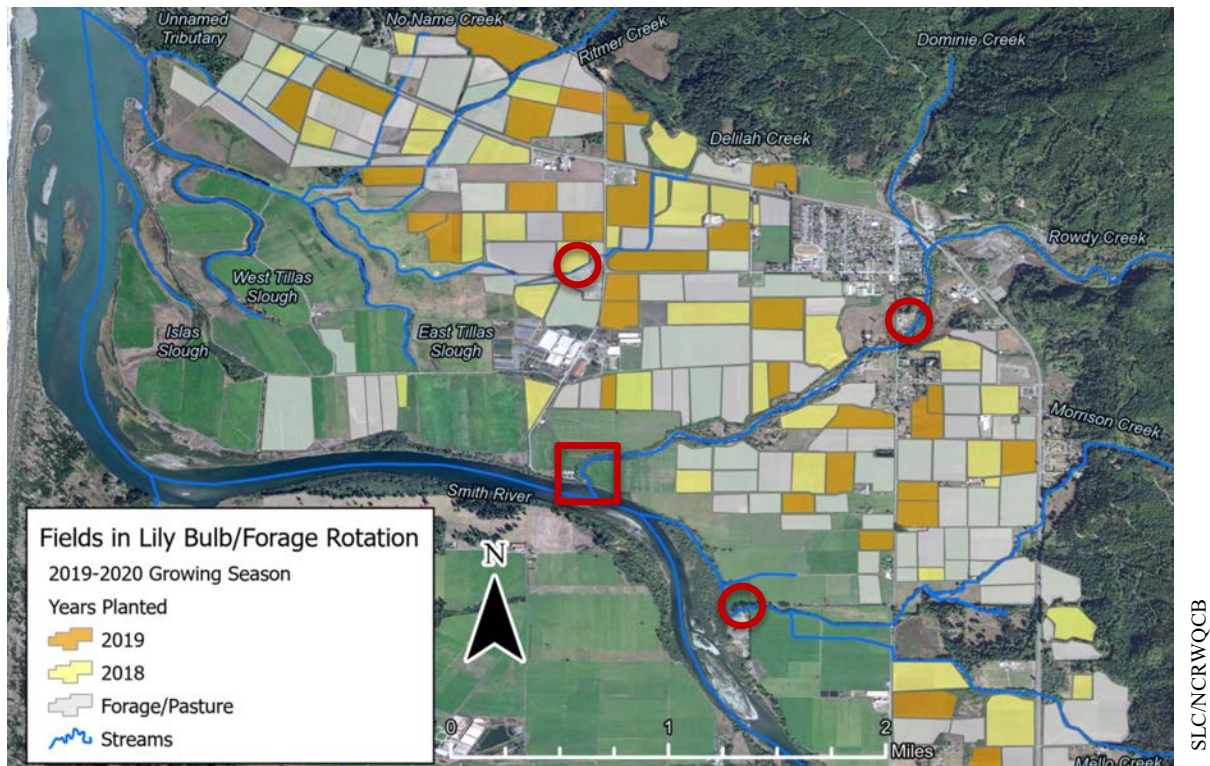


The Forty-year History of State Complicity in the Pesticide Poisoning of California's Wildest River



2013 water monitoring of streams that feed the Smith River estuary uncovered “chronic reproductive toxicity” (red circles) in Delilah Creek, Rowdy Creek, and Morrison Creek, and “acute reproductive toxicity” at the mouth of Rowdy Creek (red square). In 2024, Federal fisheries biologist Dan Free said, “Rowdy Creek has some of the highest intrinsic potential for coho [salmon] in the Smith River, and there’s no coho there. They haven’t seen coho there ... for years. And we’ve seen high levels of pesticides in Rowdy Creek during critical outmigration times, so it kind of doesn’t surprise me that that’s what we’re seeing.”

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I. Abstract

*Forty years of regulatory indifference and delinquency of the California North Coast Regional Water Quality Control Board (“Water Board”) toward prodigious applications of highly toxic pesticides at the Smith River estuary, in Del Norte County, California, and the resulting pesticide contamination of estuary waters, now threaten the survival of at least two aquatic species protected under the federal Endangered Species Act. Coho salmon (*Oncorhynchus kisutch*, listed as “Threatened” under the US Endangered Species Act) and tidewater goby (*Eucyclogobius newberryi*, listed as “Endangered” under the Act) rely on the Smith River for the best habitat remaining to these species in California.*

Since the early 1980s, the Water Board has virtually ignored severe and ongoing contamination of the Smith River estuary by the annual application of 300,000 pounds of agricultural pesticides used in the production of Easter lily bulbs. The inundation of toxins has resulted in predictable and preventable violations of state and federal endangered species and clean water laws. Much of the land where lily bulbs are grown consists of seasonal wetlands, which retain their legal wetland status yet receive from the state of California none of the protections mandated for wetlands by state and federal statutes.

The results of pesticide poisoning in the lower Smith River are not limited to impairment of habitat that supports coho salmon and tidewater goby. Massive applications and bioaccumulation of pesticides impact the entire aquatic and terrestrial ecosystem of the Smith River estuary and its tributaries. That key species and critical habitats can be in such danger within the lowermost reach of California’s cleanest, wildest river, at a time when loss of biodiversity has reached disastrous levels on a global scale, is testament to the breadth of the state’s dereliction. The current environmental crisis at the Smith River estuary is the result not just of the pesticide applications themselves, but of the Water Board’s refusal to enforce appropriate statutes, and its near collusion with lily growers to evade state and federal laws.

Residents of the small town of Smith River also suffer significant health impacts that appear to be directly tied to pesticides. Smith River is surrounded by Easter lily fields. In 2015 Christopher Pincetich, a Ph.D. toxicologist who contracted with Siskiyou Land Conservancy to examine toxicity issues at the Smith River estuary, wrote, “I believe the application of hundreds of thousands of pounds annually of fungicides, herbicides, insecticides and metals to support local agriculture may also be causing deleterious toxic effects to nearby residents, who have reported contaminated well water, illness, and cancer. The toxicity issues impacting the ecosystem and community warrant immediate attention, investigation, and remediation.” The following year Siskiyou Land Conservancy conducted a Community Health Assessment in Smith River, which demonstrated severe and widespread health impacts in the town apparently caused by pesticides.

Nonetheless, ongoing pesticide contamination of the lower Smith River has been virtually ignored, glossed over, and enabled by the Water Board. State officials have taken no

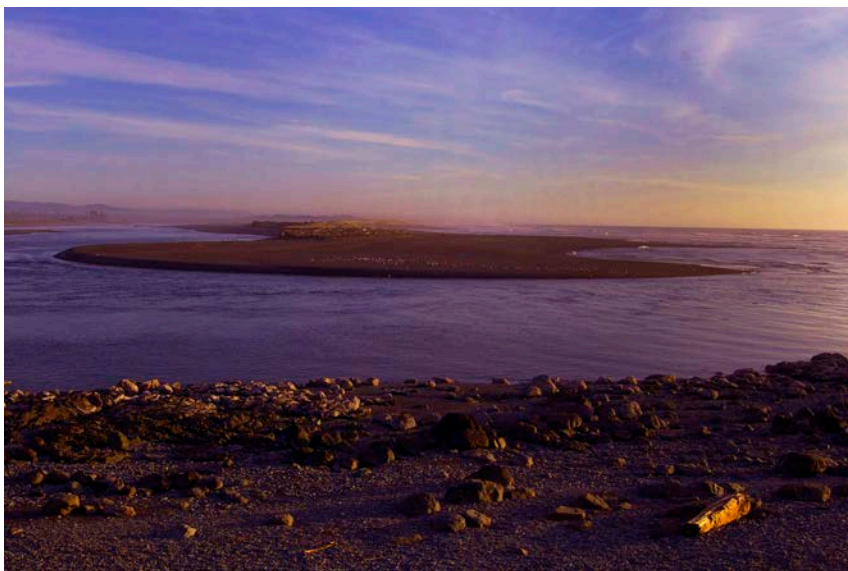
meaningful or legally appropriate action to stem or ameliorate toxicity issues that by 2018 were so extreme that the National Marine Fisheries Service (NMFS) sent all four firms that grow Easter lilies an Endangered Species Act “Section 9” letter, which warned lily farmers that their pesticide use was now threatening the survival of the Smith River’s coho salmon population, constituting an illegal “take” of a protected species under the Act.

In January 2024, the author of the NMFS letter, Dan Free, told Siskiyou Land Conservancy that little has changed since 2018—indeed, he said that the Water Board appears to be even more willing today than it has in the past to allow continuing violations of the Clean Water Act and the Endangered Species Act at the Smith River estuary.

“It’s a toxic soup in there,” said Free, referring to water quality at the estuary. “[Water Board regulators] are protecting the growers. ... [A]fter only a couple of inches of total rain the area becomes saturated and cannot hold the water on the land. So it just runs off, with all the chemicals,” into the Smith River estuary.

Nonetheless, and despite decades-long efforts of concerned scientists such as Free, the federal government has also taken insufficient action to curb pesticide abuses at the Smith River estuary. Given the decades-long refusal by the State of California to enforce state and federal laws at the estuary, the US Justice Department must now step in to seek and enforce a total ban on use of agricultural pesticides on wetlands that surround the Smith River estuary.

Simple reduction of pesticide use will not protect species that use the estuary from eventually extirpation and possible extinction. The only means of enforcing the Endangered Species Act to protect imperiled species is to permanently prohibit pesticide use on bottomlands that surround the Smith River estuary.



SLC photo

Mouth of the Smith River.

II. Biological Importance of the Smith River and its Estuary

The Smith River is California’s wildest large watershed, the last remaining undammed major river in the state. The Smith is the fourth-largest coastal river in California, and it is among the world’s cleanest rivers. The Smith River is considered to be the “crown jewel” of the federal Wild and Scenic River system—the Smith contains more miles of federally designated Wild and Scenic River status than any other U.S. watershed. The Smith River therefore, and not surprisingly, provides refugia for numerous rare and sensitive species, and is critical for the ongoing survival of federally protected salmonid and tidewater goby populations.

