

NEWS OF THE DESERT FROM SIERRA CLUB CALIFORNIA & NEVADA DESERT COMMITTEE SEPTEMBER 2021

DESERT REPORT

Houston, we have a problem.



SPECIAL ISSUE

Fundamental Choices

BY CRAIG DEUTSCHE

From the Editor

Beginning a series of focused articles

Over the past fifteen years, the *Desert Report* has presented a variety of perspectives on the arid lands in California and Nevada: direct threats to its biological integrity, technical articles about species, success stories in conservation, and first person accounts describing the fascination of these landscapes. The three issues previous to this one included a focus on public lands which extended the geographic coverage and included issues of energy resources, park visitation, and involvement of Native Americans. That intent of the series was to place our local deserts into a broader context and to recognize that many factors are interdependent.

This issue will initiate another series of focused articles placing our deserts in a still broader environmental and social context. An honest valuation must accept that what we call the Climate Crisis is really part of what we must acknowledge as the Environmental Crisis. It is clearly impossible for humans to continue our industrial and economic expansion indefinitely, and we are faced with a number of *Fundamental Choices*. Many proposals have called for large investments in renewable energy, but it is not clear that the costs of these proposals have been properly acknowledged. We need to evaluate our options for the future more fully than we have in the past. The topics which have traditionally appeared in the *Desert Report* — ORV use, water issues, endangered species, habitat degradation — will not be swept aside, but we must also acknowledge that they will be irrelevant if the larger environmental and societal problems facing our country are not solved.

This issue presents three articles focusing on the question *Where are we going?* The article by Birgitta Jansen raises this question, the article by Kevin Emmerich describes the direction being taken on some of Nevada's federal lands, and the poem by Shannon Salter presents our dilemma from an alternate perspective.

The second issue in his series will suggest possible future directions that might be taken under the title: *Alternatives to "Progress."* The third issue will broaden the question to include our intrinsic obligation to Indigenous Peoples, to other species, and to the land itself. Making proper choices in the next decades will require knowledge, thought, and courage. If all goes well, we and the deserts will remain healthy and survive.



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BY KEVIN EMMERICH

Nevada's Outback

The next green energy ground zero

Large-scale renewable energy developers have been looking for ways to develop vast swaths of Nevada public lands for about twelve years now. Their problem has always been a lack of available transmission access and capacity. Just about every basin in Nevada has been looked upon by large-scale solar developers for potential large-scale solar projects. Many of Nevada's mountain ranges are being looked at for potential wind energy while geothermal and pumped storage locations are being explored as well.

In March 2021, the Nevada Public Utilities Commission approved the first phase of the permitting process for the Green Link West Transmission Project – a 350 mile long, 525 kilovolt transmission line that would go from Reno to the Harry Allen Substation just east of Las Vegas, Nevada. The project was also recently pushed through with the passage of Nevada Senate Bill 448 which would accelerate the approval of the Green Link West Project. Not one Nevada politician considered the environmental impacts of the project during the hearing which was held with very little public notice.

The Green Link West Project is considered the Number 18 priority under President Biden's Infrastructure Plan. This has created a perfect storm of large-scale green energy plans and environmental impacts in the future.

If the Green Link West line is built, it will invite the construction of 9 gigawatts of renewable energy in the outback of Western Nevada. The BLM has said that the project will be streamlined, and the environmental review will be complete in one year. This comes after Interior Secretary Haaland revoked Secretarial Order 3355 requiring all environmental impact statement reviews to be complete in one year. At one point, the BLM said the project would be completed by 2026, but later retracted the statement as it is not appropriate for them to predetermine the outcome of an environmental review. The BLM is trying to meet the schedule of NV Energy, the applicant. It will enable new microwave towers, new access roads, amplifier sites, and eleven new substations.

The Greenlink West Transmission line will have towers that will be as high as 180 feet. It will run through very wild, undeveloped areas in Nevada. Some of the more controversial areas will be the east shore of Walker Lake, bi-state Sage Grouse habitat near



People on Hwy 374 in Death Valley National Park in view of proposed solar. Photo by Kerin Emmerich

Hawthorn, Pronghorn breeding habitat on Sacrobatus Flat, through part of the new Tule Springs Fossil Beds National Monument, and through desert tortoise and western Joshua Tree habitat in southern Nevada.

There are now dozens of applications for large-scale solar project being sent to both the Bureau of Land Management and the Nevada Public Utilities Commission. There are far too many to list them all, but below are some examples of how much land is being looked at by solar developers. At this point, almost every application is for solar energy with battery storage. We have totaled up about 105,000 acres so far, but that number keeps growing. I will list some of these by region:

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BY BIRGITTA JANSEN

The Greening Of America

But is “green” really “green?”

The article that follows is long and detailed, but the subject ought not be dismissed casually. The extensive documentation in end notes may be accessed at www.desertreport.org by going to the bottom of any page and selecting “reference.” - Editor

Since the 1950s, the chorus of voices warning of looming environmental issues has increased exponentially. Countless warnings are now coming from many different directions including the Intergovernmental Panel on Climate Change (IPCC). Other credible groups and individuals include indigenous peoples, scientists, ecologists, naturalists, biologists, farmers, writers, artists, poets, school children, and environmental activists, to name but a few. However despite mounting indisputable scientific evidence, these warnings *still* encour-

ter an almost insurmountable resistance from a large number of politicians and corporations as well as from a large segment of the population. This is what we are facing today.

Although the focus tends to be on climate change, climate change is but one aspect of a much larger problem, namely the *environmental crisis*. Climate change needs to be viewed in the context of the planet’s biosphere. The biosphere is a complex web of life consisting of innumerable factors and variables many of which are not known or fully understood. The biosphere is a closed system and all resources, regardless of how abundant they may seem, are finite. What we have now is all we that we will have in our future. If we concentrate our efforts mainly on climate change and eliminating fossil fuel emissions to alleviate climate change, we may succeed in reducing emissions but we will soon find ourselves stuck in another jar of pickles.

In spite of all the information now available to us, we are once again launching ourselves into resource intensive processes which may turn out to be as destructive as the fossil fuel industry — just in different ways. We seem to be intent on replacing one set of problems with another set of problems. This is illustrated with issues associated with the following examples: industrial solar developments; wind turbines, lithium extraction, and deep sea mining. We may consider the transition currently underway “green” but “green” has come to cover many sins.

Industrial solar developments

Solar panels have a long list of ingredients such as crystalline silicon, silicon nitride, solar cell sealant, silicon rubber (or Ethylene-Vinyl), aluminum, tempered glass, plexiglass, Mylar or Tedlar, and rare earth metals. Cables associated with installations are aluminum or copper and covered by heat resistant thermoplastic. (1) Thin-film PV technologies contain metals such as tellurium, cadmium, indium and silver.

Silicon is one of two most abundant compounds in the Earth’s crust (14 percent). It is mined for use in industry both as sand and as vein or lode deposits. The latter is found in rocks like granite, gneiss, and sandstone. (2) (3)

The issue here is that converting sand into high grade silicon requires massive amounts of energy. The



Part of the infrastructure transporting energy from remote sites. Photo by Marli Miller

high-purity silicon required by a diverse range of industries is produced from quartz sand and processed with carbon in an arc furnace to temperatures around 2200 degrees C. (4) (5)

The frames of the solar panels are usually made from aluminum, also a common element in the Earth crust (approximately 8 percent). The problem is that it is not found in isolation like gold or silver but as a compound in one of 270 different minerals. This means that a complex and resource intensive process is needed to purify it for industrial use. (6)

Mining aluminum, used for solar panels' casing and the system's cables, involves three stages: the extraction of bauxite ore, refining the ore to recover alumina, and smelting alumina to produce metallic aluminum. The ore extraction is a surface operation, referred to as open-cut mining, and done by removing topsoil and overburden with bulldozers and scrapers followed by a complex seven step process to produce aluminum ingots. (7)

The production of aluminum requires "15 kilowatt hours of electricity to produce just 1 kilogram (2.2 pounds) of aluminum. (8) The process from bauxite to alumina uses such vast amounts of electricity that it is economical for some companies to build their own hydroelectric plants, reservoirs, and dams to ensure their power supply. These developments are not always welcomed by local inhabitants. For instance, a dam built in Iceland generated a great deal of conflict about its environmental impact. For many years environmental-

ists fought to stop the project because the lake created by the dam would also destroy prime habitat for the country's reindeer and wild geese in one of Europe's largest tracts of untainted wilderness. They literally begged Alcoa, the largest aluminum producer of aluminum in the world, not to go ahead with the project. Their protests were unsuccessful. (9)

The main waste product that is produced in the processing of bauxite is red mud. It is high in calcium and sodium hydroxide and a potential source of pollution. It is stored in large ponds lined with clay or synthetic liners. (10) Over time these liners are at risk of failure which can lead to significant environmental pollution.

