



Our mark was an invasive pest that had made a remote tropical island its home. But good and evil are not so easily discerned in ecological systems, even when a place looks like Eden.

By Jeffrey A. Lockwood &
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CONFESSIONS — OF AN ENTOMOLOGICAL — HIT MAN

Most assassins work alone. But we're a pair of hired guns. Between us, we have 50 years of experience making hits in dozens of countries on five continents. Our partnership began 13 years ago, and since then our views of the world have slowly converged. Compared to most people, our thoughts are a bit twisted. But killing will do that.

For us to take a contract, we demand two things. The mark should have it coming, and the hit has to be made without unnecessary harm to innocent bystanders. So, we want to know as much as possible about our target—things like patterns of behavior, comings and goings, favorite foods, close associates, sexual habits, number and ages of kids. We're known for being very good at our job—fast and clean.

So, when the government was looking to exterminate a problem on the remote Hawaiian island of Nihoa, they called us. We were happy to get out of Wyoming during an April snowstorm and join some of the best in our line of work at a Honolulu beachfront hotel to plan the hit.

The setup seemed rather cut and dry. Our mark was *Schistocerca nitens*, the gray bird grasshopper. Thousands of them. These small locust-like creatures

start off life bright green and then usually turn a dusky gray, as if they evolved to hide in lawns as nymphs and then blend into sidewalks as adults. Being about the size of an index finger, they have some decent heft individually, which accounts for their name—when one of these fellas takes wing, the damned thing looks almost like a bird. And flying is part of this species' *modus operandi*; the species has spread itself from Venezuela north into the United States. No wonder that taxonomists have proposed two dozen subspecies.

The gray bird grasshopper arrived on Nihoa in 1977 (if not earlier, nobody knows for sure). But they didn't cause much trouble until decades later. The best guess is that a series of unusually warm, dry years allowed the population to build until something like 400,000 grasshoppers swarmed over the island in 2004. Aggravated by the drought, the outbreak virtually denuded Nihoa, stripping 90 percent of the vegetative cover.

Given the number of endemic, endangered, and locally rare plants that were going down the gullets of the grasshoppers, it was hard to blame conservation biologists for being alarmed about what was happening to Nihoa. After all, she's a 155-acre tropical paradise endowed with a pair of 900-foot tall peaks and adorned with dozens of species found nowhere else on earth. And she boasts an impressive—but entomologically ineffectual—set of state and federal bodyguards, including the U.S. Fish & Wildlife Service, the National Oceanic and Atmospheric Administration, and Hawaii's Department of Land and Natural Resources.

At first, we bought into the standard rationale that most clients give. Pests that despoil vulnerable biological meadows, fields, or tropical islands deserve to be targets. But in this case, we had a nagging doubt, a murky sense that the story was a bit too neat. We've come to learn that sometimes good and evil are not so easily discerned in ecological systems, even when a place looks like Eden. And the more we looked, the less clear things became.

IN TRYING TO PIECE together the story of Nihoa, we were immediately struck by how little is known. There has been a total of perhaps five scientist-days per year spent on the island since the 1950s. Until last year, the longest expedition was only about 30 days. The reasons are multiple: remote location, dangerous (sometimes impossible) landing, and total absence of fresh water. So what we have is a series of research snapshots that provide a sporadic account of the island's ecology. Following a 12-day visit to the island in 2006 and subsequent extended conversations with colleagues, we began to see that what had seemed like good reasons for extirpating the insect were deeply problematic.

When *S. nitens* showed up near Honolulu more than 40 years ago, the creature was assumed to be a stowaway that had jumped ship from a cargo vessel. And that's a bad thing, if you figure that nature is basically good and humans are generally screw-ups, ecologically speaking. From a conservationist's perspective, a species that arrives with human assistance is guilty by association.

But simple explanations of species introductions based on circumstantial evidence can be wrong. We now know that *S. nitens* can fly at least 300 miles over open ocean; its cousin, the desert locust, crossed en masse from West Africa to the Caribbean in 1988. What if, after centuries of failed attempts, the gray bird grasshopper finally caught a favorable hurricane track from Mexico and made it to Hawaii, only to have humans assume that the poor bastard cheated by catching a free ride and deserved to be expunged? It'd be like legitimately dealing yourself a royal flush and getting kicked out of the game.