The Smith River is so biologically significant that the Institute for River Ecosystems at Cal Poly Humboldt has identified the watershed as a “recolonization” source, or seed bank, for Endangered Species in impaired watersheds up and down the California-Oregon coast — a designation that takes on heightened importance as West Coast salmonid populations face extinction, and as the world’s northernmost population of endangered tidewater goby now clings to existence in the Smith River estuary. The federal government has designated this lowermost reach of the river to be “essential fish habitat” for all Pacific salmon under the Magnuson-Stevens Fishery Conservation and Management Act. The importance of a healthy Smith River therefore extends up and down the West Coast of the United States, particularly California, as an island of critical biological refugia.



SLC photo

Farmer applies the fungicides chlorothalonil, a carcinogen, and copper hydroxide on Easter lily fields in 2001. A 30-mph wind pumps the chemicals directly into Smith River Elementary School (buildings in background). Chlorothalonil is banned in the European Union, the UK, and Switzerland, yet it remains in use on Smith River Easter lily fields.

No matter the Smith River's otherwise pristine nature, according to state and federal studies even the Smith River's salmonid populations are shrinking. The National Marine Fisheries Service has identified agriculture in the Smith's lower reaches as the primary contributor to diminishing numbers of aquatic species in the watershed. Such agricultural uses include beef and dairy production, which has resulted in significant alteration of the size, suitability, and hydrology of estuary habitat.

Yet pesticide use alone may pose the greatest threat to protected species, and to humans, in and around the Smith River estuary. At the mouth of the Smith River is the 10,000-acre Smith River Plain, an expanse of rich bottomland and seasonal wetlands that surrounds the Smith River Estuary. Here farmers employ heavy annual applications of agricultural chemicals to produce the nation's most extensive crops of wholesale Easter lily bulbs.

More than a century of industrial abuse of western watersheds of North America, combined with the current onset of climate change, has resulted in an extinction process that currently is accelerating throughout the West. It is time for California officials to adequately perform their legal duties and enforce state and federal water laws to the fullest extent possible at the Smith River estuary. Such enforcement must result in the total elimination of toxic pesticide use on bottomlands that surround the Smith River estuary. Barring such elimination, humanity could watch even as the Smith River's heralded endangered species succumb to extirpation and extinction.

III. History of chemical use and contamination at the Smith River Estuary

First detections of pesticide Contamination in Smith River waters

As if to foreshadow the coming threats of pesticide use in Easter lily production, in 1957 a California game warden reported that a major spill of the fungicide copper sulfate into Morrison Creek, a small tributary that runs through Easter lily fields to the Smith River estuary, caused the death of at least 2,000 juvenile coho salmon. At the time the nation's Easter lily industry was beginning to consolidate in Del Norte County.

The Easter lily is native to the Ryukyu Islands of Japan. Long a Christian symbol of the Virgin Mary and the resurrection of Jesus, the domestic market for Easter lilies began to boom during the late nineteenth century. At that time the island of Bermuda was the primary source of Easter lilies, though Japan became the principal supplier after the



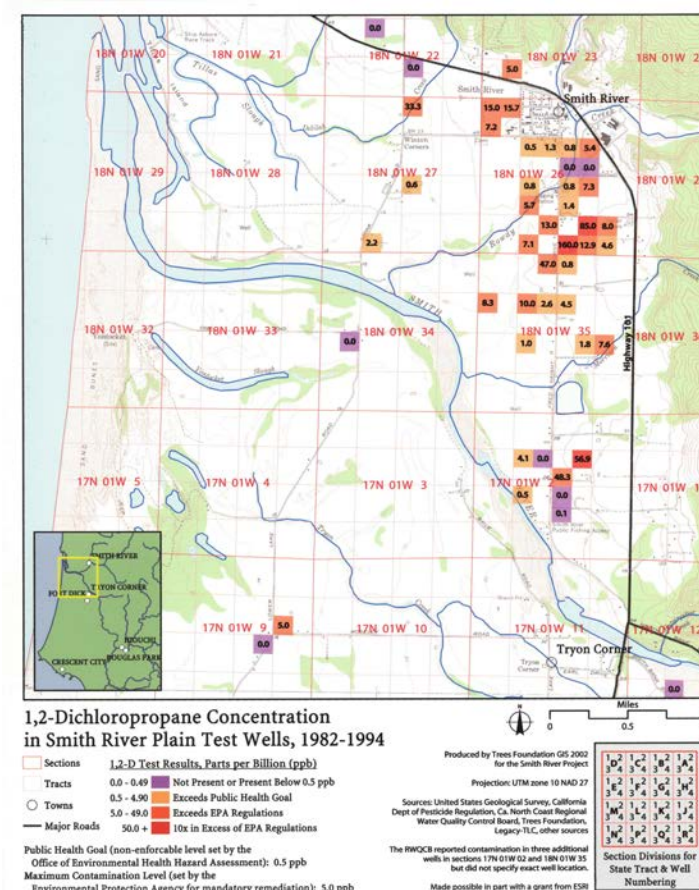
SLC photo

Easter lilies adorn a Manhattan church.

turn of the twentieth century. World War Two interrupted supplies from Japan, so American farmers quickly began dominating the domestic market. At the same time, advancements in production of petrochemical fertilizers and pesticides allowed Easter lilies to grow on the same landscape with short rotations, resulting in nearly 1,000 farmers in Northern California and Southern Oregon producing the bulk of Easter lily bulbs, known at the time as “white gold.” By the 1960s, the nation’s center of Easter lily bulb production was on the Smith River Plain.

In 1982-83, scientists from the North Coast Regional Water Quality Control Board discovered **heavy and widespread contamination of well water in the town of Smith River**, which sits one mile from the Smith River estuary and is surrounded by Easter lily fields. The contaminants found were chiefly 1,2-dichloropropane (1,2-D) and aldicarb, fumigants used to sterilize soils in preparation for planting Easter lily bulbs. Both chemicals are known carcinogens. Some of the wells contained contamination levels that were fifty times higher than the EPA's Public Health Goal, and ten times higher than that allowed by federal law. One of the wells registered 1,2-D contamination at 160 parts per billion, one of the highest rates of 1,2-D found in wells anywhere in the United States.

The US EPA has determined that 1,2-D poses “mutagenic, teratogenic, reproductive, and neurotoxic” threats to humans and wildlife. Yet facing one of the country’s worst cases of 1,2-D contamination, the state Water Board provided Smith River residents with some fliers and water filters, then largely disappeared for the next twenty years. By 2000, Easter lily farmers had phased out use of 1,2-D and aldicarb. Nonetheless, heavy pesticide contamination has not only continued unabated alongside the Smith River estuary since the 1980s, it has grown significantly.



Map created in 2002 by the Smith River Project, showing contaminated well sites found in Smith River during the 1980s.

Contamination of estuary waters discovered in 2002

In 2002, the Water Board again tested Smith River wells for possible pesticide contamination. The Water Board returned to Smith River only after being alerted by an organization, the Smith River Project, that scientists contracting with the Smith River Project had detected a dozen wells still contaminated with 1,2-D. (The Smith River Project merged with Siskiyou Land Conservancy in 2004.)

These wells still served homes in Smith River. That year the Water Board confirmed the findings but took no action to protect local residents. Mark Valentini, owner of Analytical Sciences, Inc., the firm that conducted the



SLC photo

Easter lily farm owners rallied Del Norte County residents to oppose free well testing offered by the Smith River Project, 2002.

groundwater testing for the Smith River Project, was stunned that Water Board officials would continue to ignore such high levels of pesticide inundation in Smith River.

“This is quite shocking,” Valentini told the Smith River Project in 2002. “Clearly [there’s] a huge amount of stuff present in some of these wells. ... It demonstrates pervasive contamination ... massive contamination. ... The Water Board’s inaction is incomprehensible to me. It blows me away that they would have stopped [water testing] with the hope that it would go away on its own without doing some kind of monitoring. That whole shallow groundwater in that Smith River Plain is affected by what goes on there ...”

Such high levels of 1,2-D, said Valentini, “could change into something that is potentially more potent There may be some unusual chemical changes that these could go through. This blows this thing wide open.” Valentini died in 2017, at the age of sixty-three, of lymphoma, a disease often associated with pesticide exposure and found among residents of the town of Smith River.

Also in 2002, the Smith River Project and the Center for Ethics and Toxics released a study that demonstrated that intensive pesticide use on lily fields in the Smith River Plain exceeded the Environmental Protection Agency's (EPA) established level of concern for endangered aquatic organisms (CETOS; Bailey and Lappé). CETOS compared pesticide use in Del Norte County with that of two major California agricultural counties, Tulare and Kings. While the approximately 350,000 pounds of pesticides applied that year by Del Norte's Easter lily producers might seem small compared with the 17 million pounds and 5 million pounds used at the time in Tulare and Kings counties, respectively, the per-acre intensity of use in Del Norte County rivaled and even exceeded that of the two other counties. The study concluded that the pounds-per-acre application rates of several pesticides in the Smith River Plain—in particular the carcinogenic fumigants metam sodium and 1,3-dichlorpropene (see Appendix)—exceeded that of these two major agricultural counties. All of this pesticide use abutted, and we now know has contaminated, the vital Smith River estuary—an inevitability given that most of the land farmed for Easter lilies is made up of seasonal wetlands whose surface waters flow directly into the Smith River estuary during much of the year.

CETOS used an EPA model, (GENEEC, or Generic Estimated Environmental Concentration) on five chemicals applied in the Smith

River Plain to determine whether they are hazardous for endangered aquatic species that use the Smith River estuary. Of the five chemicals selected for review (chlorothalonil, carbofuran, diuron, disulfoton, and pentachloronitrobenzene), four exceeded or met the established levels of concern for endangered aquatic organisms— meaning that some of



Britt Bailey and the late Mark Valentini discuss Smith River water quality results in the Analytical Sciences mobile lab, 2002.

SLC photo

the world’s healthiest and most important salmon and steelhead populations were, and remain, directly threatened by ornamental flower production.

Although the Smith River Project provided the North Coast Regional Water Quality Control Board with its reports, the Board did not respond to the findings and took no action to protect wildlife or human residents of the lower Smith River.

