

CONSERVATION

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Anticoagulant rodenticide bait pellets (bright green) with plant fertilizer freely dispersed around 2,000 plants from a northern California marijuana grow site.

PHOTO COURTESY OF MOURAD W. GABRIEL, INTEGRAL ECOLOGY RESEARCH CENTER

This Issue

Environmental Impacts of Illegal Marijuana Cultivation

California voters legalized marijuana for medical use in 1996. In the intervening twenty years, its cultivation has increased dramatically, compounded by marijuana grown for illegal purposes. The U.S. Department of Justice and other experts have estimated that 60-70% of all marijuana consumed in the U.S. is grown in California. This cultivation, which occurs primarily outdoors, is having a deep, broad and devastating impact on our state's natural resources.

Lands protected for conservation purposes are not only impacted – they are often the targets for illegal cultivation. Even in the absence of on-site cultivation, the water features and wildlife on protected lands can be profoundly damaged, and land stewards can be at risk if they stumble across illegal activity.

It is critical that land trusts and natural resources managers understand the scope and nature of the environmental effects of marijuana cultivation, how this impacts land and water stewardship, the elements of responsible regulations and how to draft and interpret easements in light of marijuana cultivation in California.

THE INDUSTRY

It is estimated there are 50,000 marijuana cultivation sites across California, although experts believe that is a low estimation. The status of marijuana – legal in California for medical use but still classified as a Schedule 1 illegal drug by the federal government – makes regulation of the industry difficult. This results in both legal and regulated growing operations for medical marijuana and illegal growing operations

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co-existing on lands across the state. Even for legal operations, resources for inspection and enforcement are limited and until the passage of the Medical Marijuana Regulation and Safety Act in late 2015 none of the estimated \$58 million to \$105 million in state revenue from medical marijuana regulation had been designated for environmental protection or restoration.

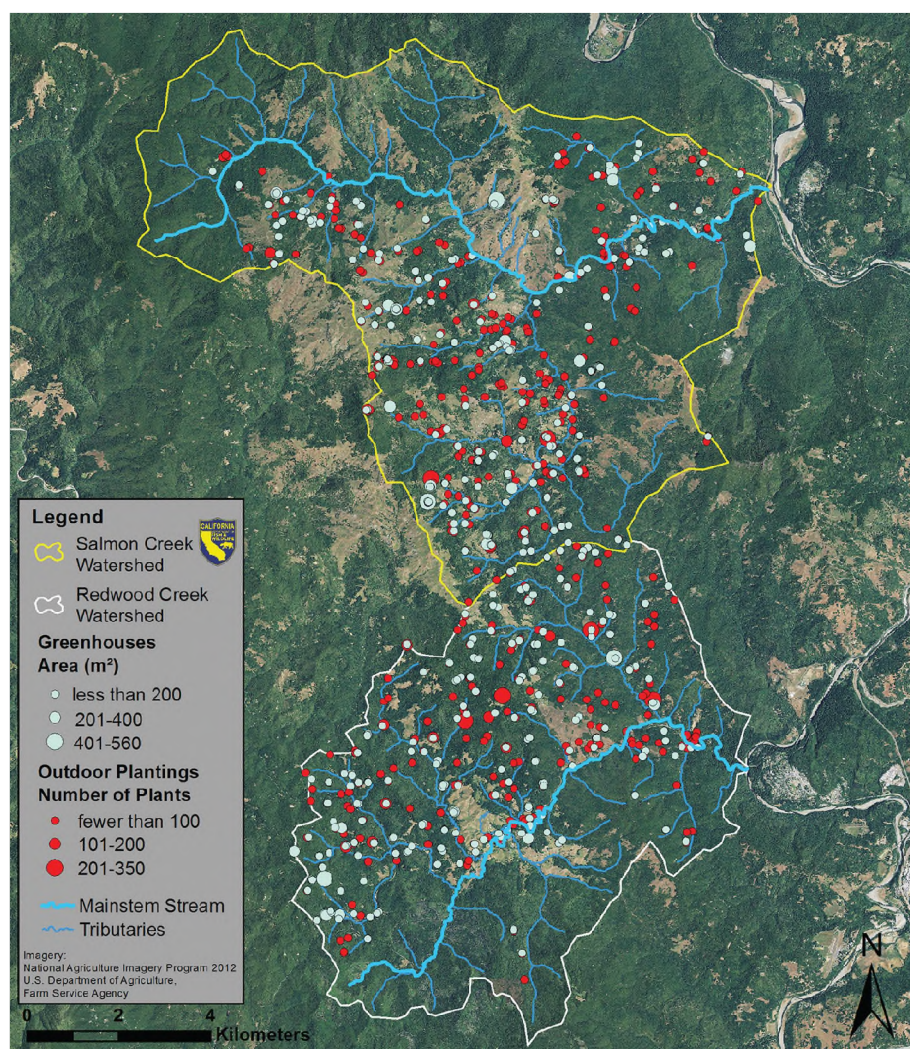
California's temperate climate allows the majority of marijuana produced in California to be grown outdoors. Some areas, like the northern California coast,