Once the grasshopper made it to Nihoa and conditions turned favorable, it did what grasshoppers do—reached extraordinary densities and ravaged the landscape. And then, like an exhausted lover, the insect population summarily collapsed, which came as a surprise to everyone—except those who know about grasshoppers. And the flora recovered nicely. In fact, from what we could tell, the island was impressively verdant in 2006, even with 20,000 grasshoppers—about five percent of the outbreak population. What's more, the native herbivores (such as the endemic weevil



Photo by Alexandre Latchininsky

The Nihoa miller bird is endemic to the island, so conservationists were understandably concerned about its wildly fluctuating population over the past 30 years. When a species has no more than 200 individuals, it's not far from "buying a pine condo," as we say in the business. But with the grasshopper outbreak, these insectivorous birds flourished—there were 450 of them in 2002 and over 600 in 2006.



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Gray bird grasshopper, *Schistocerca nitens*. ©Robert Jensen

Rhyncogonus exsul) were apparently flourishing, so competition during the outbreak didn't seem to make any lasting ecological impression on the other insects.

Schistocerca nitens was no ecological gentleman, but neither was it the environmental cad that everyone had presumed. To those seeking to protect Nihoa's presumed innocence, there was a deeper reason for wanting the grasshopper gone. Like a bum at a cotillion, it just didn't belong. In fact, *S. nitens* had formerly been named *S. vaga* (as in vagabond) and still bore the common name "vagrant grasshopper."

But here's what we couldn't figure. The grasshopper is hardly the only alien on the island. Nihoa's purity has long been violated by nonnative ants, aphids, beetles, and flies that are far more numerous than *S. nitens*. What's more, the agencies looking after the island are keen to protect about 100 archeological sites left after the period of human occupation from 1000 to 1700 AD. These stone terraces, foundations, and water catchments are quite a tribute to human ingenuity. Keeping even a few dozen people

thriving on an island with no groundwater or topsoil was some feat, as we know from the logistics required to provide for just four scientists for less than two weeks. But why are these ancient, inanimate artifacts safeguarded while a modern, animate artifact is not?

Eliminating the grasshopper would presumably return Nihoa to an earlier state. But when we tried to figure out which previous timeframe was the right one, there was no good answer. If earlier is better, then the island should be maintained in its original form as a steaming hunk of lifeless lava. That is absurd and can't be right—surely life is preferable, even from the perspective of serial assassins (at least it's job security). But every pioneering species that was washed or blown onto Nihoa was an invader when it arrived, and most of them probably disrupted whatever ecological processes were humming along before their arrival. We could repopulate the island with native Hawaiians (if they would agree), but that would mean hacking down the endemic and critically endangered Nihoa fan palm (the only tree to survive the



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Dr. James P. McVey, NOAA Sea Grant Program

Nihoa is the largest uninhabited island in what is now the Papahānaumokuākea Marine National Monument—a string of a couple of dozen islands, reefs, and banks scattered across 363 square kilometers of ocean northwest of the Hawaiian island of Kauai. Nihoa is home to 27 species of birds (two are endemic), 26 species of vascular plants (three found nowhere else on Earth), and nearly 200 species of insects (28 are unique to the island).

earlier human occupation) for firewood, planting the agricultural terraces with sweet potato, and hunting seabirds and rare monk seals. Maybe the Golden Age for Nihoa was 1976, the year before the grasshopper presumably arrived. But that would leave the cockroaches, ants, aphids, and other recent anthropogenic colonizers in place. Perhaps then the best of times were after the Hawaiians left and before the Europeans arrived, say about 1800. But if we barely know the biodiversity and ecology of the island today, who knows what things were like two centuries ago?

Environmentalists imagine a time in which all the organisms “fit in,” when species functioned in harmony with one another and the land. But if this is our objective, it's not at all clear that the new kid on the block is a misfit. In the years prior to *S. nitens*' arrival, the Nihoa millerbird, a darling endemic species, seemed on the edge of extinction; it is now thriving on a diet of grasshoppers. Not only is the grasshopper apparently good bird food, but the insect seems to be adjusting to island life. Our measurements suggest that the typical flight distance of grasshoppers on the island is

one-half that of its North American progenitors. Many island species lose their ability to fly (being blown out to sea is a pretty powerful selection pressure). *S. nitens* may be on its way to becoming *S. nihoensis*.

