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COMMENTS

“Findings” Section, Draft General Waste Discharge Requirements for Commercial Lily Bulb Operations in the Smith River Plain

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Abstract:

For more than sixty years, unabated pesticide contamination of the Smith River estuary and its tributaries by Easter lily growers has degraded irreplaceable aquatic habitats in and around this vital wetland. The Smith River estuary is otherwise fecund and serves as habitat of the highest value on the West Coast of the United States—and especially in California—for the continued survival of state and federally protected Endangered Species. Nonetheless, since the early 1980s the California North Coast Regional Water Quality Control Board has either ignored or, through inaction and intentional delays, countenanced this illegal poisoning of protected species and nearby human populations.

It is thus from a most dispirited sense of legal and moral justice that we view and are appalled by the fact that the state of California, through this Water Board, has chosen to abrogate its legally mandated obligation to protect aquatic habitat and the people of the lower Smith River from illegal and deadly applications of highly toxic pesticides. Instead, through ungenue regulatory processes that appear specifically designed to protect agriculture at the expense of water quality, wildlife, and human health, Water Board officials are protecting

a tiny group of farmers—farmers who, for decades, and without compunction, have demonstrably and illegally poisoned protected wildlife habitats and nearby human communities.

It is no surprise then that the Water Board’s “Findings” section of the draft Waste Discharge Requirements for the lily bulb NPDES permit (released to the Technical Advisory Group Nov. 8, 2024) is weak and seemingly uninformed. The document appears to conform a pattern and practice of inaction offered up in the guise of agency regulation. The draft does not at all reflect or acknowledge the severity of ongoing pesticide contamination of the Smith River estuary, nor does it recognize the obvious futility of applying “best management practices” and “adaptive management” to a regional crisis whose remediation truly hinges on just one solution: a legally binding ban at the Smith River Plain on use of pesticides that do not meet California standards for organic farming.

. The deficiencies of the draft are perhaps best represented by omissions in the document of critically important findings as published in the recent past by the federal government. Omitted are the following:

- In 2018 NOAA Fisheries found that lily growers were (and undoubtedly remain) in violation of the federal Endangered Species Act for illegal “take” of coho salmon (listed as “Threatened”).*
- NOAA’s 2014 Southern Oregon/Northern California Coho Recovery Plan notes the important fact that “the 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.”*
- The USFWS 2005 Tidewater Goby Recovery Plan reports that agricultural threats at the Smith River estuary, including chemical inundation, “could quickly extirpate the population” of tidewater gobies (listed as “Endangered”) from the Smith River estuary.*

In addition, the Findings do not cite the two-year study (released August 15, 2024) by Cal Poly Humboldt Chemistry professor Matt Hurst, which demonstrates that “filter strips”—buffer areas planted between lily crops and open water sources such as ditches and creeks, a “best management practice” that Water Board managers will principally rely upon to address chemical

inundation of the Smith River estuary—cannot possibly prevent significant pesticide runoff from lily fields into spawning streams because, as noted by Hurst as well as by NOAA Fisheries biologist Dan Free, these fields are wetlands. These wetland flows allow pesticide contaminants to run straight through the filter strips into estuary spawning and rearing habitat.

In addition, the Findings do not address the severe health impacts that Easter lily pesticides have had on surrounding human populations.

These facts, combined with the widespread and devastating pesticide contamination found consistently and over decades throughout the Smith River estuary’s endangered species habitat, demonstrate that there are no “best management practices” or “adaptive management” scenarios that can both allow the continued use of these highly toxic pesticides while at the same time preventing further and ongoing pesticide-induced degradation and destruction of Endangered Species habitat in the Smith River estuary and its tributaries.

The lily bulb order must therefore require a total disallowance of pesticide use that violates organic farming standards as established by the California Department of Food and Agriculture, and as regulated by the Organic Foods Production Act of 1990, the California Organic Products Act of 2003, and the California Organic Food and Farming Act of 2016.

Issue: Omission in the Findings of the ESA Section 9 letter issued in 2018 by NOAA Fisheries to Smith River Easter lily farmers.

Because ongoing contamination and degradation of the Smith River estuary by lily growers has been and remains in violation of the state and federal Endangered Species Acts, one would think that, at the very least, the Findings, in Sections 34 and 35, would have included mention of NOAA’s 2018 Section 9 letter that informed lily growers that they were in violation of the federal ESA.