Water Monitoring toxicity results and the Water Board’s non-response since 2002

Siskiyou Land Conservancy founded in 2004 and absorbed the Smith River Project. For twenty years Siskiyou Land Conservancy has led NGO efforts to ascertain levels and effects of pesticide inundation at the Smith River estuary, and to bring an end to pesticide use on the Smith River Plain. The organization has met fierce resistance to these efforts not just from lily growers, but from Water Board officials who have, at best, operated within a vacuum of concern for humans and wildlife at the Smith River estuary.



SLC photo

Easter lily polygons adjacent to the Smith River estuary and the town of Smith River. Rowdy Creek, which has demonstrated high levels of pesticide contamination, runs through the center-left of the photo. Tillas Slough, critical habitat for endangered tidewater goby, is the small “S” curve of water in the top-right area of the photo.

At worst, Water Board officials have actively worked hand-in-glove with lily growers and the powerful California Farm Bureau to aid farmers' ability to skirt and ignore the state and federal Endangered Species Acts and the federal Clean Water Act, and to continue exposing residents of Smith River to toxic pesticides.

After eight years of pressure by the Smith River Project and Siskiyou Land Conservancy, as well as our outreach to scientists and regulatory experts, in 2010 the Water Board finally tested for evidence of pesticide contamination of surface waters that run through lily fields to the Smith River estuary.

The 2010 testing event occurred on just one day, August 18, the driest month in Smith River, when flushing of pesticides into streams would not be expected to occur. The Regional Water Board took just six water samples, and quietly reported its findings in a form letter to lily growers. That letter noted that levels of dissolved copper in Delilah Creek were 13.7 parts per billion (ppb), nearly 28 times higher than the California Toxics Rule allows for freshwater habitat. It also revealed the devastating findings that testing of water from Smith River estuary feeder streams “demonstrate[d] evidence of chronic reproductive toxicity,” meaning that the estuary food chain that supports salmonids and tidewater goby is directly threatened by pesticide poisoning. No matter the dramatic and devastating nature of these findings and others to follow, to this day state officials have taken no meaningful action to ameliorate the threat of pesticides at the Smith River estuary.

The use of EPA-registered Class I copper-based fungicides on Easter lily fields is enormous. In 2010 Easter lily farmers applied 28,000 pound of the highly toxic copper hydroxide, and 2,544 pounds of copper sulfate. The EPA label for copper hydroxide notes, “This copper product is toxic to fish and aquatic organisms. Unlike most organic pesticides, copper is an element and will not break down in the environment and will therefore accumulate in sediment with repeated applications.”

That Water Board scientists would discover 13.7 parts per billion of dissolved copper in Delilah Creek—the largest feeder stream to Tillas Slough, which itself is the largest remaining slough in a shrunken estuary that has been significantly altered by

agricultural practices, and is the only location where endangered tidewater gobies are found in the Smith River watershed—and take zero action to ameliorate the contamination demonstrates the Water Board’s unwillingness to rectify even severe cases of contamination of critical endangered species habitat.

In its proposed Designation of Revised Critical Habitat for the Tidewater Goby (October 19, 2011), the U.S. Fish and Wildlife Service recommended that Tillas Slough be listed as one of 65 units of Critical Habitat for the Tidewater Goby in California. In 2013 the National Marine Fisheries Service reported that the Smith River estuary “is important for maintaining the tidewater goby metapopulation in the region, and plays an important role in dispersal of the tidewater goby, which could prove vital if certain factors, such as climate change, adversely impact the tidewater goby habitat locally or to the south.”

Nonetheless, the US Fish and Wildlife Service, which has jurisdiction over tidewater goby populations, has taken no action to stem pesticide inundation at Tillas Slough, no matter that the 2005 USFWS Tidewater Goby Recovery Plan notes:

Threats at this site [Tillas Slough] include pollution from pasture runoff, and disturbance/modification of drainage pattern. The area supporting tidewater gobies is small, and immediately down channel from a metal culvert crossing a trail/road with access to people staying at nearby lodging. Although connected to the Smith River estuary, this site is the only recorded location of tidewater gobies in the Smith River watershed. ... The population is vulnerable to any catastrophic event in this small area that would alter water quality, stream flow regime, or connectivity to other habitats. An event such as dredging or filling the area, chemical spills, stream channelization could quickly extirpate the population.

The threat of copper to salmonids is also severe. According to a study released in a 2007 issue of the journal *Environmental Science and Technology*, levels of dissolved copper as low as 2 parts per billion can have a direct impact on the sensory systems of

juvenile coho salmon. The Smith River is a “Core Watershed” for coho salmon, which is listed as “threatened” under both the state and federal Endangered Species Acts.

State officials are obligated to apply the most effective measures to protect the waters of the Smith River from pesticide poisoning. Yet the exact opposite is occurring with regard to copper, as well as several other pesticides. No amount of copper is safe to use on the quickly saturated lands that surround the Smith River Estuary. Copper contamination alone could prove pernicious enough to cause the Smith River’s coho salmon and tidewater goby populations to plummet, if not disappear altogether.

Given the importance of Tillas Slough to the continued existence of tidewater goby, and the understanding that the entire estuary is critical habitat for coho salmon, the elevated copper levels in Delilah Creek should have spawned an immediate enforcement action by the Water Board to relieve the Smith River estuary of copper contamination, principally through the elimination of use of copper fungicides. Yet no action was forthcoming. Incredibly, in 2013—just three years after the Water Board directly informed lily growers that they were essentially dumping copper directly into the Smith River estuary—lily farmers substantially increased copper applications on lands that surround the estuary. That year lily farmers applied 24,250 pounds of copper hydroxide, and 22,387 pounds of copper sulfate. The pernicious qualities of such massive copper applications are exacerbated when we understand that most copper is applied during the rainy season. When the region’s frequent heavy rains wash copper from soils and Easter lilies directly into the streams and estuary of the lower Smith River, copper fungicides are then reapplied, only to again wash into estuary streams and there accumulate to forever poison aquatic habitat. (Nonetheless, during a subsequent meeting of the Smith River Advisory Council, Smith River lily grower Linda Crockett said she believed that the source of the copper in estuary streams was “brake pads.”)

2013 Water Monitoring at the Smith River estuary finds widespread toxicity

Responding to ongoing pressure from federal biologists and Siskiyou Land Conservancy, in 2013 the North Coast Regional Water Quality Control Board conducted

another rare round of surface water monitoring in the Smith River estuary. That year Water Board scientists expanded sampling to fifteen water draws over six days from August-November 2013. The Water Board released results in April 2014, revealing that state scientists had uncovered “chronic reproductive toxicity” in three out of four streams that feed the Smith River estuary. One of the samples uncovered “acute reproductive toxicity.” Chronic toxicity indicates that the water samples were so impaired that the zooplankton that makes up the basis of the salmonid food chain cannot reproduce. Acute toxicity indicates that when a scientist dropped living zooplankton into the waters of the lower Smith River the zooplankton died. The findings were unprecedented and spoke to potentially widespread contamination of one of the most biologically important estuarine habitats on the West Coast of the United States.

While some of the water samples taken in 2013 revealed high copper levels, the water that caused the acute toxicity, taken from Rowdy Creek, did not show elevated levels of copper. The only feasible explanation for this finding is that not just copper, but several other pesticides used on the Smith River Plain—individually and in their often dangerous combinations, a veritable petri dish of chemical inundation—are causing the degradation and potential destruction of habitat characteristics that support rare species in the Smith River estuary. Aside from Easter lily production, there is virtually no other source of these pesticides in or around the Smith River estuary or in the entire Smith River watershed.

As if to illustrate one of the greatest obstacles to protecting the Smith River estuary, during a 2014 Smith River stakeholder meeting a Water Board scientist, referring to the 2013 toxicology results, said, "We're seeing some chronic toxicity but we don't know why. We need to get an idea of what's causing this toxicity." The cause-and-effect correlation between ground- and surface-water contaminating, fish-killing pesticides used in concentrations that are higher, in some cases, than anywhere else in California, and the die-off of a critical component of the food chain — in a watershed that is otherwise pristine — was undeniable. There is little in the entire Smith River watershed aside from hundreds of thousands of pounds of highly toxic pesticides used annually (a total of more

than 3 million pounds applied between 2011 and 2019) on Easter lily fields that could be causing such toxicity. For state officials to shrug their shoulders over such findings is dysfunctional, if not criminal, as it betrays the intention and the letter of the federal Clean Water Act and Endangered Species Act, among other federal and state laws.

At the time it was safe to say that the entire Smith River estuary, and the four streams that run through the Smith River Plain and feed the estuary, were, and remain, contaminated enough to hamper or even extinguish salmonid reproduction and growth in estuary waters. Yet the Water Board continues not only to ignore the crisis, but to exacerbate it by maintaining a state of bureaucratic stasis disguised as “collaborative” action.

Pincetich Report sounds alarm on pesticide poisoning at Smith River estuary

After analyzing Smith River estuary water monitoring data from 2010 and 2013, Dr. Christopher Pincetich, a marine biologist and an expert on the effects of pesticides on aquatic organisms, said, “The chronic toxicity result is very significant; I saw almost zero reproduction. That test uses *Ceriodaphnia dubia*, a freshwater invertebrate, the ‘water flea.’ It is very relevant to use as it is the base of the food-web. If Cerio can not reproduce in your watershed, you can technically extrapolate this to say that salmon habitat is likely impaired as their food source (small aquatic invertebrates) is impacted.”

Christopher Pincetich holds a Ph.D. in Pharmacology and Toxicology from the University of California, Davis. In 2015 Pincetich wrote an open letter to state and federal regulators that deplored pesticide contamination discovered at the Smith River estuary. Pincetich wrote:

The cumulative toxic effects of the most abundant and poisonous pesticides applied by lily farmers in the Smith River estuary are jeopardizing the continued survival of coho salmon and tidewater goby and destroying the principal component elements of their critical habitat in the estuary and floodplain of this watershed. I also believe the application of hundreds of thousands of pounds annually of fungicides, herbicides, insecticides and metals to support local agriculture may also be causing deleterious toxic

effects to nearby residents, who have reported contaminated well water, illness, and cancer. The toxicity issues impacting the ecosystem and community warrant immediate attention, investigation, and remediation.”

