



# ***Marijuana Cultivation and its Impacts on Wildlife, Habitats and the Wildlife Profession***



A full-day symposium, immediately before the 2015 Annual Conference of The Western Section of The Wildlife Society

## **Symposium Overview & Exposure and Poisoning in Forest Carnivores: Beyond Fishers**

**Presented by: Dr. Mourad Gabriel**, Integral Ecology Research Center, Blue Lake, CA

**Abstract:** In today's complex ecological systems where anthropogenic influences are substantial, the role of interdisciplinary collaborations are pivotal in contemporary wildlife research. An emerging threat to California wildlife and their habitats is the escalating environmental repercussions from clandestine and unregulated marijuana cultivation, and addressing this issue requires collaboration among many different professional groups with different goals and mandates. The aim of this symposium is to highlight not only the current data being collected or the tools used by scientists, natural resource managers and law enforcement, but discussions on how we can propel forward and avoid exploitation California has previously endured that has had legacy effects. This symposium will most likely not be the final one for our profession, but should serve as a platform to inform, educate and develop a foundation for wildlife professionals to develop future relationships to address this pressing issue.

In 2012, the fisher (*Pekania pennanti*) became the flagship species elucidating the mounting issue of environmental impacts clandestine marijuana cultivation has on wildlife. Before these published findings, anecdotal information on these environmental impacts was available but largely unknown to the core body of wildlife professionals. Since 2012, some additional papers have emerged and swelling media coverage on the topic has highlighted this as a significant issue not only for the fisher but for many other wildlife species. We present recent fisher data that describes new cases of mortality and an increase in exposure to toxicants since earlier publications. Exposure rates have increased from 79% of all California fishers to 86%, with some fisher populations displaying 90% exposure rates. Toxicant mortality cases for fishers have sprung to a total of 14 fishers, up from the 4 fisher mortalities documented in 2012. Finally, new data has demonstrated that other forest carnivores such as American and Humboldt

martens, bobcats and black bears have been exposed to or maliciously poisoned by toxicants in remote forestlands in California.

## **Barred owl exposure to anticoagulant rodenticides: likely sources of poisons and potential for impacts to northern spotted owls**

**Presented by: Mr. Mark Higley**, Hoopa Tribal Forestry, Wildlife Department, Hoopa CA

**Abstract:** Barred owls have been identified as a serious threat to northern spotted owls and experimental barred owl removal projects designed to determine the feasibility and potential conservation benefit to spotted owls have begun. The method of removal has been lethal removal and thus, has provided a large sample of specimens available for a variety of research opportunities. We have tested liver samples taken from 155 barred owls collected in Humboldt and Del Norte Counties within the northern California coastal and Klamath Provinces. Barred owls have been collected from sites and within habitats used by northern spotted owls on both private timber company land (Green Diamond Resource Company) and the Hoopa Valley Indian Reservation. Fifty percent of barred owls tested have been exposed to one or more second generation anticoagulant rodenticides. Exposure rate was significantly higher ( $p < 0.008$ ) among the samples collected at Hoopa ( $n=71$ , 44 (62.0%) exposed) than those collected at Green Diamond ( $n=84$ , 34 (40.5%) exposed). Sources of exposure to these human created chemicals may include proper and improper use near human habitation and illegal use at trespass marijuana cultivation sites.

## **Up in Smoke: Can we recover imperiled fish stocks in watersheds full of weed?**

**Presented by: Mr. Scott Bauer**, California Department of Fish and Wildlife, Eureka CA [DFW]),

**Abstract:** Large-scale marijuana cultivation has proliferated in northwestern California since the mid-1990s. The environmental impacts of marijuana cultivation appear substantial, yet have been difficult to quantify because cultivation is clandestine. We interpreted high-resolution aerial imagery to estimate the number of marijuana cultivation sites, greenhouses, and plants in four watersheds in northwestern California, USA. Low-elevation fixed-wing aircraft flights and cultivation site visits in the region validated assumptions used in aerial imagery interpretation. We estimated the water demand of marijuana irrigation and the potential effect water diversions could have on streamflow patterns. According to our estimates, water demands from marijuana cultivation have the potential to divert substantial proportions of the flow in our study watersheds, with our least impacted watershed seeing a maximum potential flow reduction of almost 23 percent, and other streams predicted to dry up entirely under certain diversion scenarios. These predictions are supported by field observations in our study watersheds documenting diminished or nonexistent flows during the summers in recent years. Diminished stream flow due to marijuana cultivation is highly likely to have lethal or sub-lethal effects on state and federally-listed fishes and further decline of sensitive amphibian species. Our paper entitled, "Impacts of Surface Water Diversions for Marijuana Cultivation on Aquatic Habitat in Four Northwestern California Watersheds," will be published in the online journal PlosOne in the spring of 2015.