Another product used in the production of solar panels are the backsheets made of a stretched polyester material (biaxially-oriented polyethylene terephthalate) called Mylar, or Tedlar which is another name for polymer polyvinyl fluoride. Both are synthetically produced. (11) Mylar, a trademark of Dupont, Hoechst and Imperial Chemical Industries, is regarded as "dirty" in production and "dirty" to dispose of. This product is not biodegradable. (12)

The mining of rare earth metals, used in the manufacturing of solar panels, involves land-use exploitation, environmental damage, and an ecological burden in the same way as any other mining operation. These mining operations are extremely energy intensive processes, emitting carbon dioxide in the air and toxins in the ground which can have consequences for human health. (13) Rare earth metals (actually not rare but difficult to extract) that are used in solar systems include indium, selenium, tellurium, terbium, molybdenum, cadmium, titanium dioxide, and gallium. (14)

Dustin Mulvaney, Associate Professor, University of California, Santa Cruz, regards mining and land use the biggest concerns with regard to industrial solar developments. He points out that solar panels and batteries are regarded as coupled, integrated systems which include not only the panels but also the batteries, inverters, and cables. In these systems, small amounts of gold, nickel, cobalt and other metals are used, all of which require mining. He adds that the lack of safety protocols and worker protection measures in various countries where the mining takes place presents a serious issue. The use of child labor, as permitted in the cobalt mines in the Congo, cannot be tolerated. There are also reports that Uyghurs, detained in forced labor camps in China, are used in the manufacturing process of solar panels. Forty-five percent of the global polysilicon supply comes from the Uyghur region. (15)

The average life cycle of solar panels is approximately 25 to 30 years as the efficiency of their functioning degrades over time. What happens with them when they are done is another matter.

At the moment the capacity to recycle solar panels is minimal. It costs an estimated \$20 to \$30 to recycle one panel but only \$1 to \$2 to send it to a landfill. The official projection of the International Renewable Energy Agency (IRENA) is that large numbers of discarded



Silver State Solar Project. Photo by Kevin Emmerich

The Greening Of America

solar panels are anticipated by the early 2030's, and these could total 78 million tons by the year 2050. An article in the Harvard Business Review points out that, "The economics of solar, so bright-seeming from the vantage point of 2021, would darken quickly as the industry sinks under the weight of its own trash." (16)

Wind turbines

A turbine is a complicated electromechanical system consisting of a concrete block that forms the foundation and is usually placed underground, a round tubular steel tower, the nacelle (the 'nerve center' of the turbine), the hub and the blades.

The nacelle houses all the components that run the turbine such as the rotor, gearbox, generator, inverters, hydraulics, pitch system, yaw system, the low and high speed shafts, the main shaft bearing, the controller, and the mechanical brake assembly. (17) This is the short version. The nacelles can be over fifty feet long, can weigh up to 300 tons, and house more than 1,500 small and large components. (18) The hub is attached to the front of the nacelle, and the blades are attached to the hub.

Considerable resources are needed to build even an average 3-megawatt wind turbine. It has nearly 5 tons of copper wiring in it, 2 tons of rare earth elements, and over 1200 tons of concrete. (19) Resources are also used in building the factories where parts are manufactured, in the assembly of the turbines, and in the transportation of parts to their final destinations. There is a YouTube video that is quite illuminating. (20) While watching this video one realizes that the ingenuity, competence, and capability of humankind is on full display. Regardless of how one feels about wind turbines, what has been achieved is impressive.

The life span of a turbine is currently approximately 20 years, but about 85 percent of all wind turbine components can be recycled or reused such as the steel, copper wire, electronics and gearing materials. (21) The problem however, is with the blades.

Blades were once made primarily with fiberglass but many companies are transitioning to using composite carbon fiber materials. This material is more costly, but it weighs less than fiberglass. This means that the blades made from composite carbon fiber are lighter and can therefore be made longer which results in increased efficiency.

But the blades, regardless of whether they are made from fiberglass or carbon fiber, cannot be recycled. Many companies are scrambling to find a way to do so, and many proposals are being considered, but none have been proven viable thus far. Blades from turbines are piling up the world over. There are only a few specific landfills that will accept the blades here in the U.S., and "it is estimated that up to 8,000 wind turbine blades will be removed and sent to landfills in Lake

Mills, IO, Sioux Falls, SD, Casper, WY, and several others. In Casper for example, a total of 1,000 fiberglass turbine blades were disposed of between September 2020 and March 2021." (22)

Approximately 90 percent of the carbon fibers are made from a chemical called polyacrylonitrile (PAN) which is petroleum based. (23) The process produces a



These wind turbine blades are stored until they can (perhaps) be recycled. These blades are 121 feet long, weigh 8 tons, and are cut up into 50 sections. The round parts are where the blade attaches to the hub. Photo by Don Lilly, Global Fiberglass Solutions



Iranpah Solar Electric Generating System. Photo by Neal Nurmi

lot of heat and yields a toxic by-product. (24), (25)

Polyacrylonitrile is also known as polyvinyl cyanide. (26) Acrylonitrile is an important monomer used in the manufacturing of this plastic, which is regarded as reactive and toxic even at low doses and has been found harmful to aquatic life. (27) However the toxicological properties don't appear to be fully understood. It can only leave one to wonder, what will happen to them in a landfill over time?

Lithium

Lithium was first discovered in the 1790s on a Swedish island by a Brazilian chemist. It has found uses

in both nuclear physics and in medicine where it is the basis for an antidepressant and mood stabilizing medication for those suffering from bi-polar disorder. (28)

In 1991 the first commercial lithium batteries appeared on the market. Since they could be recharged, they soon became popular. However, these batteries come at a significant cost to the environment.

Lithium is a non-renewable resource extracted from either igneous rocks called pegmatite or brine found in salt flats. With salt-flat mining, the process requires large evaporation ponds that are dug out of the salt flats. One set of evaporation ponds in Chile's Atacama Desert is 5 km (approximately 3 miles) long. (29)

Like most mining ventures, both extraction methods require a great deal of energy and water. Local water supplies are contaminated and considerable mining waste is left. It also irreversibly damages landscapes and ecosystems. Unfortunately, it is currently cheaper to mine fresh product than recycle and repurpose what has already been mined.

Other battery metals include cobalt, nickel, and manganese, all of which need to be mined. As previously mentioned, the mining of cobalt, especially in the Congo, has raised red flags considering the abusive working conditions and use of child labor. The industry is therefore moving away from using cobalt.

Much needed graphite, a non-metal, also requires mining. Lithium makes up only 2 percent of the battery cell mass whereas graphite makes up approximately 33 percent. (30)

The average lithium-ion battery, such as the one used in cell phones, has an approximate lifespan of 300 to 500 charge/discharge cycles. Under ideal conditions, a battery should last for more than a year. (31) Some estimates are for two to three years, but their power does degrade over time. For batteries in power tools, it might be around 3 years or 1,000 charging cycles. (32) Car batteries are built to last approximately 10 years under normal driving conditions, but they degrade by approximately 2.3 percent annually.

This brings us to the garbage heap of the future. "Industry analysts predict approximately 11 million tons of these batteries will reach the end of their life cycle by 2030." (33)

Once in the landfill, the battery cells can release hazardous materials including heavy metals. (34) Even if recycling becomes a more viable alternative, it remains a potential hazardous undertaking to dig into an EV battery. It could easily short circuit, combust, and release toxic fumes. Recycling wasn't on the program when the car batteries were designed.

The World Bank estimates a 965 percent increase in lithium demand from 2017 production levels to 2050, which would amount to approximately 43,000 thousand tonnes. (35)

Recycling could not possibly meet that demand. And there are other issues. As Lucy Crane, a senior geologist with Cornish Lithium Ltd., outlines, the process

from brine to battery for an electric vehicle, is a major trip. Once the lithium-enriched solution comes out of the evaporation ponds, it is most likely shipped to China to be refined into battery grade chemicals. From there it travels to South Korea to be put into batteries for electric cars. These batteries are then shipped to factories in Europe and other locations to be put into electric vehicles. As Crane points out in her TEDxTruro talk (<https://tinyurl.com/4c7hv29k>), some components of an average battery for an electric vehicle will travel 50,000 km (31,069 miles) before the car has even driven a single mile.

It is not surprising lithium is becoming known in the mining industry as "grey gold." (36) Another article describes the push as "The Lithium Gold Rush." (37) That should make one feel a little uneasy. We can still see the damage wrought by the fevered gold rush in the mid-1800s into the early 1900s, which left environmental degradation, toxic waste, and other garbage in its wake. We don't seem to learn from history.

