

GOLD BEACH, OREGON

It began with the whir of a helicopter and a bad smell and the even worse memories that the smell invoked, memories better left on the other side of the world. Within 24 hours of the incident, Keith Wright had a terrible cough, and blood poured from his mouth onto his naked body, staining the shower pink.

Outside, the October day was gray, the sun having slid off to a better place. The winds, swept aloft by the nearby Pacific Ocean, swirled above the stands of fir trees that rise above the small, clean one-story house. Wright's uncle, Jack Cox, who lives with him, had a ferocious nosebleed. At the same time, 33 other people, scattered up rabbit-hole roads throughout the valley, suffered in different ways: Strange rashes bloomed on their arms and foreheads, and some victims crouched over the toilet for hours, crippled by sudden diarrhea. Others were struck by nausea, headaches and asthma attacks. Wright, struggling with his own symptoms, was unaware of his neighbors' troubles. All he knew is that up until the yellow-and-white helicopter flew overhead, he'd felt just fine, working on the carburetor of his '79 Dodge truck in his front yard.



Keith Wright replaces brakes on a truck in his garage at home in Cedar Valley near Gold Beach, Oregon. Wright was working here last year when herbicides were sprayed across this coastal mountain valley; within a day, he was coughing up blood.

Matt Mills McKnight

Over the next several weeks, local doctors and nurses were mystified by the ailments that plagued members of this coastal town, a picturesque spot nestled at the mouth of the Rogue River, where it empties into the Pacific Ocean. Many people stayed sick, or got even sicker. A horse went blind. One dog died.

- **Photographs of the Gold Beach community**



[The people affected by this herbicide cocktail.](#)

An investigation completed this summer by the Oregon Department of Agriculture reveals that, on the same day last year that Wright tinkered with his truck, Steven Owen, a pilot hired by two timber-stand outfits, Crook Timberlands and Joseph Kaufman, crisscrossed the valley north of Gold Beach where Wright lives. Nozzles on the helicopter doused four recent clear-cuts, and then illegally sprayed surrounding properties with a cocktail of herbicides containing substances such as triclopyr, imazapyr and 2,4-dichlorophenoxyacetic acid, better known as 2,4-D, an ingredient in Agent Orange, the infamous defoliant. Wright knew about Agent Orange; he was a gunner during the Vietnam War, when it was heavily used.

“I never bled through my lungs before in my life,” says Wright, 60, chief of the local fire department. A former logger and commercial fisherman, he once survived for six and a half hours in 43-degree water after his crab boat capsized in the Pacific Ocean. Wright tends to joke about his own suffering, rarely mentioning the 42 pieces of shrapnel in his body or the bullet wounds he got in Vietnam. But as he recounts the spraying incident, he shakes his head.

“The whole thing, it feels like you’re being violated, you know? They (the state and the timber companies) obviously don’t care about us.”

Timber companies hire licensed helicopter pilots to spray hundreds of thousands of pounds of herbicides each year on forests throughout Oregon. Their goal is to kill the weeds, shrubs and trees that compete with the Douglas-fir and other trees harvested by the state’s \$20 billion timber industry. These herbicides, which can cause a host of long- and short-term health problems, sometimes drift away from the timber stands and onto nearby communities and into their drinking water sources. Oregon isn’t the only state with this problem. However, its relatively lax regulations, limited oversight, and the proximity of forests to homes throughout the coastal range put Oregonians at the greatest risk.

“People in Oregon are being exposed against their will, and these exposures are routine,” says Richard R. Kauffman, the recently retired Northwest regional director of the Centers for Disease Control’s Agency for Toxic Substances and Disease Registry. “Enough of these instances are happening, there should be some changes to state laws.

“But I also see a basic flaw in the (pesticide) regulations we have in this country. Our system is at fault here.”



S		Ore
BUFFER ZONES		
Drinking water sources		None 60 feet a surfa
Fish-bearing streams		60 feet trout
Homes		None
Schools		None
SIGNAGE when spraying		None
PUBLIC REVIEW		None

PHOTO: JON GOSCH

On a summer morning, fog sinks low in the shallows between forested hills in Oregon’s coastal mountains. Douglas-fir stands stretch for miles, interrupted frequently by brown patches that look as if they’ve been scraped clean by a giant spatula — logging clear-cuts. This is some of the most productive timberland in North America. But people live here, too, in homes and schools, farms and marinas squeezed between the ocean and the tree-covered hills.