Instead those sections remain boilerplate in apparent defiance of full disclosure: “This Order does not authorize violation of any federal, state, or local law or regulation. ... This order does not authorize any act that the results in the taking of a threatened or endangered species, or any act that is now prohibited, or becomes prohibited in the future, under either the California endangered species act or the federal endangered species act.”

The Water Board's reaction to the Section 9 letter, or lack thereof, is telling and would appear to inform the ingenuine tenor and purpose of this ongoing process to create an NPDES permit for lily growers. In 2018, when NOAA Fisheries issued its Section 9 letter, the Water Board abandoned a then ongoing process to create this very NPDES Order for Easter lily farmers in favor of creation of a "Stewardship Team." The purpose of the Stewardship Team was ostensibly to devise systems of best management practice and monitoring to rein in uncontrolled pesticide contamination of the Smith River estuary. The Findings section of the draft order illustrate this shift in this way:

"In response to results from surface water sampling performed between 2013 and 2015, in 2018 the Regional Water Board directed staff to develop a plan to address the results and to work collaboratively with the lily bulb Enrollees, staff of National Oceanic and Atmospheric Administration (NOAA) Fisheries, California Department of Fish and Wildlife (CDFW), the Tolowa Dee-ni' Nation, and the Smith River Alliance, a local restoration group. Regional Water Board staff worked with these partners as a Watershed Stewardship Team leading to the Smith River Plain Water Quality Management Plan (SRPWQMP), with additional input and review from the Del Norte County Agricultural Commissioner, the Del Norte Resource Conservation District (Del Norte RCD), the California Department of Pesticide Regulation (CDPR), and the Natural Resources Conservation Service (NRCS)."

Yet what actually occurred, and is not mentioned in the draft, was that the NPDES process for lily farmers, which had been ongoing (however ineffectually) since 2011, was quietly abandoned, with little or no notice to the three NGOs (Siskiyou Land Conservancy, CalTrout, and EPIC) that had been part of the Technical Advisory Group for that order. By disallowing participation of Siskiyou Land Conservancy, in particular, the Water Board was essentially silencing an organization that has been investigating and reporting on pesticide contamination of the Smith River estuary since 2004, and which was largely responsible for fomenting the state's subsequent surface water quality monitoring in estuary waters beginning in 2010. (Notably, the 2010 monitoring event also goes unmentioned in the Findings. That event analyzed just six water samples from streams that flow through lily fields. Findings included dissolved copper levels in Delilah Creek that were 13.7 parts per billion (ppb), nearly 28 times higher than the California Toxics Rule allows for freshwater habitat. It also revealed that these spawning and rearing streams "demonstrate[d] evidence of chronic reproductive toxicity.")

The notes from the Smith River Plain Water Quality Management Plan Stewardship Team meeting of April 18, 2024, demonstrate the impact of the Water Board's excising of SLC, EPIC, and CalTrout from these negotiations over pesticide use on the Smith River Plain. The notes do not include the words "endangered species," "coho salmon" (nor even "salmon"), "steelhead," "tidewater goby," "human health," or "impaired habitat" (nor even the word "habitat," with the one exception of use of the word in a report by a representative of the Smith River Alliance about a restoration project on Delilah Creek).

What we understand prompted the abandonment of the original NPDES process was NOAA Fisheries' growing concern over illegal take of protected species in the Smith River estuary. This concern reportedly prompted a lily farmer who works with the Del Norte County Farm Bureau to seek assistance from the California Farm Bureau to forestall action by the Water Board to create a meaningful NPDES permit. A Water Board official responded to the state Farm Bureau by seeking abandonment of the NPDES process in favor of the Stewardship Team, which the Water Board did. The state official also asked NOAA Fisheries to provide lily growers with "safe harbor" or "green ribbon" protections to shield them from federal action—demonstrating a wholly inappropriate and unsavory alliance between the state and polluters. Though NOAA did not provide such protections, neither has NOAA nor the Justice Department taken any action to remedy the illegal take of coho salmon in the Smith River estuary.

