APPENDIX (Volume One)

To February 20, 2015 DRECP Comment Letter

from

Alliance for Desert Preservation,

Mojave Communities Conservation Collaborative

Morongo Basin Conservation Association

- and -

Desert Protective Council, and Basin and Range Watch

Containing:

EXHIBITS A through K

EXHIBIT A

is a planned amount. We can't predict at this point how much of that amount will actually be subscribed over the duration of the plan to 2040.

And so I want to just focus in on your word "hope." I don't think "hope" is quite the right word. You know, it's a planned up-to amount that allows us to tap the amount of energy that could occur under the plan for planning purposes and analysis purposes. Is that helpful, Mike?

MR. SINTETOS: Yeah, that's a good clarification. I tried to make that point in the clarification that the 20,000 megawatts. You know, the plan isn't saying we're going to have 20,000 megawatts in the desert; it's saying that if because of outside policy drivers, there is demand for that much development, this plan would be able to accommodate that.

To answer your question, Randy, you know, the Energy Commission developed this calculator that came up with that number, and, you know, all the assumptions in terms of, you know, how much are we expecting we'll get from distributed generation, from large-scale generation in other parts of the state, things like that. And then, you know, scaling out to 2040, we could see this much development in the desert by 2040 to meet the

state's goals. So that will all be in the document. I believe it's in an appendix, so you'll be able to review that as well.

CHAIRPERSON BANIS: Thank you. Follow-up question, April?

MEMBER SALL: Yes. Thank you. April Sall. I was going to save this comment for later, but since we just opened this up about the 20,000 megawatts, I guess part of what I wanted to give feedback back to BLM and to the agencies on this point is that, you know, I have mixed feelings about the DRECP and its value, and this is one of the reasons. It is based on the assumptions that basically frame the plan.

And, you know, the devil is in the details, but in this case it's also in the assumptions and the high-level constraints that were put on this planning process. And, you know, you make the comment that this is not being done in a vacuum. But in terms of renewable energy throughout the state, it is being done in a vacuum because outside goals and accomplishments, if you will, and development in renewable energy throughout the state is not being continually reassessed and reapplied to the DRECP, thus changing the pressure and the requirements for the desert and the DRECP planning boundary to absorb up to 20,000 megawatts.

And so I think it's a very important point that you're going to hear from the public I would estimate thousands of times when this draft comes out. And in trying to prepare and somewhat answer your questions up on the slide projector here, I really feel the agencies and the REAT teams, Renewable Energy Action Teams -- sorry -- need to do a better job at talking about that, because you are going to hear, why 20,000 megawatts? Where is rooftop solar in this, et cetera, et cetera. What are we doing with geothermal? Why is that not catching up, et cetera?

So I think in all the presentations I've heard about DRECP, you guys do a very good job, and I understand there are so many different roles that each person is trying to fill. And I don't mean to be too harsh with my criticism, but from a public standpoint and the public being able to understand this massive planning document, I really think it's critical that these other components are part of the presentation because they will come up in questions. And I can't stress that enough.

And so in terms of, you know, looking at this plan and its requirements, you know, you just made a comment about setting policy. And by having the constraints of the DRECP as they exist today, the REAT

team is essentially setting policy to make utility-scale renewable energy development in the desert the model for meeting the state's 33-percent goal, and I think the public takes issue with that. I take issue with that very clearly, but I think it's something that we need to continue to be able to address throughout this process.

And certainly as the public meetings and the draft is released, there needs to be more information provided about that because in the meetings -- and I'm on the DRECP stakeholder group, for anyone that doesn't know. But the public asks these questions in meetings, and they are frequently told, "That's not part of what we're talking about today," or, "That's not part of the DRECP plan." And I think that's very inappropriate, when this is a statewide goal. It should be statewide analysis.

And I'm going to give Lorelei some kudos here. As other counties -- for example, like Kern County -- have very aggressive renewable energy targets and goals that they are meeting, that calculation needs to be current and updated with the DRECP in reference to this 20,000 megawatt goal.

So I just want wanted to dive into that a little bit because I think it's really important for the public to hear that discussion.

MR. SINTETOS: That's really good feedback. Thanks for that.

MS. WATT: For the benefit of listening, what I've found that I'm listening really carefully to words. So I have a question for you, April, and a request. So one of the things you sort of suggested is that that analysis be statewide. And of course I'm going to parse that a bit because the analysis for the environmental and other impacts is obviously going to be the desert area, the geography. But I think you make a really important point, is that there needs to be information about the current sort of state's renewable energy need.

We have the RPS, the 33 percent you've all heard. We've essentially met that. So what is the next goal we're trying to meet with the plan? I think that needs to be articulated. And I think you make a really good point about where are we in sort of renewable energy around the state and other energy towards the state's need, the state's goal for renewable or emerging potentially updated goals, which we could see out of the state at any point in time, and break that all out.

And, April, I'd be really interested if you're willing to take the time for an off-line with Mike and me to sort of list the kinds of questions you're interested in. Karen, Commissioner Douglas, we've had

these conversations. We've had them recently about the goal, if you will, of up-to amounts of this plan, and I think this would be a really important frequently asked question and contextual piece we need to issue along with the plan.

MEMBER SALL: Thank you, Terry, and I would be happy to do that.

MS. WATT: Great.

MEMBER SALL: Just to dive into the weeds very quickly, just for your sake, I have had this conversation with Karen Douglas's office and with several other members. In this discussion one of the things that came back is that the reporting process for utilities and for the CEC, California Energy Commission, on where we're at with renewable energy is two to four years behind basically, and so I will just ask you to look into that before we have our conversation so that that is not one of the reasons, if you will, that we can't move forward on this. Thank you.

MS. WATT: I'll do you one better. I'll look into that, and I'll also see what, April and folks in the room, we have developed as public information on this. But I think it's a really important question. As you look at the state's major infrastructure priorities related to water and energy, I think it's really

important to provide what contacts we have, even though we know there are gaps in information. There are gaps in information. There are definitely gaps in information. There's gaps in groundwater information. There are probably gaps in what we know about what local governments are producing on the renewable end, especially rooftops. But I know a focus of the governor's office and the Office of Planning and Research is to try to go find the best ways to assemble this information.

So let's find out what we know, how we know it and what we don't know and what that means for this and other planning efforts we're all engaged in together. So let me find out some things, April, and I'll send you an e-mail.

MEMBER SALL: Thank you.

CHAIRPERSON BANIS: Very good. You know, we're about to make a 45-minute run from the DAC, and so I'd like to ask, Diane, are you okay for a 45-minute flurry, or would you like to take five?

THE REPORTER: What does the flurry entail?

CHAIRPERSON BANIS: Our talking for 45 minutes straight.

THE REPORTER: That is okay.

CHAIRPERSON BANIS: We're going to thank our

presenters and take over and answer the questions that are on the screen and provide all the input that we can relative to public participation in the DRECP.

So do you have a comment, Al, or do you want to start? Either way.

MEMBER MUTH: Before we get off of this and before Mike sits down -- and I know what Gerry Hillier is going to say, I think, when he comments. On the slide "Land Use Plan Amendments, Conservation Management Actions, Avoidance, Minimization and Compensation Requirements for Various Resources," the counties are adamantly opposed to removal of any more private land from the tax base and inclusion in as compensation for projects under this plan. Does the DRECP address that issue?

MR. SINTETOS: I thought I was off the hook. Here I am again. So I would think about compensation as not just acquisition of land but as acquisition or restoration or enhancement. So when we say "compensation," that doesn't necessarily mean buying more private land. It could easily mean restoration of public land.

MEMBER MUTH: I assume you're aware that, when you start talking about restoration in the desert, that's another whole bag of worms?

EXHIBIT B

2015

STATE OF THE ELECTRIC UTILITY SURVEY RESULTS

HERE'S WHAT THE UTILITY OF THE FUTURE LOOKS LIKE, ACCORDING TO OVER 400 U.S. ELECTRIC UTILITY EXECUTIVES.

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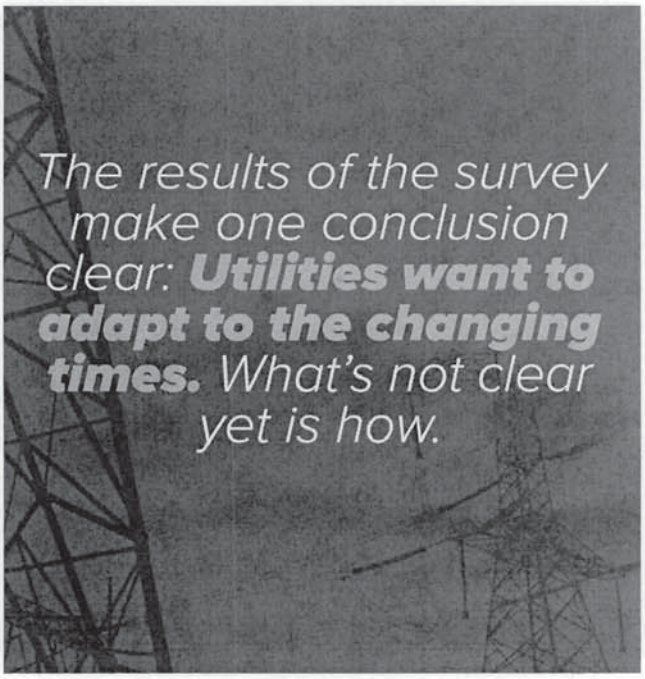
EXECUTIVE SUMMARY

In 2015, the U.S. electric utility is in a state of transition.

Traditional cost-of-service utility regulation was set up in the early 20th century to provide America with universal access to electricity. But the traditional way of doing business may no longer work in 2015 and beyond.

Emerging technologies, shifting customer expectations, and new energy economics are causing the industry to rethink the business and regulatory models that have served them for over 100 years.

To better understand how utilities view their present and future, Utility Dive surveyed 433 U.S. electric utility executives on the state of the electric utility going into 2015. The result is our second annual "State of the Electric Utility" report, sponsored by Siemens.



KEY FINDINGS

- *Utilities will move away from the traditional vertically integrated utility model towards a more distributed, service-based model.*
- *The industry's three biggest growth opportunities are distributed energy resources, the customer relationship, and transmission.*
- *The industry's three most pressing challenges are old infrastructure, the aging workforce, and the current regulatory model.*
- *The vast majority of utilities are seeing minimal, stagnant or even negative load growth in their service territories. The industry is undecided on how to best address the issue of depressed electricity sales growth.*
- *Utilities plan to use more natural gas, solar, wind, distributed energy resources, and energy efficiency over the next 20 years. Meanwhile, the industry expects to use significantly less coal and oil.*
- *Utilities see a big opportunity in distributed energy resources, but are unsure of the best business models.*

The results of the survey make one conclusion clear: Utilities want to adapt to the changing times. What's not clear yet is how.

STATE OF THE ELECTRIC UTILITY

A survey of over 400 U.S. electric utility executives reveals an industry that wants to overcome old challenges and seize new opportunities.

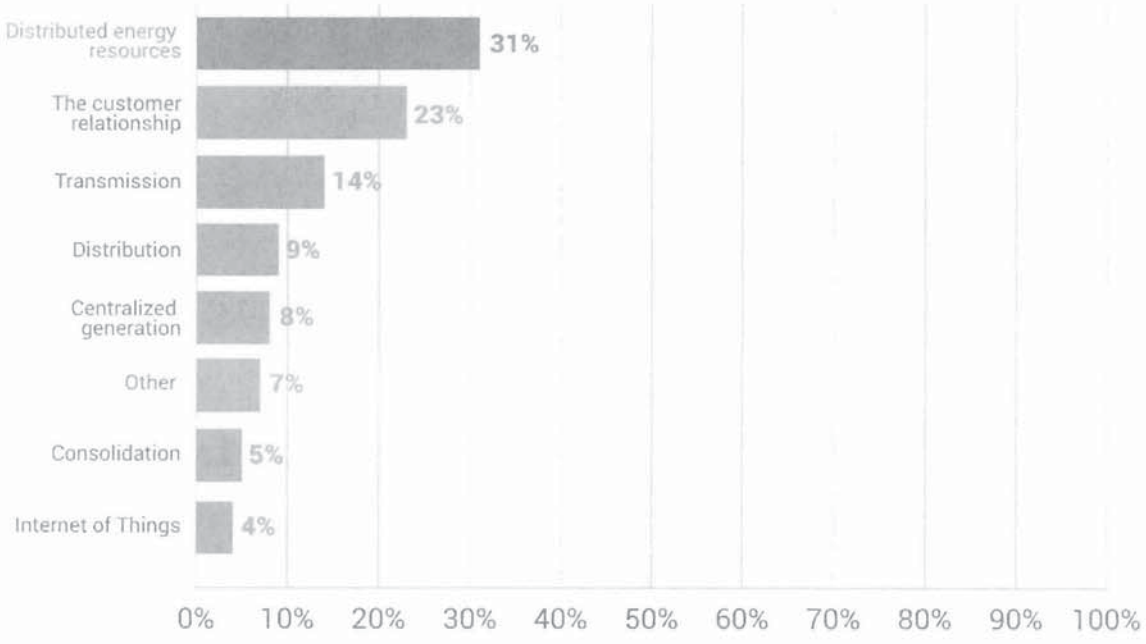
Utility executives are confident in the industry's growth, but they also expect to see new models and approaches.

