most basic principles of the science of ecology is that the larger an area, the more species in that area. Referred to as the species-area relationship, it's the primary reason there are more species of plants in the Hawaiian archipelago than on the tiny coral atoll of Palau. Ecologist Michael Rosenzweig spent years studying these relationships, and has concluded that, “The loss of ecological theatre is changing the evolutionary play.”<sup>46</sup> Humans are literally taking up too much space on the planet, and dividing habitat into ever-smaller, more isolated chunks. By isolating small populations of animals, we compromise nature's ability to adapt to new conditions through genetic exchange. According to Rosenzweig, we need to stop thinking of things like habitat and species diversity as a separate realm—the natural world—and quite literally re-weave our backyards, agricultural fields and urban spaces into the tapestry of local ecosystems—a practice he terms “reconciliation ecology.”

In an age where climate change, deforestation, overpopulation and other human-caused ills are too great to ignore, it is no longer plausible for our culture to continue believing the only nature is nature without the human touch. Our fingerprints are everywhere, and they are primarily incriminating. It's time for the nature-lovers of the Western Hemisphere to start leaving new dirty fingerprints—fingerprints bearing fresh loam and sweat, fingerprints left on shovels and identification guides, history books and the sleeves of the *kumus* of the land.



## The Fruits of Knowledge

*You don't experience wonder the way you experience facts. Most facts tend to just sit there, inert, like objects on a shelf, until you reach up and decide to grab one. With wonder, **you're** the object on the shelf. Wonder reaches off the shelf and grabs **you**.*

*-David James Duncan, "River Teeth"*

"What are *those?* Lemons?" Amelia beckoned me over to a shrub half-hidden in the tall grass and pointed at several dangling yellow fruit the size of a tennis ball. Her brown eyes, set in a face unusually pale for a resident of the islands, peered up at me from beneath overgrown blonde bangs. Surprised by her ignorance, I told her it was a strawberry guava.

"You know, like the Pass-O-Guava juice. The guava part of the juice comes from inside these." Pass-O-Guava is the unofficial drink of Hawai'i, made from a dash of passionfruit and guava juices and a lot of corn syrup. The local airlines serve little foil-covered cups of it to every customer, and most shopping carts in the grocery store checkout line bear at least one jug of the pink stuff. I found it disgusting at first, but like the Hawaiianized pop songs you hear everywhere in the islands, it grows on you till one day, you're slugging it back or humming along without a second thought.

Amelia's face brightened considerably. "Oh! Yeah, we get that at school a lot. I didn't know it came from fruit." Looking hopeful, she asked if she could eat the guava.

"Well, you can, but they're kinda sour, and it's messy." I plucked one of the fruits and sank my thumb through the rind, tearing it open to show her the goopy, stringy pink flesh and

seeds contained within. She prodded it and sucked on her finger, looking thoughtful for a moment, then grimacing as the tartness hit her tastebuds.

Earlier that morning, I had piled into one of the rusty white park vans along with Sierra, one of the vegetation technicians, two den mothers and a clutch of chattering eight and nine-year old Girl Scouts from Hilo. They'd come to the park to help out with *mamane* seed collection. It filled the requirement for a badge on environmental service and learning. On the way down to Hilina Pali Road, Sierra and I tried to explain a little bit about the restoration work we were doing in the area. Maria, a stout Filipino woman with a commanding voice, kept hollering at the girls to be still and listen as we "talked story". But we surrendered after a few rounds—not even Sierra, who had been talking about starting a family soon, could persevere in the face of their inattention and giggling. After the final attempt, she leaned over to me and muttered, "Maybe Kuponon and I *don't* want to have kids right away." \*

By the time we got out of the van, the girls had calmed down a little. Up at the research station they'd been shivering in the chilly morning fog; now several of them were already asking for water and hats. Maria scolded the girls in sandals for not wearing sneakers, and asked if we had extra water with us. We didn't, and out almost to the end of the road, we were a long ways from more. We were close enough to the East Rift Zone and its hidden crevices to warrant some caution with the children. After assigning several girls to each adult and instructing them to stay close to one another, we handed around big trash bags and headed toward the groves of *mamane* trees dotting the rugged grasslands.