are particularly favorable but marijuana is cultivated in almost all areas of the state. Outdoor growing enables growers to produce marijuana in large quantities in order to meet the increasing demand for both medical and non-medical marijuana. On the northern California coast, three counties are known as the biggest cannabis-producing region in the world. This area, known as the Emerald Triangle, is made up of Humboldt, Mendocino and Trinity counties. Marijuana growers are attracted to this area due to remote and isolated nature of these properties with few and infrequent visitors, the vast amounts of land they can use for planting and the accessible nearby water sources, such as rivers and springs.

The environmental destruction from the unregulated and illegal marijuana cultivation are impacting lands held by nonprofit land trusts and private landowning partners. Individuals sometimes trespass upon land they do not own to plant and grow marijuana. This degrades or destroys natural resources on these properties, and also endangers the public managers and land owners as they go about the business of caring for their land. Our state and national parks, national forests, and other public lands are suffering from such "trespass grows" on a much greater scale. California does not currently have the resources to identify or enforce these violations as exemplified by the 16 personnel of the California Department of Fish and Wildlife to police the estimated 50,000 marijuana farms.

ENVIRONMENTAL IMPACTS

The environmental damage from marijuana cultivation is well-documented by scientists and in the scientific literature and national press. The impacts have resulted in widespread damage to land and water, including the leveling of hilltops, clearing of forests and native vegeta-



Source: Bauer S, Olson J, Cockrill A, van Hattum M, Miller L, Tauzer M, et al. (2015) Impacts of Surface Water Diversions for Marijuana Cultivation on Aquatic Habitat in Four Northwestern California Watersheds. PLoS ONE 10(3): e0120016. doi:10.1371/journal.pone.0120016



The Emerald Triangle is made up of Humboldt, Mendocino and Trinity counties.

tion, unregulated road construction, landslides, erosion, clogging of streams with dislodged soil, poisoning and poaching of wildlife, and drying up and polluting of streams and rivers. Many trespass cultivation sites are large repositories of trash, including plastic hoses, fuels, pesticides, fertilizers, and food and human waste. Many growers import large quantities of compost which are dumped after a year or two, causing destructive levels of nutrients to pollute rivers and streams.

The Land

In order to plant and maintain large areas of marijuana crops, growers cut down trees, remove native vegetation and construct makeshift roads to have access in and out of the grow site. Land is often hastily cleared and roads are poorly constructed and not maintained. The removal of native vegetation and road building create erosion, which in turn causes sediment discharge into nearby waterways, damaging the native habitats for aquatic life. There are also fire dangers associated with marijuana growing operations. Growers often camp near the grow site and light fires for heat and cooking. Clearing the land for planting contributes to an abundance of dried vegetation in the area and increases the risk of fires.

Waterways

Marijuana cultivation requires a large amount of natural resources, such as land and water, in order to grow the plants

at each grow site. Marijuana is a thirsty plant, requiring nearly twice the irrigation water of wine grapes per plant. It is estimated that each marijuana plant needs 22 liters of water (about 6 gallons) per day during the growing season. That amount of water, though not large compared to some other crops, can have significant impacts to small streams and creeks, as water for marijuana cultivation is often taken from small streams in headwater areas where there is very little water available during the dry season, and even a few small diversions could dry up a stream. Waterways can also suffer from contamination from pesticides and erosion from the removal of native vegetation. In addition to the impact on the amount and quality of water, fish and other wildlife suffer the destructive effects on their habitat.

In contrast to traditional farmers and ranchers who must comply with water use regulations, many marijuana cultivators illegally divert water, particularly during summer months when streams are at their lowest and aquatic species most vulnerable. These diversions are generally being taken from sensitive and biodiverse watersheds such as headwater spring and streams. With water levels that are already low due to the ongoing drought, California streams are struggling to support salmon and other aquatic life without additional diversion. In areas of the north coast, the habitat and spawning areas of Coho salmon and steelhead trout, both endangered, are threatened by diversions. For example, one in-depth study found that water demand for marijuana cultivation exceeded minimum instream flows in three of the four watersheds studied.