Long seen as a threat, distributed energy resources may well become the biggest driver of industry growth, according to the executives we surveyed. While we hear frequent grumblings about the so-called "death spiral," utilities view distributed energy as a massive opportunity.

With the rapid proliferation of distributed energy resources comes the need for utilities to better understand and engage with their customers. For the first time, new competitors such as rooftop solar companies are threatening to disintermediate ratepayers from the utility. It's not surprising that utilities view the customer relationship as another big opportunity.

The opposite of distributed energy — centralized generation — seems to offer little promise of future revenue to utilities. Once a profit center, central station power is viewed by only 8% of utilities as their biggest

What does your utility see as its biggest growth opportunity over the next five years?



growth opportunity. Those utilities least interested in centralized generation tend to do business in the deregulated regions of the country where regulated utilities cannot own power plants.

If utilities abandon traditional utility profit centers of the past, ***regulators must enable them to adopt new business models.***

One traditional profit center remains a constant for utilities: transmission. Stringing wire is a utility expertise and comes with a federal guaranteed rate of return. Demand for transmission has heightened in recent years for several reasons: the need to improve reliability, replace old lines, connect wind and solar farms to the grid, accommodate fluctuations in population, and access less expensive energy resources.

Many utilities are contemplating how they can fold these varied opportunities into a coordinated business strategy. National Grid's Connect21 strategy is one such example: It proposes that utilities build a resilient grid backbone to help meet policy goals for renewables and distributed energy resources. Utilities then get paid for achieving the goals, many related to saving energy and incorporating cleaner resources.

Moving from one profit center to another is not easy for utilities since they must justify investments to regulators. If utilities leave the centralized generation business behind to provide customers with services like distributed solar and energy efficiency, regulators must enable them to adopt new business models.

That's beginning to happen in certain areas of the country, which may be part of why many utilities now see distributed energy as a significant growth opportunity. New York regulators are contemplating radical changes through the Reforming the Energy Vision (REV) proceeding, which would create a marketplace for the buying and selling of distributed energy.

Q. What best describes your feelings about the future growth of the U.S. electric utility industry?

30% NOT CONFIDENT

70% CONFIDENT

EXHIBIT C

Features

Why the U.S. Power Grid's Days Are Numbered

By Chris Martin, Mark Chediak, and Ken Wells August 22, 2013

Illustration by Jordy van den Nieuwendijk

There are 3,200 utilities that make up the U.S. electrical grid, the largest machine in the world. These power companies sell $400 billion worth of electricity a year, mostly derived from burning fossil fuels in centralized stations and distributed over 2.7 million miles of power lines. Regulators set rates; utilities get guaranteed returns; investors get sure-thing dividends. It's a model that hasn't changed much since Thomas Edison invented the light bulb. And it's doomed to obsolescence.

That's the opinion of David Crane, chief executive officer of NRG Energy, a wholesale power company based in Princeton, N.J. What's afoot is a confluence of green energy and computer technology, deregulation, cheap natural gas, and political pressure that, as Crane starkly frames it, poses "a mortal threat to the existing utility system." He says that in about the time it has taken cell phones to supplant land lines in most U.S. homes, the grid will become increasingly irrelevant as customers move toward decentralized homegrown green energy. Rooftop solar, in particular, is turning tens of thousands of businesses and households into power producers. Such distributed generation, to use the industry's term for power produced outside the grid, is certain to grow.

Crane, 54, a Harvard-educated father of five, drives himself to work every day in his electric Tesla Model S. He gave his college-age son an electric Nissan Leaf. He worries about the impact of warming on the earth his grandchildren will inherit. And he seems to relish his role as utility industry gadfly, framing its future in Cassandra-like terms. As Crane sees it, some utilities will get trapped in an economic death spiral as distributed generation eats into their regulated revenue stream and forces them to raise rates, thereby driving more customers off the grid. Some customers, particularly in the sunny West and high-cost Northeast, already realize that "they don't need the power industry at all," Crane says.

Video: NRG Energy CEO David Crane: I Own a Tesla, Fisker and a Nissan Leaf

He's not alone in his assessment, though. An unusually frank January report by the Edison Electric Institute (EEI), the utilities trade group, warned members that distributed generation and companion factors have essentially put them in the same position as airlines and the telecommunications industry in the late 1970s. "U.S. carriers that were in existence prior to deregulation in 1978 faced bankruptcy," the report states. "The telecommunication businesses of 1978, meanwhile, are not recognizable today." Crane prefers another analogy. Like the U.S. Postal Service, he says, "utilities will continue to serve the elderly or the less fortunate, but the rest of the population moves on." And while his utility brethren may see the grid as "the one true monopoly, I'm working for the day the grid is diminished."

Anthony Earley Jr., CEO of giant Pacific Gas & Electric, doesn't share Crane's timetable for the coming disruption—he thinks it's further out—but he does agree about the seriousness of the threat. Solar users drain revenue while continuing to use utility transmission lines for backup or to sell their power back to the power company. How can power companies pay for necessary maintenance and upgrades of the grid if that free ride continues? "No less than the stability of the grid is at stake," he says. So far regulators in Louisiana, Idaho, and California have rejected calls to impose fees or taxes on solar users.

Worldwide revenue from installation of solar power systems will climb to $112 billion a year in 2018, a rise of 44 percent, taking sales away from utilities, according to analysts at Navigant Research, which tracks worldwide clean-energy trends. "Certain regions in California, Arizona, and Hawaii are already feeling the pain," says Karin Corfee, a managing director of Navigant's energy practice. "We'll see a different model emerge."

Story: Ask Bill Clinton: How Can We Encourage Homeowners to Adopt Solar Energy?

After subsidies, solar power is competitive with grid power costs in large parts of those markets. Some areas in the Northeast will reach a similar "grid parity"—where residential solar is equal in cost to power from a utility—within three years; a majority of states could get there in 10 years or less, according to data from a variety of green energy and regulatory sources. A July report by Navigant says that by the end of 2020, solar photovoltaic-produced power will be competitive with retail electricity prices—without subsidies—"in a significant portion of the world." Green-thinking communities such as San Francisco and Boulder, Colo., are starting to bypass local utility monopolies to buy an increasing portion of power from third-party solar and wind providers. Chicago recently doubled the amount of power it buys from downstate wind farms.

Video: $77 Billion from the Sun: The Truth About Solar

The solar and distributed generation push is being speeded up by a parallel revolution in microgrids. Those are computer-controlled systems that let consumers and corporate customers do on a small scale what only a Consolidated Edison or Pacific Gas & Electric could do before: seamlessly manage disparate power sources without interruption. Microgrids have long been used to manage emergency backup power systems. A 26-megawatt microgrid completed in 2011 kept the power on at the U.S. Food and Drug Administration's White Oak research center in the aftermath of Hurricane Sandy last year. It also saves the federal government an estimated $11 million a year in electricity costs. The microgrid's ultimate potential, however, is in turning every person, company, or institution with a renewable energy power system into a self-sustaining utility. Imagine your house switching from power it generates itself to power from the grid the way a Toyota (TM) Prius switches from battery power to gasoline.

Outside the makeshift offices of Sunora Energy Solutions, in suburban Phoenix, the thermometer reads 112F on a recent afternoon as Crane takes a seat and begins explaining his plans to adapt to a post-grid world. While NRG's main business remains supplying electricity to utilities in the wholesale market from Staten Island, N.Y., to San Diego, Crane has overseen about $1 billion in solar and green-tech investments, including a 50 percent stake in the 290-megawatt Agua Caliente utility-scale solar plant in Arizona due to be completed in 2014. (A Warren Buffett-controlled enterprise owns the other half.) Last year, NRG bought a 50 percent stake in 22-month-old Sunora for an undisclosed sum. Its business is stealing the revenue stream of the very companies NRG sells power to.

Sunora has only a few dozen employees and an overhead befitting its warehouse location. Still, it's abuzz with ideas to tap into the changes detailed in the EEI report. Its engineers have come up with solar canopies that can be installed in supermarket and department store parking lots or above drive-up ATMs. They provide shade and generate clean power that can be used by the buyer or sold back to the grid. Sunora says it has pitched a mass purchase of canopies to a large U.S. retailer for its parking lots, though it won't name the company. For customers who think the canopies are too industrial-looking, Sunora developed a decorative solar pergola—a kind of standalone patio—that provides the output of a rooftop system without cluttering the roof with solar panels. It can be installed in two days. Crane says he can sell lots of them to luxury hotels, though he hasn't yet. Sunora is also working with DEKA, a Manchester (N.H.) technology-development company, on a microgrid package for homeowners. The price isn't set yet, but Sunora executives say they hope to start selling a 10-kilowatt residential system for about $20,000 in 2015.

Businesses are adopting solar and smart microgrids at an escalating rate to beat rising power costs and burnish their green cred. Verizon is investing $100 million in solar and fuel-cell projects that will directly supply 19 offices and data centers in three states. Wal-Mart Stores, with 4,522 locations in the U.S., expects to have 1,000 solar-powered stores by 2020. MGM Resorts International's Mandalay Bay resort convention center in Las Vegas hired NRG to install a 6.2-megawatt solar system—enough to meet as much as 20 percent of Mandalay Bay's demand. Wal-Mart U.S. President Bill Simon extolled the virtues of the company's solar program in March when he told an analyst at an investor meeting that solar was often cheaper than grid power. Besides, Wal-Mart has a lot of roofs, and "roofs are big places where we can gather a lot of solar," Simon said.

Story: Duke Kills Florida Nuclear Project, Keeps Customers' Money

In full pitch mode, Crane sees an "underserved market" for NRG in bringing solar to businesses—from grocery stores to office buildings to athletic stadiums—requiring from 100 kilowatts to 10 megawatts of power. At Lincoln Financial Field, home of the Philadelphia Eagles, NRG installed a $30 million system of more than 11,000 solar panels and 14 mini wind turbines that can supply about a third of the stadium's needs.

When Crane is asked whether he, CEO of a company that gets nearly all of its $8.4 billion revenue from selling coal-powered electricity to utilities, risks alienating his traditional customers, he says the changing world requires changing strategies. He then crisply runs through his vision of how the next two to three decades play out. The grid continues to shrink—U.S. power use actually peaked in 2007—as distributed generation captures

an increasing share from utility-generated power. There won't be much need for new large-scale transmission lines after that, except perhaps to gather and distribute power from remote wind farms. Crane says at least some existing transmission lines "are about to become stranded costs"—utilities simply won't require the capacity they have now.

Video: U.K. Sets Pace in Global Smart Grid Investments

As for utilities themselves, Crane says there will always be a need to provide what's called the "base load"—the minimum amount of power to keep essential services running—but no need for as many utilities as there are now. Most coal- and oil-fired plants are destined for extinction, including NRG's own 16 plants, which Crane wants to close sooner rather than later. "Natural gas is already wiping out coal, and it's going to wipe out most nuclear," he says. "There will be only a handful of nukes that we'll need to keep running as base load plants."

This is going to set off the scramble for market among existing utilities that the EEI report anticipates. Says Crane: "There's going to be a strong fight to preserve share."

No industry as large, long-lived, powerful, and politically connected as the utility industry will simply roll over, disruptive technology or not. Wander into the annual meeting of the EEI, and you can get a sense of the push back. At this year's event, held in June at the Marriott Marquis in San Francisco, some 950 utility executives, consultants, and support staff talk shop and offer arguments for why the grid will survive. Solar doesn't work everywhere; it still doesn't make economic sense in states that have low-cost coal power; microgrids aren't foolproof. And someone has to pay for those wires used to sell solar power back to the grid.

The big complaint, though, is about subsidies. "I don't characterize distributed generation in and of itself as a threat," says Nick Akins, CEO of Columbus (Ohio)-based American Electric Power. "I characterize the regulatory scheme that supports it as a threat."

Blog: When It Comes to Government Subsidies, Dirty Energy Still Cleans Up

Theodore Craver, CEO of Edison International, owner of California's second-biggest utility, says subsidies create "false economic signals" for rooftop solar. He estimates that 44,000 of his customers got more than a half a billion dollars in incentives to install solar systems, a total that doesn't include the amounts they're getting for selling their power back to the utility. California utilities project that under current policies, solar users' savings add about $1.3 billion to nonsolar users' bills. In other words, people who don't want or can't afford to install solar are paying for those who do. "And that ends up shifting a lot of the costs of maintaining the system to those who do not have means," Craver says.