Two of my girls quickly glommed onto the other den mother, and I was left with shy, lanky Amelia. After a few feeble attempts at conversation on my part, we fell into the companionable silence of people focused on the task at hand, listening to the ever-present wind singing through the grass and the trees. She clearly enjoyed the challenge, snaking her

way deep inside clusters of smaller *mamane* trees to reach every last-sticky green seed pod and collecting them in a fold of her shirt till they threatened to spill out. When her shirt was full, she tracked her way carefully across the crumbling *a'a* to wherever I was, and deposited her haul in my trash bag with a faint smile of satisfaction on her face.

We had been engaged in this wordless exchange for more than half an hour when she asked about the guava, and my surprise stemmed in part from her apparent ease in these environs. I simply assumed that she would be able to identify guava—it is one of the most common invasive plants on the island, and often finds a home in yards and abandoned lots. When I was Amelia's age, forgotten places like those were my favorite playgrounds, and the names of the common trees and flowers found there rolled easily off my tongue, especially those bearing edible fruit. Like most children, I deeply loved the process of learning the lay of my land. I knew when the mayflower “apples” were ripe in spring, and raced the squirrels for the bittersweet beechnuts in their prickly shells in early autumn. The local pack of neighborhood kids kept vigil over the blackberries and raspberries come July, plucking berries the moment they ripened. Ethnobotanist Gary Nabhan, writing about his own childhood, recalls completing a leaf identification assignment for school. “I remember the thrill of appropriating the object, the first step, and then, at the next level, of harvesting the power of its name. This was a new kind of knowledge... These sources of power lay around unclaimed and unowned, there for the taking.”<sup>47</sup>

But I was Amelia's age twenty years ago, in the early days of Atari, not chat rooms, before eight-to-ten year olds became a significant “consumer group” directly targeted by thousands of ads, and when parents still felt it was safe for their children to play outside largely unsupervised. To be sure, it's not merely a generation gap that created the difference in my knowledge base and Amelia's—I grew up in an environment where I was allowed and

encouraged to experience the outdoors with all five senses, both by family and the sheer ease of access.

That freedom to learn on my own fundamentally shaped who I am today. Much of my work in the park was a more sophisticated version of my childhood play: collecting seeds, digging and planting, and carefully observing the world around me. Surrounded by people similarly engaged, I had naively assumed everyone in Hawai'i—especially on the Big Island, which is quite rural—lived like I did: without TV, outside as much as in, trying to absorb every detail about the immediate world. It saddened me to realize that, though a temporary interloper, I knew more about this place than the ones who were likely to spend most of their lives on the islands.

Ecological illiteracy is in no way limited to the islands of Hawai'i, or to any particular generation. Even as the ranks of the Sierra Club swell and enterprising environmentalists transform eco-tourism into a full-fledged industry, it seems fewer people harbor intimate knowledge of their home ecosystem. Robert Michael Pyle, lepidopterist and naturalist, observes, “In many parts of the world, notably the most developed, contemporary society lacks a widespread sense of intimacy with the living world... Many tourists, members of natural history groups, and participants in countryside pursuits merely skim the surface of the landscape, reaping a shallow reward and a weak relationship.”<sup>48</sup>

Pyle and others have argued that these weak relationships to the living world are among the primary causes of the environmental destruction so prevalent across the globe today. In a consumer culture, where landscapes are little more than 3-D drive-through postcards, such image-saturation familiarity provides the gloss of experiencing the living world without actually engaging it. And, as Pyle writes, “Those who know less, care less, and therefore act less, leading to still more losses. The sequelae of extinction and alienation are

further loss and greater detachment, round and round.” He terms this cycle, “the extinction of experience.”<sup>49</sup>

Amelia was still studying the guava, peering closely at one hanging from an eye-level branch. I told her she could pick those, too, and handed her a large Ziploc bag. After she collected the guava, she joined me at a mid-sized *mamane* tree. Though she was silent, it seemed like she might be interested in learning about the area, more so than she and her counterparts had been on the way down in the van. I told her about guava, and how the pigs and birds spread it around, and why it invasive plants were bad. When I had finished what I thought was quite an informative and interesting tale about guavas, with a few *mamane* factoids thrown in for good measure, she issued a nondescript “hmm” and wandered to the next stand of trees, pausing briefly to pick more guavas.

