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Exempt from filing fee pursuant to Gov't. Code Section 6103

SUPERIOR COURT OF THE STATE OF CALIFORNIA

IN AND FOR THE COUNTY OF RIVERSIDE

CITY OF BARSTOW, et al.,

Plaintiff,

vs.

CITY OF ADELANTO, et al.,

Defendant,

AND RELATED CROSS ACTIONS

CASE NO. CIV 208568

WATERMASTER'S REPLY TO RESPONSES/OPPOSITION TO MOTION TO ADJUST FREE PRODUCTION ALLOWANCE FOR WATER YEAR 2021-2022; DECLARATIONS OF ROBERT C. WAGNER, AND KATHY CORTNER IN SUPPORT THEREOF

Assigned for All Purposes to:
Judge Craig Riemer
Dept. 1

DATE: June 3, 2021
TIME: 1:30 p.m.
DEPT: 1
RES246665

TO ALL PARTIES AND THEIR RESPECTIVE ATTORNEYS OF RECORD:

Mojave Water Agency (MWA), in its capacity as the Mojave Basin Area Watermaster (Watermaster), submits the following in response to the recent filings in reply and/or opposition to its Motion to Adjust Free Production Allowance for Water Year 2021-2022:

I.

CANNABIS CULTIVATION SINCE OCTOBER 2020

The cannabis grow operations have multiplied within the service area of the MWA since October of 2020. It seems the Federal Government, the State of California and local governmental entities have a variety of differing approaches to cannabis and enforcement staff is limited.

1. MWA has engaged the County of San Bernardino, who has land-use authority and issues permits for drilling wells. California Department of Fish and Wildlife staff, attorneys and the Cannabis Enforcement Division was notified of this impending problem.

2. MWA is restricted by its lack of land use authority and code enforcement powers. However, MWA has organized meetings of its Technical Advisory Committee which is composed of water producers and public entities in its adjudicated boundaries. At the present time this committee is attempting to draft legislation to submit to the State of California to deal with illegal production of cannabis crops and the resultant production of water outside the terms of the Judgment. See Declaration of Kathy Cortner, General Manager of MWA filed concurrently herewith (attached as Exhibit A).

3. MWA has encouraged all local retailers to monitor water use by its retail water agencies which supports illegal cannabis cultivation. The Agency has encouraged any of these entities to report suspicious activities from water producers sold through local water entities to appropriate law enforcement agencies.

4. The MWA is cooperating with San Bernardino County law enforcement. MWA has made Watermaster data and access to aerial photos available to the County Sheriff's Department, if needed. The Sheriff's Department has attempted to curtail such cultivation but as it stops one illegal operation three more begin operation. The Sheriff's Department's record as to cannabis grows seems to be comprehensive.

5. Watermaster staff and the Watermaster Engineer continue to track and identify those who are pumping outside the Judgment in excess of 10 acre-feet annually. The Watermaster does not regulate land use, cropping patterns, or water duties applied by water producers, and the variety of uses to which water is put to beneficial use in the adjudicated boundary areas. The Watermaster is bound by paragraph 12 of the Judgment which states:

"12. Production Only Pursuant to Judgment. This Judgment, and the Physical Solution decreed herein, addresses all Production within the Mojave Basin Area. Because of the existence of Overdraft, any Production outside the framework of this Judgment and Physical Solution will contribute to and increased Overdraft, potentially damage the Mojave Basin Area and public interest in the Basin Area, injure the rights of all Parties, and interfere with the Physical Solution. Watermaster shall bring an action or motion to enjoin any Production that is not pursuant to the terms of this Judgment."

The Watermaster is currently reviewing aerial photography to identify this production and will determine what actions may be necessary once completed. See Declaration of Robert C. Wagner, Watermaster Engineer (Wagner), filed concurrently herewith, attached as Exhibit B.

II.

HYDROLOGY AND LAKE OWNERS USE OF WATER

The State of California is in an extreme drought. Drought conditions are being felt in 41 of the state's 58 counties. Water consumption has been reduced due to regulations enacted during the 2012-2016 drought. Water efficient landscapes are common, and cities are using on average, 16 % less water.

The Judgment and its hydrology are based on a 60-year average from 1930-1990. The physical solution and other legal issues as determined by the Engineers and Stipulating Parties during the adjudication process, were extremely complex. Water supply and water rights of the entire Mojave Basin Area with its five subareas, extend over 3,400 square miles. The studies by the parties jointly and severely required the expenditures of over two years of time and millions of dollars. These studies continue to this day.

It was recognized that in the future, years of drought would occur as well as years with heavy rainfall. The 60-year average represents an historical average that included years of heavy rainfall as well as years of drought. The Mojave Basin is currently in a drought. The basin has experienced 10 years of well below average precipitation. This is evidenced by the inflow measured at the Mojave River Forks, the headwaters of the Mojave River. From October 1, 2020 through May 18, 2021, the estimated inflow has been about 5,161 acre-feet, which is about 8% of the long-term average. The flow at Lower Narrows for the same period is about 4,366 acre-feet.

The path to the current rampdown schedule ordered by the Court was developed prior to the recent cannabis production in the Mojave Basin Area which has increased since October of 2020. Rampdown should continue and the illegal cannabis production will be dealt with by various law enforcement agencies and through coordination between the Mojave Water Agency, County of San Bernardino, and State of California.

Supplemental water is available for use by the Newberry Springs Recreational Lake Association (NSRLA) in the Baja Subarea as well as all Producers in the Mojave Basin Area. NSRLA simply does not like the climate conditions currently existing in the cycle represented by the 60-year average, and the cost of supplemental water available to them for recreation. See Wagner, page 4 lines 5-18.

Dated: May 27, 2021

BRUNICK, McELHANEY & KENNEDY PLC

BY: _____

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EXHIBIT A

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SUPERIOR COURT OF THE STATE OF CALIFORNIA

IN AND FOR THE COUNTY OF RIVERSIDE

CITY OF BARSTOW, et al.,

Plaintiff,

vs.

CITY OF ADELANTO, et al.,

Defendant,

AND RELATED CROSS ACTIONS

CASE NO. CIV 208568

DECLARATION OF KATHY CORTNER IN SUPPORT OF WATERMASTER'S MOITON TO ADJUST FREE PRODUCTION ALLOWANCE FOR WATER YEAR 2020-2021

Assigned for All Purposes to:
Judge Craig Riemer
Dept. 5

DATE: June 3, 2021
TIME: 1:30 p.m.
DEPT: 1
RES246665

I Kathy Cortner, declare as follows:

I am the General Manager for the Mojave Water Agency. The following is true and correct to the best of my knowledge and belief and, if asked to testify, I could and would testify competently thereto.

The Mojave Water Agency (MWA) was created by special act of the Legislature and has the following Mission: "to manage the region's water resources for the common benefit to assure stability in the sustained use by the citizens we serve". I believe that the Physical Solution that was developed by the parties during the Mojave Basin Area Adjudication (Adjudication) is a cornerstone of the MWA's mission. Eliminating continued overdraft (the balancing of long-term supply and demand) in the Mojave Basin Area is a key element of the planning efforts of the MWA, and it is the heart of the programs that are administered at my direction in my role as General Manager.

Since the 1950's, overdraft has caused the mining of about 2.9 million acre-feet of water from the Mojave Basin Area, and according to the United States Geological Survey (USGS), in some places water levels have fallen as much as 150 feet.

The Adjudication is a groundwater management system designed to balance long-term water supplies with demands. In addition to serving as the Court appointed Watermaster, MWA provides a mechanism to mitigate increased water demands above the supplies of the Subareas by importing MWA's State Water Project entitlement of 89,800 acre-feet per year. MWA fulfills its role under the Judgment by purchasing water with funds assessed by Watermaster, and by importing State Water Project water under various programs. Reduction of Free Production Allowance (Rampdown) is the underpinning of the Judgment's funding mechanism. It is, therefore, essential that Rampdown continue.

Status of Oeste Recharge Basin

MWA as part of its infrastructure to deliver and recharge water in the Mojave Basin has developed recharge basins in four of the five subareas and an Oeste Subarea pilot recharge basin is in the process of being completed. In 2018 MWA purchased a 10-acre parcel in the Oeste Subarea adjacent to the California Aqueduct, in proximity to three Phelan Pinon Hills Community Services District (PPHCSD) production wells, for the purpose of developing recharge facilities in the Oeste subarea. MWA has invested about $520,000 in recharge investigations in the Oeste Subarea to ascertain recharge feasibility; a demonstration project is currently in progress. A field-scale percolation test was conducted with input and coordination with PPHCSD staff in late 2020 with favorable results and MWA has since contracted with environmental consultants to meet CEQA requirements and a Hydrogeological consultant to assist in the design and drilling of a scientific monitoring well. On May 27, 2021 the MWA

Board additionally authorized the advertising for bids for the construction of a scientific monitoring well to investigate the subsurface suitability of the site for recharge percolation and to monitor the demonstration recharge progress.