Though a clear-cut may look barren, it’s actually home to a vibrant competition for life. Long-dormant seeds buried underground take flight when exposed to the sun. Within months, these opportunistic species, including blackberry, salmonberry, alder and Scotch broom, can cover the ground with a fresh thicket of green, robbing fast-growing Douglas-fir seedlings, the industry’s big moneymaker, of sunlight. Timber companies combatting these weeds require a war-like sensibility and weapons, namely herbicides.

In the 1940s, when Wright's mother's family owned a logging company and mill north of Gold Beach, they burned out unwanted species after logging, before replanting trees, but such fires could be risky and didn't accomplish much. As long as the root systems of brush species survived, plants like salmonberry continued to grow back. So starting in the late '60s, chemists developed an array of substances designed to destroy specific forest shrubs.

By the time Wright was working logging crews in the late 1980s, he hiked through the woods armed with a hatchet and cans of what he says was a diluted solution of 2,4-D and tobacco. "We didn't spray all over the ground and into the water. You'd cut into the bark of a tree and douse a little bit of (the herbicide) where you made your cut," says Wright, staring up at a wax maple that turned bleached as bone after the helicopter flew over it. "A five-man crew could take out a lot of undesirables in a day."

But the work was slow and dangerous, putting people who trudged across steep slopes at risk of injury from chainsaws and hatchets. Aerial spraying became an attractive alternative.

Today's timber industry is particularly dependent on spraying by helicopter. About 37 percent of Oregon's timberland — 9 million acres — is privately owned, most of it divided into corporate-owned parcels of at least 5,000 acres apiece. Using ground crews on anything over 100 acres doesn't make economic sense, says Mike Kroon of the Oregon Department of Forestry. It takes 10 workers an entire day to treat the same acreage that a helicopter can spray in a half hour, while an industrial-grade clear-cut could take months to treat on the ground, without aerial spraying. That's simply too long and too costly, so the timberland equivalent of crop-dusting is deployed. In 2008, the last year that Oregon tracked spraying, more than 800,000 pounds of herbicide were dropped on the state's private timberlands. Aerial herbicide spraying is banned on Oregon's federal lands.

At high concentrations, these herbicides can cause a host of human health problems, from eye and skin irritation to vomiting and diarrhea. A person who drinks 2,4-D is likely to incur kidney failure and skeletal muscle damage, according to the National Pesticide Information Center. But regulatory agencies and timber companies, citing decades of science, insist that at the low concentrations likely to result from aerial spraying drift, most of the herbicides in widespread use are fairly harmless.

"Research can never prove that there's zero risk, but the EPA requires that these chemicals have an 'acceptable risk' when applied correctly," says Paul Adams, chair of the Oregon Society of American Foresters policy committee. "Some people feel that, until we can prove they won't ever cause any harm, we shouldn't use them. At this point, you're dealing with philosophy, not science."

Mike Newton, an emeritus Oregon State University professor of forestry who has published nearly 100 scientific articles about the ecology of Douglas-fir and the environmental effects of herbicides, agrees. Forests are sprayed much less frequently than farms are, he says, and so there is much less chance of exposure. "There has been a great deal of effort to do good science; the lay citizen doesn't have any grasp of what's gone on here, and they don't realize that there's millions and millions of dollars dealing with the safety of these products before they go on the

market,” says Newton, 81, patting a Douglas-fir he planted 40 years ago in the 30-acre parcel behind his home in western Oregon.

Over the last decade, however, new findings have called this thinking into question. Atrazine and 2,4-D, two of the most commonly used chemicals in forestry, affect the endocrine system, the hormones and glands that regulate vital functions such as sexual development and behavior, pregnancy and many aspects of childhood development. Prenatal exposures have been linked to low birth weights, according to a 2013 article in *Environmental Research*. In 2011, an Environmental Protection Agency scientific advisory panel found evidence of a link between atrazine exposure and diseases including ovarian cancer, non-Hodgkin’s lymphoma and thyroid cancer. And when chemicals are applied in a mix, they can interact, which may lead to more harmful effects than when they’re applied individually, according to a 2009 article in *Environmental Health Perspectives*.