This is the theme repeated over and over at the conference: Subsidized renewables, solar in particular, have become a matter of inequity, a challenge to "social fairness" by shifting costs to nonadopters. For Christopher Johns, president of PG&E, the solution is to roll back the subsidies to relevel the playing field. He has cause to worry. About one-fourth of all residential solar systems in the U.S. are installed in PG&E's 70,000-square-mile territory. "We ought to look at what's the transition period where we start to roll this off and allow them to stand on their own," he says.

Michael Peevey has a lot to say about this, as he might. Years ago he served as president of Southern California Edison and is now in his second term as president of the California Public Utilities Commission. He's heard the arguments from both sides. In his San Francisco office, the walls are decorated with pictures of Peevey with Cesar Chavez and former California Governor Pat Brown. He expresses a modicum of sympathy for the companies he regulates. The quick growth of solar has surprised many, he says; the subsidy arguments aren't necessarily unreasonable. In some states, regulation inhibits utilities from venturing into green energy.

Blog: Startups Are Winning the Massive Market for Off-Grid Solar

Some power companies do seem to be adapting, or are at least trying to. Duke Energy, the largest utility in the U.S., has built 1,600 megawatts of wind generation and 100 megawatts of solar since entering the renewables business in 2007. Southern Co. of Atlanta, operator of some of the most emission-heavy coal plants in the nation, has joined with billionaire Ted Turner to invest in five solar projects that will make it one of the largest utility owners of solar in the nation.

In the main though, utilities "hold their own fate in their hands," according to Peevey. "They can do nothing but complain or moan about technological change or they can try to adapt," he says. "The California utilities would have been very smart, five, six, eight years ago to get into the solar business themselves and put the solar panels on people's homes. They could have done this, and put it into rate base." Peevey, in fact, says he recommended they do just that, to no avail. "It's not their culture," he says. "They told me that. 'It's not our culture.' "

Story: EBay's Bet on Fuel Cells Will Influence Data Centers

"Renewable energy is so unlike fossil fuel energy," says John Farrell, a senior researcher with the Minneapolis-based Institute for Local Self-Reliance, a group pushing distributed generation. "You don't need large amounts of capital to build it, you don't need to produce it all in one place and use high-voltage transmission lines to transport it somewhere else. The idea that we would continue to have a centralized form of ownership and control of that system is really inconsistent with what the technology enables."

Farrell is a supporter of distributed power. However, the Bernstein energy industry black book, a kind of bible of energy trends published by Sanford C. Bernstein that's followed devoutly by institutional investors, also predicts that parity in the cost of unsubsidized solar and conventional electricity will radically change the energy dynamic. "The technology and energy sectors will no longer simply be one another's suppliers and customers," the report says. "They will be competing directly. For the technology sector, the first rule is: Costs always go down. For the energy sector and for all extractive industries, costs almost always go up. Given those trajectories, counterintuitively, the coming tussle between solar and conventional energy is not going to be a fair fight."

Story: Inventor's Latest Project: Superlab for Cleantech
Previous 1234 Next

With Jim Polson

Martin is a reporter for Bloomberg News in New York.
Chediak is a reporter for Bloomberg News in San Francisco.
Wells is a reporter for Bloomberg News in New York.

EXHIBIT D

THIS EXHIBIT LETTER NOT USED

EXHIBIT E

THIS EXHIBIT LETTER NOT USED

EXHIBIT F

In the Matter of:

U.S. Department of the Interior Bureau of Land Management
California Desert District Advisory Council

Reporter's Transcript of Proceedings

09/27/2014

Job #: 31059

(818)988-1900

there?

MR. GODFREY: Yes.

MEMBER MUTH: It's just an aggregate of all the withdrawals from the basin; is that right?

MR. GODFREY: That's correct. And it includes evaporation from Lake Tamarisk. It includes the recharge that the prison has for their toilets. You know, it includes a lot of different pieces of that puzzle. Lake Tamarisk, Palen Dry Lake and the prison are probably the three largest individual users in the basin, not counting the solar developers.

MEMBER MUTH: Is the groundwater situation addressed anywhere in the DRECP?

MR. GODFREY: Yes, it is.

MEMBER MUTH: Is it? Okay.

MR. GODFREY: And I helped write some of that with the idea that we would be able to get an idea and have some kind of an evaluation before any development would happen of the groundwater resource and what's available and with the intent of managing a renewable resource or a sustainable withdrawal.

One of the aspects of that issue that is challenging is that it's not uncommon -- and there's no value on it, but it's not unusual for water to be mined over a certain period of time as long as, you know, that

eventually whatever you suck out of the ground, you're going to get to a new equilibrium.

In the case of this valley, in the 1980s the agricultural use exceeded short-term recharge, and the water levels declined precipitously over a very short period of time. And I think that was part of why the "ag" industry in that area pretty much went away. Those levels that it reached in the '80s have recently been approved for use with the FERC licensed pump storage project, and the California Water Board has agreed that that's an acceptable use.

They determined that, as long as they don't go below what happened in the '80s, then eventually that water would return to an equilibrium that we currently have, but we have to keep into play all of the new uses that may be happening. So that analysis is still ongoing. But right now the best guess is that, while there will be a big hit over the next 30 years if that one project gets built, eventually it will return to some baseline that is acceptable.

MEMBER MUTH: Okay. I'm done.

MEMBER SHUMWAY: This has to do with the spring studies that you did in the high desert, primarily in the Mojave.

MR. GODFREY: Those are ongoing.

MEMBER SHUMWAY: Yeah. So does your studies have with it or eventually will have about with it some kind of recommendation for maintaining those springs?

MR. GODFREY: The PFC assessments are -- basically, they'll say whether everything is good, maybe not so good or it's bad, and if it's bad, here's something that's causing it to be bad, and here's something that you can do to change it. So I guess that implies management actions and recommendations.

MEMBER SHUMWAY: So some human intervention to keep some of these springs viable?

MR. GODFREY: Yes. For example, fencing cattle out. You know, we've come to some springs that are really trashed by cattle, and if you can just build some way for the cattle to get to water.

MEMBER SHUMWAY: Well, I'm looking at other options as well, and one of the things we saw with the vole is that human intervention is actually keeping the Amargosa waterways viable for riparian habitat. Well, the same thing happens in natural springs. Very often human intervention has kept them clear, kept plants out, has kept water flowing. And a spring's viability depends on the water flow. If you don't have enough or you have dry years like we do now, drought, silt gets in there, plants take over, and pretty soon you don't have

a spring anymore with open water; you just have an irrigated garden.

So I'm wondering if it's within the BLM's future plans perhaps to recommend human intervention to keep some springs from silting and keeping some plants out on a regular basis to keep a spring viable.

MR. GODFREY: I believe that the BLM does actively manage some springs. Generally it's --

MEMBER SHUMWAY: Short of keeping everybody out.

MR. GODFREY: Well, generally there are some springs that we do fence off and say, "Don't go here." Some are to keep people out. Some are to keep animals out or to keep cattle out. The problem of sedimentation, some of those springs, like that Sweetwater Spring in Calico Mountains, that doesn't have any flow. I mean, there are lots of them that don't have flow; there's just a seep there. And the evapotranspiration off that surface is about equal to what is coming in. And for those, I don't know what you can do except to say they're good.

One of the problems with the PFC process, it doesn't account for situations like alkalized springs, which we have plenty of, where you can come on an area that is lush with vegetation and that water isn't

potable for anybody, but it's a huge ecosystem. And the PFC form would leave you to say this place -- you know, you need to do something different here, but it's not the nature of an alkalized spring to be other than an alkalized spring, and it hosts a particular ecosystem that should be preserved as it is.

So those are some of the things we're trying to address administratively. But in terms of protecting, we certainly do whatever we can because they're scarce and valuable resources.

MEMBER SHUMWAY: My point is, sometimes it's matter of clearing out some silt and clearing out some plants, and it's as easy as that.

MR. GODFREY: In most of the cases that I've seen in the desert, we're talking about groundwater that's going to come to the surface whether -- I mean, you're not talking about a flowing system. You're not talking about riverbanks and things. You're talking about groundwater that, if there is groundwater, it's going to find the surface of the ground, and it's going to be a wet spot, and there's going to be riparian.

MEMBER SHUMWAY: Some of it is fracture-flow control as well.

MR. GODFREY: Yeah. I get that.

MEMBER SHUMWAY: So that's a different kind of

mechanism.

MR. GODFREY: Yeah. But still you're not going to get the sedimentation, or, you know, you're not going to be able to plug those fractures. You're not going to be able to plug that rock up unless you're really working hard at it so that that seep, that water to the surface, that damp soil is going to find the surface regardless if there's water to move through the ground. So I mean, that's a different issue. That's a climate-change issue.

MEMBER SHUMWAY: Thank you.

MR. GODFREY: Okay.

MEMBER ALGAZY: April?

CHAIR SALL: Mark.

MEMBER ALGAZY: I don't know if it's in your pay rate to answer this question. How much water at five percent, ten percent did you lose out of the groundwater source before it's considered to be significant?

MR. GODFREY: I don't know of any hard-and-fast rules for significance. Generally speaking, common sense would be the rule, if a reasonable person would think that that's significant. You know, there is some variability among whoever is taking the information, and that's just one of the Zen flaws to the process.

MEMBER ALGAZY: This is kind of a leading question from the standpoint that in the executive summary we're being told that they've already determined there's not going to be any significant impact to groundwater. At the same time you're telling us we don't even have a baseline yet. I don't know how they can make that determination.

MR. GODFREY: Well, we basically work on best available science, and within the DRECP, we've identified a process which says, if you have a sustainable resource, then you can use it as long as it's sustainable. If it's not sustainable, then you'll have to find some other place to go for the water. I think that's the intent of that executive comment. Does that make sense?

MEMBER ALGAZY: That makes it sound like anything is significant. Does "sustainable" mean a hundred percent recharge?

DIRECTOR RAML: It's just a timeframe.

MR. GODFREY: Yeah, it's a timeframe. As I was discussing with the California Water Board allowing the deficit, the reduction of the water table, to 1986 levels, that doesn't look sustainable over a five-year period or a ten-year period. But if you're looking at a 30-year time period and the water will recharge and come

back to current conditions, then that's sustainable. So the devil is in the details in terms of trying to figure out what really works and what doesn't work.

But, you know, the first step is to get a better handle on what's actually there and what characterizes it, figure out what it is, and then encourage conservation for the most part, which I think, when addressing the renewable energy projects, those projects have recognized that water is an issue, and they have gone quite a ways to reducing their water footprint, you know, in their proposals. So, you know, it's a cost thing for them. It's an ecological thing for the desert. You know, we try to find some kind of a balance.

MEMBER ALGAZY: Thank you.

CHAIR SALL: Other questions? I'll ask a couple.

MEMBER HOUSTON: I could speak to Mark's question as well.

CHAIR SALL: Okay.

MEMBER HOUSTON: Mark, you ask about significance. And under CEQA, for groundwater the criteria -- I'll read it -- for significance is, "Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there

would be a net deficit in aquifer volume or a lowering of the local groundwater table. For example, the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted."

So that is the significance criteria. But I tend to agree with you that, is there really enough data to determine substantial depletion?

CHAIR SALL: Thank you, Don. A couple of questions. So in terms of for DRECP, and kind of following up on Mark's question, if there isn't a lot of baseline data, and following back to your earlier statement of wanting to be as sort of conservative and cautious as possible, I mean, there's a lot of assumptions based on recharge if you're talking about something being sustainable for, say, a 30-year future date.

So how is, for instance, the last ten-year drought or some of these cycles from a precipitation inflow being reduced? How is that being treated in terms of the cumulative impact of various projects in, say, a DFA?

MR. GODFREY: I'm hoping that one of the models that is being developed, particularly the pause model that Penn State is putting together, will be able to

respond to the potential for climate change and reduced precipitation.

CHAIR SALL: What's the approximate timeline of that model?

MR. GODFREY: Well, we've got some preliminary stuff done, and we were hoping in the next two years to have something a little more concrete and get it out and reviewed, peer reviewed.

CHAIR SALL: Okay. Thank you. Similarly on the PFC analysis, you suggested that that's not very appropriate and applicable to a lot of desert seeps and springs. What is the process for modifying that or developing a more appropriate tool, and is that happening?

MR. GODFREY: Noel Ludwig and I have developed an alternate PFC format, which uses the same yes-no question format and leads you to the conclusion that it's either functioning or not functioning or at risk, functioning at risk or not functioning. And we've initiated discussions with the national team, which includes BLM and Forest Service employees, and we're actively working on that.

CHAIR SALL: Great. Thank you.

MR. GODFREY: We gave a presentation on that issue to the Devil's Hole workshop.

CHAIR SALL: Great. Thank you for your work on that.

MEMBER MUTH: April?

CHAIR SALL: Al?

MEMBER MUTH: Mark, can you restate what you said about the conclusion in the executive summary regarding -- was it a no significant impact on groundwater withdrawals?