Unauthorized Water Production and Cannabis Water Use Issues

Cannabis water use has emerged as a growing problem throughout the MWA service area and other areas of the State over the last 9 months. Attached as Exhibit 1 is a newspaper article from the California Globe detailing this problem. Parties to the Judgment have become increasingly concerned that the proliferation of cannabis grow operations within the Mojave adjudicated area has the potential to exacerbate overdraft due to the increase in unregulated water production and use There have been claims by two parties to the Judgment suggesting water use by cannabis grows could be in the thousands of acre-feet per year. Due to these growing concerns, I authorized the Watermaster Engineer to investigate and evaluate the potential water use by cannabis grow operations.

MWA lacks land use authority, code enforcement or any police powers to deal with these issues. However, we have organized meetings of the Technical Advisory Committee to discuss these issues, including selecting a special Ad Hoc Committee to discuss cannabis growing in our service area. The Committee is composed of water producers, elected official representatives, California Department of Fish and Wildlife, Lahontan Regional Water Quality Control Board, and numerous public entities within the adjudicated area. At the present time this committee is attempting to formulate legislation to submit to the State of California to deal with illegal production of cannabis crops and associated water use. The first meeting of this committee was on May 3, 2021. The Ad Hoc Committee will continue to hold meetings to discuss cannabis grows, water use and solutions to environmental issues, trash, sanitation, water hauling, water quality, unauthorized well drilling and land clearing and other issues of concern.

The Watermaster Engineer is developing a program for satellite imaging analysis to determine the extent of cannabis grows within our entire service area in order to provide a reliable estimate of water use and to develop a trend to quantify the rate at which operations are developed. This analysis is also being prepared to provide information to the Technical Advisory Committee and the Ad Hoc Committee.

I have engaged public officials and staff of various agencies to discuss and provide solutions such as, the special ad hoc group to map-out proposed legislation and/or changes in County Ordinances to help locals cope with this difficult and growing problem.

I have also requested data from local purveyors with cannabis customers for the purpose of understanding cannabis use in the local desert environment to help in the Watermaster's Engineer's analysis. This effort continues.

Myself and my staff recently participated in ride alongs with local individuals and public entities to view the rapidly increasing grows in the Este and Oeste areas and I have reviewed aerial photographs from October 2020 showing the proliferation of grow operations.

I have met with and will continue to meet with the San Bernardino County Chief Administrators office, land use and well permitting departments to discuss solutions and enforcement. Specifically, County well permitting does not include Mojave Water Agency in its process. Without the opportunity to review and identify conditions for service for these new wells before the permit is issued, drilling and water use begins before Watermaster staff is able to inform parties of their obligations in the adjudicated area.

MWA staff has met with local Lucerne Valley Sheriff's to discuss water filling and hauling in the area. Traffic issues are a serious community concern with respect to water hauling in vehicles ill equipped to handle heavy water loads. For example, a 500-gallon tank of water has a weight in excess of 2 tons; such tanks are frequently hauled by pickup trucks that are undersized for that effort.

MWA has engaged with San Bernardino County staff and Supervisors and was provided a presentation by the Sheriff's Department related to the Cannabis growing problem. We have provided contacts between law enforcement of California Department of Fish and Wildlife and San Bernardino County Sheriff's Department hoping the two law enforcement teams can work together on these issues.

I have been involved in meetings with County Board of Supervisor's representatives, Bighorn Desert View Water Agency, Helendale Community Services District, Phelan Pinon Hills Community Services District, City of Hesperia, City of Victorville, California Department of Fish and Wildlife, Mojave Desert Resource Conservation District, Newberry Community Services District, Lahontan Regional Water Quality Control Board, State Water Resource Control Board, Victor Valley Wastewater

Reclamation Authority and many other individuals to discuss ways to combat this issue and unfortunately we have learned that enforcement agencies have very few staff to deal with these problems.

MWA staff has fielded many phone calls and email complaints regarding cannabis grows, land clearing, water quality and well impact concerns, water hauling, unauthorized well drilling and a variety of other issues. This is a serious problem for the MWA and the community and we will continue to coordinate with local, County, State and law enforcement agencies and personnel to help combat this issue.

I declare under penalty of perjury, under the laws of the State of California, that the foregoing is true and correct.

Executed this 27th day of May 2021, in Apple Valley, California.

MOJAVE WATER AGENCY

Kathy Cortner, General Manager
Mojave Water Agency

EXHIBIT 1

Illegal Marijuana Cultivation Creating Enormous Problems for California's Rural Communities

californiaglobe.com/section-2/illegal-marijuana-cultivation-creating-enormous-problems-for-californias-rural-communities/

Laura Hauther May 3, 2021

The recent discovery of a 40-acre illegal grow in Death Valley is part of a burgeoning problem in California. That was only one of the hundreds of illegal operations found throughout Death Valley in the past decade. It's a problem that's becoming familiar to more Californians as marijuana cultivation moves into more populated rural areas.

Legalizing adult use of marijuana was a big step towards dismantling the costly and ineffective war on drugs. Voters in California and 16 other states balked at the disproportionate targeting of minorities and the unprecedented powers it gave police over its citizens by way of asset forfeiture.

California had already dropped marijuana possession to an infraction in 2011, causing these arrests to fall by 85% the following year. But the misdemeanor charges, infraction fines, and court fees still available as punishment negatively impacted lives.

Prop 64 moved past the provisions of Prop 215 that legalized medical marijuana in 1996 in several ways; it allowed recreational use by adults over 21 and the growing of a limited number of plants.

It also contained two provisions that brought about a flood of unintended consequences: Allowing local government to control both cultivation and sales in their jurisdictions and making illegal, unlicensed marijuana grows a misdemeanor instead of a felony. The high taxes on legal marijuana set the match to this fuel of bad policy.

According to the New York Times, 80% of California's approximately 500 local governments kept legal sales out of their districts. There is no legal access to marijuana in many areas, and illegal sellers are there to fill the void. A recent RAND study shows illegal retailers not only avoid taxes, making the product cheaper for consumers, but they also avoid rules about purchase limits or types of product. Their products aren't subject to the same rigorous testing as their legal counterparts.

On the production side, illegal cultivation is creating enormous problems for rural communities throughout the state.

In San Bernardino County, rural communities are being inundated by illegal grows throughout the Morongo Basin, home to Joshua Tree National Park. Several cities in San Bernardino allow marijuana sales, but unincorporated areas of the county do not.

The two towns in Morongo Valley, Yucca Valley and 29 Palms decided to keep retail sales out, eliminating legal retail sales throughout the Morongo Valley.

Despite this, in the past few years, the number of illegal grows began accelerating in the rural areas with plenty of open land– Flamingo Heights, Landers, Wonder Valley, 29 Palms, Lucerne and Johnson Valleys.

When people began noticing more and more land getting fenced off, and plastic covered grow houses popping up, often with just a RV on site for a living space, they began to take notice.

Dramatic drone fly-over videos posted by Dragon One shows 19 illegal grows in a one-mile radius in 29 Palms. His follow-up video shows the bust of a pot farm on land rented out by David Lamb, the husband of a Cathedral City Councilwoman. He had been receiving abatement notices about the marijuana cultivation on his properties since 2018.

At the April meeting of the Homestead Valley Community Council, representatives and residents from four of the rural communities packed a small meeting hall to have the chance to directly address Dawn Rowe, their County Supervisor, along with officers from local law enforcement.

The HVCC President Jim Harvey read a letter composed by the Committee hoping to get more assistance from local officials in addressing the communities' concerns:

"Of the seven western states to legalize marijuana, California is the only state experiencing wide-scale illicit marijuana grows operating with impunity and devastating rural areas across the state."

Their concerns hit on the environmental devastation from tearing up the land, ignoring protections for Joshua trees, desert tortoises, and other wildlife, along with the use of pesticides and fertilizers might mean the contamination of groundwater.

There were stories from residents and law enforcement of bullying and intimidation, guard towers, underground bunkers, moats, and large sand berms.

Supervisor Rowe urged people to voice their concerns at the San Bernardino County Supervisor's meeting the next day to push the Supervisors toward legislative means to address the problem.

"Even if we were to make it a fine of a thousand dollars per plant per day administrative fee, which the Board of Supervisor is looking at now, judges in other counties are throwing those fine out because they believe it's not really fair. Eventually, the Board would like to tack the fine onto their property tax bill."

Captain Lucas Niles of the Morongo Basin Patrol Station gave assurances that law enforcement is doing their best to address the problem but expressed his frustration at the lack of legal tools to make an impact:

"We hit 120 grows in less than a year. It's like whack-a-mole. On Friday, we hit the same marijuana grow for the third time in 10 months because it's a substantial one…We have to move our resources to where we can get the maximum effort at one time."

When asked about Federal law enforcement help, he said he was told in no uncertain terms, "the Feds aren't coming."