Such research exacerbates the fears of the residents of Oregon’s Triangle Lake region near Eugene, Oregon, who have worried for decades that their proximity to industrial timberlands and aerial sprays is responsible for their rashes, cancers and other health problems. In 2011, the EPA tested the urine of locals and found atrazine and 2,4-D in every sample. This makes Nancy Webster and her neighbors in Rockaway Beach, Oregon, 150 miles north of Triangle Lake, increasingly nervous about drinking the water that comes out of their taps.

Two summers ago, Nancy Webster sat on her front porch, morning coffee in hand, watching a helicopter spray a fine mist over a private forest about a half-mile away in the Jetty Creek watershed, the source of her town’s water supply. The high school, middle school and a local preschool sit at the base of the forest slope.

“I was horrified. I could smell the chemicals,” says Webster, a soft-spoken baby boomer who retired and moved to the coast six years ago. As was the case at Gold Beach, the timber company did not notify the community prior to spraying, so Webster didn’t set aside any water or shut the windows. The water treatment plant doesn’t filter for herbicides and, with just one day’s worth of storage, it can’t shut down for the several weeks necessary to let the chemicals pass through, as do several treatment plants elsewhere along the coast. “My neighbors and I trade tips about what filters to put on our water. We all look up at the hills and pray we’re not poisoning ourselves.”

On a day when the sky spits rain, Webster and her friend, Judy Coleman, hike into the forest to take a look at the clear-cut above Jetty Creek. The heart-shaped bowl, once home to a creek, is now full of logs and branches strewn like toothpicks in a mud fondue. “That creek feeds the main stem. But because there’s no salmon in the creek, they can log right through it,” says Coleman, a former water-quality specialist with the Oregon Department of Environmental Quality. “It makes no sense at all. Even if there’s no fish in there, that stream flows into the creek below that does have fish in it, that is the source of our drinking water. When it rains like this, everything becomes connected.” The gravel roads that crisscross this forest and most other timberland act

as vectors, delivering any herbicides deposited by helicopter into ditches along the roads, which ultimately empty into the streams.



Nancy Webster, a community organizer, stands near Jetty Creek. Runoff from the clear-cut forests that lie above flows into the creek, from which the nearby town of Rockaway Beach, Oregon, gets its water.
Matt Mills McKnight

In 2013, the state Department of Environmental Quality sampled water from the creeks and estuaries of six public watersheds along Oregon's northern coast. The herbicides atrazine, glyphosate and sulfometuron-methyl were identified in multiple locations, and since municipal water districts don't filter out herbicides or pesticides, they likely ended up in tap water. The amounts found were far below the levels that would trigger action under the federal Safe Drinking Water Act. But Josh Seeds, a water-quality expert at the DEQ, says that those low levels could result from inadequate testing: Since timber companies aren't required to tell any agency exactly when they'll spray, the DEQ wasn't able to sample for days afterward. During such a delay, chemicals dissipate.

“Most of the herbicides used in forestry move through water quickly. To find anything, you have to be set up for it,” says Seeds. “You have to know when they’re going to spray, and then sample immediately after spraying. And we haven’t been able to do that.”

Testing by the U.S. Department of Agriculture in 2011 found imazapyr in the well water at a public school in the Triangle Lake area, west of Eugene. Between 2002 and 2010, the U.S. Geological Survey took samples from Oregon’s McKenzie River Basin, an area dominated by timberland, and found that nearly half of all samples included the herbicides hexazinone, 2,4-D, atrazine and glyphosate, which rank among the most frequently used herbicides in forestry. Here, as along the North Coast, the herbicide concentrations were considered a negligible threat to human health. Yet the majority of the chemicals found are potential endocrine disruptors that the EPA has yet to regulate.

“It doesn’t take very much exposure to these chemicals in our water or air to mess with our hormones,” says Laura Vandenberg, a University of Massachusetts toxicologist who sits on the boards of the scientific journals *Reproductive Toxicology* and *Environmental Health* and is an editor of *Endocrine Disruptors*. “The functional concentrations of hormones in your body are in the parts per billion or parts per trillion. We’re talking about a drop of water in an Olympic-size swimming pool.”

It’s illegal for even a drop of herbicide to drift away from the target areas, but that doesn’t mean it doesn’t happen. Stuart Turner — a one-man “CSI-crops shop” who investigates cases of pesticide misapplication — has seen herbicides drift over six miles from where they were sprayed.