Had she been listening to me? Certainly. But what I offered to her was the type of learning we come to expect as grown-ups—handed down from on high by a voice of authority. It’s as though as adults we forget the promise and delight of wondering, not knowing, of dreaming up possibilities instead of turning to authority to identify the truth.

This contrast in learning styles came up in a recent conversation with a friend who works with both adults and younger students, using experience and modeling to teach them about endangered sea turtles. She “dresses” students, young and adult alike, in faux turtle shells made of paper to illustrate the different shapes, patterns and sizes found among shells of different species. “It’s funny to watch. The adults put them on and stand there, waiting for you to explain the differences, and the kids just go to work, practicing measuring the shells, talking about what they see. You can tell the adults have forgotten how to play.” And this inability to play is beginning at ever-earlier ages: another friend of mine who has taught elementary school for nearly thirty years reports that kids no longer know how to play during

recess. She and the other teachers must show the children how to perform even the simplest games. Stories like these make me wonder, without play, where will creativity and curiosity, humankind's greatest gifts, thrive?

If someone had dragged me out into the Michigan woods of my childhood and lectured on each flower in turn, I doubt I would have said much more than “hmm” myself. I needed to revel in the element of discovery, plucking a leaf of an unknown plant to see what it smelled like: did it smell like onions? Maybe it was a wild leek! Maybe the Indians who used to live here ate it. I needed the opportunity to take that leaf home and paw through the identification guides. I needed to claim the raw power of imagining for myself, making “stews” of wild leeks and water in empty margarine containers as I dreamed people might have done long ago. Through that mix of fact and speculation, imagination and experience, wild leeks became an important fixture in the realms of my childhood. Even though guava are reviled exotics, displacing native plants and supporting destructive populations of feral pigs, I hoped the power of naming them might open the door on such a relationship to the landscape for Amelia.

After an hour, I saw Sierra and the two den mothers coming back up the road, trailed by clusters of girls. Several looked a little pink from sunburn, and others complained of thirst. As they ate their lunches in the shade of the van, Sierra and I talked outside. I asked her how the rest of the group had fared.

“Well, one girl lost her shoe—it’s just gone, way down in a crack. We couldn’t even see it. I have no idea how it got down there. But at least it’s not like last year—no broken toes or major scratches.”

“Better the shoe than the girl! They look pretty beat. Should we call it a day?”

Sierra suggested that we try doing a little more work after a break—apparently the girls needed to do more service hours to earn their badge. Soon a roly-poly girl in a pink tank top and denim shorts emerged from the van, squirming uncomfortably. She sidled up to us and mumbled, “Is there a bathroom around somewhere?”

Sierra pointed down the road. “There’s an outhouse down there, but it’s a walk. You could just go in the bushes. That’s what we usually do.” I nodded in confirmation. The girl looked at us like we’d cheerfully admitted to cannibalism. Staring down the road once more, she fidgeted with the strap of her tank top a while before asking Sierra, “But how do you go in the bushes?” Sierra winked at me and led the girl over the nearest hillock for a lesson on how to pee without peeing on your shorts.

We rode back up to Chain of Craters Road in relative peace, the girls having cooled off and filled their stomachs. On the way, Maria and I chatted a bit. I learned that though she’d lived on the Big Island most of her life, this was her second visit to the park. Only a couple of the girls had ever been there before.

Sierra drove slowly along the road for a while as we both looked for the small black ovals of ripe *naupaka* berries. We spotted only a couple, but she shrugged and suggested we get out anyway and show the scouts a different part of the park. There was a marked listlessness among the girls as we disembarked; the girl who lost her shoe insisted on staying in the van, and one of the den mothers remained with her. Other girls attempted to stay, too. Sierra and I shot each other despairing glances.

Trying to garner some enthusiasm among the kids, I kneeled down and began sorting through the gravel surrounding us. This area was directly downwind of a huge eruption at Kilauea some years back, one that sent skyward huge fountains of lava. The “gravel” we stood upon was actually deep drifts of tephra, pea-sized cinders of hardened lava. I quickly

found what I was looking for, and held aloft on my palm a small black, tear-shaped stone that shimmered with iridescence in the sun.