Deep sea mining

The push for "green energy" does not stop at the edge of terra firma. Deep Sea Mining is seen as "the new frontier in mining," although it has been going on for some time already. For example, on Africa's west coast, the seabed is scraped in search of diamonds, and in the territorial waters of Papua New Guinea, fields of hot springs are being shattered in search of precious metals. Japan and South Korea are also searching for offshore deposits that could be mined. (38)

But now mining companies are turning to International waters where potato sized accretions, called polymetallic nodules, are found. These nodules are unattached and strewn on the ocean floor at a depth of roughly 5000 meters (16,404 feet). This environment is described as pristine. (39)

The average sedimentation rate on the ocean floor is 1 mm every thousand years. The nodules grow 1 cm every million years. For one of those nodules to have reached the size of a potato took 10 million years. (40)

Most unfortunate for the diverse array of creatures that call this area home, these polymetallic nodules have considerable amounts of manganese, nickel, copper, and cobalt in them. These metals, especially nickel and cobalt, are critical to the development of lithium-ion batteries and other applications that are part of the transition to "green energy." The World Bank predicted that by 2050, the demand for cobalt and nickel for use in EV's will increase by 1000 percent. (41)

The nodules consist almost entirely of useable materials, and unlike ores mined on land, they do not contain toxic levels of heavy elements. This means there is 99 percent less toxic waste. (42) This makes mining the ocean floor a rather attractive proposition to the

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Mo-ja-ve

Read at the site of the Yellow Pine Solar Project in Pahrump Valley

Jackrabbit,
you are my brother!
The blue whale burst off inside you
The white sun

It is 1905 and America has built the
Union Pacific Railroad
And the heart of God has put his face onto the cement

Kissing the Earth, he calls to the First Light:
Thou are

And to the sky he shows his body
And to the river

We are here to honor each other as well as the land
And the invisible majesty which we cannot see
We are here to call forth a new way of Being
A new sound, a new silence

My heart is broken, my mind
empty

This valley is alive.
This valley is the face of God.

I must believe in what is possible, that the kingdom is
within us, that we are strong, that we can build a world
which does not destroy Life, that does not insult the
living, that does not forsake the dead, nor the unborn.
{I believe in a coming revolution of things that will
make everything which has come before turn red with
shame.}
I believe I am this Yucca. I am this stone.

10,000 years ago the ancients dwelled in these valleys.
They are the Pipa Aha Macav, the people beside the
river, and from this the great Mojave takes its name.
10,000 years ago this was not a desert, it was a lagoon,
and before that it was the ocean.
Time is standing still. Time is stopped.
The dead are with us.
Reach inside the river and that is the Great Spirit.
I believe in the human spirit. I see you. My heart is bro-
ken and my heart is strong, it lives and breathes.

The psychologist C.A. Meir writes that, as wilderness
is destroyed, it does not disappear. Instead, it moves
inside the human mind. It opens a space.

Nothing disappears.

I need the open sky like I need my brother. Like I need
my Friend. I need the open valleys and the mountains
around us without which we would belong nowhere
This valley is a bowl, and the mountains are what
keep us.

Our sky is a miracle.

Go all the way in. Go to the center, go
to the beginning.

These yucca are my brothers and sisters.
How dare they kill my brothers and sisters.
This soil is my oldest friend.
How dare they take my oldest friend.

To protect the wild is to protect what is gentle.

there is only
the big moon listening
the big sun watching,
the river taking us in its long, wet mouth.

I will go with you.

I will give you my body. I will give you this stone.

This is the ministry
of birds
This is an echo around the immortal rim
Origin of love beyond, when God became empty
My heart is broken and it is strong, in death it lives and
breathes
And the rabbit is spilling itself through a viscous silence,
and the fox is nesting in the field.
Remember the wind.
Remember the wind.
The dead are with us. The dead are filling this valley.

And in the words of Yves Bonnefoy:

So we will walk on the ruins of a vast sky,
The far-off landscape will bloom
Like a destiny in the vivid light.

The long-sought most beautiful country
Will lie before us, land of salamanders

Look, you will say, at this stone:
Death shines from it.
Secret lamp it is this that burns under our steps
Thus we walk lighted.

And, finally, in the words of Juan Gelman:

Death itself has come with its documentation
We're going to take up again
The struggle
Again, we're going to begin again
We're going to begin all of us
Against the great defeat of the world
Little companeros who never end
Or who burn like fire in the memory
Again and again and again

Shannon Salter lives in Nipton, California, is a Ph.D candidate at the University of Nevada in Las Vegas, and is an advocate for preservation of unspoiled deserts.



Photo by Kevin Emmerich

Outings

As a result of the coronavirus outbreak, all the Sierra Club outings have been canceled through July 4. For updated information visit the Outings section of the Desert Report website at desertreport.org. You may also want to consult with other groups that conduct recreational and service outings in the desert.

Desert Survivors: desert-survivors.org

Friends of the Inyo: friendsoftheinyo.org

Friends of NV Wilderness: nevadawilderness.org

Future Desert Committee Meetings

Uncertainty about the Covid pandemic makes it impossible to definitely schedule a next meeting of the Desert Committee. We hope the situation will resolve so that the annual February meeting in Shoshone can be held. Desertreport.org will carry this information.

Join Us On The Desert Forum

If you find Desert Report interesting, sign up for the Desert Committee's e-mail Listserv, Desert Forum. Here you'll find open discussions of items interesting to desert lovers. Many articles in this issue of Desert Report were developed through Forum discussions. Electronic subscribers will continue to receive current news on these issues — plus the opportunity to join in the discussions and contribute their own insights. Desert Forum runs on a Sierra Club Listserv system.

SIGNING UP IS EASY

Just send this e-mail:

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From: Your real e-mail address [very important!]

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By return e-mail, you will get a welcome message and some tips on using the system. Questions? Contact Stacy Goss, stacy.goss@comcast.net, (408) 248-8206.

Nevada's Outback: Green Energy Ground Zero

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Yerington and surrounding area

Mason Valley Solar and Pine Nut Solar Project: Nextera Energy, 4,539 acres, 400 Megawatts.

Libra Solar Project: Arevia Solar, 5,400 acres, 700 MW.

Walker Lake

Walker Lake Pumped Storage Project: Premium Energy LLC, 2,000 MW, would back up big solar projects. Very controversial.

Esmeralda County, east of Tonopah

CD Solar: EDF Renewables, 17,900 acres, 1,000 MW.

Nivloc Solar: Nivloc Solar LLC, 14,700 acres.

Esmeralda Energy Center: 9,800 acres, 500 MW, Nextera Energy.

Sacrobatus Flat

Sawtooth Solar: Nextera Energy, 1,000 MW, 10,000 acres hugging the border of Death Valley National Park. Over 70,000 Western Joshua trees live on the proposed site.

Amargosa Valley

Beatty Energy Center: Nextera Energy, 800 MW, 6,500 acres directly on the border of Death Valley National Park surrounding the Titus Canyon Road entrance. In full view of Rhyolite Ghost Town.

SB Solar: EDF Renewables, 500 MW, 5,300 acres. Just south of the Beatty Energy Center, also on the border of Death Valley National Park.

Solar 373: Solar 373 LLC, 400 MW, 5,300 acres, 4 miles from Ash Meadows National Wildlife Refuge and about 6 miles from Devil's Hole, Death Valley National Park. Big "lake effect" impact to birds and water use near Devil's Hole.

Jackass Flats Solar: EDF Renewables: 1,000 MW, 10,000 acres about 10 miles from Ash Meadows National Wildlife Refuge.

Busted Butte Solar: 1 and 2: 8minute Energy, 16,000 MW, about 18,000 acres combined, 10 miles from Ash Meadows National Wildlife Refuge.

Las Vegas Valley and North

Bonanza Solar: EDF Renewables, 600 MW, 5,100 acres, Mojave yuccas, desert tortoise, rare plants.

Northwest Solar: EDF Renewables, 250 MW, 2,200 acres, hugging the border of the Tule Springs Fossil Beds National Monument.

The Bureau of Land Management has scheduled the Environmental Impact Statement for the Green Link West transmission project to be released in April, 2022. Basin and Range Watch is opposing this Transmission Line. When the EIS is released, the BLM will amend some of the Resource Management Plans to accommodate the resource impacts that will be asso-

ciated with the transmission project. Plan amendments are an opportunity to change BLM resource plans for the better. Basin and Range Watch will be helping local Nevada communities request "solar exclusion zones" which would prohibit big solar development close to their most valued areas. This must be done. Neither the solar developers, Nevada legislators, or the BLM have expressed any concern about how these plans may impact the quality of life and environment in Western Nevada.

Large-scale energy, no matter how it is produced, can not be considered "renewable" when so much habitat and public land must be sacrificed to make it happen. Now more than ever, is the time to ask permitting agencies to consider built environment alternatives to siting this energy.