**Practical considerations of working around illegal cultivation sites: logistical impacts to wildlife research projects.**

**Presented by: Dr. Craig Thompson**, United States Forest Service, Pacific Southwest Research Station, Fresno CA

**Abstract:** The sad reality is that anyone working on public lands in the western United States these days is likely to encounter illegal marijuana cultivation sites. Encounters may be as simple as footprints in an unlikely place, or they may involve gunfire and threaten researchers lives. Wildlife research professionals need to incorporate this information into project planning, as it impacts budgets, safety concerns, and other logistics. Here, I present some of our experiences and summarize some of the things project managers and field technicians need to consider. Awareness and education is of paramount importance in order to be both effective and safe in this new paradigm of wildlife research.

**California Department of Fish and Wildlife Law Enforcement Natural Resource Protection Efforts**

**Presented by: Lieutenant R.Paul Gaske and Lieutenant DeWayne Little**, California Department of Fish and Wildlife Law Enforcement Division

## United States Forest Service Law Enforcement and Investigations

**Presented by: Assistant Special Agent in Charge Kent Delbon**

**Abstract:** It is the mission of the US Forest Service to manage National Forests “*to sustain the health, diversity and productivity of the Nation’s forests and grasslands to meet the needs of present and future generations.*” The attributes that make the National Forest lands excellent producers of wildlife habitat and clean water are also prized by illegal marijuana growers.

From fiscal year 2005 through fiscal year 2013, US Forest Service Law Enforcement and Investigations data indicates that in California alone, approximately 3,356 marijuana cultivation sites, containing over 16 million marijuana plants, were eradicated on National Forest System lands.

One marijuana grow site often can impact an area up to 50 acres. Growers routinely live in a grow site for multiple growing operations from early spring to late fall. Human waste and trash are widespread in these grow sites. Growers clear native vegetation before planting and installing miles of plastic tubing to transport large volumes of water from creeks and other natural water sources for irrigation. In addition to the water diversion, growers will often overuse of fertilizers and rodenticides, some banned in the United States, to facilitate their growing operations. The arrival of winter rains and runoff creates severe soil erosion and washes the poisons, chemicals, human waste, and trash into streams and rivers. The rodenticides often will have entered the food chain and subsequently affects and/or kills native wildlife in the forest.

A typical marijuana cultivation site produces hundreds of pounds of trash and debris. In fiscal year 2013 alone, over 118,901 pounds of trash, 80.5 miles of tubing, 244 propane tanks, and 61 car batteries, 17,091 pounds of fertilizer, almost 40 gallons of liquid pesticides, and over 5 gallons of banned poisons were removed from National Forest grow sites in California.

## **HIDTA's NMI and Public Lands-Past Present and Future**

**Presented by: Director Ed Shemelya**

**Abstract:** The National Marijuana Initiative and the HIDTA's have been actively engaged in combating trespass grows on our Nation's Public Lands for well over a decade. We will examine the extent and scope of this issue from a historical context and look at how HIDTA in cooperation with our Public Lands Agency Partners are combating the continued exploitation of our Public Lands by illicit cultivators and drug trafficking organizations.

We will examine the challenges that the medical/legalization movement present to Law Enforcement and Public Lands Agencies in our attempts to remove this activity from our Nation's Public Lands. Finally will examine how NMI and the Public Lands Agencies can aid and assist the scientific endeavors that are ongoing to ascertain the full extent that of the damage being done to our Nation's Public Lands.