“Do you know what this is?” I asked the girl nearest to me. She squinted at it, then shook her head.

“It’s one of Pele’s tears. When the volcano explodes, the lava droplets fly through the air and harden in these tear shapes. In the old days, people thought Pele made them when she cried.”

The girl’s eyes widened. “Hey, how did you find that?”

Before long, the girl had told her friends the story, and a cluster of them burrowed through the cinders, searching for the obsidian gleam of the tears. Several ran to Maria, proudly displaying their best finds. Sierra and I collected *naupaka* seeds while they scabbled, and before long, a few girls joined us, having tired of their quest. We worked our way deeper into the cinder drifts, eventually losing sight of the road behind clumps of stunted ‘*obi*’a and shrubbery.

Soon I heard Amelia behind me, asking, “Can we eat *these*?” I turned and saw her pointing at an *ohelo* bush, its clusters of red blueberry-like fruit dancing enticingly in the wind. I hesitated a moment, thinking of the ‘*akia*, another bush with red berries that grew in the area. Hawaiians had once used the ‘*akia* for fishing; the entire plant contains a potent neurotoxin, which temporarily paralyzes fish and sends them floating to the surface. As one might imagine, it’s not good for humans, either.

But remembering the fun I had picking wild berries as a kid, I caved. “Yes, you can. But be very careful, because there are other plants with red berries out here that are poisonous. Check with me or Sierra first.”



Amelia selected one berry, carefully tasting the *obelo*, before enthusiastically picking more. “Those are *good!*” she said, already looking around for another bush. Then I heard Maria’s voice, shrill and alarmed. “*Amelia! What* are you doing? Those could make you sick!” I quickly assured her that it was okay, and explained that I’d given Amelia permission.

“They’re related to blueberries and cranberries. People eat them all the time. You’re supposed to offer some to Pele first—they’re sacred to her—but I don’t think she’ll mind.”

Hawaiian traditions state that Pele is in fact deeply attached to her *obelo* berries, and that anyone who wishes to eat them must first journey to the rim of Halema’uma’u, the crater in which she dwells, and offer her a branch of the fruits. Only after that is it safe to pick the berries. Hawaiians’ faith in Pele’s might suffered a serious blow in 1824, when High Chiefess Kapiolani, a recent and ardent convert to Christianity, visited Kilauea expressly to defy Pele and prove the superiority of her new god. As she stood on the rim of the lake of fire, she consumed a handful of *obelo* berries without offering any to Pele. It is said she proclaimed, “If I perish by the anger of Pele, then you may fear the power of Pele; but if I trust in Jehovah, and He shall save me from the wrath of Pele when I break her *kapu*, then you must fear and serve the Lord Jehovah. All the gods of Hawai’i are vain.”<sup>50</sup> Despite Kapiolani’s triumph, when I had the urge to nibble on *obelo* berries, I always said a silent thank-you to Pele and scattered a few of the berries on the ground before taking my share, just as I did now.

Maria relaxed at the name of the plant. “Oh, yeah. My neighbors used to make jam out of those when I was a kid. It was pretty good.” She reached for a few herself.

Meanwhile, Sierra had found an outcropping of rocks sheltering a drift of the golden strands commonly known as Pele’s hair. These brittle golden strands, some measuring several inches in length, were the broken-off tails of Pele’s tears. Then a dark-haired girl wearing tight aqua pants found a small clump of foamy reticulite, its glassy mass of iridescent bubbles

resembling a strange sea sponge. It's a rare form of basalt, formed when very hot, gas-infused lava cools rapidly. Reticulite is very fragile and so light it floats on water. When I informed the discoverer of its unique properties, she immediately ran to tell the other scouts, half-crushing the rock in her tightened palm.