Kevin Emmerich is a former park ranger and field biologist. He has lived in the Mojave Desert for thirty years. Together with his wife, they founded the non-profit conservation organization Basin & Range Watch. They now live on an old ranch surrounded by a nature preserve in Nevada near Death Valley National Park.



Rhyolite Ghost Town Last Supper in view of solar locations. Photo by Kerin Emmerich

The Greening Of America

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mining industry and many others who have an interest in the green energy business.

Much talked about is the Clarion-Clipperton Fracture Zone in the Pacific Ocean between Mexico and Hawaii, where the nodules are abundant. What worries scientists and environmentalists most is that so little is known about the various ecosystems and what the potential impact of scraping the ocean floor could be on these ecosystems. The expectation is that it will be significant. And to be truthful, we can't really know until in retrospect.

The mining operations that are planned would involve "large, robotic machines to excavate the ocean floor in a way that is similar to strip mining on land. The materials are pumped up to the surface operations vessel, while wastewater and debris are dumped into the ocean, forming large sediment clouds underwater." (43) To consider the process to be excavation might be a bit of an overstatement, but there is no doubt that the ocean bottom, and creatures that cannot get out of the way quickly enough, will be severely impacted by both the weight of the machinery that will be used and the resulting debris plumes.

The process actually produces two sediment plumes: one that is immediately associated with the machinery that is collecting the nodules and another one that is created by returning sediment and waste to the ocean. This plume is of considerable concern to scientists because it may have a widespread impact. Although the International Seabed Authority (ISA) projects that these plumes will not travel more than 61 miles, research attempting to track how far these plumes will travel and their impact has been inconclusive. What can be said, however, is that where there is mining there will be destruction of the ecosystems. A short video about the process as planned, was put together by a UK mining company: (44)

Nineteen permits have been issued to mining companies by the (ISA) for exploration in the Clarion-Clipperton Fracture Zone. Twelve more permits have been issued for exploration elsewhere for polymetallic sulphides and cobalt rich crusts. (45)

The NGO Mining Watch Canada, in collaboration with the Ocean Foundation's Deep Sea Mining Campaign, published a detailed report in 2020. They reviewed over 250 science based articles on deep sea mining and based on their conclusions they are calling for a moratorium on regulations that would permit companies to begin mining. They believe that the risks need to be better understood and that alternatives must be explored. (46) The PDF of the report is available on the following website: <https://tinyurl.com/c2v8rxwj>

Conclusion

And here we find ourselves on the horns of dilemma. We know that the need for energy and an energy

infrastructure is fundamental to our functioning as a society. We know that we need to construct a different energy system, more efficient and less damaging to the biosphere than what we have hitherto inflicted on the planet. This transition has already begun and should move forward with utmost urgency, otherwise we risk economical and societal upheaval. But when we consider how this transition into a "green energy economy" is going to impact our biosphere, it suddenly does not look so green anymore.

Vaclav Smil, in his book *Growth; From Microorganisms to Megacities* emphasizes "the trajectory of modern civilization, coping with contradictory imperatives of material growth and biospheric limits, remains uncertain." (47) He asks, "Will we be able to come close to a genuine planetary equilibrium that would protect the biosphere from any global unraveling, or will our transformation be too late?" (48)

A major contributor to our predicament is the relentless expansion of the global human population, which means that the scale of our needs and wants will continue to increase. Even major efforts to recycle mined ingredients cannot meet the anticipated demand. Unfortunately in the relentless pursuit to meet our needs, wants, and desires, we have already altered many of the natural cycles that evolved to maintain a biospheric balance. We are losing, or have already lost, that much-needed biospheric balance.

It is important that we come to realize that we may fuss over quagga mussels, kudzu, Russian thistle (tumbleweed), pythons, burros, and incalculable other invasive species, but *we are the ultimate invasive species*. Yes, the climate has been in a constant state of change ever since this planet has existed. But the scale of the changes, the speed of it all, and the way in which we've impacted the planet in recent times, is unprecedented. We need to take responsibility for that.

We cannot predict the future. We don't know what will happen. Predictions are to no avail. But in that uncertainty lies hope. What that future will look like will depend on the decisions we make today.

Part II of this article exploring what some of our options are, will be in the December *Desert Report* issue.

Footnotes in this article can be found at desertreport.org by selecting "reference" at the bottom of any page.

Birgitta Jansen has been an active volunteer in Death Valley National Park. Currently residing in British Columbia, she is a managing editor of Desert Report, has written previously on a number of environmental topics, and has completed a book about the October 2015 flash floods in Death Valley NP.

BY ANNE HENNY

The 30x30 Campaign In California

A proposal to preserve our planet

What is the 30x30 initiative that is beginning to receive notice among environmentally concerned citizens, and why should we be involved? Simply put, 30x30 is a slogan for the growing global movement to protect and restore 30 percent of the planet's land and water ecosystems by 2030. This may be seen as a stepping stone to protecting at least half of nature — promoted by Nature Needs Half¹, Global Deal for Nature², E.O. Wilson's Half Earth Project³, and others. 30x30 is supported by the G7 of which the U.S. is a member, and will be debated next spring at the Convention on Biological Diversity⁴ in Kunming, China.

Readers of *Desert Report* need no reminders that our California deserts along with other sensitive lands and waters in our State are under assault from roads and urban development, mining, military uses, water ex-

traction, grazing and agriculture, motorized recreation, renewable energy generation and transmission, invasive species, wildfire, and more — and that all of these stressors are being intensified by the climate crisis. We know that globally, many of the earth's remaining healthy and biodiverse places are stewarded by Indigenous communities⁵, but people and livestock are rapidly displacing wild species⁶.

The international community is finally waking up to the linkages between the biodiversity and climate crises. A June 2021 workshop report from the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) and the Intergovernmental Panel on Climate Change (IPCC) concludes that biodiversity loss and climate change are both driven by human economic activities and mutually reinforce each



The open land belongs to the Los Angeles DWP. It has been drained, with water sent to the city, but it has also been spared from suburban style development. This raises the question of what constitutes “Conservation.” Photo by Neal Nurmi

other: “Transformative change in all parts of society and our economy is needed to stabilize our climate, stop biodiversity loss, and chart a path to the sustainable future we want. This will also require us to address both crises together, in complementary ways.”

In October of 2020, Governor Newsom made California the first state to officially embrace a 30x30 goal when he issued Executive Order N-82-20⁷, “Executive Order on Biodiversity and Climate Change.” The 30x30 part of the Executive Order (EO) directed California state agencies to advance strategies to conserve at least 30 percent of California’s land and waters by 2030 in a way that: maintains California’s economic prosperity and food security; protects and restores biodiversity; enables enduring conservation measures on natural and working lands; builds climate resilience, reduces climate risk and helps address climate change; and expands equitable access to outdoor lands and recreation. The order requires that the California Natural Resources Agency (CNRA) and other State agencies engage in stakeholder consultations and release a “Pathways to Reach 30x30” document by February 2022. Questions and answers about the EO, adapted from our CA 30x30 Coalition resources, are available here⁸.

As of July 2021 the CNRA has conducted nine regional workshops and three topical workshops⁹. The topical workshops focused on nature-based climate solutions, 30x30 and social equity, and protecting biodiversity. Two more topical workshops in August focused on conserving lands and coastal waters. Commentators asked hard questions such as: How does CNRA intend to broaden and diversify its community engagement for 30x30? How will the state work with local and federal governments and other state agencies, boards, and commissions to achieve meaningful conservation gains? What standards of protection will be used, and how will progress be measured? How will 30x30 implementation be funded and staffed? Will the state also review and identify state-level laws, policies, and regulations that harm nature and need to be improved, amended or eliminated?

After the Pathways document is published, the state will move to implementation. While it’s doubtful that the State of California will quickly fund and implement a transformational 30x30 program, there are reasons to take seriously 30x30 in California. For one, it makes social equity integral to protecting nature and climate, as outlined in its Advisory Panel Summary Document, *Using Nature-Based Solutions to Advance Equity*¹⁰. Also, it clearly makes the important linkage between the extinction crisis and the climate crisis. And most obvious: being among the first large entities in the U.S to adopt 30x30 as a goal, California will set precedent for the Biden Administration as well as and other states. The Biden-Harris administration’s version of a 30x30 initiative, *Conserving and Restoring American the Beautiful*¹¹, calls for steps to tackle the climate and biodiversity crises and address inequitable access to the outdoors, strongly emphasizing job creation and local, voluntary conservation and restoration efforts

across public, private, and Tribal lands and waters.