MEMBER ALGAZY: There's two columns.

MEMBER MUTH: Please restate it, would you, sir.

MEMBER ALGAZY: Well, there's two columns in the executive summary analyzing the difference between the no-action alternative and the preferred-action alternative, and under the groundwater section, they've checked the box as indicating that there's not a significant impact under the preferred alternative. And it's an interesting conclusion to be making at this point in time.

MEMBER MUTH: Right. So I guess my question would be, is that a prudent assumption to be made, given all the unknowns and the unknown unknowns and all of that?

MR. GODFREY: Can I address that?

MEMBER MUTH: Sure.

MR. GODFREY: I'm sorry. I didn't mean to interrupt you.

MEMBER MUTH: I deserve to be interrupted occasionally.

MR. GODFREY: I was just trying to jump the gun here. The significance issue for CEQA is -- it's not quite the same for federal actions. For us to come to a finding of no significant impact, we can mitigate those impacts to some degree, and if those impacts are mitigated, then we can say there's no significant impact federally, I believe.

DIRECTOR RAML: And I think they're thinking what we need to keep in mind is, what is the DRECP approving, significant impact from what? No. So part of it is, you're talking about what is the impact? But the DRECP is not approving projects. So part of it is, when you determine what the preferred -- what is the DRECP approving, then you come back and say, "Okay. Is that valid or not?" But if you leaped ahead in a way to say that's approving projects in the basin and it's approving certain stuff, and you've said, "How is that factored in?" that's not kind of where you're at in terms of reading the document yet.

MR. GODFREY: It's a planning document. So the decision to be made is whether to approve the plan

which, under that preferred alternative, has conservation measures as a part of it which should take care of those issues that you're discussing -- the impacts in some way so that the impacts are mitigated and not significant.

MEMBER ALGAZY: I'm sorry. I understand what you're saying, but I still see it as being relevant that in the initial stages without any projects being specifically referred to, to me is analogous to deciding whether you're going to put bullets in your gun or not. No murder is being committed, but you're getting a lot closer to a murder being committed at the point where bullets are being put into a gun.

So it's something that needs to be looked at at the time when the vehicle first comes along. And in this case it's not a gun, but the DRECP is a vehicle for making things happen. It can have consequences.

MEMBER MUTH: It looks like first the verdict and then the trial, is what it comes down to.

MR. GODFREY: And I guess in defense of the DRECP, I think if you'll spend the time to look at the water issues and the water CMAs, you'll probably feel better about what we're discussing. They include having for any given project a water study done, verifying the basin water balance. It includes some other issues that

I think go a long way to addressing all of those concerns that you may have. So before you hang the DRECP for the summary, it's, you know --

MEMBER ALGAZY: One more comment. I think that it's actually unfair to developers not to have the information incorporated into the initial documents because, if the DRECP goes through without this information, it gives the developer a false sense of hope, and then they go into the office to submit for a project and you say, "Oh, sorry. In the meantime we've determined that every basin is in over drought, and we can't give you a permit," so the whole process has just been giving developers a false sense of hope. That's another reason why the information needs to be developed and a determination of significance before any projects are put on the table.

MR. GODFREY: I get your point.

CHAIR SALL: Thank you, Pete. I think that was very helpful, and we will all be looking into diving into the document and will have more thoughts and questions at that point, I think. But, yeah, thank you for the presentation. That was very informative.

At this point do we have any other DAC discussion or comments on the presentation or topic? Seeing and hearing none, we are going to move into our

EXHIBIT G

ENVIRONMENT

Hydrologist urges panel to make water decisions now

By MIKE LAMB
STAFF WRITER
Posted Dec. 1, 2014 @ 12:08 pm
Updated Dec 1, 2014 at 12:13 PM

LENWOOD — Despite differences in opinion over climate change, one hydrologist believes decisions have to be made now to deal with dwindling water flow in the Mojave River and its affects on groundwater supplies.

"The Mojave River in Barstow, it can be 20 years with no significant flow in that river," Dr. John A. Izbicki said during a climate change workshop held by the Lahontan Regional Water Quality Control Board recently at the Hampton Inn in Lenwood. Izbicki is a scientist with the United States Geological Survey.

"So the last significant flow occurred in 2010," Izbicki said. "I would like to think in 2030 we can be sitting in a room like this talking about the success and merits of what was done today and decided today in light of climate change. Not arguing and discussing about, well, we failed because we didn't correctly anticipate climate change. Knowledge of the past, even if assuming stationary and concluding understanding what this extreme event means in terms of drought. Understanding what extreme event means in terms of water flow and its availability is going to really, really be important in the decision process in understanding climate change."

Izbicki made one of three presentation during the workshop. Dan Cayan from the Scripps Institution of Oceanography and the USGS gave a presentation on climate variability change and California water. Max Gomberg, climate change advisor to the California Water Resources Control Board, made a presentation on climate change adaptation and mitigation policy.

After the presentations, water board officials joined representatives from other government agencies and broke out into small groups to brainstorm ideas to deal with climate change issues in the region, such as extreme drought conditions.

Izbecki offered several conclusions in his presentation:

• Climate in the Mojave Desert has been changing for millennia;

• There is uncertainty as to the long-term change in climate on groundwater recharge for the Mojave River generally drier climate versus larger and more frequent extreme events;

• Other man-made influences have already created measurable impacts on groundwater recharge and availability;

• The existing record (1931 to present) shows large streamflows and subsequent large-scale recharge occurs on average every seven years. But extended periods of up to 20 years can occur without significant flow and recharge of the Mojave River.

Izbicki will be conducting a four-year study to find out what part of the chromium-6 in Hinkley groundwater belongs to PG&E and what part was put there by nature. As part of the study, Izbicki said he will looking at the connection between the agriculture treatment plants and groundwater supplies.

While Cayan said he would rather not make any bold predictions, he offered some key points.

"If you twist my arm, I would say we are about to get drier," he said. "The models differ on how much drier."

His other points:

• California's climate is prone to year-to-year and longer term variation in precipitation. Drought is an expected part of the state's climate — present and future;

• California's dry spells often build up over multiple years. A more/less dry pattern has been in place since 1999;

• The absence of a few very large storms is often a key driver of dry years;

• Climate change will broadly affect California's hydroclimate and impact sectors and systems across-the-board;

• Climate changes in annual precipitation is not so clear in California. However, climate change may shift precipitation characteristics. Implications are less snow and more rain, earlier run-off from traditionally snowfed mountain watersheds, higher floods and potentially less stored water.

Gomberg mentioned that wildfire threats have increased in the state. He said firefighters have responded to 5,329 fires so far this year, compared to 4,356 this time last year. He also said fires have burned 91,912 acres in state responsibility areas.

Gomberg also reported the drought impacts on water:

• Several cities and towns are in danger of running out of water in 60 to 90 days;

• Several dozen communities are on the critical water list, which is 120 to 150 days from running out of drinking water;

• Domestic wells are already dry and expect more to dry up as water tables decline.

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Joe Wenzel Top Commenter

Let me guess one of their plans is to raise the price of water substantially just like they did by taxing gasoline excessively to get us to stop using it as much. Only thing is people can live without gasoline but not water.

Reply · Like · December 4, 2014 at 12:32pm

Drive-in undergoing digital conversion, expected to reopen in March Feb. 16, 2015

Future uncertain for drive-in theater Feb. 14, 2015

Mitchell: Casino decision looms Feb. 18, 2015

Emmy Award winning Beatles tribute band comes to Barstow Feb. 14, 2015

Federal grand jury investigating jail Feb. 17, 2015

Two local hotels see growth in revenue, patrons Feb. 18, 2015

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High Desert Jets First Annual Car Show, Victorville

Damsel in Defense
Saturday, Mar 7, 9:30 am
Mateo Academy of Self Defense, Victorville

Farmers Insurance - Diane Holder
Wednesday, Mar 18, 9:00 am
Farmers Insurance - Diane Holder, Victorville

Royal Ballet: Swan Lake
Thursday, Mar 19, 7:00 pm
Cinemark at Victor Valley Mall, Victorville

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EXHIBIT H

CALIFORNIA DROUGHT

State: Groundwater supplies at risk of overdraft

Officials emphasize need for continuing conservation

By STAFF REPORTS
Posted Dec. 2, 2014 @ 5:44 pm
Updated Dec 2, 2014 at 5:47 PM

SACRAMENTO — The state Department of Water Resources offered an update Tuesday on the three-year drought in California, emphasizing a risk to groundwater supplies and aquifers such as those relied on in the High Desert.

The update followed an announcement Monday in which the department said it would increase the allotment from the State Water Project to authorized water contractors in 2015.

Drought conditions typically result in an increase in groundwater well activity and pumping to compensate for surface water supply shortages, DWR said in a news release. Local water managers say most of the High Desert's water is supplied by underground sources administered by Mojave Water Agency, the area's watermaster and a State Water Project contractor.

"MWA will continue to closely monitor our groundwater basin and take action necessary according to how the conditions are," the agency's spokeswoman, Yvonne Hester, said on Tuesday.

She echoed comments made by DWR Director Mark Cowin that conserving water is a key action to continue.

Collectively, groundwater basins are the state's largest reservoir, 10 times the size of all its surface reservoirs combined. More than 80 percent of Californians rely, in part, on groundwater for their drinking water, DWR officials said.

Water management officials are hoping the Sustainable Groundwater Management Act, composed of three bills Gov. Jerry Brown signed on Sept. 16, will help head off problems such as subsidence and overdraft, "which may damage aquifers permanently," Cowin said. He said the bill would help local agencies "to establish groundwater pumping levels that yield reliable supplies for generations to come."

"State and local agencies will be working together over the next several years to craft local sustainability plans in regions where groundwater basins are vulnerable to overdraft," he said.

On Monday, the California Department of Water Resources announced an initial allocation of 10 percent for the customers of the State Water Project, including Mojave Water Agency.

Improved precipitation forecasts this week allow DWR to set the initial allocation for 2015 at 10 percent, up from the 5 percent allocation State Water Project customers got this year, the department said. The level of Lake Oroville — the keystone reservoir of the SWP system and a source of water for 25 million Californians — is rising due to recent storms, after approaching its lowest level ever last month.

"Certainly the increased allocation is good news," Hester said. "However, we have to remember there's no guarantee there will be more. We need to make sure, statewide, we continue to conserve water aggressively."

Begin optional trim

This year the state department originally allotted 5 percent of the SWP contractors' entitled amounts. But it was reduced to zero, then brought back up to 5 percent.

The only previous zero allocation in the 54-year history of the SWP was for agriculture in 1991, but cities and others that year received 30 percent of requested amounts.

This year's 5-percent allocation was the lowest final calendar year allocation in SWP history because a sparse mountain snowpack melted early and rainfall was near record lows in most parts of the state.

The final SWP allocation for calendar year 2013 was 35 percent of requested water amounts. In 2012, the final allocation was 65 percent. It was 80 percent in 2011, up dramatically from an initial allocation of 25 percent.

Staff Writer Gary Brodeur contributed to this report.

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Drive-in undergoing digital conversion, expected to reopen in March Feb. 16, 2015

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EXHIBIT I

UNIVERSITY OF CALIFORNIA
UC RIVERSIDE

College of Natural & Agricultural Sciences
Center for Conservation Biology
1303 Webber Hall
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DESERT DEVELOPMENT ISSUES

Solar Power in the Desert: Are the current large-scale solar developments really improving California's environment?

Gaps in Desert Research

Michael F. Allen, Director
Professor of Biology, and Plant Pathology and Microbiology

Alan McHughen, Cooperative Extension Specialist
Department of Botany and Plant Sciences

California deserts are faced with unprecedented anthropogenic change. Impact factors range from expanding urban centers and military bases, to potential significant habitat loss from solar and thermal power expansions (including ground water exploitation and depletion beyond recovery, land stripping for power generation units, and fragmentation from power and associated transportation corridors), and climate change. Together these factors threaten remaining suitable habitat for endangered and for other endemic desert species. Other individuals and studies have commented on the use of out-moded technologies employed in the current American Recovery and Reinvestment Act of 2009 (ARRA) projects, and the economic subsidies that are enabling individual site development and the creation of new transmission corridors in remote, previously undisturbed, areas rather than focusing on existing degraded lands and power corridors. We want to be clear that although we question the current project implementation in this article, we strongly support a transition from a fossil-fuel based energy system to one that will not further exacerbate our current trajectories of anthropogenic climate change, as well as providing energy independence and economic stimulus for our country.