Issue: Section I.3 of the draft Findings determines, rightly, that the Smith River estuary must be protected from "discharges from agricultural drainage structures, irrigation return flows or tailwater, percolation, tile drain water, stormwater runoff flowing from agricultural lands, and runoff resulting from operational spills."

Yet because these fields are wetlands most of these factors cannot be controlled, especially discharges from agricultural drainage structures, percolation, and stormwater runoff. **For this reason, among many, the state must create an NPDES order for lily growers that disallow any and all use of non-organically certified agricultural products.**

In his final report, "The Effects of Vegetative Barriers on Copper in Runoff from Lily Bulb Fields," issued August 15, 2024, Dr. Matt Hurst writes, "The effectiveness of vegetative barriers on removing copper from the agricultural runoff had varied results. The filter strips reduced the total suspended solids (TSS) and total copper (tCu) by 20% with a standard deviation of +/- 20% over five sampling events during the wet season in 2022-2023 (Figure

6). Dissolved organic carbon (DOC) and dissolved copper (dCu) were not affected by the vegetative filter strips. ... *The average dCu concentration was actually higher in runoff transported through the filter strip* (Figure 6); however, given the large standard deviation, it can be concluded that the removal was similar to traditional management practices. ... *[T]he filter strip can become overwhelmed by runoff. When the soil in the fields becomes water-saturated, such as in December and January, the filter strips become ineffective.*” Hurst Compared lily fields with those that had never been planted in Easter lilies and found that *“lily bulb field activities contribute substantially (by 3-5 times) to the elevated pCu levels.”* (emphasis added)

While Hurst focused just on copper as a contaminant of the estuary, his conclusions must also be applied to many of the pesticides used on Easter lily fields. For instance, in January 2018 the Water Board reported that spawning tributaries to the Smith River estuary were contaminated with *seventeen different pesticides*. That report also noted ten individual instances of contamination of the aquatic food chain, contamination that is inexorably linked to pesticide exposure. It is likely that many of these contaminants entered the Smith River by way of field runoff—though drift is also a common means of contaminating surface waters. Given that both of these routes of pesticide inundation and contamination—runoff and drift—cannot be contained or controlled, the Water Board’s NPDES permit must mandate that the contaminants themselves—the non-organically certified pesticides used by lily growers—be disallowed from use on the Smith River Plain. **Hurst’s findings; the pernicious inevitability of pesticide inundation and exposure no matter the implantation of ineffective if not illusory “best management practices”; the fact that lily fields are wetlands; and the importance of the Smith River estuary to the ongoing survival in California of keystone aquatic species—all of these factors and more support the state’s legal mandate under the state and federal Endangered Species Acts and the Clean Water Act to disallow use of these pesticides on the Smith River Plain.**

Issue: The Findings must include a full, detailed examination of all contamination issues uncovered at the Smith River Plain and estuary. This examination should include a list of all monitoring events since 2010 and the potential and actual impacts, if determinable, of the results to the water quality, aquatic habitat, wildlife, and nearby human population of the lower Smith River.

The draft Findings does contain a list of the most toxic pesticides used on the Smith River Plain, and the pounds applied per year, and in this section the Findings provides a good accounting of the perils of copper inundation. A similar analysis of the potential impacts to water quality and aquatic habitat must be provided for the other chemicals as well. The findings do note that 1,3-dichloropropene is the most commonly used pesticide on the Smith River Plain. But the findings do not report that the 141,600 pounds of 1,3-D applied to ~300 acres of lily fields in 2021 was among the highest per-acre concentrations of 1,3-D use in California that year. The Findings should also note that in 2023 USEPA determined that 1,3-D was “likely to adversely affect” salmonid populations. 1,3-D is a probable groundwater contaminant that also contaminates ditches and streams through field runoff and through drift; aquatic organisms can be killed by concentrations of less than 10 parts per million of 1,3-D. 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. These omissions are startling given the widely available information about pesticide hazards and the importance of outlining in the findings exactly the risks associated therewith.

The nematicide metam sodium also receives no analysis in the draft Findings, although in 2021 lily farmers applied 62,000 pounds of the highly toxic chemical.¹ In humans, metam sodium is a reproductive toxin and immune system toxicant. The primary breakdown product of metam sodium is MITC (methyl isothiocyanate), which in humans 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.