Maria and I watched as the scouts swarmed over the cinder hills, transformed from bored to hyper in minutes. Why were they so excited about learning and exploring here, whereas in the grasslands they had primarily remained in their own world? Maybe it was just lunch fueling their activity, but it seemed like it was also the freedom to roam, asking questions of us authority figures as needed. They shared that knowledge amongst themselves, generated hypotheses and stories. I knew a few hours of one day of their lives couldn't establish the sort of connection to the living world I had enjoyed at their age, but it was a joy to witness a spark, a flicker of that passion in their eyes—Maria's, too, as she searched for Pele's tears on her knees next to her daughter. Given a chance, wonder knows no age limits.



A few days later, I was driving along Chain of Craters Road with Matt and Verena for the last time. I had one more week of work left before a few days of vacation, then the trip home. I was deeply torn, looking forward to returning to all the things I thought of as *home*—ranks of towering conifers, the gleam of low light off a river, the cool scent of blackberries lingering in the depths of the woods—yet I knew I would miss dearly everything I knew here. When I'd planted those countless trees and shrubs, I put down roots of my own. I wanted to watch them grow into thriving forests. I could, and would, come back and visit, but quick snapshots of time like that don't compare to the daily dramas of change. They may impress and inspire, but they do not weave through the fabric of your life in quite the same way.

“Okay, one quick stop at Naulu to check on some stuff, and we’re done.” Matt pulled the truck over at a wide spot in the road, halfway up the cliffside. Nothing but a recent lava flow and a bit of scrubby exotic grass stretched in any given direction—no trees in sight for miles, just hazy blue sky meeting a distant ocean, and all that gleaming, glassy black rock. We started picking our way down the slope, following an irrigation hose running from a well-concealed cachement tank. The loose plates of frozen lava shifted beneath my weight. As I wobbled precariously atop a tipping chunk four feet wide and three inches thick, Matt reassured me, joking, “One of these days, you’ll get your lava legs.” He’d been saying that to me since my first week on the job three months ago.

After a quick descent down a rocky slope so steep it felt like I was poised to fall into the distant ocean, we stood beneath the welcome greenery of Naulu. A medium-sized *kipuka*, no more than a few acres wide, this was one of the best remaining patches of low-elevation dry forest anywhere on the island. Protected by newer lava flows, kipukas remain relatively free of exotic animal and plant invasions. They are Pele’s most effective line of defense for Hawai’i. Looking up at the *pali* from down on the coastal plain, you could see the lime-green splash of Naulu’s *kukui* nut trees, surrounded by uninterrupted expanses of glistening black and rust-red lava. From that perspective, Naulu had always struck me as a child, cradled protectively in the crook of Pele’s scorching arm.

Beneath the canopy of *kukui* and *lama* trees grew spicy-scented carpets of *Peperomia*, and clumps of fat-leaved ferns poked from beneath shiny, dark green *Sidrex* shrubs. Dozens of other small shrubs dotted the rocky slope, and persimmon *lama* berries brightened the leaf litter. Birds zoomed through at eye level due to the steepness of the slope. Naulu is a Special Ecological Area within the park, home to many rare and endangered plants I’d never encountered anywhere else. I’d only been to Naulu a few times, so I was still full of curiosity

about the place. One plant in particular caught my eye—a strappy-leaved treelike plant about two feet high, it looked like the houseplant my cats liked to climb.

“What is this, Matt? Didn’t you tell me last time that it’s a *Dracena*?”

“It’s called *halapepe* in Hawaiian, and yeah, it’s a kind of *Dracena*. But this one’s endemic to the islands, and here it’s endangered. Haleakala National Park, on Maui, has quite a few in the backcountry, but this is about the only place they grow on the Big Island.”

I wandered downward, picking my way through brambles and looking for the flagging that marked the plants we’d set out a month ago. It had been hard work; much of Naulu is covered with ancient *a’a* clinkers, and getting through them to a pocket of soil is no easy task. I was happy to find so many sprigs of green next to the flags—survivorship looked better than Matt had anticipated. Many of the plants had weathered the brief drought very well.