Our goal here is to outline the scope of environmental changes that are underway, and to outline research needs necessary to provide long-term sustainability of federally- and state-listed species and their habitats, ensuring that energy developments are also fully compliant with the letter and intent of state and federal resource protection statutes. We identified several topic areas that are of concern to land managers and project developers in the California deserts. These represent topic areas badly in need of research using state-of-the-art techniques coupled with known expertise, tailored to the desert areas to be impacted by the proposed developments. These include the following issues and their interactions:

- Climate change and shifts in endangered species habitat location and migration potential
- Sources, recharge, and loss of groundwater from large-scale solar steam generator systems
- Persistence of endangered, threatened, and unlisted endemic species in current protected areas, and in new areas where habitat suitability is altered from climate and anthropogenic land-use change
- Exotic invasive species migration pathways, competitive abilities and productivity
- Interactions among vegetation composition, production, fire, pollution and climate change
- Carbon budgets and net carbon loss or sequestration.

Unfortunately, many federal and state agencies, as well as several non-government organizations, whose goal is to protect habitats appear to have overlooked previous results suggesting unacceptable levels of "take" for endangered species, and overlooked existing literature addressing net carbon fluxes that would be affected by the proposed solar developments. Nor have they employed state-of-the art research tools capable of integrating new ecosystem and habitat modeling approaches coupled with carefully-collected spatial and temporal data.

Most of the large-scale solar power projects utilize large quantities of water as steam power generators. The largest of these plants are steam-based thermal plants, using up to 2.9 to $3m^3$/MWh (US DOE 2006). Assuming 12h/day of active use, a 1,000MW would drain $35,280m^3$/day, or 28.6 acre-feet of water per day, or 10,435 acre-feet/year. One groundwater basin, such as the Palo Verde Mesa Groundwater Basin recharges only 800 acre-feet per year, largely from recharge by underflow from the Chuckwalla Valley (Department of Water Resources 2003). Even with a low water system, with less energy efficiency, the water use may still likely be well more than the recharge rates. The use of water affects agriculture, existing housing and businesses, the mining industry, military training grounds, and wildlife habitats. Plant species, such as the *Amargosa niterwort* (Hasselquist & Allen 2009), and animals including the desert pupfish populations in Ash Meadows (Deacon et al. 2007, Martin 2010) that are dependent upon surface waters and a high groundwater level are once again threatened this time by solar development. Despite the Department of Interior's call that conservation is a high priority, this is not apparent for these developments.

While researchers in the region, including UC Riverside scientists, have been addressing factors that challenge the ability of desert ecosystems to sustain themselves with state-of-the-art analyses, many state and federal agencies have continued to employ outdated models and decision tools (e.g., see "Harness sun wisely" Riverside Press-Enterprise 12/26/2010, and "energy developers need better tortoise counts, officials say" Riverside Press-Enterprise 11/4/10).

Federally-listed species such as the desert tortoise and those of concern like the Mohave fringe-toed lizard (Fig 1) are already impacted by new energy developments (e.g., the Ivanpah bulldozing of prime tortoise habitat), roads and urbanization, invasive plants, and changes in military base activities. Relocating species like the tortoises to unoccupied habitats, even those postulated "suitable" by experts, is conceptually flawed. Over 50 percent mortality is reported in short-term experiments (Desert Tortoise Council 2010). If environmental factors like climate change is included, the potential habitat in the desert is reduced even further (Fig 2).

Figure 1. Species that are directly impacted by the current and proposed developments in the California deserts, include the desert tortoise (a federally-listed endangered species) and the Mojave fringe-toed lizard (local populations are of concern to ecologists) (photographs by Cameron Barrows).

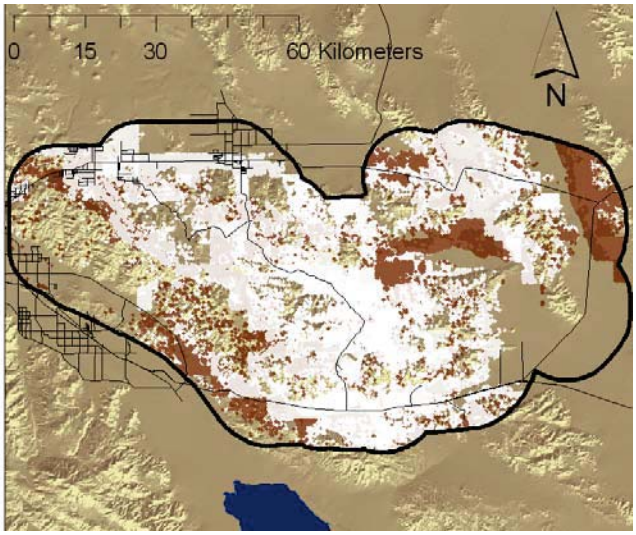


Figure 2. Potential response of desert tortoise to projected climate change at Joshua Tree National Park (C. Barrows). The white plus brown areas represents current habitat. White is the area lost with a 1°C increase in temperature, and a 75mm drop in precipitation, with the brown showing the remaining habitat. Transplanting animals, such as the desert tortoise is conceptually suspect, and the data presented to date suggest that this is not a viable approach. Even if accepted, "unoccupied" habitats are both currently suspect, and certainly have not been vetted against future climate change.

Solar development is essential to reduce carbon inputs to the atmosphere and global warming. But solar development needs to incorporate the best available science into planning and production efforts. The proposed large scale solar developments in California will impact dramatically current habitat and potential habitat of species of concern. We already understand that development patterns can dramatically affect current and potential habitat, as published for the Coachella Valley fringe-toed

lizard (Barrows et al. 2010). Coupling climate change and development impacts could easily lead to local extinction for many populations of these species, and even extinction in some cases (Barrows et al. 2010).

Infrastructure and transportation associated with urban expansion and energy development is likely to impact significantly desert environmental quality. Almost all areas outside of the National Parks, and the existing military bases are among areas potentially subject to these developments (Fig 3). A decade ago, we demonstrated that in developed areas, such as along highway 62, nitrogen in the

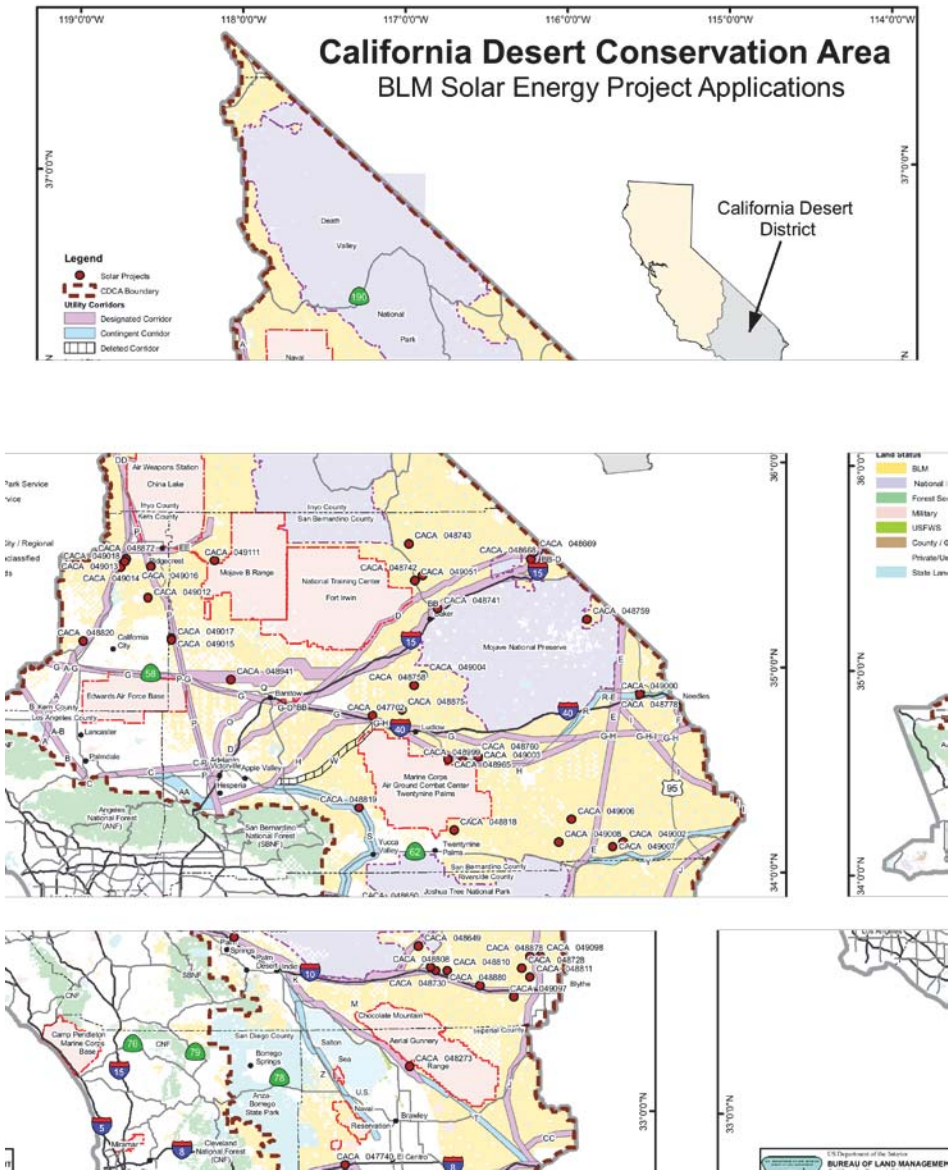


Figure 3. Proposed large-scale energy projects (http://www.energy.ca.gov/siting/solar/cdd_energy_points_8_5x11_solar.pdf). These areas will be subject to increased habitat fragmentation, vehicular traffic and development resulting in significantly increased air pollution, and N deposition.

soil accumulated during the dry season from vehicular-derived air pollution (Fig 4, M. Allen unpublished data). These soil depositions functioned as fertilizer and were subsequently leached and absorbed by vegetation during the wet season, contributing to the massive increase in exotic grass production, to a level capable of carrying fire (Rao et al. 2010). Regional nitrogen deposition models (Fig 5) show that the military bases and solar developments are in locations undergoing increasing air pollution, threatening endangered species and land management protocols. Continued disregard of these changes likely will have dramatic impacts on the natural resource management issues of the region.

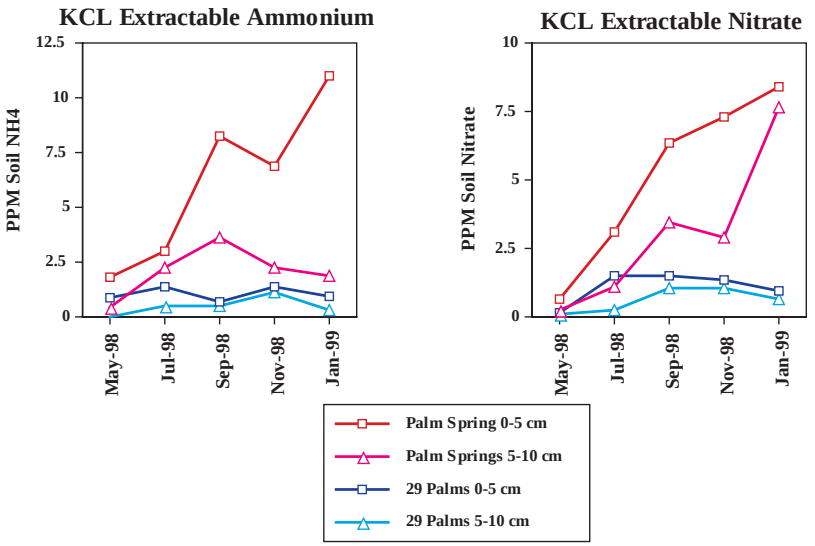


Figure 4. N changes in soil in response to development activity (M Allen unpublished data) showing seasonal increase in N in a developed area (near Palm Desert) versus a remote site (29 Palms Marine Corps base) in 1998. As the Yucca Valley and other desert regions continue to develop, and new energy developments are placed, the potential for more problems with N deposition, fire, and invasive species continues to grow.