¹ The 2021 Smith River Plain Water Quality Management Plan itself does reference 1,3-D and metam sodium, but the passage is ruefully sanguine and could have been written by the lily growers themselves: “Both fumigants are applied under controlled conditions to avoid drift and also to ensure the effectiveness of the fumigants. The metam sodium is applied under very strict guidelines and both supervisors and applicators are required to take specialized training annually. The environmental conditions required for applying fumigants such as proper wind speed, soil moisture, soil texture, status of inversion layers, and air temperature are specified on the fumigant labels. In general, conditions are usually suitable for the application of fumigants during the summer months since precipitation is light. Once the fumigant is applied, the soil is compacted to trap the fumigant in the top layer of soil. The fumigants are volatile, and after multiple days most of the chemical has dissipated into the air above the field. The label specifies a minimum wind speed and time of day to ensure adequate circulation for the fumigants to dissipate in the air.” These sorts of assurances are largely fallacious and therefore dangerous. Such assurances have been widely disproven by numerous studies—including by USEPA itself as well as by independent scientists and science-based NGOs—that demonstrate the catastrophic impacts these chemicals have on aquatic species and human health. Communities throughout California have been directly poisoned by these widely used chemicals, leading to robust community organizing efforts and lawsuits.

MITC can catastrophically impair reproduction of invertebrates that salmonids feed on—a critically important understanding as we note that in virtually all water monitoring that has occurred along the lower Smith River there have been several instances of acute and chronic reproductive toxicity found in the salmonid food chain.

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.

The lily bulb order needs to define just how severe these chemicals are by themselves and in combination. In 2015, Christopher Pincetich, who holds a Ph.D. in Pharmacology and Toxicology from the University of California, Davis, wrote an open letter to state and federal regulators, including at this Water Board, that examined 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. ... The toxicity issues impacting the ecosystem and community warrant immediate attention, investigation, and remediation. 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.”* (emphasis added)

This sort of full accounting, of the potential and, clearly, actual impacts of specific lily bulb pesticides used by lily farmers, should be included in the Findings. Accordingly, in Findings section 28 the following sentence should be changed: ~~“These discharges can contain wastes~~ have been shown to contain pesticide wastes that could affect that have degraded the quality of waters of the state and impair beneficial uses to the likely detriment of species listed for protection under the state and federal Endangered Species Acts.” For a list of the most pernicious pesticides used by lily growers in 2021 and their potential impacts on the environment and humans, see the Appendix.

Issue: Monitoring and Reporting. Monitoring and reporting should not be done by lily growers, but by state and federal officials working in partnership with lily growers and with environmental NGO stakeholders.

Issue: Aquatic species themselves, such as sculpins, should be tested for pesticide contamination and bioaccumulation. There is no mention in the Findings of any tissue sampling, for pesticide residues, of aquatic species that inhabit the Smith River estuary year-round. The Findings should state whether or not such tissue sampling has been done. If not, the Findings should state why such sampling has not been done, and whether it will be done in the future.

Issue: Section I.46 of the Findings cites “extremely low hardness” of Smith River waters as a driver of food chain mortality in the Smith River estuary and its feeder streams. Yet in the same section we learn, “The TIE identified the presence of both a metal and a non-polar organic compound (pesticide) as the drivers behind the acute toxic response in which there was no test species survival. Chemical analysis of the surface water sample associated with the acute toxic response in 2015 documented that two current use pesticides, imidacloprid and permethrin, were detected in concentrations exceeding the USEPA’s Office of Pesticide Programs Aquatic Life Benchmarks and that dissolved copper concentrations exceeded the CTR Freshwater Aquatic Life Criteria for acute toxicity.” Clearly “water hardness” has little or nothing to do with species mortality. It is unlikely that two hundred years ago “water hardness” was destroying the salmonid food chain in the lower Smith River, whose fish populations were famously robust.