The definition of what counts as conserved under the America the Beautiful program is likely to get diluted to include lands used for agriculture, grazing, timber harvesting and other uses that degrade ecosystems. The CNRA has not yet committed to a definition of what is “conserved” under 30x30 in California, so there remains a chance to influence how strong that may be — for example by using the International Union for the Conservation of Nature (IUCN) system, which has six categories of protected areas:¹²

- Ia. Strict Nature Reserve
- Ib. Wilderness Area
- II. National Park
- III. Natural Monument or Feature
- IV. Habitat/Species Management Area
- V. Protected Landscape/Seascape
- VI. Protected area with sustainable use of natural resources

In conclusion, there still are many questions about how meaningful the State of California’s 30x30 program implementation will be. Persistent pressure is needed to move the state to actions that bring real gains for biodiversity, social equity, and climate. And it’s an opportunity to reinvigorate advocacy for lands, waters, wildlife and people — we need to demand action and stay engaged over the coming months and years.

Vicky Hoover, speaking for Sierra Club California at the state’s Biodiversity Workshop on July 28, made an even more direct request: “The criteria most needed to protect biodiversity are action-oriented. And even before establishing strategies to enhance biodiversity, and without expensive acquisitions, we need to halt current activities that degrade biodiversity. Here the state can, and must, act fast and firmly for at least the following:

- Restrict destructive off-highway vehicle (OHV) use;
- Regulate - and stop - open pit cyanide heap leach mining;
- Subsidize urban rooftop solar, to save valuable desert habitat;
- Stop the poisoning of offshore islands;
- Restrict large monoculture agriculture, such as for biofuel;
- Stop forest clearcutting and monoculture planting;
- Fund more highway crossings for wildlife; and
- Encourage more Indigenous community traditional land practices.

Setting a good 30x 30 goal, writing a Pathways document, and taking public input in workshops like this are all valuable mainly — and maybe only — insofar as they lead to real action.”

Footnotes in this article can be found at desertreport.org by selecting “reference” at the bottom of any page.

Anne Henny is a member of the Sierra Club SF Bay Chapter, chair of the Sierra Club’s California/Nevada Wilderness Committee, and volunteer co-lead of the Sierra Club’s 30x30 Campaign in California.

Dennis Casebier

A legend of the California desert

Old “Desert Rats” may fondly recall the writings of one of the more knowledgeable and opinionated explorers of remote byways across the Mojave Desert.

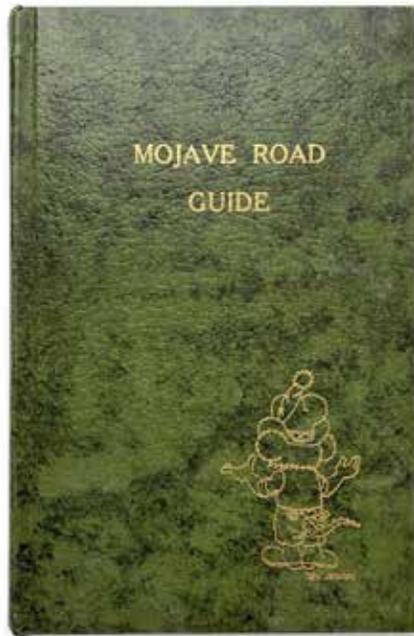
Just after my first field trip into the Joshua tree-studded creosote flats of California, I came across a multi-volume set of books describing historic roads in the Mojave Desert by Dennis Casebier. These were immensely influential for my understanding of this remote arid landscape and for my future goals of exploring the region. Published in the late 1980s, the *Guides to the East Mojave Heritage Trail (Tales of the Mojave Road)* were beautiful books with hard covers in various colors — blue, white, tan, red. I have them all.

I was particularly attracted to the variety of information provided in these books, including natural history notes on desert plants, wildlife, and geology. In Casebier’s books I learned for the first time that one of the last surviving California wolves was trapped along the Mojave Road near Watson Wash in the 1920s (now in the center of the Mojave National Preserve), and he included a sad photo of the large, trapped wolf next to a coyote that greatly moved me.

He included many detailed descriptions and old photos of historical features one would encounter along the Mojave Road. Mileages were plotted and advice given to survive the drive along this route. Humorous hand-drawn cartoon character illustrations also sprinkled the pages of the book, giving it a unique and personal touch.

Dennis Casebier (1934-2021) is a controversial figure among conservation and environmental advocates, but his love for the Mojave Desert, its human history, its natural history, and the ways to survive in it, cannot be questioned.

During a career as a systems engineer for the Navy, he worked out of Corona, California, and in the 1960s and 70s he began to research the “Old Govern-



The first of the guide books published by Dennis Casebier. Photo by Craig Deutsche

ment Road” through the East Mojave Desert. By 1981, he had organized the *Friends of the Mojave Road*, which repaired sections of the old dirt track and prepared a road guide to make it into a recreational route. He amassed a treasure of photographs, historical accounts, old maps, and other artifacts centering largely along the Mojave Road – a long trail, a trade route, and later a travel

road that stretches east-west from the Colorado River at Beale’s Crossing to the Mojave River just east of Barstow where it joined the Old Spanish Trail.

We gratefully acknowledge that the original Mojave Trail was used for thousands of years by various tribes across southern California including the Piute, Chemehuevi, and others. It served as a trade route to connect inland tribal groups to the Pacific Coast in a sophisticated trade and travel network that fell apart with European colonization and settlement. These layers of history, the scenery, and the few residents in the region fascinated Dennis Casebier.

Off-highway enthusiasts embraced Casebier for re-establishing the 140-mile Mojave Road in California, apparently after he hiked the route on foot. The stewardship of 4x4 groups to care for the Mojave Roads should be recognized. Dennis Casebier opposed important conservation designations in the Mojave Desert — such as the transfer of the East Mojave Scenic Region, administered by the Bureau of Land Management, to management by the National Park Service as the new Mojave National Preserve. Nevertheless, his knowledge and perspective should be understood be-

fore they are criticized.

I was an explorer of the old East Mojave Scenic Region, its dusty routes and remote back-country plains and mountains. I recall driving dirt roads in Lanfair Valley in the early 1990s with a Honda Civic, negotiating ruts and high-centers with a college friend, the two of us girls out on an expedition trying to see what Dennis found. We camped in a beautiful spot in the New York Mountains, and I recall BLM rangers driving up and warning us of “rough characters” sometimes seen in the region — be careful. We were vigilant, but we never encountered any trouble and dreamed of obtaining a Jeep or other more capable vehicle that would allow us to explore deeply into this desert wildland on established routes.

Perhaps Casebier worried that new land management designations would limit the ability of Jeep tours to explore the historic 4x4 routes. I never met him, but I can see clearly that National Park Service protection has not prevented anyone with the wherewithal and 4x4 experience from driving the Mojave Road — a project best done in a caravan in case you get stuck in deep sand or have multiple tire blow-outs. Water is scarce, and cell-range even scarcer in these parts.

Perhaps what I admire most about Dennis Casebier and his caravan of desert expeditioners is that he explored some of the most remote parts of the remote and deep Mojave long before cell phones, GPS units, and Internet-connected digital maps separated us from the natural world. These modern contrivances tempt us to rely on external media and not enough on our own skills to read a paper map, to plot a course with a compass, and to understand the hazards of the road they are following. Wise travelers in these parts of the California outback will have sufficient water and fuel, suitable hats and clothing, spare tires and tools, shovels to dig out of sand traps, and much more. I benefited greatly from his advice on the Mojave Road and about how to plan for such an expedition.

After retiring in 1989, Dennis and his wife Jo Ann purchased the crumbling schoolhouse property at Goffs, California, in the wide Fenner Valley, and fixed the place up into a museum and library. The library contains 6,000 volumes pertaining to deserts, 6,000 maps, 1,000 oral histories, and 108,000 historical photographs. His legacy lives on with the Mojave Desert and Cultural Association (mdhca.org). Until the pandemic, an annual Mojave Road Rendezvous has been held at Goffs.

Long-time southern Nevada desert resident Judy Bundorf recalls the Rendezvous: “We were introduced to Dennis and the museum by our friends and Goffs volunteers Gail and Donna Andress some twenty years ago. Dennis has collected an amazing history of the East Mojave, including more than oral histories, mining equipment, and maps. He has enlisted a large number of loyal volunteers from across the U.S. and even from Europe! Beyond a book sale and barbecue, the annual Rendezvous, held in October, gives the public an opportunity to experience 4-wheel drive trips to historic locations in the area, and to witness historic stamp mills



Once a railroad stop, now the site of a Mojave Desert museum.

and rock crushers that have been brought back to life and are operating.”

I was saddened to learn of Dennis Casebier’s passing, as he was a large influence on my initial interest in exploring the Mojave Desert and its secrets. In an age when the deserts were considered “useless” and therefore left alone and untouched in their primordial state, Casebier led exemplary efforts to undertake volunteer stewardship of these remote places. This contrasts with the current situation where the Mojave Desert has become a “gold mine” for large-scale renewable energy development no matter how remote the uninhabited basins and lonely creosote deserts are from the urban load centers.