## **Maximum Entropy Modeling to Predict the Probability of Trespass Marijuana Cultivation Site Presence and Potential Risk of Exposure of Fishers and Spotted Owls to Toxicants**

**Presented by: Mr. Mark Higley**, Hoopa Tribal Forestry, Wildlife Department, Hoopa CA

**Abstract:** Illegal trespass marijuana cultivation sites established primarily by drug trafficking organizations have proliferated on public, tribal and at times on private lands throughout California over the last decade. Such sites often use toxicants and chemical fertilizers to protect and grow their illegal crop. Toxicants used range from over-the-counter household insecticides to banned chemicals such as carbofuran and DDT. In all cases they are used illegally and outside of the manufacturer's directions. In recent years researchers have discovered that fishers (*Pekania pennanti*) (federally proposed for threatened status) have been exposed to and killed by first and second generation anticoagulant rodenticides (AR) which they encounter most likely at trespass marijuana cultivation sites. In addition, there is recent, unpublished data documenting exposure of barred and northern spotted owls to second generation AR. Due to the clandestine nature of the cultivation activities it is impossible to know the number and distribution of such sites each year. Law Enforcement agencies collect location information at the time of eradication efforts each year and using such data in combination with a variety of geographic covariates we have developed maximum entropy models which estimate the probability of cultivation site presence. High probability of use areas have been intersected with high probability fisher and spotted owl habitat models to estimate potential risk of exposure of animals to cultivation site activities and toxicants within the northern California range of both fishers and spotted owls.

## **Indirect and covert impacts of trespass marijuana cultivation on public and tribal lands**

**Presented by: Dr. Greta Wengert**, Integral Ecology Research Center, Blue Lake CA

**Abstract:** The direct impacts on wildlife from trespass marijuana cultivation on public and tribal lands have only just begun to be uncovered over the past few years. Water diversions, wildlife poisonings, and clearing of habitats are now understood to be common at cultivation sites throughout California. There are, however, more clandestine ecological disturbances that may affect sensitive wildlife populations indirectly, or be delayed with more substantial consequences yet to be seen. Through two large-scale projects focused on documentation of trespass cultivation sites in northern California, we are collecting data which may shed light on the more covert and indirect ecological impacts faced by forest biotic communities. For instance, data from our initial rodent trapping efforts at six cultivation sites indicate that prey populations are indeed being affected by rodenticides disbursed throughout the planting patches and growers' camps, which in turn may cause more stress on the carnivores that depend on them. We are also collecting data on more covert impacts including pesticide residues in soil and water, pesticide bioaccumulation in invertebrates, enhanced predator movement along grower-constructed trail systems, and increased congregating of species at garbage dumps within the sites. Our preliminary data show that rodenticides remain in the soil months after the sites are abandoned, likely leaving invertebrates and the species that prey on them vulnerable to exposure. When considered at the regional scale across hundreds of trespass cultivation sites on California's public and tribal lands each year, the cumulative impacts could be substantial. Future efforts will incorporate these less evident ecological effects into landscape-scale models to estimate the cumulative impact over years and throughout known and projected locations of cultivation sites in California.

## Techniques for measuring surface water quality near marijuana grow sites

**Presented by: Dr. Michelle L. Hladik and Mr. James L. Orlando,**  
United States Geological Survey, 6000 J Street, Placer Hall, Sacramento CA

**Abstract:** One of the many environmental concerns associated with illegal marijuana cultivation is the contamination of water and soil by pesticides, and the potential for these pesticides to cause toxicity. Collecting water-quality samples near areas of illegal marijuana grow activities can be difficult and potentially dangerous. There has been an interest in the use of passive samplers to document pesticide runoff from grow sites to nearby creeks and streams. Passive samplers offer advantages over traditional water sampling techniques because they can be deployed for longer periods of time resulting in fewer site visits by personnel, and can be placed in remote areas where it may be difficult to sample during a storm events. There are many types of passive samplers; some of the most commonly used are semi-permeable membrane devices (SPMD) for more hydrophobic contaminants, and polar organic chemical integrative samplers (POCIS) for more water-soluble compounds. Both SPMD and POCIS have been used extensively in many types of waters, and information is known about the uptake of a variety of organic contaminants. Some drawbacks to these samplers are that they need to be continually submerged, which may be difficult to achieve in small creeks; sample analysis can be costly; and, the samplers are expensive if lost. Polyethylene devices (PED) are another type of passive sampler and consist of common plastic sheeting affixed to a holder. PEDs have the advantage of being relatively inexpensive, which is useful in areas where loss of the sampler might be high (theft, vandalism, high-flow events). The different types of passive samplers vary in their ability to give qualitative (presence/absence) and quantitative (concentration) data. Knowing the benefits and disadvantages of varying sampling devices can help guide how to use them for water-quality monitoring.

