

Mapping & Assessing Unlicensed Cannabis Cultivation

December 2025

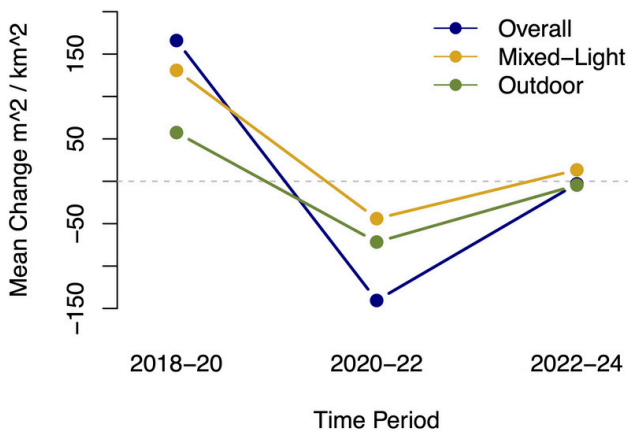
Reliable spatial data on cannabis cultivation has been hard to come by. Recent advances in the aerial image detection model, CannaVision, developed by California’s State Water Resource Control Board, has provided an opportunity to study unlicensed cannabis cultivation over space and time. We utilized cultivation mapping data from 2018-2024, provided by CannaVision, to analyze changes in cultivation density, identify key drivers of change, and assess the distribution of cannabis relative to environmental resources.

Methods

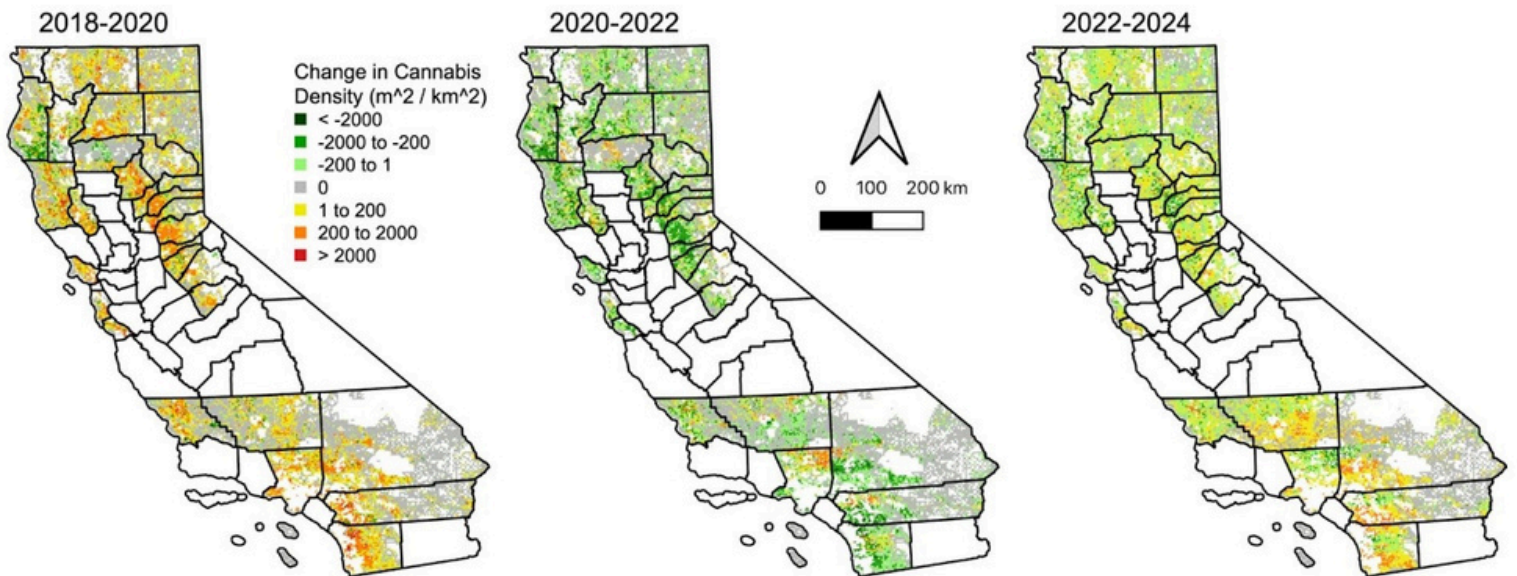
- Helped to train the CannaVision model for greater geographic applicability and accuracy.
- Characterized a large portion of California using numerous physical (e.g., average hill slope, stream network density, distance from incorporated areas) and social/policy (e.g., presence/absence of a ban, proportion conservative voters, enforcement history) variables, generated from large spatial datasets and rigorous review of local policies and ordinances.
- Developed several models to assess what policies and terrain features were associated with changes in cultivated cannabis density and what the potential aggregate environmental impacts of cultivation were over three periods.

Results

**Changes in Density
of Unlicensed Cannabis**



- Unlicensed cultivation expanded rapidly from 2018-20, but retracted sharply from 2020-22.
- There was almost zero net change from 2022-24, but high spatial variability.
- From 2020-24, cultivation declined more significantly in environmentally sensitive counties.
- The relationship between declining cultivation and environmental sensitivity was most prominent in permit counties.



Changes in cannabis density over the study period (2018-2024)

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Physical Variables:

- Flatter and more building-dense areas saw the largest increases in cannabis density during the 2018-20 cultivation boom and largest declines during the 2020-22 contraction.
- While unlicensed cultivation later sought the protection of hilly terrain, it prioritized doing so in less remote and less fire prone areas.
- During the 2020-22 period of decline, larger reductions occurred in areas with high stream network densities, likely reflecting enforcement priorities.



Policy & Social Variables:

- The most consistent and significant factor reducing unlicensed cultivation was the presence of licensed farm nearby.
- Unlicensed cultivation initially avoided areas likely perceived as unfriendly to cannabis (i.e., highly conservative counties and those with historically intensive enforcement), yet this completely reversed by the 2022-24 time period.
- Bans showed mixed results as they were correlated with relative cultivation declines from 2020-22, but increases from 2022-24.
- Civil policies, like fine amounts and landlord liability for cultivation, had mixed results but showed increasing efficacy in later time periods.
- Cultivation exhibited “whack-a-mole” dynamics (lots of cultivation site movement) in counties with bans, particularly those with significant eradication enforcement. This effect was also seen in counties that held landowners liable for cultivation.

Limits

Every data source has limitations. Cannavision may miss small or partially visible features, could only be applied to certain types of landscapes found in 30 of 58 counties statewide, and did not include indoor cultivation. We limited our modeling to areas where object ID was reliable. Rather than attempting an estimate of absolute quantities, which can be highly variable, we confined our analysis to estimating relative changes over space and time.