I wonder if Dennis Casebier might today see the value of greater protections for desert lands in the face of such massive energy land use, increasing tourism pressure, vandalism, illegal off-road proliferation, and climate change threats. We will never know, but we should appreciate his legacy.

Laura Cunningham is the co-founder of Basin and Range Watch, is the California Director at Western Watersheds Project, and lives next to Death Valley National Park. She has worked in the field of wildlife and fishery biology and is author of A State of Change: Forgotten Landscapes of California (Heyday, 2010).



A stamp mill at the Goffs outdoor museum. This page photos by Wendy Van Norden

Water In The West

Failure of the Colorado River to meet future demand

Structurally, because of controlling laws and regulation, there is more water allocated to states within the Colorado River basin than the basin produces *even without considering* drought or climate change. The long-term average flow is substantially less than the amount of water allocated to the basin states and Mexico, and the reservoir system loses up to 15% of this average flow. This is the first of two articles that will examine how the economy in Nevada, California, and Arizona depends on an increasingly depleted supply of water.

The Colorado River drains the southwestern Rocky Mountains and portions of the Colorado Plateau and Basin and Range of Arizona. It includes parts of seven basin states: In the Lower Basin are California, Arizona, and Nevada while Utah, New Mexico, Wyoming, Colorado, and a small part of Arizona are in the Upper Basin (Figure 1). Prior to development into a huge plumbing system, the Colorado River nourished thousands of acres of riparian wetlands along its course and a huge delta at the area of its discharge into the Gulf of California (as described in an essay published by Aldo Leopold in "A Sand County Almanac"). Now providing irrigation water for 4.9 million acres and drinking water for 40 million people, the river has not naturally reached the Gulf of California since 1998.

Hydrology and water development in the Colorado River Basin are a story of two basins as established by the 1922 Colorado River Compact (hereinafter "Compact"). The Compact defined the Upper and Lower Basins with a dividing line at Lee Ferry (Figure 1). Approximately 92 percent of the river flow at Imperial Dam (near the US-Mexican border) originates in the Upper Basin, but most initial water development occurred in the Lower Basin, primarily in California and Arizona. Colorado and Wyoming feared that the Supreme Court would apply the doctrine of prior appropriation to the entire basin (meaning "first in time, first in right" or that the priority of use depends on the chronology of water development) so that the vast majority of the river flow would be used in perpetuity in California and Arizona.

The Compact divided the 1902-1920 average flow at Yuma of 17.4 million acre-feet per year (maf/y) by allocating 7.5 maf/y each to the Upper and Lower Basins and assuming the surplus would be allocated later and would also go to Mexico. As we shall see, the allocations were based on the wettest period of the century (Figure 2).



Figure 1: Colorado River basin including major reservoir and canal systems, and area outside of the basin served with water from the basin.

Source: tinyurl.com/mp5weu5x

As the Law of the River, the set of compacts, treaties, Supreme Court decisions, and regulations that control water deliveries and storage throughout the basin, developed, allocations for Lower Basin states California, Arizona, and Nevada became 4.4, 2.8, and 0.3 maf/y, respectively.

The Upper Basin allocation is also 7.5 maf/y, but its highest priority is to deliver 75 maf every ten years to the Lower Basin. A strict reading of the Law of the River indicates that the Upper Basin must provide the allocations to the Lower Basin before it is entitled to any use. The Upper Basin water use is divided among states based on a percentage of the water that is left

after making its required deliveries to the Lower Basin, 51.75, 11.25, 23, and 14% to Colorado, New Mexico, Utah, and Wyoming, respectively, with an additional 0.05 maf/y to Arizona, which has a small area in the Upper Basin.

The 1906-2017 average natural flow at Lee Ferry was 14.8 maf/y (Figure 2). Natural inflow between Lee Ferry and Imperial Dam averaged 1.3 maf/y, so the total natural flow at Yuma (not including the Gila River) is 16.1 maf/y, not 17.4 maf/y. Figure 2 shows the ten-year moving average of the natural flow at Lee Ferry in 1922 was anomalous at 18.8 maf/y, the highest between 1906 and 2020 and possibly the highest in a millennium based on tree-ring studies. Extending the flow record back to the year 765 using tree rings shows that flows during the 30-year period occurring at the beginning of the 20th century were very rare, similar only to flows during periods in the late 1100s and early 1600s. The tree-ring record also shows that low flow periods, equaling those in the 1950s to 70s and so far in the 2000s, occurred numerous times including the period from about 1860 to 1902, at the beginning of the flow record at the Yuma gauge. Science published by E.G. Larue of the US Geological Survey in 1916 documented the late 1800's drought, so Compact negotiators should have known there was not sufficient water for everything they wanted to do. Tree rings show the current drought, even without climate change, could continue several more decades without being an extreme occurrence in the 1300-year record.

Climate change, however, is here and changing the Colorado River watershed faster than most expected. Natural flow projections at Lee Ferry based on basin-wide temperature increases of 2.5 to 6.5F and small precipitation decreases are 10 to 20% less than the historic (1906-2017) hydrology, ranging from 12.0 to 13.5 maf/y compared to an average 14.8. A drought is a temporary condition, but this is a long-term alteration in normality. This is aridification. Warming temperatures are much more responsible for the forecast decreased flow because temperature variability is small and leads to increased evapotranspiration, soil moisture and groundwater deficits, decreases in snowpack due to sublimation, and much earlier and less efficient snowmelt. Natural variability overwhelms the projected precipitation change but precipitation will likely increase in the Green River and decrease in the San Juan watersheds.

Most flow originating in the Upper Basin (70%) originates as snowmelt but 50% of the flow is groundwater. That the sum exceeds 100% means that a substantial portion of the snowmelt enters and flows through the groundwater before discharging to the river. However, groundwater pumping diverts groundwater but is not counted as a river diversion in the Upper Basin. In other words, groundwater pumping is not part of the river flow allocation system in the Upper Basin.

The Colorado River system includes reservoirs and canals that deliver water to the states. Reservoir evaporation and bank storage loss throughout the basin ap-

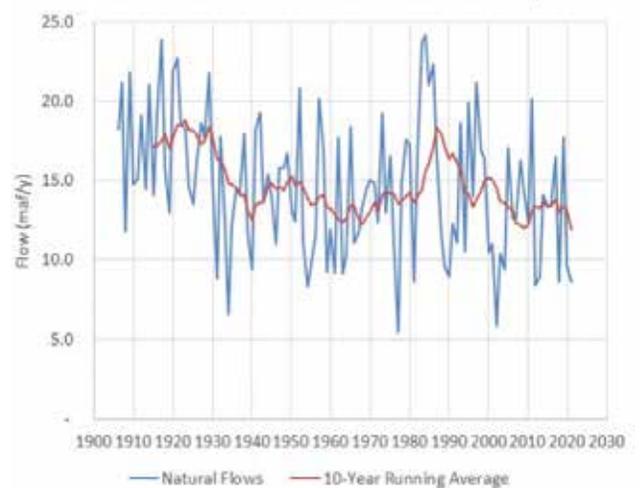


Figure 2: Colorado River natural flow at the Lee Ferry compact point by water year: maf/y is million acre feet per year.

Source: tinyurl.com/3xeh74y9

proximates 2 maf/y with full reservoirs, so the remaining water from the 16.1 maf/y long-term average flow is 14.1 maf/y. This is less than the total basin allocation without considering the treaty obligation to Mexico, which in 1944 was set to 1.5 maf/y. The ten-year running average flow reached its historic low in 2021, 11.9 maf/y, indicating the river is at its the driest on record (Figure 2).

One cannot rely on runoff to replenish the reservoirs in the future now that diversions exceed that average annual runoff. Even a repeat of 1984 with 24 maf reaching Lake Powell would provide less than 8 maf excess above diversions to fill the two main reservoirs that have more than 34 maf of vacant volume.

The Bureau of Reclamation expects Lake Mead to drop to levels that will trigger shortage declarations next year. This means the amount that Arizona and Nevada can use will be decreased; California does not share the initial shortages. Shortage declarations will not solve problems or prevent long-term shortages.

Use of the river is reaching its maximum allocations at the same time the basin experiences a historic drought and water stored in its major reservoirs have approached their historic minimums. Details on how this train wreck may play out will be considered in an article in the next issue, with a specific focus on the Southern Nevada Water Authority and Coachella Valley Water District and their use of the Colorado River, including water they own but that may only be available on paper.

Tom Myers is a semi-retired water resources consultant and long-time desert activist. He lived in the Great Basin and southwest desert for 35 years but now lives on a forested ridge in the Endless Mountains of his home state of Pennsylvania.

