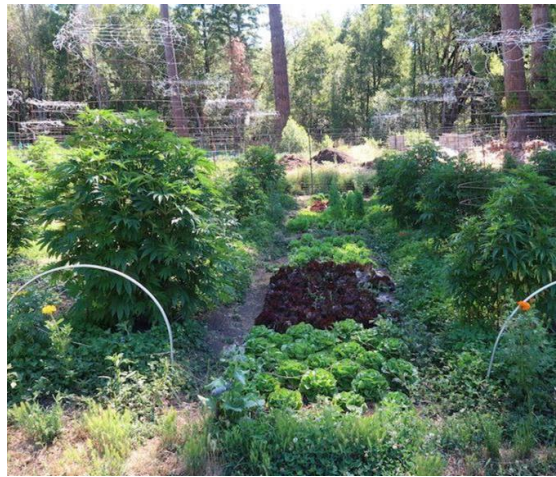


# Cannabis Research Center

*The CRC promotes interdisciplinary scholarship on the social and environmental dimensions of cannabis. Through scientific research and engagement with community, government, and academic entities, we advance understanding of cannabis in socio-ecological systems at local, national, and global scales. We seek to inform public dialog and contribute to the development of prosperous, equitable communities and healthy environments.*



# Our Vision

<https://crc.berkeley.edu/>

Berkeley Cannabis Research Center

# Confusion around water and cannabis

- For many years, cannabis was regulated by the number of plants grown.
- This led to many growers producing huge cannabis plants!
- 6 gallons/water/day become a commonly used metric.

But.....

- This metric is only accurate for large plants during peak season
- When applied to today's smaller plants or to the full growing season it leads to LARGE OVERESTIMATES of water use

# How much water does cannabis use

- Legal Cannabis (from 618 records in Mendocino, Humboldt, Trinity counties)
  - Average for Northern California is 2 acre feet per year for mixed light (14.9 gallons per sq/ft applied per year)
  - Average Northern California outdoor cultivation is 1.5 acre feet per year (11.9 gallons per sq/ft applied per year)
  - New data from Mojave Water district suggest approximately 1 acre foot per harvest. In that region 4 harvests a year are possible, equaling 4 acre feet per year.

# Is this efficient?

- Is cannabis a water efficient crop?
  - It depends on how you measure efficiency
    - Most efficient \$/gallon
    - Least efficient Calories/gallon
  - 1.8 – 3.3 grams per gallon
  - \$1000 pound ~ \$2 gram ~ \$3.6–\$6.6 per gallon,
  - \$651,702 per acre foot

# Compared to other crops

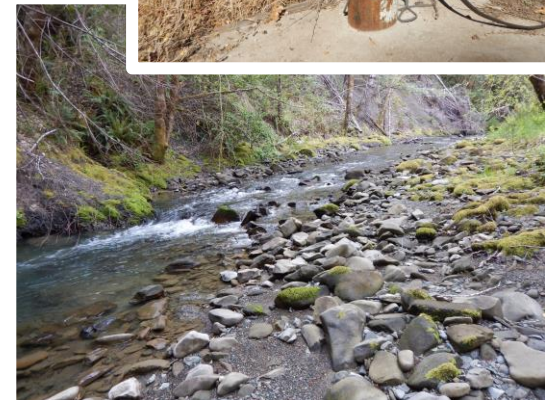
- Water use efficiency
  - \$651,702 per acre foot – cannabis
  - \$2,750 per acre foot – wine (Statewide)
  - \$1,250 per acre foot – almonds (Statewide)
- How much water per serving?
  - 0.5g pre-roll joint = 1 serving
    - 0.13 – 0.25 gallons per serving
  - 23 almonds = 1 serving
    - 23 gallons per serving
  - 1 glass of wine = 1 serving
    - 21 gallons per serving

(assuming 1 acre foot of irrigation for wine grapes; 4 tons per acre = 3000 bottles per acre = 15,000 glasses per acre;  $325851/15,000$  – UCCE report from 2007)



# Efficiency is one thing, but the timing and location of water use is key

- Timing of irrigation water extraction is heavily dependent on a cannabis farm's:
  - Water Source
  - Storage Capacity
- Groundwater extraction peaks in August
- Surface water extraction can be more uniform year round



# Water storage capacity is generally insufficient for meeting total growing season demand

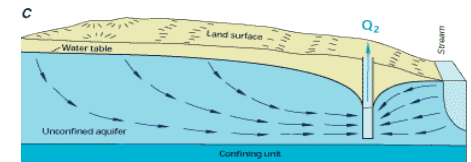
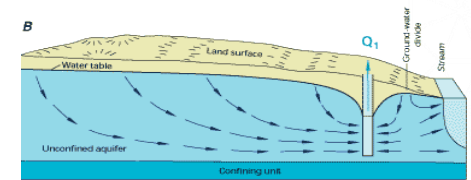
- Among permitted cannabis farms, only those with irrigation ponds typically have the capacity to meet irrigation demand
  - Few farms (~10%) have ponds
  - Installation and use is tightly regulated
  - A typical cannabis farm uses ~150k gallons of water, which would require 30 or more water tanks
- Most cannabis farms use wells
  - Mendocino County: ~75% of permitted farms
    - More than two thirds are outside of groundwater basins





# Location of wells for cannabis farms can be problematic

- The geography of cannabis farming is unique from other agriculture
  - Cannabis is often clustered on the landscape
  - Cannabis is in remote and rugged locations, not in groundwater basins
- Near stream wells are common and difficult to regulate
- Cannabis in groundwater basins is less of a concern, given their small footprint
- Unpermitted farms in Mendocino are likely to use wells should they transition to the regulated cannabis industry



Well Use Among Mapped Parcels