The aftermath of a law enforcement marijuana grow bust. (Photo: Laura Hauther for California Globe)

Concerns about water usage prompted Big Horn Water Agency serving these areas to change to their water tiers. The Agency created a new "Agricultural" tier and increased the cost of installing a new meter to over fifteen thousand dollars. They aren't allowed to deny a meter installation based on suspicion of illegal activity.

Last year, at least three bills on the state level attempted to enact fines of $30,000 a day for operating illegal grows, being a landlord to an operation, or helping to market or advertise their products. None of them passed.

Sam Kiernan, Executive Director of the California Cannabis Reform Project, thinks he may have a fix for California's pot-related woes – a new proposition. Kiernan released a statement at the beginning of April announcing the initial draft of the proposition he hopes to put before voters. It would end local controls on marijuana sales, making access more consistent across the state and pushing sales toward legal retail outlets.

The proposition would also lower taxes, both cultivation and excise taxes on legal marijuana, helping to make it a more competitive choice for consumers.

Kiernan is hoping holdout communities around the state could be convinced if they see it as a way to curb the deeply entrenched illegal market.

In his announcement of the proposition, Kiernan quotes California's Cannabis Advisory Committee's warning to legislators:

"Despite the state's committed effort to bring cannabis business fully into the regulated commercial market, as much as 80 percent of the cannabis market in California remains illicit."

Kiernan doesn't address the penalties for illegal cultivation and sale, but he is asking for input from all stakeholders in helping to shape this new proposition.

EXHIBIT B

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SUPERIOR COURT OF THE STATE OF CALIFORNIA

IN AND FOR THE COUNTY OF RIVERSIDE

CITY OF BARSTOW, et al.,

Plaintiff,

vs.

CITY OF ADELANTO, et al.,

Defendant,

AND RELATED CROSS ACTIONS

CASE NO. CIV 208568

SUPPLEMENTAL DECLARATION OF ROBERT C. WAGNER, P.E. IN SUPPORT OF WATERMASTER"S MOTION TO ADJUST FREE PRODUCTION ALLOWANCE FOR WATER YEAR 2021-2022

Assigned for All Purposes to:
Judge Craig Riemer
Dept. 1

DATE: June 3, 2021
TIME: 1:30 p.m.
DEPT: 1
RES246665

I, Robert C. Wagner, declare as follows:

I am a licensed Civil Engineer in the State of California and President of the firm of Wagner and Bonsignore, Consulting Civil Engineers in Sacramento, California. I am providing the following supplemental information in support of Watermaster's recommendations regarding Free Production Allowance (FPA) and to address other matters related to water supply use and disposal within the five

Subareas. I incorporate by reference, as though fully set forth herein, my declarations and all attachments thereto that were filed with the court in this action in support of prior Motions to Adjust FPA.

Parties to the Judgment have become increasingly concerned that the proliferation of cannabis grow operations within the service area of the Mojave Water Agency (MWA) has the potential to exacerabate overdraft due to the increase in unregulated water production and use. While this problem exists throughout the MWA service area, this declaration focues on the Mojave Basin Area Adjudicated Boundary. The problem of water production occurring outside the Judgment has been an ongoing issue for Watermaster, that has accelerated recently due to cannabis grows.

Watermaster continues to track minimal producers and identify those producers pumping more than 10 acre feet annually; this includes any use of water. In general the amount of pumping outside of the judgment is small relative to total pumping; however, the potential for this amount to significantly increase is high. The investigation that Watermaster has been conducting based on the best information we had available to us prior to May 1, 2021, indicated that cannabis water consumption on a unit basis was relatively small. It is believed that a single operation may not use more than 10 acre feet of water, however, there is concern that larger operations that have been identified might use more than 10 acre feet. Further, the total number of grow operations is increasing rapidly.

I have been informed by parties to the Judgment that our previous estimates greatly underestimated the number of grows and potential water use to support them. Subsequently, based on field inspections, meetings with parties, and review of updated satellite imaging, I believe the water use is potentially impactful to the five subareas, if not in the form of additional rampdown, then by a lowering of the water table. Particularly important are the Este and Oeste subareas (although all subareas are affected), where annual water supply is limited, and potential water use is high. Even a small increase in water production in these subareas will affect the sustainability of the supply.

The number of "grows" has accelerated making identification difficult with the tools available to Watermaster and Mojave Water Agency (aerial images, drive by investigations, etc). Conseqeuently, since May 1, 2021, Watermaster has taken several actions to help indentify and quantify water useage.

A) I engaged Dr. Jan M.H. Hendrickx, Professor Emeritus of Hydrology, New Mexico Tech, to conduct a detailed investigation (attached hereto as Exhibit 1) of the unit water use per square foot of grow area for cannabis. The purpose of this work was to develop a metric to easily identify operations that might use more than 10 acre feet annually. The results of that investigation, yielded a range of about 1 to about 4 acre feet per acre, depending on number of harvests per year. I believe for the operations I have witnessed, from a distance, that the higher end of the water use estimate is a prudent value to use for estimating potential impact to water supply.

B) Dr. Hendrickx and I are also collaborating to develop a program and process for remote sensing through publically available satellite imaging to rapidly identify changes in land use. The goal is to track over time the expansion of cannabis grows. The process will also be useful for determing other production that mght be greater than 10 acre feet and therefore outside the Judgment. A proof of concept paper for this program is attached hereto as Exhibit 2.

C) Accelerated the time frame to obtain new aerial photograhs for Watermaster's annual photo flight.

D) Dedicated staff to evaluating existing land use to quantify the number of grows. Prior to May 1, 2021, this effort identified about 290 acres thoughout the basin, based on aerial photography from June and October of 2020. I expect that the total acreage is likely twice this amount as of this writing. I have been informed by some parties that operations can be developed in as few as 7 days.

Based on an a upper limit of 4 acre feet per acre, there is potentially 2,400 acre feet of water (assuming the actual acreage is twice as much as previously identified) needed to support this level of cannabis grows. Importantly, the impact on the water supply is likely amplified as most of the water used for cannabis grows is entirely lost to the operation resulting in very little if any return flow. Because this amount of water is relatively new production, its impact on the basin is unrelated to the historical cause of overdraft, but, it will directly impact overdraft in the future.

The affect cannabis production or other production outside the Judgment might have on rampdown in the future is of concern to the parties. Rampdown of Free Production Allowance (FPA) is related to FPA in a subarea exceeding the subarea's estimated Production Safe Yield (PSY). As cannabis production continues, it is possible that PSY will need to be adjusted.

GENERAL WATER SUPPLY CONDITIONS

In acknowledgement of the filing of the Newberry Springs Recreational Lake Association, the basin has experienced 10 years of well below average precipitation, evidenced by the well below average inflow measured at the Mojave River Forks, the headwaters of the Mojave River. From October 1, 2020 through May 18, 2021, the estimated inflow has been about 5,161 acre feet measured at Deep Creek (about 8% of the long term average) , and zero in the West Fork (Deep Creek and West Fork combined to form the Mojave River). The flow at Lower Narrows Mojave River, for the same period is 4,366 acre feet. The resulting net inflow to the upper part of the Alto subarea, where most pumping occurs, is the difference, or about 800 acre feet.

Continued periods of well below average inflow result in reduction in groundwater storage in the subareas along the river, exacerbating overdraft conditions leading to declining water levels. It is likely that Water Year 2021 will be another very dry year in terms of inflow. The average inflow for the past 9 water years was only 47% of the long term average. The current year will be substantially less than this amount as we move through the spring and summer months.

I declare under penalty of perjury, under the laws of the State of California, that the foregoing is true and correct.

Dated: May 27, 2021

Robert C. Wagner, P.E.

EXHIBIT 1

Water Requirements of *Cannabis sativa* for Mojave Hoop House Marijuana Production

Note for the Mojave Water Agency – May 2021

Jan M.H. Hendrickx, Professor Emeritus of Hydrology, New Mexico Tech
Robert C. Wagner, President, Wagner & Bonsignore Engineers

Abstract**:** The water requirements for growing high-THC *Cannabis sativa* in hoop houses in Lucerne Valley is 1.076 acre feet per harvest with an annual maximum of 4.30 acre feet for four harvests per year.

General

Water requirements in agriculture are typically determined per crop [e.g., 1, 2, 3] and we will follow this approach for the crop *Cannabis sativa* also known as hemp or marijuana. Within this crop species there exist a high-THC and low-THC subspecies that both have domesticated and ruderal varieties [4-7]. Tetrahydrocannabinol (THC) is the mind-altering substance responsible for the effects of marijuana on a person's mental state[1]. The low-THC subspecies must by law have a THC content of less than 0.3 – 0.1% (dry weight) in the upper, flowering portion and are called "industrial hemp". The high-THC subspecies have a THC content higher than 0.3% (dry weight); these plants are considered marijuana [8]. Marijuana today is made only from the female inflorescence and for that reason nearly all indoor illicit cultivations consist of female plants propagated vegetatively as cuttings [8-10] with a growing cycle of about eight weeks [7, 11].

