Science and Strategies:
Collaboration to Combat Marijuana Cultivation on Public Lands

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Background

Marijuana cultivation on public lands, primarily by Mexican national drug traffic organizations (MDTO), has exploded in the last five years. This illegal activity has resulted in serious landscape-level impacts with increasing threats to watersheds, vegetation and wildlife populations, as well as critical safety concerns ranging from booby traps to guards carrying weapons.

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Collaborations among interdisciplinary teams can make a difference in the threat and impact of marijuana cultivation on park lands. Partnering law enforcement specialists, GIS modeling analysts, and resources specialists has created a powerful formula for curtailing this illegal activity through intelligence gathering, site locating, eradication, and restoration. Through increased participation and communication, resource specialists can significantly aid field efforts, including contributing to the development of early detection models, resource assessment protocols, and site restoration.

Impacts of marijuana cultivation on public lands

Throughout California, 3,641,328 marijuana plants were seized on state and federal public lands in 2008. This translates to approximately 9,100 acres of public land cultivation with a street value of over $14 billion. The cost of restoring these areas is $10-12,000 per cultivated acre. The footprint extends much further than the cultivation site (Figure 1), however, with the related impacts spreading 20 to 40 acres per acre cultivated (Figure 2). And that's just in the state of California for 2008. MDTOs are seizing on the mild climate and vast stretches of remote lands on the west coast to set up cultivation sites. Tightened security on the U.S.-Mexico border has convinced many MDTOs that it is easier to grow marijuana in

Figure 1 (left). Cultivation site in Whiskeytown National Recreation Area from the air.

Figure 2 (right). Related site impacts of campsite development.

the United States than to smuggle it into the country. The MDTOs take extreme measures to protect the plants, which can be worth $4,000 each. Marijuana cultivation has been identified as one of the most pressing issues facing public lands. Pacific West Region national park areas in particular have seen a dramatic increase in illegal marijuana cultivation including seizures at Sequoia and Kings Canyon National Parks, Yosemite National Park, Golden Gate National Recreation Area (NRA), Point Reyes National Seashore, Redwoods National and State Parks (Figure 3), North Cascades National Park Complex, and Whiskeytown NRA. In addition to obvious law enforcement and resource protection challenges, the sky-rocketing cost of restoration and increased patrol personnel is not covered by existing operational budgets.

Examples of impacts seen on national park service lands:

- Trees and vegetation cleared for growing areas.
- Introduced chemicals (herbicides, pesticides, fertilizers, fuels) pollute watersheds and kill native species (Figure 4).
- Ditches and crude dams are created, and streams and other water sources are diverted—sometimes by as much as three miles.
- Extensive irrigation equipment is installed, leaving behind miles of irrigation tubing.
- Human waste and garbage are left by the ton after a completed harvest.
- Increased soil erosion due to cleared land, irrigation, diverted water, foot traffic, and camp areas.
- Unlimited poaching of wildlife and

Figure 3. A marijuana cultivation site in Redwood National and State Parks.

game for subsistence and trophies while occupying the site (typically involves 2–8 people for 5–7 months).
- Damage to cultural resources within the area.
- Increased visitor and employee safety risk due to heavily armed guards.
- Labor intensive patrolling and restoration efforts stretch already tight budgets.

Applying predictive modeling to inform investigators and resources specialists

With limited resources to help combat the growing occurrences, a method of focusing efforts was developed through modeling, using a geographic information system (GIS). Two habitat suitability model approaches, multiple logistic regression and weighted overlay, were compared in an effort to identify a best predictive model for marijuana cultivation sites. The models incorporate plant attributes and human activity. Plant criteria include attributes that are related to plant growth such as aspect, soil depth, and land cover. Human factors are site selection criteria, such as proximity to water and roads.

The multiple logistic regression model was evaluated as providing the best results. The model was applied to Yosemite, Sequoia and Kings Canyon, and Whiskeytown with 80 to 95% of historic sites plotting in the area identified as most probable for cultivation. The regression model process is still in development, and data collection and management standards are necessary to ensure better calculations in the future. GIS modeling and analysis of this type is a valuable and efficient means to support resource protection and law enforcement on public lands.

Cultivation site restoration case study—Sequoia and Kings Canyon National Parks

Most of what we know about restoring marijuana cultivation sites comes from the Sequoia and Kings Canyon, which are situated in a rugged, sparsely-populated area of California that is both ideal in climate and topography, as well as adjacent to a major highway corridor, making it desirable for illegal planting operations.

Sequoia and Kings Canyon have completed four consecutive years of marijuana site cleanup and restoration. Sequoia and Kings Canyon's goals are to disrupt the site use by growers by removing infrastructure, and to restore sites to a more natural condition. The highest priority is to remove the immediate evidence of camps, including irrigation hose, garbage, fertilizers, and pesticides. Vital information on location, size, aspect, topography, ground cover, etc., of cultivated sites is collected by resource specialists and law enforcement rangers, as well as quantifying and documenting the resource impacts of chemical use, land disturbance, and water contamination. This information helps define the extent of the impacts, improve future preparedness of staff, and predictive capabilities of scientists.

Work is accomplished with the cooperation of the California Conservation Corps, private contractors, volunteers, and California Air National Guard, and has included the removal of 18,500 pounds of garbage and 23 miles of hose, as well as the documentation and mapping of 105 cultivation sites, 37 camps, and 41 garbage pits. Challenges include working safely amid numerous job hazards, data management, information transfer from law enforcement to natural resource staff, monitoring restoration efforts, and continuing to fund work in the absence of a dedicated funding source.

Lessons learned

Effective partnerships are the key to success. Efforts must be made to develop alliances across disciplines, management boundaries, and agencies to create a successful outcome. Marijuana cultivation has proven to be a boundary-less resource issue that can be likened to light pollution, soundscapes, and air pollution.

Funding is sorely lacking to address this growing challenge. There is a need for a concerted effort towards shaping political will, funding sources, and the public's perception of the problem.

Consistent, clear communication is necessary to gain public and political support for keeping public lands free from marijuana cultivation. Messages need to communicate that at this level, it isn't a "choice" or "legalization" issue; it's about keeping public lands safe, protected, and intact for current and future visitors, and the resource damage is immense.

Invest energy and effort in early season disruption of growers' activities to prevent damage to natural resources, and break the cycle of degradation and restoration.

Standardize a single repository/data model for comprehensive marijuana data inclusive of case reports, arrests, surveillance, eradication, and restoration. Such standardization of data and data collection allows for much more effective trend analysis.