## Illegal Marijuana Cultivation on Public Lands: Management Perspectives

**Presented by: Dr. Matt Brownlee**, Natural Resources Recreation Planning and Management Department of Parks, Recreation and Tourism, University of Utah, Salt Lake City, UT

**Abstract:** Illicit marijuana cultivation (*Cannabis sativa*) on U.S. public lands impacts environmental, social, and economic resources. However, preventing, mitigating, and responding to marijuana cultivation is a significant challenge for land management agencies. This research aimed to a) understand public land managers' challenges, successes, ideas, and experiences regarding marijuana cultivation, and b) highlight specific drivers that prohibit, assist, and influence the prevention, mitigation, and response to marijuana cultivation on public lands. The investigators conducted, recorded, and disseminated the results of 29 on-site and telephone semi-structured confidential interviews ( $M = 46$  minutes) with a variety of key informants involved in addressing marijuana cultivation on public lands. Participant responses were grouped into six non-distinct themes: *Collaboration, grows and growers, challenges of interdiction, ecological impacts, complexity, and future concerns*. The interconnectedness between themes suggests that collaboration, good investigation, and removal of infrastructure contribute to eradication success but are performed inconsistently across and within agencies. Secondly, ecological impacts and safety also influence the efficacy of eradication but are not well-understood and under-researched. All six themes appear to be influenced by limited financial, human, and physical resources, which according to respondents consistently plague eradication efforts and subsequent success of addressing the issue. Finally, tactics and policies are influenced by inadequate resources, are inconsistent across and within agencies, and are not well-understood. Ultimately, the agglomeration of the elements noted above, and their interrelationships, result in a complex problem requiring intensive resources, research, training, formal education, and substantial public outreach. Results also indicated a need within and across land management agencies for further research, including an

extensive quantitative population assessment of managers' engagement with illegal marijuana cultivation, as well as research into growers' perspectives.

## **Local Regulation of Cannabis Cultivation: Opportunities and Obstacles**

**Presented by: Mr. Scott Greacen**, Friends of the Eel River, Humboldt County, California

**Abstract:** The increasing environmental impacts of marijuana cultivation in California's Emerald Triangle have become an important driver of efforts to legalize and regulate cannabis cultivation. The rise in the number and scale of operations in the region since the 1996 passage of Proposition 215 has been so rapid that the era has become known as the "Green Rush." Of particular concern to watershed and fisheries advocates have been increased sediment inputs from roads and land clearing and increased water diversions from already-overallocated and declining surface flows. Together, these impacts threaten to overwhelm restoration efforts and to drive threatened species even closer to extinction in the region.

A proposed Humboldt County land use ordinance is being pitched as providing solutions to these problems. However, the proposal would allow cannabis cultivation on much larger scales than even today's inflated operations, and as a principally permitted use in essentially all rural areas. It also being proposed as a county initiative. The initiative process would preclude the use of CEQA analysis to identify potentially significant impacts of such a dramatic increase in cultivation, as well as mitigation measures that might be necessary to reduce those impacts.

## **Remediation of Public and Tribal Land Grow Sites: Cost, and Community involvement**

**Presented by: Mr. Rick Fleming**, The High Sierra Volunteer Trail Crew, Fresno CA

## **High Time for Conservation: Adding the Environment to the Debate on Marijuana Liberalization**

**Presented by: Ms. Nancy Smith**, the Nature Conservancy, San Francisco

**Abstract:** Liberalization of marijuana policies including legalization of medical and recreational marijuana is sweeping the United States and other countries. Marijuana cultivation can have significant negative collateral effects on the environment that are often unknown or overlooked. Focusing on the state of California where ~70% of the marijuana consumed in the United States is grown, we argue that (1) the environmental harm caused by marijuana cultivation merits a direct policy response, (2) current approaches to governing the environmental effects are inadequate, and (3) neglecting discussion of the environmental impacts of cultivation when shaping future marijuana use and possession policies represents a missed opportunity to reduce, regulate, and mitigate environmental harm.