Clambering over an old snag, trying not to fall onto the *a’a* and scratch myself all to hell, I came face to face with a mature *halapepe* in full bloom. About fifteen feet tall, spiky clusters of dark, narrow, foot-long leaves sprang from the ends of the smooth, white branches. Hiding beneath the uppermost foliage were huge clusters of pale yellow, banana-shaped flowers, each about an inch and a half long. There were probably a hundred flowers in each cluster, and the bottom ones were just beginning to open into fluted trumpets of a slightly deeper yellow-gold, the stamens sticking out beyond the petals. The constant breeze and the dappled light conspired to make them sway from bright to dim, flickering like a candle chandelier.

I stood directly beneath the largest cluster of flowers, trying to memorize every fold in every petal. They had no scent, but I was intoxicated by their form, and by the potential they represented. The flowers were precious beyond compare—not because speciation, adaptation, and endemism are unusual. Those are possibly the most common characteristics

of life. Forms adapt or fade away, and adaptation to unique places yields incredibly unique creations. Although the tree and flowers were beautiful in their own right, what made the flowers precious was their fleeting presence in the world and my being one of the few there to witness it. Those flowers became a haunting symbol of my time in Hawai'i.

Verena, collecting *lama* berries up above on the steep slope, called to me in hushed tones. I fixed my gaze on her long blonde hair and wove between the snags and loose scree to where she stood next to a small bush, holding one of the branches. Her eyes round with delight, she smiled. "Look!" She let the weight of her hand bend the branch, and three naked and blind chick heads simultaneously popped out of a well-camouflaged nest. Beaks agape to the sky, more mouth than body, they peeped with a ferocity that belied their tininess. We grinned at each other, and Verena released the branch. The chicks immediately sank back into their sanctuary.

Though I initially came to Hawai'i because I wanted to help save an incredibly rare place, I've come to believe that preservation of species isn't the most precious thing to be sought in the hinterlands—here or in any other threatened landscape. Systems-oriented sciences like ecology and chaos theory have established that the earth functions as a nearly incomprehensible exchange of interdependencies. The prospect that a butterfly flapping its wings could trigger a chain of reactions culminating in a thunderstorm is the most popular example. These scientists have shown that this web is resilient, self-healing, capable of adaptations at a scale that suggests something resembling sentience.

Most people know this theory as the Gaia hypothesis, but it can also be reduced the axiom that life exists to keep on living, and it will adapt to whatever comes its way. It's been 65 million years since the dinosaurs were extirpated by some astronomical collision that created nuclear winter-like chaos. At the time, the first Hawaiian islands had barely begun to

graze the surface of the Pacific Ocean—and look at the life on these islands today. I'm not saying we should quit sentimentally clinging to koalas, *balapepe* and other endangered species. I just find comfort in believing there's only so much screwing up we can really accomplish. Gaia, in all her diversity, doesn't need us nearly as much as we need her.

What we seek and find through the process of restoration ecology projects is the restoration of ourselves, a re-making of our personal narratives which puts us *in* the frame as we observe the living world. They allow us to become intimate with a landscape, invite us to wonder and play, challenge us to learn and to care. Restoration can provide newcomers with the means to become indigenous to our home landscapes, opening pathways to traditional cultural practices and knowledge—openings which energize in both directions, making the past relevant and alive to the future.

It's questionable how much genetic adaptation is going on with good old *Homo sapiens* anymore, but the cultural adaptations are slightly more visible. We are a ways down the road from the folks who drove the passenger pigeon to extinction simply for the pleasure of the hunt. It's true, a person's culture and ability to meet their basic needs are serious caveats to this statement, but much of the world has learned to value the myriad forms life chooses. Yet the widening gap between the haves and have nots of the world, combined with overpopulation and a tendency among the affluent to fill their empty lives with useless artifacts threatens to overwhelm the progress we've made.

Too often, we humans are all too similar to those chicks, blind and voracious, singleminded in our desire to grow, transparently fragile. We accept artifice over engagement, eating food that does not feed us, fleeing to NeverNever Land in front of our TV sets in hopes of leaving our hunger behind. Taking the long view, we are among the most endangered species on the planet, with our big brains and gifts of imagination and creativity.

We probably can't completely extinguish all of life, but imagination, art and culture could easily become victims of their own strength. Nobody gets a deed to the house out of Gaia—lease agreements only, and we already know from the stories of sedimentary rock that those leases get terminated far more often than not. Intelligence has yet to give a single species a guarantee to long-term survival on Earth. The hand which rests upon our branch does not have to be a gentle one.