Many of the areas that are proposed to be developed for the solar development include Microphyll woodlands (Fig 6). The dominant plants (legume trees) have deep roots capable of reaching groundwater (several meters). When desert plants grow, they absorb carbon dioxide (CO_2). The carbon (C), as sugars, moves into roots and soil organisms. Carbon dioxide is respired back into the soil, part of which reacts with calcium (Ca) in the soil to form calcium carbonate. This is how our deserts sequester large amounts of C and thus function to reduce atmospheric CO_2. ***The magnitude of this carbon storage process is still a crucial research question and remains unknown for our California deserts.*** However, values of up to 100g/m2/y of C-fixation are reported for deserts in Baja and Nevada (Serrano-Ortiz et al. 2010). After vegetation is removed to make

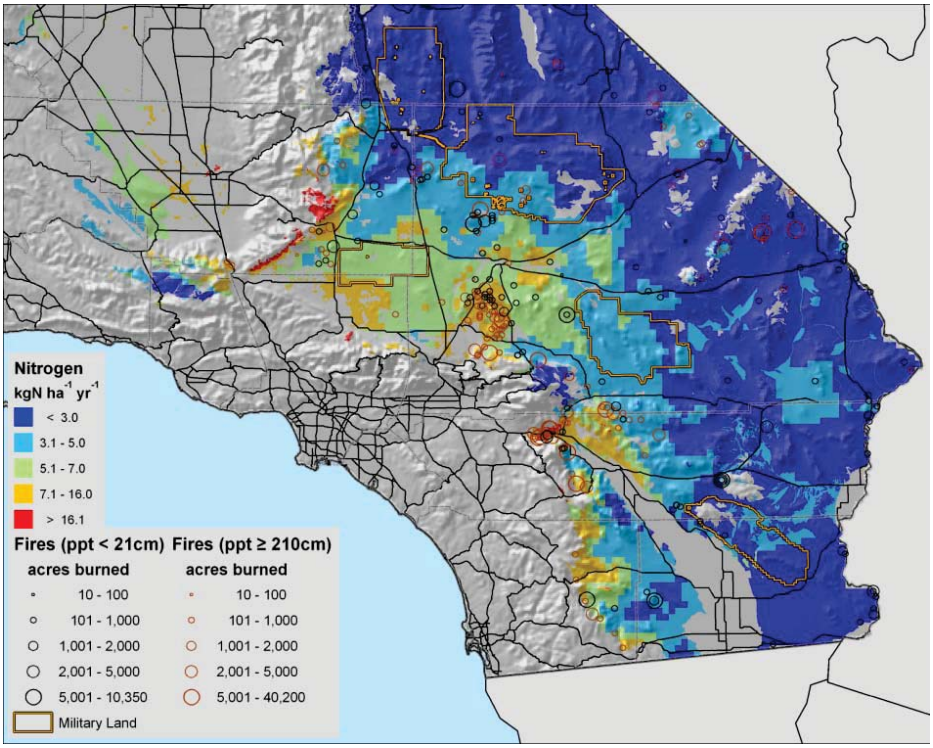


Figure 5. Fire in the desert and nitrogen deposition (from CCB, R. Johnson and E. Allen). Research in the Mojave desert (Rao et al. 2010) shows that in these regions, N deposition (largely from transportation and suburban development) above 3-9 kg/ha/y is above the "critical load" that facilitates exotic grass production, can result in fire and permanent ecosystem degradation. As development increases surrounding these areas, the potential for invasive species, land degradation, and risk of fire increases as it has in other developing areas.

Figure 6. Microphyll woodlands are among the most productive ecosystems that will be affected by solar power facilities. There are no data documenting the amount of carbon sequestration that will be lost with the loss of these stands. However, because these stands access groundwater, they are among the most productive of desert ecosystems.

way for solar arrays, carbon dioxide will be left to return to the atmosphere that ordinarily would have been used to form soil organic matter buried up to several meters deep, or released by roots and soil microbes as soil CO_2, which in turn, binds with soil Ca to form caliche.

Our deserts have large amounts of CO_2, stored as caliche ($CaCO_3$). The amount of C in caliche, when accounted globally, may be equal to the entire C as CO_2 in the atmosphere. This caliche is formed from weathering of Ca in desert soils binding to carbonates that originate in large part from respiration of roots and soil organisms. Most of the caliche in our deserts was formed during the ice ages, when vegetation was more dense and more productive. These deposits likely have been stable since (Schlesinger 1985). Being stable, though, means that inputs equal exports. Carbon in caliche may in fact be released, especially when vegetation and soils are disturbed. Mielnick et al. (2005) reported losses of up to 145g $C/m^2/y$. Additional research is needed to understand and quantify these exchanges (Schlesinger et al. 2009, Serrano-Ortiz et al. 2010), as there are C exchanges in desert ecosystems that we do not understand. This loss may be especially critical following removal of the vegetation for thermal solar power units. The net C loss due to a loss of native desert vegetation could be as high as 50g $C/m^2/y$ plus weathering and dissolution of carbon dioxide from caliche up to 150g/m^2/y for an area of 7,000 acres (a common size for solar plants of 1,000MW). This translates to an annual loss of nearly 6,000 metric tons of C released by caliche, or retained in the atmosphere due to the loss of vegetation. This does not include the land disturbed by transmission corridors and maintenance roads through desert lands.

Solar power units that generate 1,000MW would save nearly 560,000 metric tons of C per year. However, we do not know the life-span of these solar power units. This net loss of caliche could continue or even increase as temperatures warm for centuries or more, given the incredibly large amount stored in our California desert valleys and vegetation recovery following disturbance for developing desert lands can also take a century or more (Fig 7). If we include the C savings from an active use of photovoltaic cells in the locations where demand is heavy (see Warmann and Jenerette 2010), then the entire regional C balance becomes even less weighted toward the large desert thermal developments.

Finally, what is the life-expectancy of a thermal solar energy development? A common presumption is that these extend indefinitely into the future. But water quality is a crucial issue for solar development, because water from both the Colorado River and the groundwater basins of the regions are highly corrosive to the project plumbing. This means additional land disturbance from maintenance and replacement activities, and a reduced lifespan of these solar projects. Given changes in government subsidies, the over-exploitation of groundwater supplies, and the heavy replacement and maintenance costs associated with the corrosive water quality, this may not be a reasonable assumption. Even when plant re-establishment occurs, disturbed lands will be dominated by annual grasses and

forbs with shallow roots instead of deep-rooted shrubs, potentially for a century or more. Soil organic C likely will rapidly cycle back to the atmosphere. We do not know how soil inorganic C behaves. Understanding the lifespans of the solar plants, compared with this long-term slow C balance is a critical need for determining if these solar developments represent a net long-term reduction in greenhouse gases. Does calcium carbonate then weather back into CO_2 with no plants to replenish the soil CO_2? Could large-scale solar developments in our deserts actually increase atmospheric greenhouse gas levels over the next centuries?

Figure 7. Overlook from Desert Center, CA, looking eastward across lands designated for solar power development. The combination of developments has the potential to fragment populations of desert species, degrade soils, and reduce carbon sequestration potential of these arid lands.

The areas of the California deserts where the mega- solar projects are to be built are mainly in areas where water is the limiting factor for production and organism survival. Precipitation is highly variable in space and time, and hydrology is not well documented. The basins are interconnected. Yet we know little about the rates or even directions of the subsurface flows and small transient perched water pockets created by earthquake fault lines that support plants whose roots must reach the groundwater, such as palms, ironwood and mesquite. Water extraction at large scales could have critical impacts on desert ecosystems, including animal species like deer, bighorn sheep, and mountain lions, more than just tortoises. Microphyll woodlands and mesquite stands support various endangered species and species of concern, both directly as habitat and food, and indirectly by supporting annual forbs that serve as food sources as the soil dries out. We do not know how or where water is connected between basins, nor if the water used for individual projects is continually recharged, or comprised of water laid down in the Pleistocene.

Concluding Remarks

These development impacts are particularly questionable given the incredible surface area located in regions with high solar radiation such as southern California. Warmann and Jenerette (2010) estimated that 10 percent of the rooftop areas suitable for solar photovoltaic systems could supply 80 percent of the annual energy requirements for the region. Given the large acreages of private, already disturbed lands scattered across the California deserts, use of more pristine habitat of endangered species like the desert tortoise and the *Amargosa niterwort* seems counterproductive.

Again, we are not objecting to renewable energy development in the California deserts. Indeed, we have worked for decades with military installations and with energy companies to enhance environmental management and restoration. We can do the same with renewable energy projects. However, without careful planning and management, massive detrimental impacts over extremely large areas could result from the current energy development proposals. For society to benefit from solar energy while preserving our desert ecosystems, we must obtain and use sound existing scientific methods, and fund credible new science based on accepted review and award principles, as practiced by agencies with experience in peer-reviewed funding such as National Science Foundation or National Institute of Health. We must apply principles as judged by published peer-reviewed literature in top journals, and defendable, innovative ideas judged by scientific experts without conflicts of interest.

If the construction of poorly placed solar arrays in California leads to the loss of endangered species, destruction of plant and animal habitat, increased environmental contaminants, diversion of water and increased global warming due to more carbon dioxide in the atmosphere, then any justification for placing solar arrays in our deserts is seriously undermined.

Relevant Readings

Allen, E.B. 1988. The reconstruction of disturbed arid ecosystems. AAAS Symposium. Westview Press, Boulder Colorado.

Allen, E.B., S.A. Eliason, V.J. Marquez, G.P. Schultz, N.K. Storms, C.D. Stylinski, T.A. Zink and M.F. Allen. 2000. What are the limits to restoration of coastal sage scrub in Southern California. In J.E. Keely, M.B. Keely, and C.J. Fotheringham, eds. Second Interface between Ecology and Land Development in California. International Association of Wildland Fire, Fairfield, Washington.

Allen, M.F. & E.B. Allen. 1986. Utah State Project Exemplifies Restoration Ecology Approach to Research. Restoration and Management Notes 4(2): 64-67

Bainbridge, D., R. MacAller, M. Fidelibus, R. Franson, A. C. Williams and L. Lippit. 1995. A Beginners Guide to Desert Restoration. United States Department of the Interior, National Park Service. Denver, CO

Bainbridge, D.A. 2007. A guide for desert and dryland restoration: New hope for arid lands. Society for Ecological Restoration International, Washington D.C., Island Press.

Bainbridge, D.A. and J. Lovich. 1999. Anthropogenic degradation of the southern California desert ecosystem and prospects for natural recovery and restoration - a review. Environmental Managment 24(3):309-326.

Barrows, C.W. and M.F. Allen. 2007. Community complexity: stratifying monitoring schemes within a desert sand dune landscape. Journal of Arid Environments 69: 315-330.

Barrows, C.W., M.B. Swartz, W.L. Hodges, M.F. Allen, J.T. Rotenberry, and B-L. Li. 2005. A framework for monitoring multiple species conservation plans. Journal of Wildlife Management 69: 1333-1345.

Barrows, C.W., J.T. Rotenberry, and M.F. Allen. 2010. Assessing sensitivity to climate change and drought variability of a sand dune endemic lizard. Biological Conservation 143: 731-736.

Department of Water Resources. California's Groundwater Bulletin 118. http://www.water.ca.gov/groundwater/bulletin118/update2003.cfm

Desert Tortoise Council. 2010. Results presented. 2010 Annual meeting and symposium. http://www.deserttortoise.org/

Deacon, J.E., Q.E. Williams, C.D. Williams, J.E. Williams. 2007. Fueling population growth in Las Vegas: How large-scale groundwater withdrawal could burn regional biodiversity. BioScience 57: 688-698.

Edwards, Fred S., David A. Bainbridge, Thomas A. Zink and Michael F. Allen. 2000. Rainfall catchments improve survival of container plants at Mojave Desert Site. Ecological Restoration 18(2): 100-103

Guay, B.E., C.J. Eastoe, R. Bassett, and A. Long. 2006. Identifying sources of groundwater in the lower Colorado River valley, USA, with ^{18}O, D, and ^{3}H: implications for river water accounting. Hydrogeology Journal 14: 146-158.

Hasselquist, N. and M.F. Allen. 2009. Increasing demands on limited water resources: consequences for two endangered species in Amargosa Valley, USA. American Journal of Botany 96: 1-7.

Huntley, B. P. Barnard, R. Altwegg, L. Chambers, B.W.T. Coetzee, L. Gibson, P.A.R. Hockey, D.G. Hole, G.F. Midgley, L.G. Underhill, and S.G. Willis. 2010. Beyond bioclimate envelopes: dynamic species' range and abundance modeling in the context of climate change. Ecography 33: 621-626.

Martin, A.P. 2010. The conservation genetics of Ash Meadows pupfish populations. I. The Warm Springs pupfish *Cyprinodon nevadensis pectoralis*. Conservation Genetics 11: 1847-1857.

Mielnick, P. W.A. Dugas, K. Mitchell, and K. Havstad. 2005. Long-term measurements of CO_2 flux and evapotranspiration in a Chihuahuan desert grassland. Journal of Arid Environments 60: 423-436.

Powers, B. 2010. Federal government betting on the wrong solar horse. Natural Gas & Electricity DOI 10.1002/gas/@2010 Wiley Periodicals, Inc.

Preston, K.L., J.T. Rotenberry, R.A. Redak, and M.F. Allen. 2008. Habitat shifts of endangered species under altered climate conditions: importance of biotic interactions. Global Change Biology 14: 2501-2515.

Rao, L.E., E.B. Allen, and T. Meixner. 2010. Risk-based determination of critical nitrogen deposition loads for fire spread in southern California deserts. Ecological Applications, in press.

Rotenberry, J.T., Preston, K.L., Knick, S.T., 2006. GIS-based niche modeling for mapping species habitat. Ecology 87, 1458–1464.

Serrano-Ortiz, P. et al. 2010. Hidden, abiotic CO2 flows and gaseous reservoirs in the terrestrial carbon cycle: Review and perspectives. Agricultural and Forest Meteorology 150: 321-329.

Schlesinger, W.H. 1985. The formation of caliche in soils of the Mojave desert, California. Geochimica et Cosmochimica Acta 49: 57-66.