Pesticides

The application of pesticides and fertilizers to the marijuana crops can cause serious damage to wildlife and waterways. Pesticides are sometimes applied directly to the plants themselves to protect them from destructive pests and insects. At trespass cultivation sites, to keep away vermin and larger animals, such as deer, poison is often applied around the perimeter of the growing areas. The anticoagulants

MARIJUANA by THE NUMBERS

WASTE

In 2012, in California's public forests, authorities found:

- ✱ **315,000** feet of plastic hose
 - ✱ **19,000** pounds of fertilizer and
 - ✱ **180,000** pounds of trash
- on more than 300 illegal marijuana plantations

Source: Marijuana Grows and Restoration, US Forest Service, https://www.youtube.com/watch?v=IFNe_KZhPZw.

PRODUCTION

According to the USDOJ, it is estimated that 60-70% of marijuana consumed in the United States is grown in California.

In 2012:

- ✱ **3.6 million** plants were removed from more than 5,000 illegal outdoor grow sites in the U.S.
- ✱ **43%** of the marijuana plants eradicated were found on public and tribal lands
- ✱ Nearly **83%** of the **1,048,768** plants eradicated from National Forests were in California

Source: Marijuana on Public and Tribal Lands, Office of National Drug Control Policy, <https://www.whitehouse.gov/cndcp/marijuana-on-public-lands>

WATER

*"Marijuana is a high water-use plant consuming up to **22.7 liters** of water per day. In comparison, the widely cultivated wine grape, also grown throughout much of Northwestern California, uses approximately **12.64 liters** of water per day"*

Source: Bauer S, Olson J, Cockrill A, van Hattem M, Miller L, Tauzer M, et al. (2015) Impacts of Surface Water Diversions for Marijuana Cultivation on Aquatic Habitat in Four Northwestern California Watersheds. PLoS ONE 10(3): e0120016. doi:10.1371/journal.pone.0120016

and other poisons spread by cultivators around growing areas are now regularly found in dead animals, including rare and endangered mammals and birds. For example, one study found that “more than 80% of deceased Pacific fishers recovered in northern California and the southern Sierra Nevada were exposed” to poisons and pesticides used in marijuana cultivation. Pacific fishers are rare and have been proposed to be listed as an endangered species. Two endangered spotted owls have also tested positive for the same rat poison that is commonly used in marijuana cultivation at trespass sites. There is no way to know the extent of the animal and plant destruction that is caused by these pesticides and poisons being sprayed and seeping into the ground and water.

THE COST OF CLEANUP

The costs to remediate and restore the environmental damage caused by marijuana cultivation is substantial. Initial cleanup at trespass cultivation sites may include hauling away trash and growing equipment such as irrigation lines. Hazardous waste, including pesticides, fertil-

izers and poisons, will have to be safely removed. Possible site contamination must be assessed to know the extent of the damage caused by these poisons. Restoration tasks and expenses may include replanting destroyed vegetation, remedying water diversions and repairing water banks. The U.S. Office of National Drug Control Policy estimates that the costs of cleanup can range from \$14,900 to \$17,700 per acre. The Nature Conservancy estimates that initial restoration and repair costs in California could exceed \$90 million annually and \$120 million including the costs of enforcement.

CONCLUSION

The environmental impacts of marijuana cultivation across the state are severe. The impacts will only continue to get worse as demand for marijuana increases; there is little indication that a reduction or elimination of cultivation could occur. The devastation caused by illegal grows is widespread and substantial. The threat of destruction and contamination of our waterways and the threat to endangered species of animals may cause irreversible damage to the ecosystem.

State officials are taking steps to address these issues. Last year, the State Water Resources Control Board issued Best Management Practices for mitigating water pollution from cannabis cultivation activities. In addition, Governor Brown signed three bills



Google Earth view of a grow in Humboldt County.
Source: Google Maps

to begin regulation of medical marijuana. A new set of regulations were included in SB 837, the Budget act of 2016, signed into law by Governor Brown on June 27, 2016. Included in these regulations is the requirement that medical marijuana growers obtain a permit to grow and to certify where the water for their crops is sourced. It also tasks the Department of Fish and Wildlife and the State Water Resources Control Board with adopting principles and guidelines for water use and diversion in cultivation, and provides additional resources to fund these activities.

On November 8, 2016, California voters approved a measure legalizing marijuana for adult use. It imposes extensive controls and regulation. This Act identifies the environmental concerns and contains strong provisions and funding for protection, enforcement and remediation of damages. Regulation of this industry will provide clear enforcement authority and resources for state and local agencies. Land trusts must follow and understand the regulations that develop at both a state and local level, as well as prepare to address issues of cultivation on current or future protected lands and easements as marijuana cultivation enters the light of day.



Multiple packets of anticoagulant rodenticides found surrounding an illegal marijuana grow site in Northern California.

Conservation Frontiers is published by California Council of Land Trusts.

CCLT provides a unified voice for land trusts in California.

Our mission is to build a statewide land trust community that is equal to the challenge and privilege of conserving our extraordinary land and water resources for all Californians.

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