Pincetich writes that the presence of tidewater goby in Tillas Slough “is extremely significant, as climate change has shown to be causing a general northern migration of coastal and intertidal marine species in response to warming ocean temperatures. The range of tidewater goby will likely expand northward from the Smith River in coming years, but this natural progression would be inhibited if the Smith River population is jeopardized. The consistent and abundant use of herbicides for agricultural production in the Tillas Slough area within the Smith River Estuary does threaten to destroy one of the three identified PCEs [primary constituent element] of their critical habitat, the presence of aquatic vegetation.”

Pincetich’s letter also examined the threats that pesticides pose to coho salmon:

The life history of coho salmon is unique among salmonids in the Smith River watershed, exposing them to contamination in the lower watershed for a greater portion of their life history when compared to other species. . . . The coho smolt life-stage requires a healthy estuary to feed and grow during acclimation to ocean conditions, often residing in this habitat longer than other salmonid species. Chinook and chum salmon migrate to the ocean during their first spring as fry, while anadromous steelhead trout can grow to a much larger size than coho smolts before beginning their journey to the ocean. Coho are unique among salmon in that they spend, on average, 18 months of their life in freshwater. Their extended inland residency puts them at the greatest risk from harmful land-use practices and subjects this species to the greatest effects from degraded riparian and estuarine habitats. This life-history trait, an extended freshwater juvenile period, has resulted in their precipitous population declines as freshwater and estuarine habitat is degraded and destroyed.

The state and federally protected coho salmon in the Smith River watershed is a functionally independent population that is at high risk of extinction (NMFS, 2014).

Within the entire Smith River watershed that is available to coho, the Smith River plain

and estuary contains the largest area of habitat with the highest Intrinsic Potential (IP) to support restoration and recovery of the species (NMFS, 2014). The severity of stress on the juvenile and smolt life history stages of coho in the estuary and mainstem is categorized as “Very High”, resulting in the overall ranking of the impaired estuary and mainstem function as a Very High limiting factor in the survival and growth of the coho population (NMFS, 2014).

The majority of poor habitat conditions exists in the Smith River Plain and overlap with areas of high IP value (NMFS, 2014). Within this area, agricultural production of lily bulbs produces 95 percent of the lily bulbs in the US, a practice that requires copious pesticide use to control nematodes and diseases. The pesticide use by lily production can impact salmonids (NMFS, 2014).

The cause for special concern—that pesticide applications in the Smith River estuary could be impacting endangered coho salmon—is based primarily on the co-occurrence of high pesticide concentrations with sensitive life stages of these salmonids, and is summarized with respect to general exposure scenarios below:

Salmonids are at the greatest risk of reduced growth from pesticide exposure during their fry to smolt life stage where rapid growth is needed in order to survive. The longer salmonids remain in freshwater the greater the probability for pesticide exposure. Juveniles rearing in estuaries and nearshore environments are also susceptible to growth impacts. For most of the listed salmonid species, but especially stream-type Chinook and coho, extended periods of growth occur in shallow, low-flow habitats, including floodplain habitats and small streams... Many freshwater salmonid rearing sites are located in floodplains where shallow, low flow habitats are at high risk of pesticide drift and runoff. These habitats provide some of the most important foraging areas for developing juveniles (NMFS 2011).

Pincetich’s devastating findings—that pesticide use on the Smith River plain is extreme and threatens to cause the extinction of coho salmon and tidewater goby in the Smith River—have been known to the Regional Water Board since at least the early 2000s. Yet the Water Board has done nothing to address the threat of pesticides at the Smith River estuary. Quite the opposite. The Water Board has instead directly abetted pesticide contamination of the Smith River estuary in ways that clearly violate the federal Clean Water Act and the Endangered Species Act.

NMFS 2014 Coho Recovery Plan for the Smith River cites dangers of pesticides

In his report, Pincetich frequently cited the Southern Oregon/Northern California Coast Coho Salmon Recovery Plan, released in 2014 by the National Marine Fisheries Service. The Recovery Plan notes the significant alteration of the Smith River estuary’s hydrology due to post-World War Two construction of levees,



SLC photo

Ranchers used cement trucks and other material to construct levees along the Smith River estuary.

dikes and tide gates that have significantly shrunken the estuary acreage. The Recovery Plan emphasizes that, within this altered landscape, Easter lily farming is of “particular concern” and threatens the survival of coho salmon in the Smith River watershed. The Recovery Plan notes, “Agriculture in the lower [Smith River] watershed and around the estuary has been, and continues to be the greatest contributor to loss and degradation of coho salmon habitat. ... [T]he high pesticide use associated with agriculture in the Smith River Plain adjacent to streams and drainages that enter the Smith River Estuary may be affecting the survival of coho salmon. ... [A]gricultural runoff needs to be addressed to reduce the concentration levels of pesticides and sediment reaching the Smith River and its tributaries. ... The current level of chemical contamination is a high risk for juvenile salmonids. ...”

The Coho Recovery Plan cited the Smith River Project’s CETOS assessment of pesticide use in the estuary, noting that “this study found that levels of [pesticide] use

exceeded the federal government’s established level of concern for endangered aquatic organisms for four of five pesticides studied. ... The current level of chemical contamination is a high risk for juvenile salmonids (Bailey and Lappé 2002).”

2016-2017 water monitoring and contamination at the Smith River estuary

In late January, 2018, the Water Board released a long-awaited report on the results of two years of water quality monitoring in the Smith River Estuary. The monitoring detected 17 pesticides in surface waters of streams, creeks and ditches that feed the estuary, and 10 instances of contamination of the aquatic food chain. The findings demonstrated to most educated observers, including scientists at the National Marine Fisheries Service, that Easter lily farmers are, at a minimum, in clear violation of the Clean Water Act, and likely also in violation of the “take” provision of the Endangered Species Act by threatening to eradicate the Smith River’s endangered aquatic species.

The Water Board shrugged off the pesticide detections, as well as the potentially lethal finding that five of the pesticides detected during the 2016-2017 sampling event turned up at levels that exceeded the US Environmental Protection Agency’s Aquatic Life Benchmarks, meaning they are considered hazardous to fish and other wildlife. In addition, high levels of copper—which, as shown, is extremely toxic to fish and is used widely in Smith River as a fungicide—were found in every water sample. When small aquatic organisms that make up the basis of the salmonid food chain were exposed to the water in a laboratory, many of them either died or failed to reproduce.

The Water Board report does note that “agricultural activities on the Smith River Plain are affecting the water quality” in the estuary. Yet, in a conference call with stakeholders prior to the report’s release, Water Board officials stated that its findings of widespread contamination could not be attributed to the 17 toxic pesticides found in surface waters. Instead they claimed that the contamination of estuary waters required no action because it was occurring primarily due to “extremely low water hardness” which was “interfering with the ability of the test species to reproduce.” Water Board staff

recommended “voluntary” measures and “best management practices” to address pesticide inundation of the Smith River estuary.

IV. Smith River Community Health Assessment

In addition to the destructive impacts of pesticides on fish and wildlife, human communities of the lower Smith River are likewise at risk. In 2016, Siskiyou Land Conservancy responded to years of requests from residents of the town of Smith River by conducting a Smith River Community Health Assessment to determine if their health was being impacted by pesticides used near their homes. To create the survey SLC followed guidelines developed by the Center for Bioenvironmental Research at Tulane University.

In February 2016, Siskiyou Land Conservancy mailed a survey to all Smith River residents, in English and Spanish, in order to assess the human effects pesticides used in the town. The survey sought to ascertain levels of concern by Smith River resident about pesticide applications, potential exposures of local residents to pesticides, and the prevalence of local health conditions which could be related to pesticide exposure. Respondents represented at least 14 percent of Smith River residents.

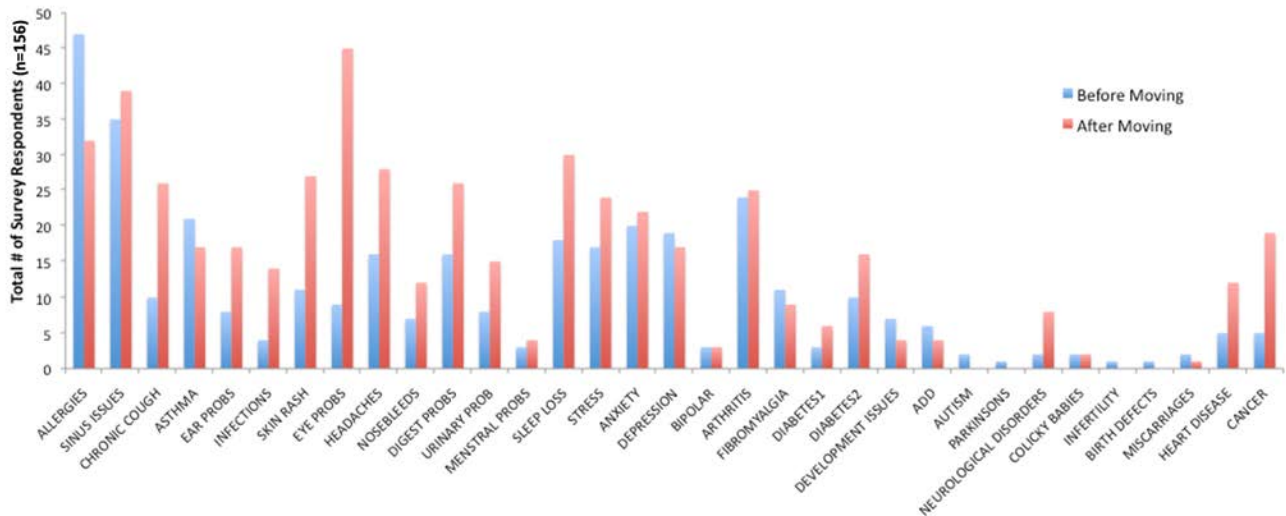


Figure 14. All Health Conditions Surveyed – Before and After Moving to Smith River

Chart used in the Smith River Community Health Assessment that demonstrates health problems in Smith River likely associated with pesticide use.