Environmental Factors of Marijuana Production

Efficient marijuana production depends on an economic combination of light intensity, plant density, and strain of marijuana [8]. Although plant density has a significant effect on yield/plant, the yield/m^2 does not differ significantly under indoor conditions with densities between 9, 12, 16 and 20 plants/m^2 [12-15]. Unfortunately water use is not available in any of these studies; *Vanhove et al*. (2011) report that "irrigation water was applied every two days in amounts that were arbitrary determined on the basis of plant requirements" [13]. In these studies, light intensity and marijuana strain have a significant effect on both yield/plant as well as yield/m^2. The yield difference expressed as yield/m^2 between different strains can be as high as a factor two while an increase in light intensity from 400 to 600 W can increase the yield between 6 to 215% depending on the strain [13].

In addition to the light intensity, marijuana production also strongly depends on the number of daylight hours as well as air temperature and relative humidity. During seedling (week 1 and 2) and vegetative growth (week 3 through 6) the plant needs 18 hours of light per twenty-four hours; then to force the plant into flowering and producing the female inflorescence the light hours are reduced to 12 hours. High-THC cannabis does not tolerate cold temperatures well and grows best at temperatures between 77 and 86 °F although it can survive at temperatures as low as 50 to 55 °F. A relative humidity of about 40 to 80% is ideal but a range of humidity can be tolerated [8].

[1] https://www.nccih.nih.gov/health/cannabis-marijuana-and-cannabinoids-what-you-need-to-know accessed on 24 April 2021.

Crop Calendar of High-THC *Cannabis sativa* in Mojave Hoop House

The information in this section comes from the scientific literature [8, 11, 13, 14, 16-18], guidelines for cultivating cannabis for medicinal purposes by the Dutch Ministry of Health, Welfare and Sport [19], a well-written blog https://www.ilovegrowingmarijuana.com/ and an interview with a former Dutch indoor attic grower. The Mojave Water Agency informed us that lamps are used inside the hoop houses. During a field visit to Lucerne Valley, we typically observed ventilators at one side of the hoop house and side panels at the other side which indicates that ventilation for temperature and humidity control is possible.

A typical hoop house cannabis operation is shown in Fig. 1 by Wilson et al. [2019] who surveyed Californian growers about how they produce cannabis outdoors or in greenhouses. Such a hoop house in Lucerne Valley would have a growing season of about 245 days with four or three annual harvests. The cannabis crop typically would be grown in raised beds (as in Fig. 1) or in native soil with a plant density of one plant per 3 sq ft (Fig. 1 has a slightly higher plant density). Most growers will prefer to purchase good quality clones to assure that the female inflorescences will not be contaminated by male pollen. The growing process starts with planting the clones or cuttings. After two weeks of frequent application of small irrigation volumes, vegetative growth starts followed by the flowering phase and harvest. The duration of the seedling, vegetative and flowering developmental stages varies by variety, management, and type of cultivation. For example, for medical cannabis the flowering stage can last up to seven weeks [17]. However, for illicit growers' time is of the essence and typically an entire growth cycle is completed in about eight weeks: 2 weeks for cutting establishment and growth, 4 weeks of vegetative growth and 2 weeks for flowering.

Figure 1. A typical hoop house cannabis operation [18] for which water requirements are estimated using the Penman-Monteith equation [1].

Water Requirements of High-THC *Cannabis sativa* in Mojave Hoop House

Somewhat surprisingly for "the world's most recognizable, notorious, and controversial plant" limited information has been found on the water requirements of cannabis [20]. The probable reason is that cannabis is tolerant of hot and arid conditions if the roots have an adequate water supply. Cannabis cannot tolerate waterlogging and, therefore, does not grow well in clay soils that retain water [8]. Overall, cannabis is a relatively easy crop to grow and produces a decent yield as long as overwatering is avoided.

The physics and physiology of crop water use in agriculture are well understood and expressed in the Penman-Monteith equation that calculates crop water use as a function of weather parameters (solar radiation, wind speed, air temperature and air relative humidity) and crop parameters (stomatal conductance, leaf area index and vegetation height) [1, 21-23]. On a day with high incoming solar radiation, high wind speed, high air temperature and low relative humidity the crop will have a high water loss through transpiration. During the night when incoming solar radiation is zero, the water loss is negligible. A crop with a high stomatal conductance, a high total leaf area and a tall height will release more water than a crop with a low stomatal conductance, low total leaf area and low height.

The Penman-Monteith equation can be used in two different ways: 1. Direct calculation of the crop water use when all weather and crop parameters are known; 2. A two-step calculation when the crop parameters are not available that consists of (i) using the Penman-Monteith equation with measured or estimated weather data for calculation of the crop water use of a reference crop (a clipped lawn well supplied with water) and (ii) multiplication of the reference crop water use by a crop coefficient for the crop of interest. We use the latter method for the estimation of marijuana water use in hoop houses.

The first challenge is how to estimate the weather parameters needed for the Penman-Monteith equation inside the hoop house. Because a complete analysis of the energy balance inside a hoop house is too complex for this effort [24-28], another approach is taken. All growers know that a cannabis hoop house needs to maintain an air temperature between 77 and 86 °F and relative humidity between 40 and 60%. Light intensities between 500 to 600 Watt/m^2 are common in most indoor settings [12-14] and air flow inside a hoop house is expected to remain below 5 mi/hr. For an estimate of a representative hourly reference evapotranspiration ETo (mm/hr) we calculated the ETo for all combinations: light intensity 500 and 600 W/m^2, air temperature 68, 77 and 86 °F, wind speed 0.2, 2.2 and 4.5 mi/hr and relative humidity 20, 40, 60 and 80%. For each of these 72 combinations the hourly reference ETo was calculated which yielded values between 0.011 and 0.022 inch/hr with an average of 0.015 inch/hr. The daily reference ETo is calculated as the hourly ETo times the number of light hours.

A literature search yielded drip-irrigated early-season and mid-season hemp crop coefficient values of, respectively, 0.4 and 1.1 in semi-arid Southern Italy [29]; 0.5 and 1.15 during an arid summer at Novi Sad, Serbia [20]; and values of 0.6, 0,8, 1.0 and 1.2 during the first, second, third and fourth month of growing in semi-arid Southern Spain [30]. The relatively high crop coefficient values of 0.4, 0.5 and 0.6 at the start of the season reflect the relatively high amount of soil evaporation that results from frequent soil wetting by the drip-irrigation system. As the season progresses the crop coefficient reflects the increase in hemp transpiration and the fraction of soil evaporation becomes small when full soil cover is reached (see Fig. 1). We estimate an average crop coefficient value of 0.5 for the crop coefficient at the start of the high-THC marijuana growing cycle and a maximum crop coefficient value of 1.2 during the mid-season to reflect the 18 hours of continuous optimal light intensity between 500 and 600 W/m^2 and air temperatures between 77 and 86 °F. Under such conditions the stomatal conductance for transpiration is at a maximum [31, 32]. These crop coefficients are used for the construction of the crop coefficient curve during the growing season (Fig. 2). Table 1 presents the calculation of weekly cannabis crop water use using the crop coefficients of Fig. 2 and determines the total water volume needed for one through four harvests. The water requirements for growing high-THC *Cannabis sativa* in hoop houses in Lucerne Valley is 1.076 acre feet per harvest or 4.30 acre feet for four harvests per year.

The water use per marijuana plant (gallons/plant) has not been calculated in Table 1 because crop water use does not depend on plant density (plants/sq ft) but on the amount of net short and long-wave radiation per square foot generated by the sun and the lamps as well as thermal emission. This amount of energy (Joules) per square foot determines the amount of crop evapotranspiration (gallons) per square foot that is directly related to the yield (grams) per square foot [33]. Therefore, the above-mentioned studies [12-15] found no significant relationship between plant density and yield per square foot but did find a highly significant relationship between energy per square foot and yield per square foot. Although sometimes used for

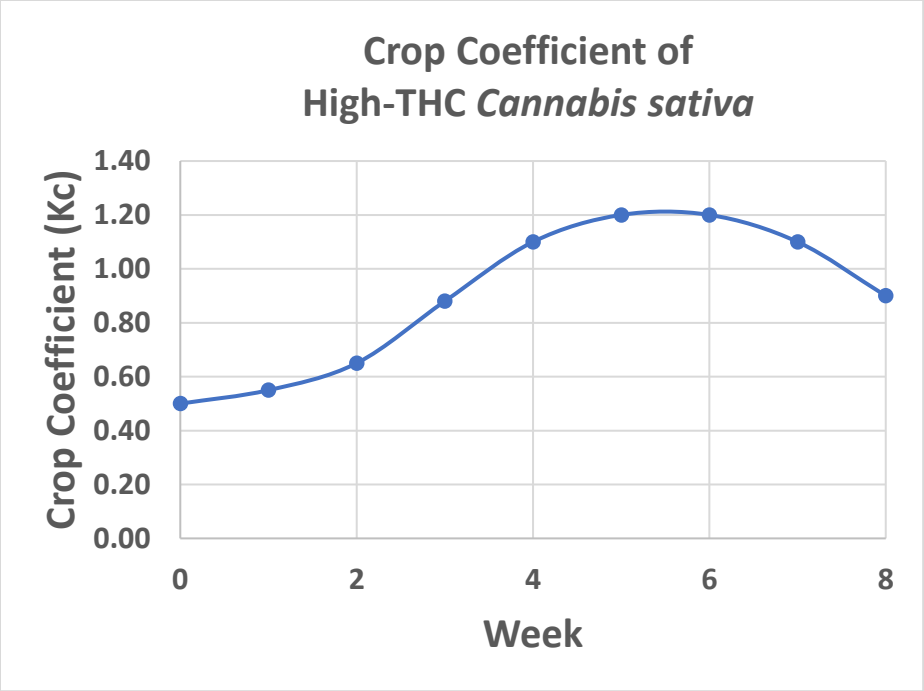

Figure 2. The crop coefficient curve for calculation of water use needed for one harvest of high-THC *Cannabis sativa*.