The EPA sets standards for how specific herbicides are applied, determining the likelihood of drift based on industry-produced data using fixed-wing aircraft targeting crops from about 10 feet above flat land in Texas. (Helicopter application is not factored in.) The agency’s own model for drift calculation allows users to input no more than a 20 percent slope, even though coast range slopes are frequently twice that.

And drift is much harder to predict in most Western forests than it is above flat land in Texas or laser-leveled Iowa cornfields. The timber-dusting helicopters along Oregon’s coast fly as high as 80 feet above 40-degree slopes, and torrential rain and unpredictable ocean winds can pull chemicals downslope during application, making it nearly impossible to prevent herbicides from drifting away from their targets. “The pilots are the best in the business, but they’re not 10 feet off the ground like you are in a crop-duster,” says Turner, who chaired the Helicopter Associations’ International Aerial Applications Committee for 13 years. “There’s no doubt you’re getting people being exposed to pesticides against their will.” But neither the EPA nor any state agencies have established a protocol for taking air samples, making it impossible to document the accusations of landowners who report breathing chemicals after seeing a helicopter drop herbicides.

Though herbicide application is in part federally regulated, enforcement and investigation remain primarily up to the states. State pesticide regulatory agencies get most of their funding from chemical manufacturers or distributors that pay to register their products, and from licensing fees

paid for by pest-control applicators and dealers. This, combined with the Oregon Department of Agriculture's dual mandate to both bolster and police the industry, makes for a poor record of investigating cases, critics say.

With only nine field investigators to cover all of Oregon, the agency monitors applications only if asked. "As an investigator, I'm typically following up on complaints," says Sunny Jones, an Oregon Department of Agriculture pesticide investigator. "We're not Big Brother. A lot of use goes on that we don't know about."



A logging truck comes through Cedar Valley, in Coastal Oregon. Tourism and other industries have replaced logging as the area's main economic engine.

Matt Mills McKnight

In October, an investigation by the Portland *Oregonian* found that for six years, state agencies had ignored residents' reports of herbicide drift in the Rogue River Valley before finally launching the Gold Beach investigation.

That investigation, however, was far from complete, critics say: The investigator didn't arrive to collect samples and interview affected parties until seven days after the spraying. The agency

took vegetation and soil samples, but no water, urine or blood was collected, and the investigator gathered testimony from only four of the approximately 20 households that reported being directly impacted. Initially, the helicopter pilot, Stephen Owen, said he sprayed only glyphosate, the main ingredient in Roundup. Less than two weeks after he sprayed, however, the agency discovered other chemicals, including 2,4-D, triclopyr and other herbicides, in vegetation samples. But community members weren't given this information for another six months, delaying proper medical treatment for those who had gotten sick.

In August this year, 10 months after the incident, the department fined Owen and the company he owns, Pacific Air Research Inc., \$10,000 each, for providing false and misleading information to agency inspectors. Owen may lose his operating license as well; the punishment, however, will ultimately be decided at an administrative hearing before a state judge, during which "anything is open to negotiation," says Dale Mitchell, program manager of the Oregon Department of Agriculture's enforcement division. In September, the EPA fined Pacific Air Research an additional \$1,500 for illegally spraying two herbicides in a way that caused them to come into contact with people.

The \$10,000 fines, if they hold, are significantly higher than those typically levied by the state agency. (The most recent available data, from 2012, shows that the agency issued fines ranging from \$204 to \$962 each for various misapplications of pesticides.) The people of Gold Beach, however, remain unimpressed.

"At this point, I've put out \$30,000 in health care and vet bills, so (the fine) is pretty much a drop in the bucket," says Kathryn Rickard, a daughter and granddaughter of loggers, a former hairdresser and mother of five, who developed rashes on her arms, flu-like symptoms and an instant headache after standing on her porch a few hours after the helicopter flew over her house. Her dog became sick with a wasting disease that she blames on the spraying; it later died. "I'm pro-logging — I know chemicals have their place, if used appropriately — but I'm angry. I was sprayed against my will."