Issue: Section I.76 offers a discussion of “adaptive management.” Given the Water Board’s glacial speed in pursuing a lily bulb order, and the agency’s apparent reluctance to curb pesticide use anywhere in the state, we argue that there is no time for “adaptive management” in the lower Smith River. History tells us that were we to wait for further studies and findings and then adapt remedies for ongoing contamination—a process of adaptation that presumably would occur over a period of many years if not decades—it is likely that the aquatic habitat of the lower Smith River will be all but destroyed, its fisheries decimated. **Something must be done *now*, given the clear and irrefutable understanding that there are no**

adaptations lily growers can adopt to prevent contamination of the Smith River estuary with highly toxic pesticides save the elimination of use of those pesticides altogether.

Issue: The draft Findings all but ignores the severe and demonstrated impacts to human health among residents of the lower Smith River. Whereas “human health” is mentioned in several places in the order², there is no indication therein of instances of severe pesticide exposure and resulting sickness experienced by Smith River residents during the past five decades. **Over the course of two days of meetings that lasted several hours in Smith River and in Crescent City (Oct. 21-22, 2024), some two dozen residents, including members of the Tolowa Dee-ni’ Nation, reported to the Water Board severe and ongoing impacts of pesticide exposure that they have experienced. Yet this information is not contained in the Findings—begging the question: Why were these meetings held at all?**

In 2016, Siskiyou Land Conservancy surveyed Smith River residents to determine what, if any, pesticide impacts they were experiencing. We conducted the Smith River Community Health Assessment owing principally to an apparent lack of interest by the state government and Del Norte County in human health issues at Smith River. We widely shared the results of the Health Assessment with state and local officials, but received only silence from the former and hostility from the latter.

Siskiyou Land Conservancy mailed the survey to all Smith River residents, in English and Spanish, to ascertain the human impacts of Easter lily pesticides. The survey sought data on levels of concern by Smith River residents 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.

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

² For instance, that CDPR, whose budget is 70 percent dependent on pesticide sales, “has developed Human Health Reference Levels” for pesticides; that residents will be informed when pesticides in their drinking water exceed state standards; that lily growers themselves “shall report any noncompliance that may endanger human health or the environment;” etc.

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.

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.

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.

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!”

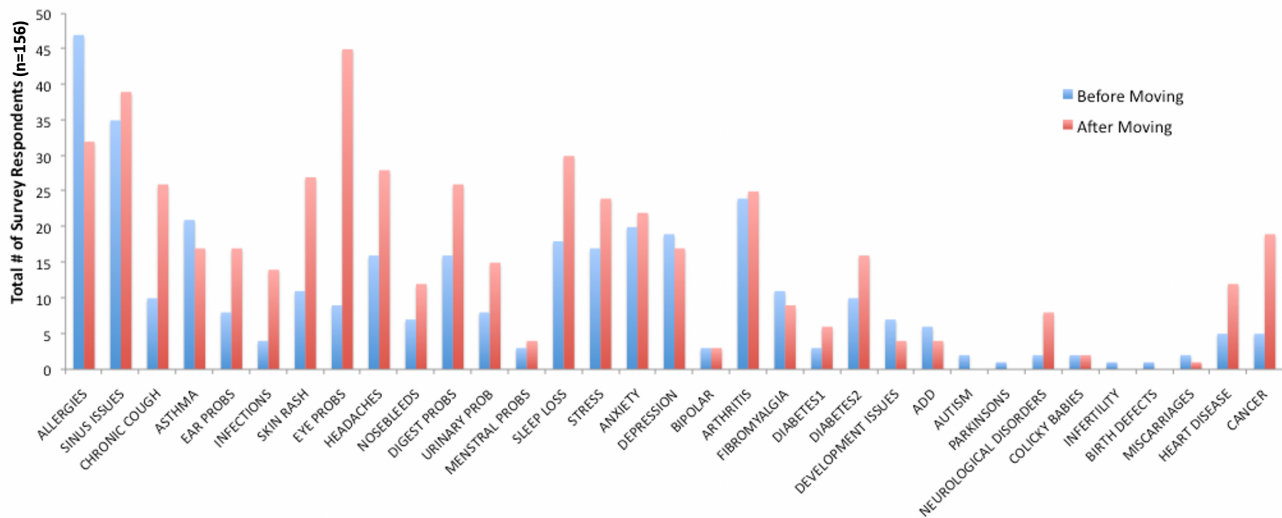


Figure 14. All Health Conditions Surveyed – Before and After Moving to Smith River

Appendix: Pesticides used on Easter lily fields and their effects

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.