Schlesinger, W.H., J. Belnap, and G. Marion. 2009. On carbon sequestration in desert ecosystems. Global Change Biology 15: 1488-1490.

U.S. Department of Energy. 2006. Energy Demands on Water Resources: Report to Congress on the Interdependency of Energy and Water (Dec. 2006), *available at* http://www.sandia.gov/energy-water/docs/121-RptToCongress-EWwEIAcomments-FINAL.pdf. Carter provided notes.

U.S. Environmental Protection Agency. 2010. Clean Energy: Natural Gas. http://www.epa.gov/cleanenergy/energy-and-you/affect/natural-gas.html

Van der Putten, W.H., M. Macel and M.E. Visser. 2010. Predicting species distribution and abundance responses to climate change: why it is essential to include biotic interactions across trophic levels. Philosophical Transactions of the Royal Society B 365: 2025-2034.

Wall Street Journal. 2010. The great transmission heist. November 7, 2010.

Warmann, E.C. and G.D. Jenerette. 2010. Box 11: Two paths towards solar energy: Photovoltaic vs Solar Thermal. In: Planetary Stewardship. Bulletin of the Ecological Society of America April 2010: 173- 174.

Zink, T.A. 1997. "Impacts of Military Training Disturbances on Mojave Desert Creosote Scrub Habitat". Soil Ecology Society National Conference, Manhattan, Kansas. May, 1997.

EXHIBIT J

MEETING

STATE OF CALIFORNIA

ENERGY COMMISSION

In the Matter of:	)
	)
Desert Renewable Energy	)
Conservation Plan	)

HILTON SAN DIEGO MISSION VALLEY

901 CAMINO DEL RIO SOUTH

SAN DIEGO, CALIFORNIA

TUESDAY, OCTOBER 21, 2014

6:30 P.M.

Reported by:

Troy Ray

alone that it's causing us to try to set our lives aside to deal with all of this is -- should be taken into consideration.

We've got a lot of incidences of Valley Fever that are already happening out there. The tremendous land disturbance that is being proposed could cause an incredible amount of this Valley Fever. It's called coccidioides and it causes all kinds of chronic problems which include fever, chest pains, joint aches, fatigue, headaches, chills, night sweats. I think I have a lot of that from going through some of this process already.

And you know, there's just a lot of considerations that we feel need to be looked at before we hurdle into things that will destroy our desert forever. It's not just, you know, it's not just a few considerations. We've got -- we've got precious land out there that we want to protect, and we want to protect it for our generations to come.

And we are imploring you, especially the BLM and those of you that have, you know, stepped up, too, because you love this land, we're asking you to take another look at this and to give us the time that we need to -- to come up with some viable alternatives and solutions. Thank you.

MR. BEALE: Thank you. Ron Rempel.

MR. REMPEL: My name is Ron Rempel and I've had the privilege of working on numerous NCCPs, both in the

development and the implementation of those plans. And I just have a few comments tonight, since I haven't had a chance to look at the whole document yet. I do have the disk now, and I appreciate the Energy Commission providing that.

One of the clear pieces the NCCP Act requires is funding for the long-term management and monitoring of species. The plan does not appear to include funding that will take those management and monitoring into the long term. I think the assumption is that someday some plants will be taken out and be restored. But that is, I think, really open question over the long term.

But in addition the costs associated with management and monitoring appear to be off by a factor of 20 or more. In other words, there isn't near enough money being put into the program in order to do the management and monitoring. And I'm sure there are some folks here in San Diego that would be more than willing to sit down with Staff and go over the real costs of management and monitoring for an NCCP and the types of species we're talking about since we do know those costs today, and it's far greater than anybody anticipated.

I think the piece, also, with the long-term funding for management and monitoring is -- I see that really as a cost shift to future -- to future residents, to

future developers out in the desert. Because this program really is going to underestimate the required mitigation to fully offset the impacts. We know that out at Coso Geothermal, the mitigation that was put in there did not work for Mojave ground squirrels. There was not demonstratable increase to take care of the losses that occurred there, and I think that's going to be a situation throughout this conservation plan area.

Some very simple facts I didn't see in the documents at this point, maybe they're in there someplace, but for the plants, nobody has even discussed the ploidy level in the plants which could affect whether or not adjacent populations of plants are actually part of the same population or are they -- if they cross, are they incompatible? And that's terribly important if you're going to manage these plant species over the long term, understanding what that is. And the same thing with -- with the animal species. The talk is about connectivity, functional connectivity, yet there is no data that's in there that would show that, in fact, the populations of these various species are actually connected out there. The techniques are there. It does take some time to get that data. But the techniques are clearly there so you know whether or not you're trying to manage a meta population or a whole lot of individual populations. The management and

monitoring is totally different depending on that situation.

I think lastly, I didn't see anything in the document at this point that talks about the impacts of the NCCP for the DRECP on adjacent NCCPs. That appears to be totally missing. Perfect example there is within San Diego County in the western portion there's a very specific number of nesting pairs of Golden Eagles that is required to maintain. If -- and those eagles do move around. They do move out of the area at times. If one of those eagles gets killed by a wind energy project in DRECP, who has to make it up, the people of the Western San Diego County who had no impact on that eagle pair, or does DRECP proponents have to make it up and deal with that particular issue?

And I think we don't know enough about a lot of these populations to really understand how that whole piece fits together. It would strike me that a lot more data needs to go in and the management and the monitoring piece, at least sampling designs, how the data is going to be analyzed to understand whether change occurs, and what change has to occur in order for the Department of Fish and Wildlife to take the step of actually revoking the permits or removing species from the covered species list.

It seems to be the assumption that it's all going to work. I can tell you, it is not going to all work, based on experience. Thank you.

EXHIBIT K

SC Wildlands
Science & Collaboration for Connected Wildlands
P.O. Box 1052, Fair Oaks, CA 95628
(877) Wildland www.scwildlands.org

Via email only February 19, 2015

California Energy Commission
Dockets Office, MS-4, Docket No. 09-RENEW EO-01
1516 Ninth Street
Sacramento, CA 95814-5512
docket@energy.ca.gov

RE: SC Wildlands' comments on the Draft EIR/EIS for the DRECP

SC Wildlands' mission is to protect and restore systems of connected wildlands that support native species and the ecosystems upon which they rely. SC Wildlands was engaged by the Alliance for Desert Preservation to review, critique and comment on the DRECP and to make recommendations for improvements to the Reserve Design specifically in the Pinto Lucerne Valley and Eastern Slopes Ecoregion. Comments herein are focused on the Preferred Alternative.

Enhancing connectivity and linking natural landscapes has been identified as the single most important adaptation strategy to conserve biodiversity during climate change (Heller and Zavaleta 2009). All of California's climate adaptation strategies (CNRA 2009, 2014), frameworks (Gov. Brown, CEPA, ARB 2014), and action plans (CDFG 2011; CNRA, CDFA, CEPA 2014) identify maintaining connectivity as one of the most important adaptation strategies to conserve biodiversity and support ecological functions during climate change, with statutory authority and legislative intent found in AB 2785 (2008).

Meeting renewable energy production goals is essential to help combat climate change, but the vast scale of Development Focus Areas (DFA) being proposed for renewable energy developments in the California deserts are likely to impact habitat connectivity, alter essential ecosystem functions, and eliminate opportunities for species to shift their ranges in response to climate change. The potential impacts, specifically to wildlife and their ability to move across the landscape, are enormous. Strategically conserving and restoring functional connections between habitat areas is an effective countermeasure to the adverse effects of habitat loss and fragmentation, and it is an essential mitigation measure for climate change.

A Linkage Network for the California Deserts (Penrod et al. 2012), commissioned by the Bureau of Land Management and The Wildlands Conservancy, was intended to provide more information to natural resource agencies and the general public concerning where and how to maintain connectivity and sustain ecological functions in a changing climate. The study area encompassed the entire DRECP planning area with a buffer into the neighboring Sierra Nevada and South Coast Ecoregions. The Desert Linkage Network was designed to help meet the following Biological Goals and Objectives of the DRECP "*At the landscape-level, the Plan-wide*

BGOs address creating a DRECP-wide, connected, landscape-scale reserve system consisting of large habitat blocks of all constituent natural communities. The reserve system maintains ecological integrity, ecosystem function and biological diversity, maintains natural patterns of genetic diversity, allows adaptation to changing conditions (including activities that are not covered by the Plan), and includes temperature and precipitation gradients, elevation gradients, and a diversity of geological facets to accommodate range contractions and expansions of species adapting to climate change".

The Desert Linkage Network (Penrod et al. 2012) was developed in part based on the habitat and movement requirements of 44 different focal species (Table 1) that are sensitive to habitat loss and fragmentation. These focal species were selected to represent a diversity of ecological interactions and are intended to serve as an umbrella for all native species and ecological processes of interest in the region. These 44 focal species capture a diversity of movement needs and ecological requirements and include area-sensitive species, barrier-sensitive species, less mobile species or corridor-dwellers, habitat specialists, and ecological indicator species. Seven of these focal species are also Covered Species under the DRECP, including Bighorn sheep, Mohave ground squirrel, pallid bat, burrowing owl, Bendire's thrasher, desert tortoise and Mojave fringe-toed lizard, and 3 of these species (bighorn sheep, desert tortoise and Mohave ground squirrel) were also used as "Reserve Drivers".

In addition to linkages designed for focal species, the Desert Linkage Network (Penrod et al. 2012) was also designed to be robust to climate change. As climate changes the focal species' distributions and the land cover map is likely to change; indeed it is likely that many land cover types (vegetation communities) will cease to exist as the plant species that define today's vegetation communities shift their geographic ranges in idiosyncratic ways (Hunter et al. 1988). We used the land facet

Table 1. Desert Linkage Network Focal Species (Penrod et al. 2012)

Mammals	
Mountain lion	*Puma concolor*
Badger	*Taxidea taxus*
Kit fox	*Vulpes macrotis*
Bighorn sheep	*Ovis canadensis*
Mule deer	*Odocoileus hemionus*
Ringtail	*Bassariscus astutus*
Mojave ground squirrel	*Spermophilus mohavensis*
Round-tailed ground squirrel	*Spermophilus tereticaudus*
Desert pocket mouse	*Chaetodipus penicillatus*
Little pocket mouse	*Perognathus longimembris*
Southern grasshopper mouse	*Onychomys torridus*
Pallid Bat	*Antrozus pallidus*
Birds	
Burrowing owl	*Athene cunicularia*
Loggerhead shrike	*Lanius ludovicianus*
Cactus wren	*Campylorhynchus brunneicapillus*
Black-tailed gnatcatcher	*Polioptila melanura*
LeConte's thrasher	*Toxostoma lecontei*
Bendire's thrasher	*Toxostoma bendirei*
Crissal thrasher	*Toxostoma crissale*
Greater roadrunner	*Geococcyx californianus*
Herpetofauna	
Desert Tortoise	*Gopherus agassizii*
Chuckwalla	*Sauromalus obesus obesus*
Rosy boa	*Lichanura trivirgata*
Speckled rattlesnake	*Crotalus mitchellii*
Mojave rattlesnake	*Crotalus scutulatus*
Mojave fringe-toed lizard	*Uma scoparia*
Collared lizard	*Crotaphytus bicinctores*
Desert spiny lizard	*Sceloperus magister*
Desert night lizard	*Xantusia vigilis*
Red spotted toad	*Anaxyrus punctatus*
Plants	
Joshua tree	*Yucca brevifolia*
Blackbrush	*Coleogyne ramosissima*
Desert willow	*Chilopsis linearis*
Arrowweed	*Pluchea sericea*
Cat claw acacia	*Acacia greggii*
Mesquite	*Prosopis glandulosa*
Mojave yucca	*Yucca schidigera*
Big galleta grass	*Pleuraphis rigida*
Paperbag bush	*Salazaria mexicana*
Invertebrates	
Yucca moth	*Tegeticula synthetica*
Desert green hairstreak	*Callophrys comstocki*
Bernardino dotted blue	*Euphilotes bernardino*
Desert ("Sonoran") metalmark	*Apodemia mejicanus*
Ford's swallowtail	*Papilo indra fordi*

approach (Brost and Beier 2010) to design climate-robust linkages. A land facet linkage consists of a corridor for each land facet, plus a corridor for high diversity of land facets. Each land facet corridor is intended to support occupancy and between-block movement by species associated with that land facet in periods of climate quasi-equilibrium. The high-diversity corridor is intended to support short distance shifts (e.g. from low to high elevation), species turnover, and other ecological processes relying on interaction between species and environments. The focal species linkages and land facet linkages were combined and then refined (e.g., adding riparian connections, removing redundant strands) to delineate the final Desert Linkage Network.