The survey found that Smith River residents experienced several potential routes of exposure to pesticides. Easter lily fields abut the town on all sides. More than half of respondents lived within a half-mile of an agricultural field, including 17 percent who lived within 100 feet of a field. Several respondents relied at least partially on residential wells for drinking water in areas at high risk of well contamination. Nearly half of respondents reported that their children had attended, currently attended, or would soon attend Smith River Elementary School, which is within 100 feet of fields used for lily bulb production. Few respondents reported having been notified that pesticide applications were soon to occur near their homes or the school.

The state and federal governments have associated eye, skin and respiratory problems, along with increased cancer risk, with exposure to the pesticides most commonly applied to easter lily fields. Results showed that respondents experienced many of these conditions more frequently after moving to Smith River. Eye problems in particular were experienced five times more frequently after moving to Smith River. Other significantly elevated impacts included skin rashes, chronic coughs, headaches, infections, ear problems, heart disease, neurological disorders, and cancer. Unsurprisingly, respondents expressed high levels of concern about exposure to pesticides and the potential health effects of such exposure.

A 2005 study by the California Environmental Protection Agency found that high concentrations of metam sodium and 1,3-dichloropropene applied to lily fields had off-gassed for several days into Smith River neighborhoods. Metam sodium and 1,3-D are known carcinogens and



SLC photo

A sign warns Smith River residents that an Easter lily field has just been sprayed with 1,3-dichloropropene. Ditches from this field drain to Delilah Creek..

are notorious for sickening people and pets near pesticide application sites. They can also cause nerve damage, birth defects, skin rashes, respiratory problems, eye problems, and many other health issues. Yet metam sodium and 1,3-D are just two of more than a dozen highly toxic pesticides sprayed year round on the Smith River Plain surrounding the town of Smith River. No matter the CalEPA report and the known health impacts of pesticide use, lily farmers increased their use of metam sodium and 1,3-D nearly every year throughout the decade, ballooning from a combined 117,493 pounds in 2000 to 243,794 pounds in 2010, according to the state Department of Pesticide Regulation.

Health impacts among laborers who work in lily fields and in lily greenhouses are also significant. Still, most reports are anecdotal as laborers fear reprisals and loss of employment, or even withholding of pay, if they report incidents to the Del Norte County Agricultural Commissioner. An example of pressure on farmworkers to “stay quiet” is found in a report from a Siskiyou Land Conservancy contractor who investigated farmworker complaints during the 2010s. The employee had discussed the issue with a local nurse.



Farm workers on their bellies ride the “airplane,” a device attached to a tractor that moves the workers along lily fields. Here workers remove lily flowers to promote bulb growth.

The nurse did some home care in the Smith River community and said they have an exceptionally high cancer rate there and was convinced that it is due to the chemicals being used there and that she would not live there if someone paid her. The nurse worked at a local clinic and said the migrant workers came in all the time with medical problems, rashes, breathing difficulties, and other problems. The nurse speaks Spanish fluently and is partners with an undocumented migrant and the people trust her and would tell her of the conditions there. Farmworkers work 12-14 hours a day with one ten-minute break and twenty minutes for lunch, six days a week. Minimum wage. One lady came in with a rash

on her hands that was bleeding and would not heal so she would get gloves from the clinic to wear at work (which makes me wonder at the possible lack of PPE, personal protective equipment, required by OSHA). The nurse said that during the heaviest months of chemical use the farmworkers all suffer respiratory problems and come to the clinic for inhalers etc. to help them breathe.

Notably, when Siskiyou Land Conservancy directors brought the findings of the Community Health Assessment to officials at the Del Norte County Health Department, the officials dismissed the survey and appeared offended. The SLC directors requested that county officials conduct their own health assessment—or at minimum follow up on our findings—or request that the state Department of Health do so. Yet the county took no action, and never has. Even when the Del Norte County Board of Supervisors finally agreed to SLC’s long-running request for a public hearing on the threat of pesticides in Smith River—which occurred for the first and last time on May 26, 2015—no action was forthcoming. Indeed, we were met with animosity and contempt for our efforts, as a majority of the supervisors, from the dais, disparaged calls for reform of agricultural practices at the estuary.

Sampling of responses to the health survey

“There are 5 homes that I am personally aware of that one or more of the residents were diagnosed and treated for cancer. This is all on the same street. I have had cancer twice, the person we bought the home from had cancer. One of our neighbors also had cancer twice and one of the other neighbors died due to cancer.”

“Neighbor got cancer and died, my mom got cancer and died, I got cancer again, still here, in remission. In 22 years living here, 4 dogs and 2 cats all died of cancer.”

“My dog died of pancreatic cancer in Dec. 21, 2015, came on very quickly and severe. I felt very sick and lost a lot of weight over 65 pounds in a very short amount of time, nausea, stomach pain, vomiting. My dog also suffered dizziness, confusion, falling over, stress, anxiety, not eating, stomach and bowel problems as well as being diagnosed with terminal cancer and etc...Myself, severe headaches, stomach pains, depression,

anxiety, worse arthritis feelings in all joints and nose and throat and eye problems, severe weight loss and etc...”

“Our dog’s skin became infected about 6 months after moving to Smith River. She now has severe allergies and is taking daily medication to try to keep her allergies and skin infections under control.”

“Please stop the use of pesticides in the fields which are in close proximity to residences. They say that Smith River leads the area in rates of cancer. Scary! Would not have moved here if I were aware of this.”

“I am a 50-year-old life-time resident of S.R. Both of my parents and many locals I know have died or are dying of cancer. My mother passed away at age 39. My father at age 55.”

“We have animals (domestic) and over the years lost them to organ cancers, lymph node cancer. I'm concerned about the water and soil due to the many years the field across from our home was used for lilies, now used for hay.”

“Have considered moving out of Smith River for my children's health and all the spraying on the lily fields.”

“I am overly concerned. They have changed lily chemicals several times since 1977 when we moved into this home. ‘Timic’ stayed in the wells. When the fields are injected with gas it is sickening. They did cover the fields, now they leave them uncovered and it is really scary because of the rain and run out to the river to the ocean. But most of all it's all for money not health. I have watched families with bad wells have high cancer in the family. But then they can have both children with cancer and not want to complain because they live in the place that employs them. They must be afraid to have no job. Hard for me to understand. I question their reasoning. We give up our well because we weren't sure about the lilies and can't believe the testing because of the ‘good old boy thing.’ I didn't trust it. People are afraid of the Lily growers. They will hurt your families if you talk. There is a very high cancer in people and animals in this area. We have had hives of bees die, complete hives in one day.”

“I have [been here] 15 year[s] with multiple health problems. We are on well water. [Pesticides] cover the cars when the wind blows. My son now sees a neurologist, orthopedic specialist and geneticist. Plus my husband and I have several health problems.”

“I have leukemia.”

“Easter lilies growers [spray] the herbicides, fungicides during windy days w/no care for human health. With rain coming throughout year run-off is great. Please try to stop the use of herbicides and fungicides in such huge amount. They are killing the lower river and hurting us!”

V. Federal intervention at the Smith River estuary

In October 2018, the National Marine Fisheries Service—whose biologists have been critical of the Water Board’s indifference to contamination of the Smith River estuary—and the California Department of Fish and Wildlife announced that critical salmon and steelhead streams that feed the Smith River estuary, in Del Norte County, were widely contaminated with high levels of toxic copper. Half of the copper detections exceeded the California Toxics Rule, the federal standard used to “protect human health and the environment,” said the report. As shown, Easter lily farmers annually apply tens of thousands of pounds of Class I (“most toxic”) copper fungicides. In 2018 Easter lily farmers also applied 260,000 pounds of other dangerous pesticides.

The NMFS/CDFW report was the second government analysis in a single year to reveal widespread contamination by pesticides of the vital Smith River estuary—the first being the 17 pesticides found in estuary streams and ten instances of contamination of the salmonid food chain. The new report acknowledged those findings by noting, “NMFS is not ... ignoring the toxic effects of the other pesticides that were found in surface water testing done by the North Coast Regional Water Quality Control Board (NCRWQCB 2018). Notably, the toxic effects of metals to salmonids may also be exacerbated by other types of contaminants such as pesticides.”

The report stressed that, while state Water Board officials continued to claim an inability to ascertain the source of water quality toxicity at the Smith River estuary, there was no doubt as to the origins of pollution of these state waters: “NMFS and CDFW have observed lily bulb field conditions and their proximity to waterways in the Smith River Plain, and believe that these conditions result in a high likelihood of delivering agricultural chemicals (e.g., dissolved copper) to salmonid rearing habitats. Some of these chemicals, like copper, are very toxic to salmonids, especially coho salmon and other aquatic life that is important for healthy ecosystem function, [and they are] feeding directly into waterways and tributaries of the Smith River Plain.”

Assessing the impacts of copper on fish, the report said, “Dissolved copper can have an acute toxic effect to fish through exposure of the gill. ... Copper ... concentrations (in the Smith River estuary) were well above those that cause olfactory and lateral line damage. ... Dissolved copper can inhibit or destroy neuron (nerve) cells and impair two important sensory and behavioral response systems: olfaction (sense of smell) and the lateral line. ... Fish use their sense of smell to identify predators and prey, assess potential mates, avoid pollutants, detect migratory cues, and navigate to their natal streams from the ocean. The lateral line is the visible line along the side of a fish consisting of a series of sense organs, which fish use to detect movement, pressure, and vibration in the surrounding water. When these senses are impaired, fish growth and survival suffers. ... Therefore, dissolved copper has the potential to limit the productivity and intrinsic growth potential of ESA-listed coho salmon populations by reducing the survival and lifetime reproductive success of individuals.”

NMFS notifies lily growers that they are in violation of the federal Endangered Species Act

On December 17, 2018, the National Marine Fisheries Service alerted the four lily bulb growers operating on the Smith River Plain that copper concentrations alone, from near monthly application of fungicides on fields, were likely to place their operations in violation of Section 9 of the federal Endangered Species Act by resulting in an illegal “take” of endangered coho salmon.