BY TIMOTHY WORLEY, PhD

Cannabis Grows Across Mojave Desert

An unanticipated problem

A flourishing black market for cannabis rings alarm bells for Mojave Desert residents and friends as illegal marijuana farms (also called “grows”) spring up across the arid landscape. In a July 28 letter to Governor Newsom, the Morongo Basin Conservation Association (MBCA) asserted, “The CA deserts are now, more than ever, under serious attack from the onslaught of illegal cannabis cultivation.” Area residents and environmentalists list high water use and the potential for contamination, land and habitat disturbance, and physical safety as primary concerns, but say that so far solutions have proven elusive.

California voters approved Proposition 64 in 2016, largely legalizing adult use of cannabis and products derived from the plant, so a black market and illegal cannabis may sound strangely incongruent. However, critics like MBCA say, “Like most Californians we anticipated that Prop 64 would meet its intent and purpose to rid our communities of illegal black-market production and sale of marijuana, when in fact it has made the problem exponentially worse by downgrading felony penalties and fines to a misdemeanor.” Unfortunately, the regulated market implementing the voter initiative also presents barriers to farmers who want to comply, according to a 2020 survey report from the Cannabis Research Center at UC Berkeley¹.

Among the illegal desert farms, county law enforcement officials believe that these are predominantly backed and controlled by cartels with little interest in the legal market. Accurate information is difficult to obtain and estimates vary widely, but it appears that from half to ninety percent of illegal cannabis cultivation is done by cartels, with individual growers forming a minority.

Aerial reconnaissance shows that the typical desert cannabis “farm” has a fence or soil berm pushed up to minimize visibility. Some cannabis is grown in the open, but more common are the long, covered “hoop house”-style greenhouses measuring 30 feet wide and up to 120 feet long. The number of greenhouses within a given perimeter range from a few up to twenty or more. The number of these grows fluctuates as new ones get constructed while a few are closed by law enforcement. Working from three sets of aerial and satellite imagery made in 2020, the Mojave Water Agency (MWA) counted over 1,500 individual cannabis sites within its portion



A typically developed industrial site.
Photos by Mojave Water Authority

of San Bernardino County, including 423 outdoor sites and 1,106 greenhouse sites. One individual farm greatly expanded over a five-month period (May to October, 2020), from six greenhouses in the earlier image to twenty-eight large structures later.

As the court appointed Watermaster for the Mojave Basin groundwater aquifer, MWA is especially interested in quantifying the water used by unpermitted and unregulated cannabis production. The agency has been frustrated in its efforts to keep track of new wells which are subject to regulation if they are over the “minimal producer” threshold. Combining efforts of its staff and engineering consultant, MWA is meticulously monitoring registered hemp farms and sites growing high-THC cannabis to estimate overall water consumption and, where possible, the source of the irrigation water used.

Preliminary estimates, coming from analyzing the 2020 images, were reported to the MWA Board in July. Beyond the smaller 52 acres of *registered* hemp, the analysis shows 227 acres of greenhouse sites and 104 acres of open grows, for a combined total of 331 acres

in illegal cannabis. Using established crop coefficients to estimate the amount of water needed for cannabis and a crop cycle of four crops per year, their analysis estimates that these identified grows require 1,424 acre-feet (AF) of water per year. Approximately 70% (976 AF) is attributed to greenhouse sites. *Registered* hemp production, by comparison, was estimated to require only 225 AF of water.

Kathy Cortner, General Manager of MWA, expresses the agency's consternation: "It is really hard to develop a good understanding of the [water] demand. By the time we are able to get aerial photos and develop an [estimate of the demand], it is outdated due to the pace of the grows coming in." It is also hard to ascertain whether the water is bought legally from another producer, whether the water is being pumped from existing wells permitted by the county or from illegal wells, or whether the water is stolen and/or hauled from another location. Another concern is the impact on water quality in the groundwater basins due to the chemicals being used. This is probably the bigger concern for the long term.

While water resource managers struggle to understand the full effects of surging cannabis growing, for land managers striving to protect an intact ecosystem the alarm touches on a long list of issues. A chief concern for the Mojave Desert Land Trust is the practice of developing the sites by scraping the desert to level the ground and forming perimeter berms. Deputy Director Cody Hanford puts it into perspective by noting that most desert fauna survive there by taking shelter underground. He also notes that the undisturbed top surface of the desert forms an important cryptobiotic soil crust.

Hanford says, "It's a tremendous problem by scraping it clear and the disruption that comes from that. The desert is an intact system, and you have key species on decline for many reasons. And now, this is another huge problem. We're putting a lot of time and effort into preserving these species, like desert tortoise... I know that some of these grows are in what we call hot spots [for the tortoise]. And other key species are going to be impacted."

Although Hanford is usually an optimistic person, a slight hint of despair creeps into his voice as he projects out to the future and reflects on the array of issues the land trust worries about. "Pesticides and rodenticides are going to leave a lasting impact. There is increased traffic on the roads that puts animals in danger. Wind-blown trash ... we have areas that are just covered with plastic." Regarding the berms: "These are some of the windiest places, and dust [blown from the loose soil] is increasing. And plants... what comes back is weeds, invasive species. It's just throwing the whole system out of balance." The other impact Hanford predicts is illegal trespass by off-highway vehicles, with berms from abandoned grow sites being used for jumps and trails. "It's going to be a lasting impact," he concludes.

Van Butsic, Co-director of the Berkeley Cannabis Research Center, takes a more measured view on the

question of environmental impacts. "In our experience, making the jump from 'Look, there is a cannabis farm, it's wrecking the environment' to actually showing changes in animal populations, habitat quality, etc., is extremely difficult." He acknowledges that most of the research his center has conducted is from northern California, and "... more work should be done in southern California, and we have current research projects started in the area. Our team will certainly be working to try to put more data to the issues going on in Southern California."² Along those lines, a doctoral student from UC Riverside has started to investigate the environmental impacts, some of which are suspected but not well documented.

Pat Flanagan, a board member of the Morongo Basin Conservation Association, participates in a group of environmental organizations calling attention to the carbon sequestration effects the California deserts provide. In an August 3 letter to the California Air Resources Board, the coalition wrote that although carbon in desert ecosystems needs to be better understood, "California's hot deserts contain a large pool of inorganic carbon, calcium carbonate, derived from biological processes. While this might not be a large new input, it could be a large loss of [sequestered] carbon following anthropogenic disturbance with carbon released back into the atmosphere"³.

What happens next for illegal desert cannabis is up for debate. Residents have mobilized to protest changes to their way of life, citing safety, light pollution, air pollution, trash, and other nuisance concerns. The issue has reached the agendas of the San Bernardino and Los Angeles County Boards of Supervisors, and has been taken up by area legislators and water organizations. In addition, the Community Water Systems Alliance (a coalition of large water agencies and smaller water systems serving economically stressed areas) is urging a three-pronged approach: (1) communication and outreach to build awareness and a larger coalition for action; (2) increased and coordinated enforcement of existing laws and regulations; and (3) legislative reforms of Proposition 64 to raise the stakes for organized criminal cannabis while lowering barriers to the fledgling, regulated industry.

Dr. Tim Worley is a Senior Consultant at Ortega Strategies Group (OSG), where he serves as managing director for the Community Water Systems Alliance. He sits on the Leadership Council of WaterNow Alliance and pursues independent projects in leadership training and sustainable water utility management.

1. Bodwitch, H., Polson, M., Biber, E., Butsic, V., Carah, J., Dillis, C., Grantham, T., Parker-Shames, P. 2020. *Barriers to Compliance in Cannabis Agriculture*. Cannabis Research Center, University of California, Berkeley, CA.

2. Email communication from Van Butsic, August 3, 2021.

3. Letter to Dr. Adam Moreno, California Air Resources Board, signed by representatives from thirteen groups concerned with desert conservation issues.

BY LENA LE, WITH ASSISTANCE FROM NANCY HOLMES

We Built It, Will They Come?

Minority access to US National Parks



Dancers of Chilean descent performing during Hispanic Heritage month in 2019 at the George Washington Carver National Monument.

Photo by NPS

This brief conversation gave me much to think about on the topic of minority access to U.S. National Parks. What barriers may minority groups experience that deter their access to U.S. National Parks?