I like to believe that we are a unique opportunity in the history of life—a self-reflexive form that is able to consider the implications of the little thing we call a cell. The capacity to wonder—both to be curious and to delight in the sensation of amazement—could enrich the grand adventure of living in ways that benefit the entire endeavor of life. We have vast potential to be Gaia's imagination, to make culture function as a collective storehouse for reveling in the wild manifestations of beauty that we share with all creatures. Maybe it's through myth, the power of storytelling, and all the blessings of human culture that we will each navigate our way to harmony, to home.

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## End Notes

### Introduction

- <sup>1</sup> Loope, 1998.
- <sup>2</sup> Wagner et al, 1995.

### Change in Pele's Land

- <sup>3</sup> Hazlett and Hyndman, 1996. Pgs. 31-35.
- <sup>4</sup> USGS factsheet on the Pu'u O'o eruption 1983-2003. <http://www.usgs.gov>
- <sup>5</sup> Kane, 1987. Pg. 7.
- <sup>6</sup> Beckwith, 1940. Pg 169.
- <sup>7</sup> Lamoreaux, 1976. Pg.42.

### The Deep Muscle of theWorld

- <sup>8</sup> Safina, 2002. Pg. 279
- <sup>9</sup> Pyle, 1990. Pgs. 99-100.
- <sup>10</sup> Quammen, 1996. Pg. 313
- <sup>11</sup> Loope, 1998.
- <sup>12</sup> Scott, et al, 1986.
- <sup>13</sup> Knight, 2001.
- <sup>14</sup> Primack, 1992, pp. 253-260.
- <sup>15</sup> Egan, 1990; Hall, 1997.
- <sup>16</sup> Mish, 2001.
- <sup>17</sup> Loope, 1987.
- <sup>18</sup> Katz, pg. 39, in Gobster and Hull, 2000.
- <sup>19</sup> Ibid. Pg. 38.

### Going Native

- <sup>20</sup> Brunson, in Gobster and Hull, 2000.
- <sup>21</sup> Bonsey, 2001.
- <sup>22</sup> Durham, 1992.
- <sup>23</sup> Kirch, 2000. Pg. 213.
- <sup>24</sup> Ibid, Pg. 231.
- <sup>25</sup> Finney, 1991. Pg. 387.
- <sup>26</sup> Handy and Pukui, 1972.
- <sup>27</sup> Kirch, 2000.
- <sup>28</sup> Polynesian Voyaging Society website: <http://www.pvs-hawaii.com>.
- <sup>29</sup> Finney, 1991. Pg. 397.
- <sup>30</sup> Ibid.



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<sup>31</sup> Polynesian Voyaging Society website.

<sup>32</sup> Scott, et al, 1986. Pg. 363.

<sup>33</sup> Degner, 1975. Pgs. 145-6.

<sup>34</sup> Jordan, 2003. Pg. 36.

### **Myths of A Different Kind**

<sup>35</sup> Jordan, 2003. Pg. 162.

<sup>36</sup> Solnit, 1994. Pg. 255.

<sup>37</sup> Graber, 2003. Pg. 265.

<sup>38</sup> Higgs, 2003. Pg. 51.

<sup>39</sup> Ibid.

<sup>40</sup> House, 1996. Pg 58.

<sup>41</sup> Cronon, 2003. Pg. 42.

<sup>42</sup> Twain, 1962. Pg. 402.

<sup>43</sup> Volcano Art Center website: [www.volcanoartcenter.org](http://www.volcanoartcenter.org) and conversation with Ed Bonsey 3/02.

<sup>44</sup> Medeiros, 2003. Pg 51.

<sup>45</sup> Jordan, 2003. Pg. 120.

<sup>46</sup> Rosenzweig, 2003, Pg 200.

### **The Fruits of Knowledge**

<sup>47</sup> Nabhan, 1996. Pg. 25.

<sup>48</sup> Pyle, 2003. Pg. 207.

<sup>49</sup> Ibid, Pg. 205.

<sup>50</sup> Kepler, 1998. Pg. 151.

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