Table 1. Calculation of weekly and daily water use for *Cannabis sativa* using an hourly reference evapotranspiration of 0.015 inch/hour. In addition, the average values per harvest during an eight-week growth cycle are presented as 1.00 gallons/week per square foot and 0.14 gallons/day per square foot. The total water use per harvest is 8.0 gallons per square foot or 1.076 acre-foot. The climatic conditions in Lucerne Valley will not allow more than four harvests per year so that the maximum annual water use is 4.30 acre-foot.

Crop Development	Week	Kc	Light Duration Hours	Weekly Water Use Gallons/ week sq ft	Daily Water Use Gallons/ day sq ft
Clone Planting	0	0.50	18		
	1	0.55	18	0.63	0.09
	2	0.65	18	0.72	0.10
Vegetative Growth	3	0.88	18	0.92	0.13
	4	1.10	18	1.19	0.17
	5	1.20	18	1.39	0.20
	6	1.20	18	1.45	0.21
Flowering	7	1.10	12	0.93	0.13
	8	0.90	12	0.80	0.12
Average/Harvest	1 - 8	1.00		1.00	0.14

demonstrative purposes [18, 34, 35] “gallons per plant per day” is a poor unreliable metric for the quantification of high-THC *Cannabis sativa* water use.

The values for high-THC *Cannabis sativa* presented in Table 1 agree well with the average application rates for greenhouse cannabis cultivation per month reported by California growers in 2018 (*Wilson et al.* [2019] [Fig. 4 in 18]) and presented in Fig. 3. The peak water application rate reported in September of 0.22 gallons per sq ft per day is nearly equal to the 0.21 gallons per sq ft per day calculated for week 6 at the end of vegetative growth in Table 1. The lowest application rates at the start (March) and end (October – November) of the growing season also agree with the Table 1 numbers in weeks 1, 2, 3, 7 and 8. The fact that two completely independent studies using two completely different approaches (physics versus growers’ survey) yield nearly identical values for hoop house *Cannabis sativa* water use in California is a strong indication that the values reported in this note and by *Wilson et al.* [2019] are reliable.

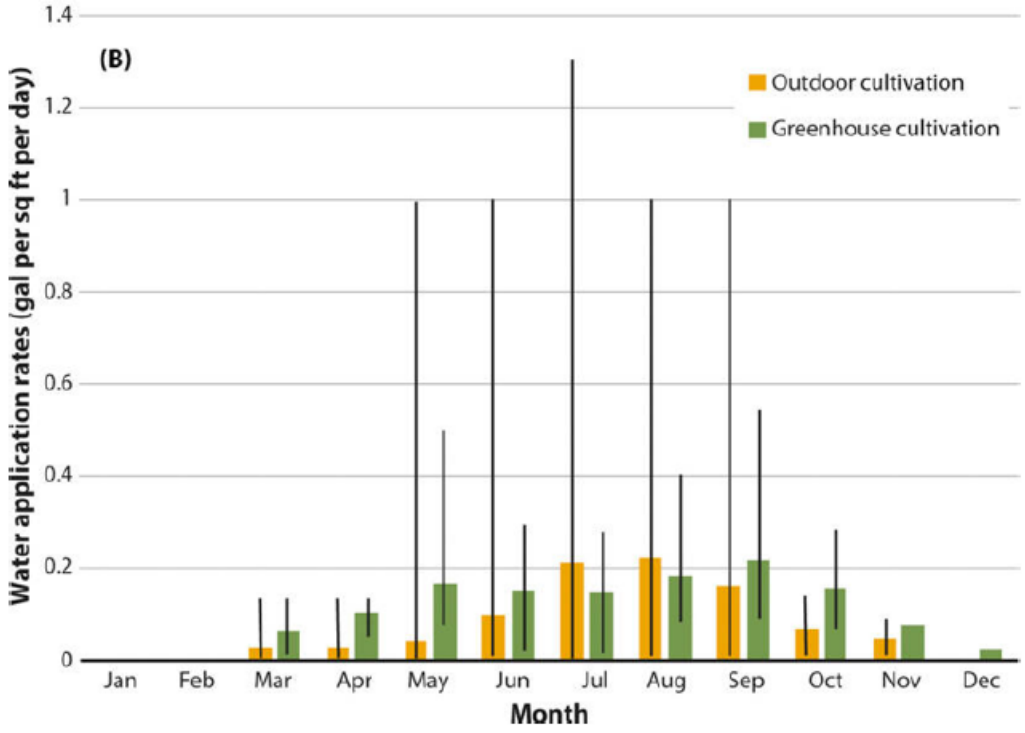

Figure 3. Average water application rates (gallons per sq ft per day) for outdoor and greenhouse cannabis cultivation by month in 2081 reported by California growers to *Wilson et al.* [2019] ([Fig. 4 in 18]). Application rates were similar for outdoor and indoor cultivation; black lines indicate the range of values reported.

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EXHIBIT 2

Detection of Mojave Marijuana Hoop Houses Using Satellite Imagery: Proof of Concept

Note for the Mojave Water Agency – May 2021

Jan M.H. Hendrickx, Professor Emeritus of Hydrology, New Mexico Tech
Robert C. Wagner, President, Wagner & Bonsignore Engineers

Abstract: Frequent detection of Mojave marijuana hoop houses using Sentinel satellite imagery is challenging but possible. Step One: Use cost free nearly real time (5 – 10 days) Sentinel imagery for semi-automatic change detection over the entire 4000+ square miles of the service area of the Mojave Water Agency. Step Two: A GIS professional identifies the cause of unknown detected changes using high resolution satellite/aerial/drone imagery or field inspections. Only Step Two requires a budget for the GIS effort and the purchase of high-resolution imagery, but this expense will only be a fraction of the current budget for flying an aerial survey followed by visual inspection of each square mile on high-resolution imagery.

General

The detection of hoop houses in the Mojave Desert by visual inspection of high resolution (<4 ft) images as provided cost free by Google Earth is straightforward (Figs. 1-2). Visual inspections have a nearly perfect accuracy but become expensive for large expanses of desert due to the cost of labor and the purchase of recent high-resolution images[1]. Therefore, the objectives of this proof-of-concept analysis are (1) explore whether cost free nearly real-time Sentinel imagery with a spatial resolution of 33 ft can be used for *nearly real-time hoop house detection*; (2) quantify the spectral reflectance curve of hoop houses in the Mojave Desert and (3) explore whether Sentinel imagery with a spatial resolution of 33 ft can be used for *nearly real-time land cover change detection*. In this note the term "hoop house" is used as well as the term "plastic covered greenhouse" that is a more common in the scientific literature.

Satellite Images

Sentinel 2 optical images are available cost free about every 3-5 days if the sky is clear during satellite overpass. The spatial resolution of the visible (B2, B3, B4) and near-infrared (B8) bands is 33 ft, six other bands with visible and infrared wavelengths have a resolution of is 66 ft. The images are available on the day of acquisition. *Sentinel 1 radar images* are available cost free about every 12 days even under cloudy conditions during satellite overpass; their resolution is approximately 16 by 33 ft. Optical satellite images with a spatial resolution of 10-4 ft or less can be custom ordered and purchased[1].

Spectral Signatures

A spectral reflectance curve of a surface (bare soil, water, vegetation, plastic covered greenhouse) presents the relationship between the wavelength of electromagnetic radiation and its reflectance from that surface. Each land surface has its own spectral reflectance curve(s) also known as spectral signature(s). For example, Fig. 1 presents the spectral reflectance curves of 11 different land covers derived from 12 Sentinel bands. These Sentinel land cover signatures have

[1] At $6.00/square km (see soar.earth), historic high-resolution optical imagery for the 4,000 square miles of interest would cost about $60,000. An aerial survey is about the same expense. Nearly real-time custom ordered imagery will be more expensive. Another provider is apollomapping.com/.

been measured in Turkey but they are quite similar all over the world. For example, the spectral signature for "Lake" and "Sea" in Fig. 1 is like the one found over Big Bear Lake; the one for "Farmland" is similar like the one over the irrigated areas near Barstow during the growing season. Of course, the reflectance curve for farmland varies during the year depending on the presence of fallow soil during winter and the crop development phase during the growing season.