The numbers

The 2008-2009 Comprehensive Survey of the American Public asked a random sample of Americans if they had visited a national park. Respondents were counted as “visitors” if they correctly identified a national park they had visited in the past two years. Results showed that White

non-Hispanics were much more likely to visit a national park than any other race. (Note: The term “non-visitors” only referred to the two-year period and did not mean

*A further contribution to the series on Public Lands.
— Editor*

When I saw a woman sitting outside the Visitor Center at Congaree National Park, I assumed she was just enjoying a South Carolina spring morning. Or perhaps she was birdwatching? Congaree is on the migration pathway of many species and known for excellent birdwatching. But a couple of hours later, as the day grew hot, she was still there. Curious, I asked what type of birds she was seeing. The lady replied that she was not birdwatching but waiting for her child who was on a school field trip “in the swamp” with a ranger. I asked why she didn’t go inside the visitor center, with air conditioning and comfortable seating. She explained that she hadn’t seen anyone “like me” going in, thus, she didn’t think she was allowed inside. Misunderstanding what she meant by “like me,” I informed her that some other parents, also waiting for their kids, were inside watching the park movie and looking at the exhibits. Looking at me as if I were the world’s most clueless person, she asked “Did you see any Black folks like me?”

2008-2009

Have you visited a national park in the last two years?

Response	% visitor	% non-visitor
Hispanic, any race	32.2%	67.8%
White only, non-Hispanic	52.6%	47.4%
Black only, non-Hispanic	28.0%	72.0%
Other only, non-Hispanic	47.7%	52.3%
Two or more races, non-Hispanic	31.5%	68.5%

Reproduced from National Park Service Comprehensive Survey of American Public (2008-2009 Technical Report, NPS/NRPC/SSD/NRR - 2011/295)

the respondents had never visited a national park in their lifetime).

Although Hispanics comprise over 16% of the U.S. population, visitor studies at various National Park Service (NPS) sites revealed that Hispanics often make up less than 9% of total visitation.¹ A few exceptions were parks located in areas with higher concentrations of Hispanics, such as Yosemite, Everglades, and Saguaro. Still, although the number of visits made by Hispanics exceeded 10% at these parks, they made up 30-60% of the population in the surrounding areas. African Americans were much less represented among national park visitors, comprising 2-3% and in many cases less than 1% of total visitation. In some situations, such as Congaree National Park, where African Americans represent approximately 30% of the local population, they comprised only 3% of total park visitation. Asians also represented less than 3% of park visitation in most NPS sites.

The academic debate

Minority groups' participation in outdoor recreation has been a topic of academic discussion for decades. Among the four major journals in recreation and leisure behaviors, over 3,000 articles have been published on the topic. Although each study attempted to examine different aspects of minority groups' recreation behavior, four dominant theories emerged to explain lack of representation: marginality, assimilation, subculture (ethnicity), and discrimination.

Marginality theory explains the lack of diversity in public land visitation as a socioeconomic factor whereby minority groups experience barriers related to lower economic and educational status, a barrier faced by low-income populations regardless of race or ethnicity. However, minority groups, especially African Americans, are often in the lower-income bracket and less likely to have disposable income for travel and recreation. Assimilation theory describes differences between minority groups and mainstream recreation behaviors. These differences are more dominant among non-U.S.-born residents, especially those who speak languages other than English. People from different backgrounds may also have different perspectives toward nature in general, and outdoor recreation in particular. As Richard Luv described in "Last Child in The Woods," a child growing up in the U.S. may associate outdoor space with happy memories of fishing, hiking, or camping with family. To children from unsafe environments or places with ongoing armed conflict, the woods are scary places often associated with hunger, violence, and destruction. *Subculture (or ethnicity) theory* hypothesizes that different ethnic and racial groups have subcultural differences in values and expectations related to outdoor recreation experiences. *Discrimination theory* explains that lack of minority group participation in outdoor recreation is due to discrimination that individuals have experienced, either in daily life or at recreational settings. The discrimination may occur as incidents targeting specific individuals or as systemic racism.

Among the dominant theories, subculture (or ethnicity) is often used as an easy explanation rather than as a concept that needs definition and explication. Many of the differences in outdoor recreation may be viewed as cultural but were socially constructed as consequences of marginality or racial discrimination. It is common in the U.S. for property to increase in value when located near a park or open green space. While access to nearby open space in a city setting is not necessarily disproportionately distributed by race or ethnicity, minority groups, especially African American communities, are often in the lower-income group and thus not able to afford properties with easy access to outdoor recreation areas. For decades Black men walking through Chicago's Lincoln Park, carrying a duffel bag (often with workout equipment and gear) raised suspicion and were subjected to search by the police. Recent incidents of Black men (and children) being gunned down while jogging, playing in the park, or simply walking in the "wrong" neighborhood have reinforced perceptions that outdoor activities are generally not safe for minority groups.

A meta-analysis of 64 visitor studies² at national park sites published in 2012 revealed no differences between Hispanic and White visitors' appreciation for the natural resources protected in national parks, such as clean air, clean water, native species, and historical features. However, Hispanic visitors rated more highly than White visitors the importance of recreational and educational opportunities, and facilities (such as visitor centers, picnic areas, trails) provided by the NPS. In other qualitative studies³, we found that minority groups, namely African Americans, Hispanics, and Asians, preferred family-oriented recreation activities. They also emphasized the need for safe environments and facilities that can accommodate large groups. Since its inception, the NPS approach to designing parks has been rooted in the 19th-century White middle- and upper-class culture that values quiet enjoyment of nature. Large group and (sometimes) boisterous activities, preferred by minority groups, may not fit within the White-centric concept of how national parks "should" be used. Depending on the perspectives, the lack of minority participation in outdoor activities at national parks could be explained as a cultural difference. It could also be viewed as a consequence of systemic racism in design.

The implications

We built it, why didn't they (minority groups) come? The situation is complex, without a simple solution. Reducing social-economic gaps between racial and ethnic groups is a discussion much beyond the realm of outdoor recreation, and it requires systemic change. As a consequence of the Jim Crow era's influence in public policy, segregation in the right to use public areas has led to a degree of separation in recreation behavior. With statues of confederate generals, and sometimes confederate flags prominently displayed at public areas in some states, African Americans

We Built It, Will They Come?



An African-American ranger speaking to visitors at the George Washington Carver National Monument on the day of a naturalization ceremony. Photo by NPS

may not feel welcome at a government facility such as a national park. The Hispanic community may have negative experience with border patrol agents and ICE officers and is thus reluctant to interact with anyone in uniform, including park rangers. Diversity deficit⁴ among the agency's work force also does little to create a friendly image for NPS. "Fixing" the systemic racism in the design of national parks requires change at macro levels. Various attempts have been made to encourage participation from minority groups. For example: across the park system, publications are produced in multiple languages; and park rangers who speak different languages have been recruited to lead programs to meet different visitor needs, which also increases diversity among the NPS workforce. Park websites have been featuring images of park rangers and visitors from different racial and ethnic origins.

Agency-level public relation efforts attempt to create an image to which minority groups can better relate. At the park level, different ideas and programs to connect with local communities have been tested. Yosemite and several other national parks have started community outreach programs with rangers coming to classrooms and participating in community events, especially those attended by Hispanics and Spanish speakers. One goal of these outreach programs has been to combat the stigma associated with people in uniform and steer public perceptions toward a more positive view.

Some parks, such as George Washington Carver

National Monument, have hosted naturalization ceremonies to help assimilate new citizens. This park also started the "community ambassador" program where outreach activities in local communities are conducted by local residents in the role of park "ambassadors." Many other national parks have begun adding facilities to accommodate different needs such as picnic areas for larger family groups, and organizing cultural events that celebrate diversity. Going beyond a single event or time period, Santa Monica Mountains National Area and Boston Harbor Islands developed "youth of color" programs that aimed to build sustainable relationships with minority communities.

Time will tell whether these efforts draw more minority groups to national parks. Some may argue that such efforts are not needed because the lack of minority groups' participation in outdoor recreation is simply due to cultural differences. However, the question remains: are there access issues that systemically discriminate against certain racial groups? The few examples described in this article of NPS's attempts to attract minority groups would indicate that some NPS managers believe there are indeed problems to be addressed. And visitation statistics clearly show a lack of participation from minority groups, but not the reasons for this. Listening to and having candid conversations with potential park visitors from the communities would be a first step to providing insights on public perceptions. Sometimes real change starts with a simple conversation.

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Footnotes in this article can be found at desertreport.org by selecting "reference" at the bottom of any page.

Desert Website

The Desert Report website has been rebuilt to feature material in a more timely manner than the three-month interval between printed issues. The blog that appears on the Home page will also be more action oriented than has been customary in the past. The archive of past issues, the index for past issues, and the endnotes for printed articles will be largely unchanged. You are encouraged to visit.

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Desert Report Is Published By Sierra Club California / Nevada Desert Committee

To receive *Desert Report* please see details on the back cover. Articles, photos, and original art are welcome. Please contact Craig Deutsche (craig.deutsche@gmail.com, 310-477-6670) about contributions well in advance of deadline dates: February 1, May 1, August 1, and November 1.

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DESERT REPORT

PUBLISHED BY

California/Nevada Desert Committee of the Sierra Club
3250 Wilshire Blvd #1106
Los Angeles, CA 90010

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