“NMFS is concerned that the concentrations of dissolved copper observed below lily bulb fields may be resulting in the take of coho salmon in violation of Section 9 of the ESA,” NMFS wrote in the letter.

Under the Endangered Species Act, “take” of an endangered animal or plant is illegal. The “take” provision disallows any action that would “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect [listed endangered species], or to attempt to engage in any such conduct.” “Harm” is defined as, “An act which actually kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation which actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding or sheltering.”

The NMFS Section 9 letter notes, “[T]he Smith River Plain tributaries provide critical natal and non-natal rearing habitat for salmonids, including ESA listed coho salmon. ... Many of the tributaries to the Smith River Plain that currently support natal and non-natal rearing coho salmon are in close proximity and, therefore, exposed to run-off from lily bulb fields. ... Recent sampling for dissolved copper by NMFS and CDFW indicates that dissolved copper concentrations in the Smith River Plain are significantly higher in streams below some lily bulb fields as compared to sampling locations above lily bulb fields. Additionally, observed dissolved copper concentrations exceeded EPA benchmarks for protection of aquatic life and also exceeded concentrations that are likely to cause neurobehavioral toxicity to coho salmon.”

The Section 9 letter also states, “Pesticide sampling in the Smith River Plain from 2013-2015 by the NCRWQCB indicated concentrations of copper, imidacloprid, diuron, permethrin, and tebuconazole that exceeded U.S. Environmental Protection Agency (EPA) benchmarks for protection of aquatic life as described in the Smith River Plain Surface Water and Sediment Monitoring Report 2013-2015 (NCRWQCB 2018).”

NMFS fisheries biologist Dan Free warns that pesticides pose a significant threat to protected species in the Smith River estuary, and that the Water Board appears to have abandoned its legal obligation to enforce state and federal laws to protect these species.

On January 26, 2024, NOAA-National Marine Fisheries Service fisheries biologist Dan Free agreed to speak with Siskiyou Land Conservancy for this report. Free is a twenty-six year veteran with NMFS who has long expressed frustration with the Water Board's inability, or unwillingness, to take appropriate legal and regulatory action to address toxic pesticide use at the Smith River Plain. Phasing out pesticides, said Free, would eliminate one of the greatest threats to the Smith's coho salmon and tidewater goby populations, among other species. Even when Free sent lily growers the federal Section 9 letter, warning farmers that contamination of the Smith River estuary caused by the pesticides was putting them in violation of the federal Endangered Species Act, the Water Board, rather than rallying behind the federal lead, moved forward with the creation of a "Smith River Plain Water Quality Management Plan" (see below) whose primary result was to undermine the federal government's efforts to enforce the Endangered Species Act.

"It's intentional," Free said of the Water Board's unwillingness to enforce environmental laws at the Smith River Estuary. "They are protecting the growers, period." Free said he tells Water Board officials, "'Do your job. Don't be an advocate for the farmers.' But that's what they've done all along."

Free said that pesticide use on Easter lily fields should not be allowed because the lands "are absolutely wetlands." He continued,

[A]nybody who's been in Smith River has seen what happens in the winter when it rains there. Basically all of the bottoms become flooded. ... [R]eally after only a couple of inches of total rain the area becomes saturated and cannot hold the water on the land. So it just runs off, with all the chemicals, and as we know any of the buffers are completely inadequate for trying to remove some of that material before it gets to the streams. ... [T]hese places simply aren't suitable [for lily production] because they're wetlands. ... One thing that I'm going to have to emphasize too is that with our minimal sampling that we did, we were focused on copper, because at very low concentrations it has significant effects on coho salmon,

impairing their ability to smell, things like that. So that's what we focused on. But we keep telling the Water Board that you have five pesticides that ... have exceeded EPA criteria [for pesticides found in streams] and are labeled as harmful to aquatic species and yet they keep going back to the copper data. ... The fact that they ignore these other highly toxic pesticides ... is ridiculous.”

Free said that, sometime in 2018, the California Farm Bureau stepped in to represent lily growers in negotiations with the Water Board. (Rob Miller, owner of the Dahlstrom and Watt lily bulb farm in Smith River, is president of the Del Norte County Farm Bureau). Afterward, said Free, a staffer for the Water Board told him that the agency did not want to impede lily farming “because the Farm Bureau doesn't want to set precedent” for pesticide use throughout California. According to the California Department of Pesticide Regulation (DPR), pesticide use throughout California reached 209 million pounds in 2018, an astonishing figure that was 17 million pounds higher than during the previous year.

In the end, said Free, the results of Water Board officials refusing to enforce state and federal clean water and endangered species laws at the Smith River estuary could soon include extirpation from the watershed of coho salmon and tidewater goby. Free is frustrated that the Water Board continues to ignore data that demonstrate the risk of pesticides to salmonids and the tidewater goby in the Smith River. He references a long-term salmon study conducted by the California Department of Fish and Wildlife. Agency scientists examined fish populations in streams that feed the Smith River estuary. These streams include several small creeks that historically have harbored large numbers of coho salmon. One of the streams, Delilah Creek, is surrounded by lily fields and has demonstrated acute pesticide toxicity in water tests. In Delilah Creek, said Free, CDFW “didn't see coho there.” Free continued,

And then we have Rowdy Creek. Besides Mill Creek, which is the stronghold for fish in the Smith River, Rowdy Creek has some of the highest intrinsic potential for coho in the Smith River, and there's no coho there. They haven't seen coho there at the hatchery trap for years.

And we've seen high levels of pesticides in Rowdy Creek during critical outmigration times, so it kind of doesn't surprise me that that's what we're seeing.

The Water Board's surface water testing of 2013 first alerted state officials that the aquatic habitat of Rowdy Creek had been poisoned by agricultural chemicals. Rowdy Creek is the largest of several streams that drain directly to the Smith River estuary and once ran thick with coho salmon. The state's 2013 results demonstrated that Rowdy Creek—one of the Smith River's two most important tributaries for anadromous fish—was the most contaminated of all the estuary streams. The water quality report of 2013 noted that the waters of Rowdy Creek demonstrated “Significant reduction in reproduction compared to the control (chronic toxicity), AND significantly lower survival than the control (acute toxicity).” Rowdy Creek is also impacted by a hatchery weir that, during low water years, can block fish migration. Nonetheless, Water Board officials took no action to ameliorate pesticide inundation of Rowdy Creek and the Smith River estuary, instead plodding ahead with what turned out to be phantom “irrigated lands permit process” that state officials would abandon as soon as federal officials notified lily growers that their pesticide inundation of the Smith River estuary had put them in violation of the Endangered Species Act.

Free said that, after his long tenure with NOAA, he is eligible for retirement, but that he remains at the post in large part to continue pressuring the Water Board to “do its job.” The ongoing contamination of the Smith River estuary, said Free, “is actually a big part of” the reason that he remains at his post. “I don't want to let this one go,” he said. “It's too damn important. I work to protect the public trust. That means that the public needs to know what's going on.”

VI. Water Board responds to four decades of Smith River contamination, possible extinctions, and the federal government’s pressure to enforce environmental laws at the Smith River estuary, by devising a “plan” that effectively does nothing to curb the destruction of habitat by pesticides but appears instead to exist solely as a stalling mechanism done in support of agriculture.

In 2011 the North Coast Regional Water Quality Control Board launched an “irrigated lands discharge permit” process in response to toxicity findings of the previous year. Rather than initiate enforcement action to prevent further pesticide contamination, Water Board officials promised that the permit process would develop appropriate protections for the estuary. In hindsight, the process must be viewed primarily as a stalling tactic.

To develop the permit, the Water Board formed an “advisory group” of lily growers, state and federal regulators, and representatives from three environmental NGOs who would meet several times to create the permit for lily growers. Yet this process simply served to widen the state’s eddy of dysfunction and neglect, until the Water Board abandoned it altogether in 2018. During those seven years the three NGOs that were allowed to participate in the process—Siskiyou Land Conservancy, the Environmental Protection Information Center, and CalTrout—devoted significant staff time to providing scientific input in a process that, in the end, served only to wear down momentum for addressing pesticide contamination at the Smith River estuary.

In 2018 the Water Board replaced the discharge permit process by launching the creation of an even more illusory “management plan.” The Water Board released its Smith River Plain Water Quality Management Plan late in 2021. The plan ostensibly set in motion the state’s newly energized effort to address the severe and widespread contamination of the Smith River estuary through “monitoring” and “best management practices.” The three NGOs that had worked for seven years on the Water Board’s “Irrigated Lands Discharge Permit” for lily growers were not invited to participate in the process of creating this plan. Nor were the organizations even notified that the permit process had ended and was replaced by another bureaucratic mechanism. Instead, during

the April 2018 meeting of the full North Coast Regional Water Quality Control Board, in Weed, California (a four-hour drive from Smith River), the Board abruptly announced its intention to abandon the discharge permit and instead create the “plan.”

Upon release of the new management plan for lily production, the public was allowed to submit comments. Virtually all critical input offered by parties other than the Water Board and lily growers was ignored, including comments from Tolowa Dee-ni’ tribe, the center of whose ancestral homeland surrounds the Smith River estuary, as well as Siskiyou Land Conservancy, EPIC, the Environmental Law Foundation, and the Pacific Coast Federation of Fishermen’s Associations. (These comments are available upon request.) Instead, as Water Board Executive Officer Matt St. John noted in an October 2, 2018 letter to the four Smith River lily growers, “it is expected that growers, in consultation with technical advisors as necessary, will select and implement practices identified in the Plan that are best suited on a case-by-case, field specific basis to address the potential risks to water quality from operations on that field.”