Unfortunately, the spectral reflectance curves of plastic covered greenhouses exhibit a disproportionate variability for several reasons. First, their spectral signature -just like regular farmland- depends on the cropping calendar inside the greenhouse: fallow soil during winter and crop development phase during the growing season [1]. Second, the plastic covers can be made from different plastic types with variable light transmissivity and, sometimes, be painted white during summer; they also degrade over time and can be covered with dust in between cleanings [1, 2]. Third, yet another major source of variability is caused by mixed pixels that partly cover the plastic greenhouse and partly the surrounding soil or cropland. Figure 2 shows the variability of spectral reflectance caused by mixed pixels as a function of percentage crop/soil cover versus plastic greenhouse cover. A fourth and final source of variability for plastic covered greenhouses for marijuana cultivation in the Mojave Desert is the rapid change of pixel spectral reflectance during greenhouse construction from native desert to plastic covered greenhouse.

Detection Effort One: Detection of Hoop Houses

Our eyes are by far the best tool for quick effective detection of Mojave marijuana hoop houses but unfortunately such visual inspections require not only access to nearly real-time expensive high resolution (less than 10 feet) optical imagery but also a considerable time commitment of GIS professionals for the weekly or monthly visual inspection of 4000+ square miles of desert. The only viable option for cost free nearly real-time optical images are Sentinel images with a spatial resolution of 33 feet in the visible and near-infrared bands (B2, B3, B4, B8) and six other bands at resolution 66 feet. Therefore, we have evaluated what information is available from Sentinel images as compared to high resolution Google Earth imagery. Hoop houses are clearly visible on Sentinel images (Figs. 3-4) which indicates that the spectral signatures of the hoop houses are different from the surrounding desert. However, it is nearly impossible to look at a Sentinel image and identify with certainty that darker pixels are indeed hoop houses.

Land surfaces that never change much such as water or asphalt can be identified by their unique spectral reflectance curves (Fig. 1). Their classification is straightforward using existing classification algorithms in QGIS or other software packages. For example, these algorithms compare the water spectral reflectance curve with the reflectance curve of each pixel and assign the class "water" to a pixel when the pixel spectral reflectance curve matches the water spectral reflectance curve. For land surfaces that change during the seasons such as irrigated lands, deciduous forests or snow cover similar classification algorithms have been developed using time-series of different images during the year. We have tried several standard methods for the classification of hoop houses but without obtaining reliable results. The spectral reflectance of hoop houses and the mixed pixels around them is so variable (Fig. 2) that no classification algorithm can accurately identify hoop houses on a single Sentinel image. Even if it would be possible at great expense to formulate a logistic regression or artificial neural network for hoop house location prediction using Sentinel and Google Earth images of 2020, there is no guarantee that these classifiers would perform well in 2021 and later. Thus, detection effort one leads to the

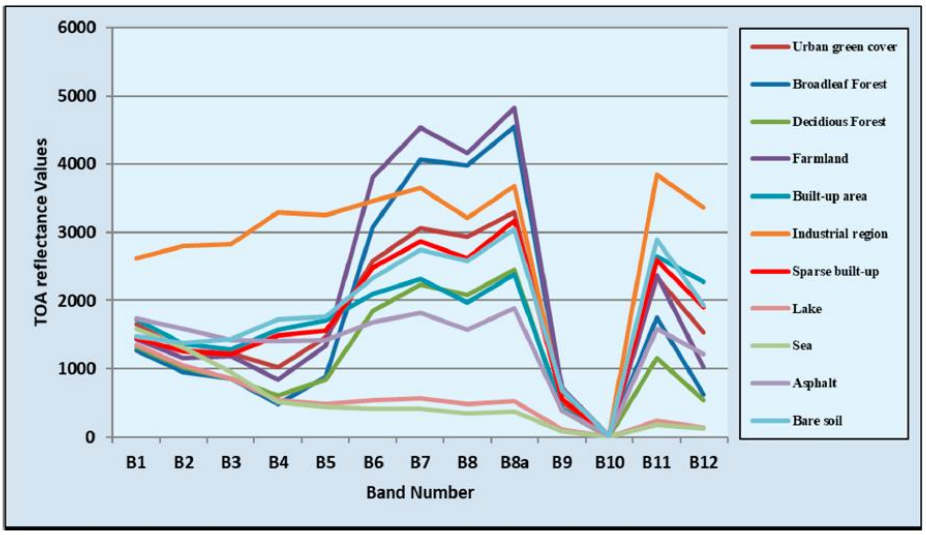


Figure 1. Spectral reflectance curves of different land cover surfaces measured in Turkey [3]. For comparison of this figure with Fig. 2 the reflectance values need to be divided by 10,000. The reflectance is a number between zero and one; it represents the fraction of sun light at a given wavelength or band number that is reflected from the land surface back into the atmosphere.

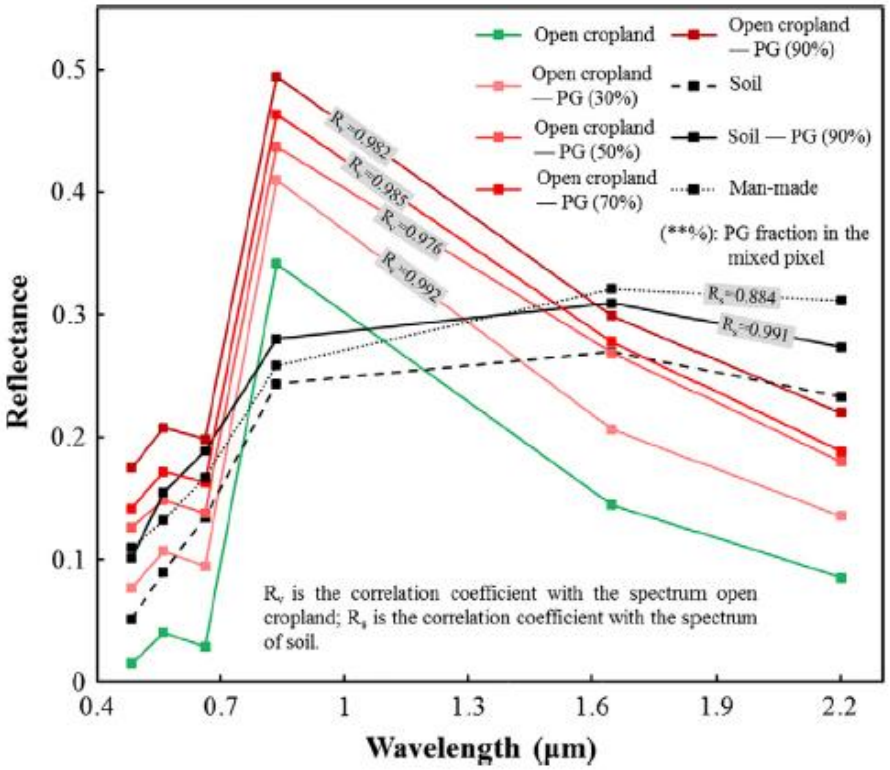


Figure 2. Spectral reflectance curves of crop land (green line), bare soil (dashed black line), man-made materials (dotted black line), and mixed pixels with different proportions of plastic greenhouse covers. Typically, there will be more mixed pixels at a plastic covered greenhouse site because the scale of the pixel has the same order of magnitude as the scale of the greenhouse [1]. The points in the graph going from left to right represent the reflectance of, respectively, bands B2, B3, B4, B8, B11 and B12 shown in Fig. 1.

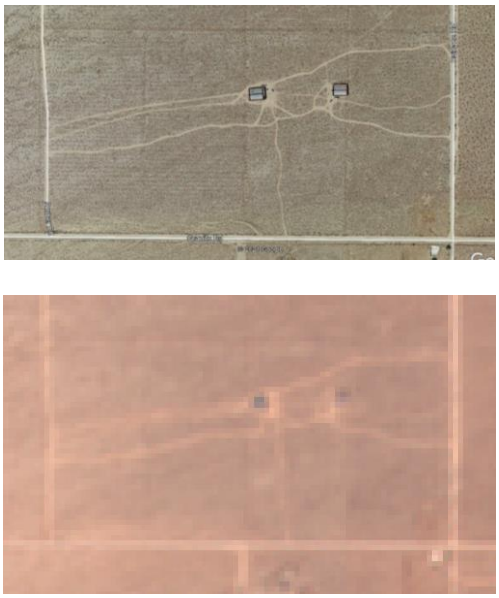


Figure 3. Comparison of top Google Earth image (less than 3 feet spatial resolution) with bottom Sentinel 2 image (33 feet resolution) on October 2, 2020. The left NS road is Amber Road and the WE road is Granite Road. The distance between the two NS roads is 0.5 miles. The distance between the two pairs of hoop houses is about 450 feet.