WE MIGHT BE HIRED GUNS, but we're not slobs. After a locust control job, we take pride in cleaning up after ourselves. And the same is true in spades for the rare visitors to Nihoa. Our scientific associates were attentive to the removal of every speck of trash, like experienced assassins cleaning up after a hit to ensure that not a clue remains at the scene. But why? It didn't really matter to the biotic community if a thumbnail-sized bit of paper was left behind. But it mattered to us. And lurking in that fastidiousness is an explanation of the human desire to rid Nihoa of the grasshopper.

Trash is ugly. And littering is wrong. These are childhood realizations that become adult truths. In more sophisticated terms, Aldo Leopold proposed that we know a thing is right (including killing, we might note) if it tends to preserve the integrity, stability, and beauty of the biotic community. While ecologists have

focused on integrity and stability, Leopold probed deeply into aesthetics, contending that “Our ability to perceive quality in nature begins, as in art, with the pretty. It expands through successive stages of the beautiful to values yet uncaptured by language.” This expansion of perception came from understanding the ecology and evolutionary history of a being or place. Science, it turns out, is vital to cultivating an aesthetic of nature.

Perhaps our revulsion to trash arises not from its ecological or evolutionary implications but from what the trash says about us. This is not so different from how the two of us feel when we see a field littered with nontarget insects after a mass assassination of pest grasshoppers. Litter is a statement of who we are, and making a mess indicates disregard for others and arrogance about ourselves. The same concern applies when humans create or fail to clean up biological litter.

After getting to know Nihoa on a first-hand basis, we began to wonder whether extirpating *S. nitens* is not so much about preserving the integrity and stability of the island as it is about fostering our own goodness. If the grasshopper is understood as biological litter—particularly offensive trash because of its cultural, religious, and literary associations with plagues and starvation—then failing to remove the insect suggests that we are disrespectful and irresponsible. By ignoring our entomological trash we become the sort of people who want only to leave our mark (biological graffiti?) across the world, the sort of people who might dam the Grand Canyon, shoot the last condor, or disregard the poor. Removing the grasshopper from Nihoa is justified not because of the modern notions of ethics (the rights of species or the utility of ecological processes) but based on the oldest moral concept in western culture: virtue.

Aristotle was right. A good life comes from cultivating a character that is fine and noble. As with the universality of human meaning, Nihoa’s grasshoppers are but a particular case of a much wider concern. The reason conservationists call in pest managers (the euphemism for biological assassins) to extirpate *S. nitens* or any other problematic species is because of who we want to be—a society that deeply appreciates beauty and genuinely cultivates virtue.

However, there is one last worry.

Scientists, no less than assassins, value objectivity. But we’re suggesting that human subjectivity—our sensitivity to beauty and desire for virtue—justifies taking out contracts on odious species. That means we have to come to terms with the fact that humans—complete with our feelings—are deciding whether a grasshopper (or mussel or vine or goat or thistle) deserves it. Face it: the natural world will, given enough time, do just fine whether or not we tinker with all this preserving, restoring, and reclaiming. Entomological hit men aren’t needed to save life on Earth. Given enough time, ecological systems will find a way to persist in some form. But between now and then, things can get pretty ugly.

AS A PAIR OF AGING entomological hit men, we’re definitely getting soft. That is, we empathize with our victim. We’ve come to appreciate the lives of the grasshoppers, which found their version of paradise on Nihoa in the face of staggering evolutionary and ecological odds.

But we also empathize with our conservation colleagues who find the grasshopper intolerable. This left us in a quandary. But in the end, we sided with our fellow humans. As it turned out, we declined the Nihoa contract because we couldn’t come up with a way to take out *S. nitens* without excessive collateral damage. If we ever do find the right weapon, we’ll offer our services. Even so, we’ll wonder whether the grasshopper had it coming. 🐞



Photo by Alexandre Latchininsky

Schistocerca nitens, an easy mark under most circumstances, is much less so when it mingles with dozens of sensitive nontarget species. We tried the old “poisoned entree” gimmick, but the grasshopper wasn’t at all fond of our specially formulated bran baits. Yet ants (all nine species on Nihoa are aliens) arrived in droves to sample honey-molasses and peanut butter baits, but trying to take them out might be an even bigger challenge than whacking *S. nitens*.

The author of numerous books and essays, **Jeffrey Lockwood** began his academic career as an assistant professor of entomology but shifted gears and now teaches creative writing and philosophy at the University of Wyoming. His partner, **Alexandre Latchininsky**, is an associate professor/extension entomologist at the University of Wyoming’s Department of Renewable Resources.