Kathryn Rickard stands at the gravesite of her dog, which died after being exposed to drift from spraying of a forest two miles from her home in Cedar Valley, Oregon. Rickard, too, felt the effects: A few hours after she heard the helicopter overhead, she went out on her deck, and there was “the most horrid smell, heavy stinging sensation that gave me an instant headache and nausea.” Her arms broke out in a rash that resembled tiny pinpricks. “We don’t have any faith in our government at this point. I don’t feel that they are helping us to be safe.”
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Rickard’s ability to sue in response is limited. In Oregon, as in Washington and Colorado, the law insulates herbicide and pesticide applicators from liability for damages incurred by neighbors. If a neighboring landowner sues and then loses, she’s on the hook for the opposition’s attorney fees, which can run upwards of \$100,000. But the Gold Beach incident might lead to change. In early August, Chris Winter of the Crag Law Center, a Portland-based public interest law firm, filed suit on behalf of Rickard and 16 other Gold Beach residents, asking a state judge to declare portions of the Oregon Right to Farm and Forest law unconstitutional. If the judge finds in their favor, citizens such as Rickard could sue the timber companies for property damages without being on the hook for defendant’s legal fees.

Beyond the courts, a coalition of regional environmental nonprofits, private timber owners and public health advocates is working to lobby the Oregon Legislature for reform. The coalition has several demands: It wants Oregon to adopt a formal application process for all use of herbicide sprays on private and state lands, and it asks that pesticide applicators file publicly available records of where and what they sprayed within 24 hours of application. In addition, it wants the names of the sprayed chemicals turned over to the Poison Control Center so that doctors can treat patients in a timely fashion. The group also wants Oregon to follow Washington's example and establish buffer zones to prevent spraying within 200 feet of surface water, homes and schools.

“How many more people have to get sick before we do something about this?” says Lisa Arkin, executive director of Beyond Toxics, an Oregon-based nonprofit. People from 11 Oregon counties have reported getting sick from aerial spraying, says Arkin. “The fact that earnest and truthful complaints from communities in Oregon and other states have fallen on deaf ears is unacceptable and outrageous.”

In late May, the Oregon Senate Committee on Energy and the Environment, following a hearing on the Gold Beach case, asked the state agencies involved to develop protocols to better respond to future spray emergencies. The committee met again in September, and lawmakers say they may push for stricter policies in the upcoming legislative session.

But getting them passed could be an uphill battle. The timber industry in Oregon contributed \$4.4 million to state campaigns over the last four elections — two and a half times more than the oil and gas industry, and 25 times more than the dairy industry. And rural legislators are worried about the impact of policy changes on forestry jobs, says Sen. Michael Dembrow, D, head of the state Senate Energy and Environment Committee. “The question is how can we affect the practice (of herbicide spraying) in a way that harms the industry the least while protecting people's health the most,” says Dembrow.

In the interim, Ecotrust, a regional economic development organization, is looking for ways to help communities protect their watersheds from potential sources of contamination, including aerial spraying. It's helping the community of Carbonado, Washington, near Mount Rainier, work out a voluntary agreement to halt spraying in the most sensitive areas of its municipal water source, which lie on forest land not owned by the city. In the future, the town hopes to pay the timber company to minimize exposure to additional areas by using backpack sprayers instead of helicopters.

Private forest land in four Western states



Hewes, Jaketon H.; Butler, Brett J.; Liknes, Greg C.; Nelson, Mark D.; Snyder, Stephanie A. 2014. Public and private forest ownership in the conterminous United States: distribution of six ownership types - geospatial dataset. Fort Collins, CO: Forest Service Research Data Archive. <http://dx.doi.org/10.2737/RDS-2014-0002>

The spraying issue has caused some division in the small town of Gold Beach; some of those who have spoken out against the timber industry have complained about feeling threatened, and ugly quotes have appeared in local news stories. Keith Wright has helped form a telephone tree so that in the event of an emergency, neighbors can quickly come to each other's aid. In June, Wright received a form letter from the state Department of Agriculture stating that it planned to investigate his lung damage; he says that an ear, nose and throat specialist in Coos Bay has ascribed his bleeding and cough to his exposure to the aerial spray. At the time, he felt optimistic. "I hope somehow I play some little part in getting them to stop spraying everywhere," he said.

But by this fall, having heard nothing from the department since the letter, his hope was subdued.

Last spring, the state Department of Agriculture erroneously reported that Wright had died following the spray incident; he only found out when a mortuary called his house to make funeral arrangements. Almost a year after the spraying, a wicked cough continues to trouble him, but he still tries to have a good laugh when he can. Today, someone calls to ask how he is. "I'm alive," he replies. "Are you?"

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