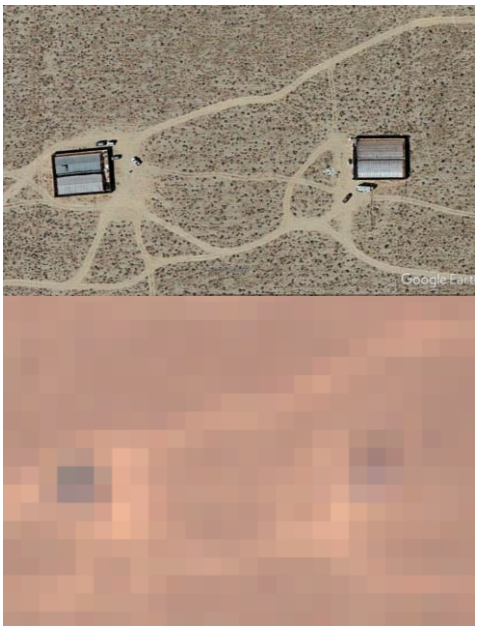


Figure 4. Zooming in on the Google Earth image one can clearly observe the two sites that have each one pair of hoop houses surrounded by a fence. Each hoop house has a width of about 30 feet and length of about 80 feet. Zooming in on the Sentinel 2 image does not result in more detail except that the left hoop house is represented by a rectangle of 2 by 3 darker pixels and the right hoop house by a square of 3 by 3 darker pixels. Only by comparison with the Google Earth image do we know that these darker pixels represent a hoop house.

conclusion that Sentinel imagery cannot be used for the detection of marijuana hoop houses in the Mojave Desert. The large variability of spectral reflectance curves of hoop houses and their surrounding mixed pixels makes it impossible to define the unique hoop house spectral curves signature needed for successful classification. However, this disappointing classification effort does reveal that Sentinel imagery can be used for accurate land cover change detection by comparing two images taken at different dates. Examples of land cover changes are: before and after snowfall, before and after planting an agricultural crop, before and after cutting down a forest, along with before and after hoop house construction. Therefore, detection effort two will not focus on hoop house identification but on land cover change detection whatever the cause.

Detection Effort Two: Detection of Land Cover Changes

Detection effort two consists of two steps: I. Detection of pixels that have a significant change in pixel spectral reflectance values between the Sentinel-2 images of October 2, 2020 and May 8, 2021; II. Identification of the cause of pixel value change. A wide variety of pixel change detection approaches are found in the literature [4, 5] but in this proof-of-concept study we

employ a simple straightforward metric for change detection per pixel: the sum of the absolute differences of the spectral reflectance values of bands 2, 3, 4 and 8 in the two images from October and May. A large sum indicates considerable land cover change took place in the pixel while a small sum indicates no or little change. By adjusting the color scheme of the image one can immediately explore how many major changes occurred between the two dates and how many small changes. For example, Fig. 5 presents maps with intermediate and major land cover changes in blue (no change) and white (change) over a 25×30 square mile area. The Sentinel images show that the white land cover change pixels in the lower left corner represent high snowcapped mountains while the ones found just below the center of the left edge in Lucerne valley represent agricultural lands. In both areas, land cover changes are expected. Where the map is solid blue, no further inspections are needed so the GIS professionals can focus on areas with land cover changes only. On the intermediate land cover changes map there appear "clouds" of white pixels not only on agricultural lands but also in the surrounding desert. Fig. 6 presents a zoom to an area of 1.5×1.9 square miles located in the north-eastern part of Lucerne valley. Now, the white agricultural lands are well in focus as well as an area of about 40 acres in the right upper corner of the intermediate land cover changes map. An adjustment of the change metric visualization in QGIS leads to the major land cover changes map without white "noise". Even on this map there are bright white pixels with major land cover changes in the 40 acres area and this area is marked as an "area of interest". The next step is to investigate what is causing the major land cover change by purchasing a high-resolution image, asking a local volunteer to check it out or by checking the local news paper. Of course, now it is known that this land cover change has been caused by an illicit marijuana production operation[2].

Conclusion and Recommended Work Plan

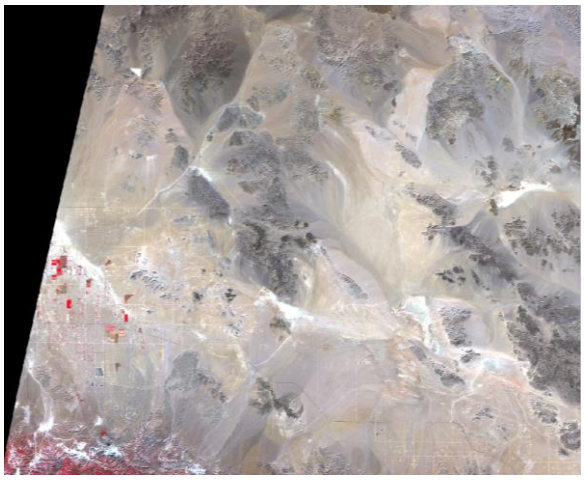
We conclude that Sentinel 2 images are amazingly effective for nearly real-time detection of land cover changes using the QGIS approach described in this proof-of-concept note.

We recommend a work plan with the following activities for further development of our approach to an operational tool for nearly real time marijuana hoop house detection:

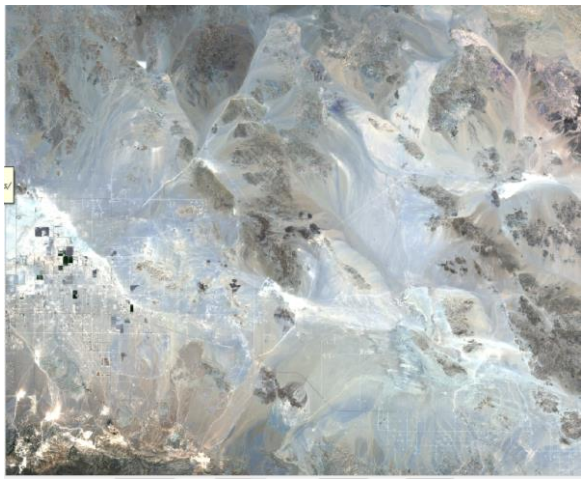
1. Improve the sensitivity of the land cover change metric derived from Sentinel imagery.
2. Use the output of our approach to make immediate changes in the existing land use map of the Mojave Water Agency territory.
3. Setup a system to efficiently check "areas of interest" using high resolution imagery, field inspections by staff and/or volunteers.

This work plan can be implemented by a team consisting of Dr. Hendrickx and two GIS professionals of Wagner & Bonsignore Engineers and Mojave Water Agency.

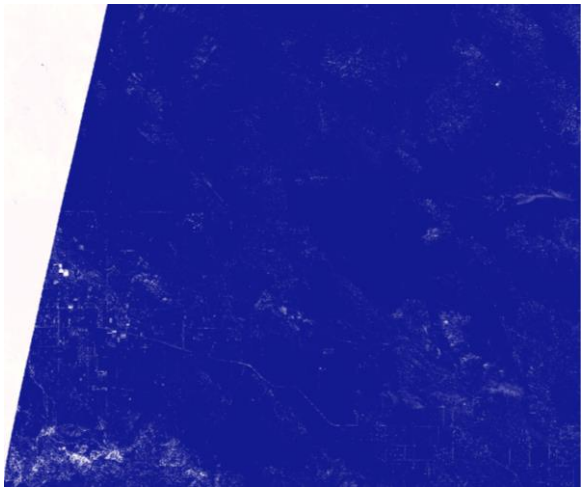
[2] https://www.vvng.com/76118-marijuana-plants-destroyed-in-lucerne-valley/



Sentinel Image 2 October, 2021



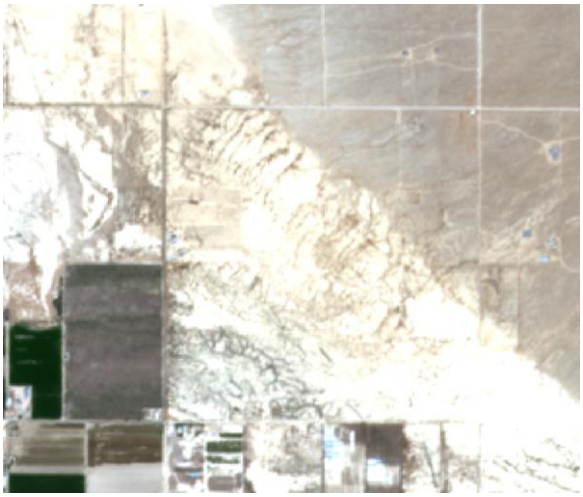
Sentinel Image 3 May, 2021



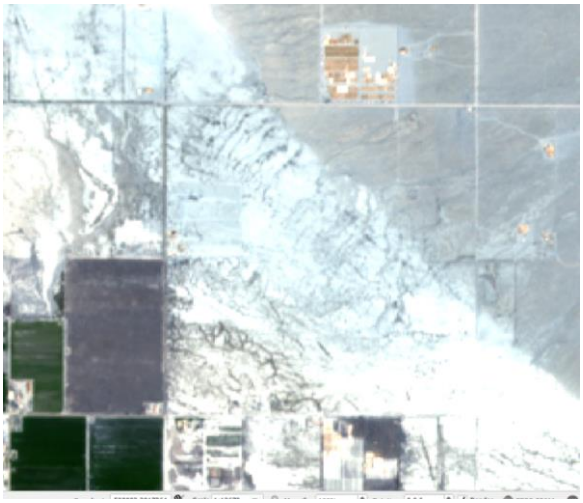
Intermediate land cover changes

Major land cover changes
(ignore left upper triangle)