The Water Board opted to allow growers to develop their own means of protecting the Smith River estuary from pesticides—rather than impose restrictions on pesticides—and to self-monitor and self-report their results, no matter the findings, as St. John acknowledged in the letter, that:

- lily operations caused “varying levels of seasonal toxicity associated with agricultural chemicals, primarily in the Tillas Slough watershed, and in particular Delilah Creek;”
- “Surface water sample results also documented the presence of copper, imidacloprid, diuron, permethrin, and tebuconazole above US Environmental Protection Agency benchmarks for the protection of aquatic life;”
- “Groundwater sample results documented occasional exceedances of California Department of Health drinking water standards for nitrate;”

- “pesticides and copper are likely being delivered to surface waters during irrigation and stormwater runoff events either dissolved in water or attached to eroded soil particles;”
- “Staff also observed direct hydrologic connections between many fields where chemicals are being applied and the drainage network to the Smith River and its tributaries.”

It would be difficult to characterize the Water Board’s “management plan” to address pesticide contamination at the Smith River estuary as anything but a perpetuation of the business as usual that has threatened aquatic life at the estuary for more than four decades. Dan Free charges that the Water Board’s Plan is insufficient to protect aquatic species. He said, “The current direction of the [Water Board’s] permitting, we believe, is inadequate to meet the federal ESA—no take of listed fish. So we’re closely following the plan development and the permit development. We’ve gone along, hoping that this would be adequate, but what we’ve seen to date, it is not adequate whatsoever.”

Free said that the agency’s “plan” is just one more indicator that “the Water Board is very reluctant to do their job. ... [T]hey basically want to turn a blind eye to what’s going on.”

The state’s plan provides a list of potential “actions” that, individually and collectively, may be utilized by lily growers to stem pesticide impacts at the Smith River estuary. Yet the actions in no way adequately address the severity of pesticide contamination in the estuary or meet the Water Board’s obligation to enforce the Clean Water Act and the Endangered Species Act. Actions available to lily growers include creation of no-grow “buffers” alongside streams, augmenting pesticides with “additives ... to increase droplet size to reduce drift,” and refraining from spraying too soon before a predicted rain. Lily growers’ self-monitoring would require just a single report presented annually to the Water Board—an almost poetic fox-and-henhouse approach to environmental regulation.

Working together, the Water Board and lily growers created a deadline of March 31, 2022 for farmers to submit their first annual reports to the state. Siskiyou Land Conservancy

began asking to see the reports shortly after the deadline had passed, only to learn that no such reports were available.

In this respect, said Free, the Water Board’s Smith River Plain Water Quality Management Plan is “this black hole, and the farmers control all the information and do not have to release it. Once these things [buffers, self-monitoring and reporting by lily growers] happen we won’t know what’s going on out there. . . . We can’t point to a specific field and a specific treatment and see what that means to pesticides reaching the stream. We can’t relate that back to, okay, this is what happened on this field, this was the testing that occurred, these are the treatments that were done on that field to reduce runoff, and this is the result. There’s no way to do that. Basically the Water Board’s going to give them a list of tools that they can use, and they’re going to probably rely on the monitoring to tell them what’s happening. But they won’t do anything anyway once the monitoring tells them what’s happening.”



A ditch carries contaminated water from Easter lily fields and greenhouses to the Smith River estuary.

SLC photo

Finally, on November 28, 2022—eight months overdue—a Water Board official sent Siskiyou Land Conservancy the first reports, which had been filed that day.

On January 25, 2023, Jim Clark, writing as the Conservation Committee co-Chair of the Redwood Region Audubon Society, alerted California elected officials that the Water Board’s Smith River Plain Water Quality Management Plan “appear[s] to be designed to

promote a ‘business as usual’ or ‘continue to contaminate’ type of management in which lily bulb growers are only required to ‘consider,’ rather than implement, measures that could reduce contamination to below threshold levels. Open ended plans disguised as ‘adaptive management’ should not be used to correct violative conditions, such as allowing regulated pesticides to enter a waterway contrary to EPA label directions. ... As an active member of Redwood Region Audubon Society and current Conservation Committee co-Chair, I know that it is important that the public trust resource agencies to protect the environment that we depend on. This public trust occurs when an agency advocates for environmental protection rather than being on the wrong side of litigation.”

Cal Poly Humboldt Chemistry professor finds that buffers alongside lily fields don’t work

The Water Board is a big fan of buffers as a “best management practice” to supposedly protect water quality. In Smith River, buffers would typically consist of a 75-foot “filter strip” of land planted in blackberry or rye grass that would run between lily fields and ditches, ostensibly to keep pesticides from running off of fields into Smith River estuary via its feeder streams.

Since 2022, Cal Poly Humboldt chemistry professor Matt Hurst has experimented by planting such buffers alongside a small Easter lily field in Smith River to determine whether copper from fungicides could breach the buffers and wash into estuary waters. In



Slide from Matt Hurst’s PowerPoint presentation. Rainwater from Easter lily fields flows straight through a grassy buffer into a ditch that leads directly to a spawning creek and the Smith River estuary.

February 2024, Hurst, who specializes in developing means of detecting trace metals in aquatic systems, told Siskiyou Land Conservancy, “It doesn’t seem like these buffer strips

work once the ground is saturated. Once the ground becomes saturated, even a small amount of rainfall across a field will cause runoff through the buffer (filter) strip and into the ditch. ... If it's raining it [the copper] is just going to keep moving."

Hurst said that copper applied to lily fields attaches to particles in the soil. He said he watched soils become saturated even after modest rainfall, at which point whatever was on the field simply washed directly into ditches, spawning streams, and the Smith River estuary. Hurst found copper entering estuary waters at rates as extraordinarily high as 400-500 parts per billion (ppb) of total copper (as opposed to dissolved copper, which is measured to determine the potential impacts of copper residues to aquatic life). "These numbers show that most of the copper is attached to particles and that is the mechanism for transport," said Hurst. "The particles may settle out in the ditches, creeks, or continue to move through the estuary."

Copper accumulates in lily fields "for decades," said Hurst. "It's just in the soil. It just keeps accumulating. It has nowhere else to go. Any time you get erosion off the fields it's going to run off. I don't know how you're going to keep the particles from going in the water. Even a small rain would cause runoff. It just rains a lot up there."

Analyzing Hurst's results, NMFS's Dan Free said, "What Matt has found with regard to saturation and the inability to control run-off from certain fields is profound. These areas are undoubtedly classified as wetlands and any application of chemicals harmful to aquatic life, not just copper, is likely to result in their reaching salmon and their critical habitats."

VII. Conclusions

Industrial, pesticide-intensive production of Easter lily bulbs on Smith River wetlands contaminates the state's most viable remaining habitat for endangered salmonids and the tidewater goby, in clear violation of the federal Clean Water Act and the federal Endangered Species Act. For more than forty years the state of California has abetted these violations in service of industry in Smith River, and, by extension, throughout the rest of California's treasured aquatic habitats. The California North Coast Regional Water Quality Control Board must be investigated and overhauled to correct this ongoing crisis of collusion and illegality.

Given the twin crises of climate change and the planet's collapsing web of biodiversity, humanity must now take immediate and forceful action to protect remaining biological strongholds such as the Smith River, and to restore lands and ecological systems impacted by industrial extraction and production. Lily growers, NGOs, and the county, state, and federal governments must now begin charting a means to drawdown and eliminate all non-organically certified pesticide use on the Smith River Plain, and restore these lands as wetlands that function as an integral element of the Smith River estuary. These actions would not bar some forms of agricultural production on the former lily lands. For instance, certified organic lily production, and the growing of organic food, could occur on the small areas of the driest portions of the current lily fields, but such production would be subservient to prioritization of the protection of aquatic species in general and the ecological functionality of the Smith River estuary in particular.

This cannot be a long-range plan. A blueprint for transition to organic production, and to fallowing the wettest portions of the current lily fields, must be developed and executed within a few years. We suggest that by the end of 2025 the above parties complete construction of a framework and timeline to develop a total phaseout of non-organically certified agricultural use on the Smith River Plain, resulting in state legislation that enforces the restriction by the end of 2030. The legislation should include compensation to lily farmers and employees to ameliorate any economic impacts of the transition.

Barring the initiation and completion of such legislation and pesticide phaseout, the federal government must bring litigation against lily growers to enforce the Endangered Species Act and the Clean Water Act in such a way that toxic pesticides are eliminated from the Smith River Plain. As Dan Free notes, “[T]hese places simply aren't suitable [for lily production] because they're wetlands. ...”

Ending non-organic agriculture on the Smith River Plain will not cause Easter lilies to go extinct. History demonstrates that the bulbs can be grown in many parts of the American West, and the world, and they can be grown without pesticides. Yet *not* ending pesticide use on the Smith River Plain could bring about the extinction of coho salmon in California, and the global extinction of the tidewater goby.

Today in the far northwestern corner of California, humanity has a choice—an opportunity. We can collaborate in the difficult but doable work to salvage a rare and precious island of biological diversity in a way that will forever serve the cause of ecological recovery and functionality. Or we can allow business as usual to poison this island until it is sterile—until the ecological functionality of the lower Smith River collapses. Now is the time. What shall we decide?

VIII. Appendix: Pesticides used in Smith River in 2021

Following is a roster of the most toxic chemicals used on Del Norte County Easter lily fields in 2021, the most recent year for which data are available. That year farmers applied 219,822 pounds of these pesticides on approximately 300 acres of Easter lily fields (733 pounds per acre).

1,3-dichloropropene (1,3-D)

Since 2002, 1,2-D has been largely replaced by the fumigant 1,3-dichloropropene (1,3-D), which has been in the news throughout California and the nation for sickening residents, farmworkers, and school children, and for poisoning wildlife. 1,3-D is a known carcinogen and a reproductive toxin. The chemical is banned in thirty-four countries including the European Union. In 2021 (the last year for which the California Department of Pesticide Regulation data is available), Easter lily farmers applied 141,601 pounds of 1,3-D on approximately 300 acres of farmland (472 pounds per acre)— one of the highest per-acre concentrations of 1,3-D anywhere in California. (Smith River lily bulb farmers cultivate approximately 1,000 acres of lily fields, rotating the crops every third year.)