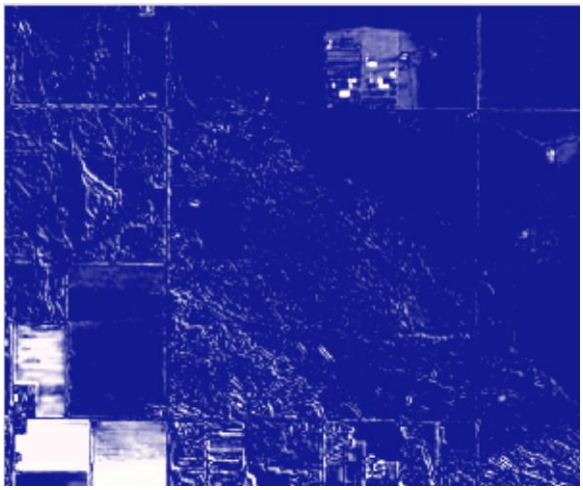
Figure 5. Subset of Sentinel 2 image covering an area of about 25×30 miles covering Lucerne Valley and surroundings. The pixel properties are: size 33×33 ft; 3 bands with visible light (blue, green, red) and one band with infra-red (NIR); 12 bits or 4096 brightness levels for each band; available once a week or less. A simple adjustment in QGIS allows to visualizes areas with intermediate or major land cover changes.



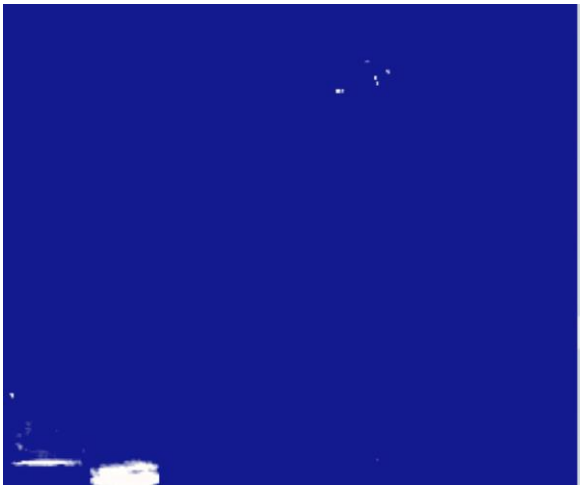
Sentinel Image 2 October, 2021 without hoop houses.



Sentinel Image 3 May, 2021 with hoop houses.



Intermediate land cover changes



Major land cover changes

Figure 6. Subset of Sentinel 2 image covering an area of about 1.5×1.9 miles covering Lucerne Valley and surroundings. The pixel properties are: size 33×33 ft; 3 bands with visible light (blue, green, red) and one band with infra-red (NIR); 12 bits or 4096 brightness levels for each band; available once a week or less. The bright white pixels indicate major change; the weaker white pattern in the upper right corner of the left lower image indicate the entire site of the hoop house at the Granite/Amber intersection.

References

1. Yang, D., et al., *Mapping plastic greenhouse with medium spatial resolution satellite data: Development of a new spectral index.* ISPRS Journal of Photogrammetry and Remote Sensing, 2017. **128**: p. 47-60.
2. Novelli, A., et al., *Performance evaluation of object based greenhouse detection from Sentinel-2 MSI and Landsat 8 OLI data: A case study from Almería (Spain).* International journal of applied earth observation and geoinformation, 2016. **52**: p. 403-411.
3. Ettehadi Osgouei, P., et al., *Separating built-up areas from bare land in mediterranean cities using sentinel-2a imagery.* Remote Sensing, 2019. **11**(3): p. 345.
4. Mas, J.-F., *Monitoring land-cover changes: a comparison of change detection techniques.* International journal of remote sensing, 1999. **20**(1): p. 139-152.
5. Benedetti, A., M. Picchiani, and F. Del Frate. *Sentinel-1 and sentinel-2 data fusion for urban change detection*. in *IGARSS 2018-2018 IEEE International Geoscience and Remote Sensing Symposium*. 2018. IEEE.

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Filing as an Attorney	Bar Number	Attorney for
Yes	46289	Mojave Water Agency

Documents

1 Watermaster's Reply to Responses/Opposition to Motion to Adjust Free Production Allowance for Water Year 2021-2022; Supporting Declarations

Notes / Special Instructions

IMPORTANT: This document serves as a confirmation of delivery only and the submitted documents have not yet been processed and/or filed by the Superior Court of California, County of Riverside.

PROOF OF SERVICE

STATE OF CALIFORNIA }
COUNTY OF SAN BERNARDINO}

I am employed in the County of the San Bernardino, State of California. I am over the age of 18 and not a party to the within action; my business address is 13846 Conference Center Drive, Apple Valley, California 92307.

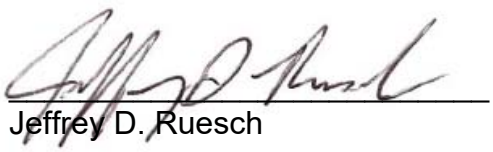
On May 27, 2021, the document(s) described below were served pursuant to the Mojave Basin Area Watermaster's Rules and Regulations paragraph 8.B.2 which provides for service by electronic mail upon election by the Party or paragraph 10.D, which provides that Watermaster shall mail a postcard describing each document being served, to each Party or its designee according to the official service list, a copy of which is attached hereto, and which shall be maintained by the Mojave Basin Area Watermaster pursuant to Paragraph 37 of the Judgment. Served documents will be posted to and maintained on the Mojave Water Agency's internet website for printing and/or download by Parties wishing to do so.

Document(s) filed with the court and served herein are described as follows:

WATERMASTER'S REPLY TO RESPONSES/OPPOSITION TO MOTION TO ADJUST FREE PRODUCTION ALLOWANCE FOR WATER YEAR 2021-2022; DECLARATIONS OF ROBERT C. WAGNER AND KATHY CORTNER IN SUPPORT THEREOF

_X_ I, Jeffrey D. Ruesch, declare under penalty of perjury under the laws of the State of California that the above is true and correct.

Executed on May 27, 2021 at Apple Valley, California.



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Mojave Basin Area Watermaster Service List as of May 27, 2021

Attn: Craig Carlson (kcox@helendalecsd.org; ccarlson@helendalecsd.org)
Helendale Community Services District (via email)
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Attn: Joshua Behnke
Helendale School District
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Helendale, CA 92342-0249

Attn: Jeff Gallistel
Hendley, Rick and Barbara
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Hensley, Mark P.
35523 Mountain View Rd
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Hert, Scott
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Attn: Jeremy McDonald (jmcdonald@cityofhesperia.us)
Hesperia - Golf Course, City of (via email)
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Attn: Janie Martines (janiemartines@gmail.com)
Hesperia Venture I, LLC (via email)
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Attn: Jeremy McDonald (jmcdonald@cityofhesperia.us)
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Hesperia, CA 92345-3493

Attn: Jeremy McDonald (tsouza@cityofhesperia.us)
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Attn: Patricia Mohr (ghd123@earthlink.net)
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Attn: Lori Clifton (lclifton@robarenterprises.com)
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Attn: Katherine Hill (Khill9@comcast.net)
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Attn: Mary Thomas
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P.O. Box 20001
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2142 W Paseo Del Mar
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Horton, John
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Attn: Gretchen Horton
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Attn: Norman A. Howard
Howard, et al.
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Mojave Basin Area Watermaster Service List as of May 27, 2021

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Jackson, James N. Jr Revocable Living Trust
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Attn: Lawrence Dean
Jackson, Ray Revocable Trust No. 45801
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906 Old Ranch Road
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Johnston, Harriet and Johnston, Lawrence W.
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Mojave Basin Area Watermaster Service List as of May 27, 2021

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Mojave Basin Area Watermaster Service List as of May 27, 2021

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Attn: Jodi Howard
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Mojave Basin Area Watermaster Service List as of May 27, 2021

Attn: Jeff Gaastra (jeff@weaponsedge.com)
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Attn: John Poland
Poland, John R. and Kathleen A.
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Mojave Basin Area Watermaster Service List as of May 27, 2021

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Attn: Sara Fortuna (sarajfortuna@gmail.com; fourteengkids@aol.com)
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Attn: Kanoe Barker (kanoebarker@yahoo.com)
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Mojave Basin Area Watermaster Service List as of May 27, 2021

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