1,3-D is deadly to aquatic species. 1,3-D is a soil fumigant and nematicide that presents a serious risk to the health of Smith River estuary residents and the river's aquatic ecosystems. The carcinogenic effects of this pesticide on humans, and the toxicity to fish and the food chain that supports aquatic species makes 1,3-D a potent threat to all life along the lower Smith River. The EPA has classified 1,3-dichloropropene as a probable human carcinogen, and it is present on California's Proposition 65 list of

chemicals “known to the State to cause cancer.” When 1,3-D is inhaled or ingested by it will rapidly enter the bloodstream, causing irritation to skin and eyes, damage to the lining of the nose and stomach, and anemia. Impacts include chest pains, respiratory problems, coughing, rashes, and lung and kidney damage. 1,3-D is highly soluble in water and does not evaporate readily. It is likely to contaminate groundwater. Aquatic organisms can be killed by concentrations of less than 10 parts per million of 1,3-D.

Metam sodium

Metam sodium is another highly toxic and carcinogenic fumigant used in high concentrations on the Smith River Plain. In 2021, lily growers applied 61,938 pounds of metam sodium on 300 acres, or 206 pounds per acre. Metam sodium is banned in the European Union.

In humans, metam sodium is a reproductive toxin and immune system toxicant. The primary breakdown product of metam sodium is MITC (methyl isothiocyanate), which can cause nausea, vomiting, abdominal pain, headaches, dizziness, depression, irritability, seizures, loss of consciousness, and asthma. Metam sodium is highly toxic to fish. One study showed that 1 part per trillion of metam sodium caused 100 percent mortality in tadpoles. MITC can catastrophically impair reproduction of invertebrates that salmonids feed on. In 1991, a Southern Pacific train derailed, spilling 19,000 gallons of metam sodium into the Sacramento River. The spill killed virtually every living aquatic organism along 45 miles of the river—including 1.1 million fish—until the chemical diluted in Lake Shasta.

Chlorothalonil

In 2021, Easter lily farmers applied 2,080 pounds of chlorothalonil. Chlorothalonil is a probable human carcinogen and reproductive toxin. Chlorothalonil can contaminate the air traveling beyond the field and has been found in nearby residential neighborhoods. It is persistent in soils, is a groundwater contaminant, and is acutely toxic to fish, crabs and frogs. In 2019 the European Union and the United

Kingdom banned chlorothalonil. Nonetheless, according to the organization Beyond Pesticides, in 2023 French health officials warned the public that more than half of all drinking water samples taken throughout the country were contaminated with chlorothalonil.

Diuron

In 2021, lily farmers applied 1,343 pounds of the fish-killing chemical diuron. Diuron is a human carcinogen and is highly toxic to aquatic invertebrates, such as those that make up the basis of the salmonid food chain in the Smith River estuary. In 2023 the European Parliament banned all but highly restricted uses of diuron in EU nations and is currently considering a total ban.

Phorate

Lily farmers applied 1,300 pounds of phorate in 2021. Phorate is a probable groundwater contaminant that is deadly to fish. The US EPA reports, “This pesticide [phorate] is very highly toxic to fish and wildlife. ... Runoff may be hazardous to aquatic organisms in neighboring areas.” The agency also notes that humans exposed to phorate can suffer “nausea, dizziness, confusion, and at very high exposures (e.g., accidents or major spills), respiratory paralysis and death.” Phorate is banned in the EU, China, India, Switzerland, Brazil, the United Kingdom and Turkey, among other nations.

Ethoprop

In 2021 Smith River lily farmers applied 955 pounds of ethoprop. Ethoprop is a fumigant that is highly toxic to humans through all routes of exposure. It is a carcinogen and a cholinesterase inhibitor (meaning it can damage the central nervous system). Ethoprop attacks aquatic ecosystems directly through runoff, and it is a groundwater contaminant. It is moderately toxic to fish, and highly toxic to crustaceans and zooplankton such as *Ceriodaphnia dubia*, the freshwater invertebrate that was either

unable to reproduce or was killed outright when exposed to pesticide-contaminated surface waters taken from the Smith River estuary.

Copper-based fungicides

Easter lily farmers in Smith River also utilize heavy applications of copper-based fungicides. In 2021, lily farmers applied 8,280 pounds of copper-based fungicides on their crops. Of this, 7,854 pounds consisted of copper hydroxide, which is among the most toxic of all copper fungicides. Copper fungicides are applied year-round in the extremely wet area of the Smith River Plain, and they are applied often in winter, as rains remove the copper coating from plants that the fungicide is meant to protect. The result has been extreme levels of bioaccumulation of copper in fish-bearing streams that feed the Smith River estuary. (Amounts of copper applied to fields fluctuates in sync with rain events. In 2020, Easter lily farmers applied 12,085 pounds of copper. In 2019 they applied 11,221 pounds of copper.)

Copper is deadly to aquatic organisms, such as fish and the food they feed on. Copper does not break down over time but rather bioaccumulates and infests watersheds for decades. A report from Cornell University notes that copper fungicides are “highly toxic to fish. Even at recommended rates of application, this material may be poisonous to trout and other fish.” The National Marine Fisheries Service (NMFS) reports that copper is a “neurotoxicant that directly damages the sensory capabilities of salmonids at low concentrations.”

In August 2010 state scientists found copper levels in a stream leading to the Smith River estuary that were 28 times higher than allowed by state law. During state water quality monitoring events from 2013-15, “levels of dissolved copper were detected in every surface water sample collected as part of the Smith River Plain Water and Sediment Quality Study,” according to a Water Board report. The report noted that scientists once again detected “acute toxicity” in Delilah Creek, a stream that feeds Tillas Slough in the Smith River estuary. Nonetheless, in reporting these findings the Water Board determined that most of the copper findings were “not indicative of an

environment that may lead to reduced reproduction or survival,” due to low “hardness” levels of waters in the Smith River.

Yet scientists with the National Marine Fisheries Service, reviewing the Water Board’s data for the federal agency’s 2014 Coho Recovery Plan for the Smith River, determined that the state’s water samples “revealed copper concentrations that may have acute toxic effects and impair olfaction and reproduction of coho salmon.” The data demonstrated that copper levels in the Smith River estuary were “over 33 times higher than the level at which NMFS identified neurotoxic effects on salmon.” Yet application of copper-based fungicides on Easter lily fields has continued largely unabated, and undergirded by official dismissiveness on the part of the Water Board.

Pesticides newly placed into use in Smith River

In 2021 lily growers also applied several pesticides that had never previously appeared in Del Norte County. These included:

Imidacloprid

Lily growers applied 143 pounds of imidacloprid in 2021. The National Institutes of Health reports that imidacloprid can damage “gastrointestinal, cardiorespiratory, and nervous systems or it can be multisystem and can be life threatening.” An insecticide, imidacloprid is also a neonicotinoid, a class of chemicals whose use has been proven to decimate local insect populations including honey bees, but also insects that provide feed for native fish. In 2018 the journal *Environmental Science & Technology* reported, “Pollinators and aquatic insects appear to be especially susceptible to the effects of neonicotinoids. ...” Imidacloprid is banned in the EU.

Iprodione

Also appearing for the first time in 2021 was iprodione (214 pounds), a fungicide that is an endocrine disruptor and reproductive toxin. The US EPA reports that iprodione is moderately toxic to freshwater fish, moderately toxic to estuarine and marine fish, and

moderately to highly toxic to estuarine and marine invertebrates such as *Ceriodaphnia dubia*. Iprodione is banned in the EU.

Acephate

Lily growers applied 92 pounds of acephate in 2021. The US EPA reports that acephate is a probable human carcinogen that “can overstimulate the nervous system causing nausea, dizziness, confusion, and at very high exposures (e.g., accidents or major spills), respiratory paralysis and death.” Acephate is banned in China, the EU, and the United Kingdom.

Bifenthrin

Lily fields also received 118 pounds of bifenthrin in 2021. The National Pesticide Information Center reports, “Bifenthrin is very highly toxic to fish. ...” In 2021, the same year that lily growers began using bifenthrin, the National Center for Biotechnology Information (NCBI, a branch of the National Institutes of Health) reported, “Bifenthrin, among the most predominantly detected pyrethroids in the environment, is frequently measured in water samples above concentrations reported to induce neuroendocrine and neurotoxic effects to several threatened and endangered fish species, such as the Chinook salmon and steelhead trout.” In 2022 *Scientific American* reported that bifenthrin is in a class considered “forever chemicals ... they do not readily biodegrade. ... Chronic exposure is linked to neurotoxicity, and the EPA has classified it as a possible human carcinogen.”

Napropamide

Easter lily farmers applied 426 pounds of napropamide in 2021. The US EPA reports that napropamide “is toxic to fish. ... Do not apply where runoff is likely to occur.” The chemical persists in the environment long after it has been applied.

Mancozeb

Smith River lily growers applied 80 pounds of the fungicide mancozeb in 2021, the same year that the European Union banned the chemical because it's an endocrine disrupter that causes brain malformations in newborns. In 2023 the NCBI reported that mancozeb "induced toxicity to the fish evident in changes in fish behavior, neurological activity, hepato-renal functioning, and immune-antioxidant responses which suggest physiological disruption."

Captan

The chemical captan does not appear on the state's pesticide use list for Del Norte County in 2021. Nonetheless the fungicide is worth examining as an example of lily growers' willingness to continue to inflict harm on the Smith River estuary even when pesticide use has demonstrably contaminated estuary waters. Monitoring of Smith River estuary surface waters from 2012-13 detected significant levels of Captan contamination. That year captan turned up at the highest concentration of any pesticide detected during water quality monitoring events in the Smith River estuary. The EPA labels captan as Highly Toxic due to its acute toxicity in standardized tests. In a hazard assessment, the California Department of Fish and Wildlife (CDFW) found captan to be highly toxic to salmon. The agency found trout (e.g. steelhead) and salmon to be the top and third most susceptible groups of freshwater organisms threatened by captan, which in 1999 killed half of fish tested in their review of over a dozen studies.

Yet, no matter the devastating contamination results of just five years before, during the 2018 season lily growers applied 1,301 pounds of captan, a greater than sixfold increase from 208 pounds applied in 2012. In 2019 they applied 450 pounds of captan, In addition to captan's high risk to salmonids, it is present on California's Proposition 65 list of chemicals "known to the State to cause cancer." Human exposure to captan also results in dermatitis, conjunctivitis, vomiting and diarrhea.