Table 2. Land Ownership in the Linkage Network (Penrod et al. 2012)	Acres
Bureau of Land Management	2,663,847
Department of Defense	366,394
National Park Service	109,475
California State Lands Commission	82,517
California Department of Fish and Game	19,664
United States Fish and Wildlife Service	16,322
The Wildlands Conservancy	13,894
California Department of Parks and Recreation	9,943
United States Forest Service	8,801
Special Districts	3,230
Other Federal	2,148
Cities	1,076
Friends of the Desert Mountains	818
Riverside Land Conservancy	313
Counties	242
Private Lands	930,500
Total Desert Linkage Network	4,229,184

The Desert Linkage Network encompasses 4,229,184 acres. At the time the report was released in 2012, approximately 68% (2,932,291 acres) of the linkage network enjoyed some level of conservation protection (Table 2) mostly in land overseen by the Bureau of Land Management, National Park Service, California State Lands Commission, California Department of Fish and Wildlife, US Fish and Wildlife Service, and The Wildlands Conservancy. An additional 9% (366,394 ac) of the Linkage Network is administered by the Department of Defense, providing some level of conservation for these lands, though not included in DRECP. Thus, the Linkage Network includes substantial (78%) public ownership under the No Action Alternative.

We applaud the DRECP for delineating 1,804,000 acres of the Desert Linkage Network as BLM LUPA Conservation Designations (ACEC, NLCS, or Wildlife Allocation; Table IV.7-71) under the Preferred Alternative, which together with the Existing Conservation Areas and Conservation Planning Areas, would conserve 71% (2,612,000 acres) of Total Available Lands (3,682,000) in the Desert Linkage Network. However, we firmly believe that the other 1,070,000 acres of the Desert Linkage Network is essential to achieving **Goal L1:** Create a Plan-wide reserve design consisting of a mosaic of natural communities with habitat linkages that is adaptive to changing conditions and includes temperature and precipitation gradients, elevation gradients, and a diversity of geological facets that provide for movement and gene flow and accommodate range shifts and expansions in response to climate change.

The first page of the Executive Summary uses the word "transparent" to describe the DRECP's approach but the document is chock full of black box assumptions and analyses that fail to fully and accurately disclose impacts. Section I.3.4.4.3 says, "the reserve design envelope was

developed from a systematic and objective approach (Margules and Pressey 2000; Carroll et al. 2003; Moilanen et al. 2009) using several independent methods that were iteratively evaluated and refined". The Evaluation and Refinement is described as "exhaustive interactive GIS comparisons in collaborative mapping sessions," which isn't too terribly systematic or objective. This section also says that, "Important areas for desert tortoise, Mohave ground squirrel, and bighorn sheep were based on REAT agency interpretations of the species distribution models and recent occurrence data for these species, which correspond to the BGOs for these species"; also not systematic or objective, especially since most occurrence data is gathered when developments are proposed and thus cover only a portion of these species ranges. This section also says that "quantitative GIS analyses were conducted periodically throughout the evaluation and refinement process to quantitatively track and assess the capture of the species, natural communities, and landscape elements/processes". In order to fully and accurately disclose impacts, the actual results of those GIS analyses should be in Volume IV rather than after the results have been put through the mysterious acreage calculator.

The Impact Analyses and reported acreages are completely nebulous. As described in Section IV.7.1.1, "the reported impact acreage (e.g., acres of impact to natural communities or Covered Species habitat) is based on the overlap of the DFAs and the resource (e.g., mapped natural community or modeled Covered Species habitat) times the proportion of the impacts from Covered Activity development anticipated with the DFA". The results of the impact analyses are reported in an onerous number of tables with relatively meaningless acreages based on assumptions about proportions of DFAs that will actually be impacted. There are NO maps showing the overlap of the DFA's and the resource (e.g., mapped natural community or modeled Covered Species habitat). In Volume IV: Environmental Consequences/Effects Analysis, Section IV.07 Biological Resources, there is only ONE Figure, Figure IV.7-1 Subunits, in the entire section. While there is a whopping total of 311 tables associated with this same section, Tables IV.7-1 through IV.7-311. These 311 tables slice and dice the "Conservation Analyses" and "Impact Analyses" in various ways, generally starting with Plan-Wide and then breaking it down by BLM LUPA, NCCP, GCP, Subregions, Covered Species, etc. The various Conservation Analysis tables report actual acreages while the Impact Analysis tables report Total Impact Acres generated by the mysterious black box. For example, the Plan Wide Preferred Alternative includes 2,024,000 acres of DFAs and transmission corridors but says only about 177,000 acres will actually be impacted. Nowhere does the document report actual acreages of how the 2,024,000 acres of DFAs and transmission corridors in the Preferred Alternative overlap for example, habitat for the 37 Covered Species or the Desert Linkage Network. Instead, all of the impact analysis tables associated with the Preferred Alternative relate to the 177,000 acres of reported "Total Impact Acreage". All tables in Volume IV should add a column to report actual acreage of DFA overlap with resources alongside the reported "Total Impact Acreages". Maps must be included to show where the DFAs coincide with these resources. And, please do not answer in the Response to Comments that the Data Basin Gateway is serving this purpose. The DRECP approach to impact analysis is anything but transparent.

Section I.3.4.4.3 says the Desert Linkage Network was one of several inputs to a focal species, natural communities, and processes approach, which created "an initial reserve design envelope using better information with less uncertainty". Section I.3.4.4.3 (I.3-26) Reserve Design Methods and Appendix D, D.3.6., refers to a composite map of KEY covered species, natural

communities and processes as "reserve drivers" (i.e., desert tortoise, Mohave ground squirrel, bighorn sheep, microphyll woodland, dunes and sand resources, flat-tailed horned lizard, hydrologic features, and West Mojave corridors, rare natural communities, and environmental gradients), which were selected because they are "*important to the overall DRECP conservation strategy and generally occur across a range of ecoregion subareas and habitats of the Plan Area, such that conserving the areas important for the reserve drivers would also conserve areas important for the other Covered Species and natural communities*". There is no figure for this "Composite Map of Key Reserve Drivers" in the document and it is NOT one of the 500+ data layers available for public review on the Data Basin Gateway. While it is clear from ES Figure 5 that landscape connectivity was one of the reserve drivers for many of the conservation designations, Table D-2 in Appendix D Reserve Design Development Process and Methods, indicates that the data generated by Penrod et al. (2012) was only used as a "Reserve Driver" in the Western Mojave, which is ironic because the Western Mojave is particularly hard hit with DFAs that could sever connectivity or significantly reduce functional habitat connectivity.

The 37 Covered Species were selected (Appendix B) because they are ALL "important to the overall DRECP conservation strategy. How well do the "Reserve Drivers" (I.3.4.4.3 Reserve Design Methods and Appendix D, D.3.6) capture modeled habitat for all of the "Covered Species"? A quick review of the species distribution models in relation to the Development Focus Areas (DFA) show that several covered species are NOT so well covered by the Key Reserve Drivers (e.g., gila woodpecker, greater sandhill crane, mountain plover, tricolored blackbird, Swainson's hawk, willow flycatcher, Yuma clapper rail, Alkali mariposa lily). For example, a quick GIS analysis for tricolored blackbird revealed that 60% of its habitat falls within DFAs. Further, another 9% of the tricolored blackbird modeled habitat is Undesignated and available for "disposal (Table 3). This analysis did not even factor in transmission lines. Maps should be included for each of the 37 Covered Species showing their modeled habitat, recorded occurrences and when applicable designated critical habitat in relation to DFAs, FAAs,

Table 3. Tricolored blackbird habitat overlap with integrated Preferred Alternative

Designation - Preferred Alt Integrated	**Acres**	**%**
BLM ACECs	7,910.17	3%
BLM ACECs and NLCS	2,243.56	1%
BLM Wildlife Allocation	2,694.56	1%
Conservation Planning Areas	47,566.51	17%
Development Focus Areas	***165,526.27***	***60%***
Future Assessment Areas	114.79	0%
Impervious and Urban Built-up Land	8,361.00	3%
Legislatively and Legally Protected Areas	11,525.35	4%
Military	6,597.31	2%
Military Expansion Mitigation Lands	133.95	0%
Open OHV Areas	34.64	0%
Tribal Lands	40.09	0%
Undesignated	25,125.55	9%
Total Modeled Tricolored Blackbird Habitat	**277,873.76**	**100%**

SAAs, and Undesignated land. This is the type of disclosure of impacts this is required under the legal framework provided under 1.2. Currently, the only maps for ALL 37 Covered Species are buried in Appendix C of Appendix Q, *Baseline Biology Report.* All 37 Covered Species should be Reserve Drivers.

Currently, Table IV.7-47 Plan-Wide Impact Analysis for Covered Species Habitat – Preferred Alternative is the closest the Plan gets to disclosing impacts to ALL of the 37 Covered Species. The tricolored blackbird analysis above shows 60% (165,526 acres) of the species habitat falls within DFAs, while Table IV. 7-47 reports only 8,000 acres of Total Impact for this species. There is NO reason why both of these acreages cannot be reported in Table IV.7-47. Table IV.7-57, Plan-Wide Conservation Analysis for Covered Species Habitat – Preferred Alternative is the closest the Plan gets to disclosing how poorly the 37 Covered Species are actually covered by the plan - only 19 of the 37 species have 50% or more or their habitat conserved under the Preferred Alternative. Not even all of the Reserve Drivers are very well "Covered" by the Preferred Alternative. Which begs the question – how well does the reserve design capture the needs of the 123 "Non-Covered" special status species?

I.3.4.4.5 DRECP Plan-Wide Reserve Design Envelope for Each Alternative

The following standards and criteria were used to develop the Interagency Plan-Wide Conservation Priority Areas (and Conceptual Plan-Wide NCCP Reserve Design):
- Conserve important habitat areas that also provide habitat linkages for the movement and interchange of organisms within the Plan Area and to areas outside the Plan Area.
  - o Important habitat linkage areas were included in the NCCP Conceptual Plan-Wide Reserve Design using species-specific linkage information for key Covered Species, including desert tortoise (*Gopherus agassizii*), Mohave ground squirrel (*Xerospermophilus mohavensis*), and desert bighorn sheep (*Ovis canadensis nelsoni*).
  - o Landscape-scale, multispecies habitat linkage information was used to identify movement corridors between habitat blocks inside and outside the Plan Area.
  - o Species-specific threats and stressor information was incorporated to identify the linkage areas critical for inclusion in the NCCP Conceptual Plan-Wide Reserve Design.

One of the DRECP Planning Goals in section 1.2 of the Executive Summary is to "Preserve, **restore**, and enhance natural communities and ecosystems including those that support Covered Species within the Plan Area". However, it appears that several "fuzzy logic" models of intactness were the primary drivers used to identify the DFAs, regardless of whether the DFAs make up the majority of a given Covered Species habitat. "*In order to minimize habitat fragmentation and population isolation, DFAs were sited in less intact and more degraded areas. Based on the terrestrial intactness analysis developed for the DRECP area, approximately 87% of the DFAs in the Preferred Alternative are characterized by low or moderately low intactness. Therefore, a majority of the DFAs are in locations with existing habitat fragmentation and population isolation such that development of Covered Activities in these areas would not appreciably contribute to additional effects".* Yet, habitat loss and fragmentation is precisely why many of the 37 Covered Species and 123 Non-Covered Species are listed as threatened, endangered or sensitive in the first place!

The California Desert Connectivity Project (Penrod et al. 2012) is briefly described in III.7.7-246. This is the ONLY place in the entire document that refers to "23 crucial linkage planning areas within the Plan Area". Actually, there were 22 linkage planning areas but nowhere are the 22 crucial linkages actually identified by name. And, nowhere are the 22 crucial linkages actually analyzed by linkage. Instead, baseline conditions of the Desert Linkage Network and impacts to the linkage network are analyzed by fictitious Ecoregion Subareas, which is relatively meaningless in the context of landscape connectivity since several of the 22 linkages span more than one Ecoregion Subarea. The DRECP repeatedly refers readers to Penrod et al. 2012 but that document is organized by linkage NOT invented Ecoregion Subareas, so it is impossible to evaluate and compare baseline conditions or impacts to the Desert Linkage Network.

The discussion in Vol. III Pages 7-248 through 7-271 provides virtually NO information beyond what is already summarized in Tables III.7-69, 7-82, and 7-96 other than vague geographical references, like "providing connectivity between mountain ranges within the ecoregion subarea" which was copy/pasted in several of the descriptions. Further, none of the Figures III.7-26 through 7-36 label any of the Landscape Blocks intended to be served by the 22 crucial linkages. Of particular note, is that none of the targeted Landscape Blocks outside of the Plan Area (e.g., Sierra Nevada, San Gabriel Mountains, San Bernardino Mountains) are labeled or depicted in Figure III.7-26 or in the subareas maps, or any other maps in the entire document. Yet, several areas of the DRECP refer to the importance of maintaining connectivity beyond the Plan boundary! Weren't PhDs, Cartographers and Copy Editors employed to develop this Plan?

The ENTIRE Section, III.7.8 Landscape Habitat Linkages and Wildlife Movement Corridors (III.7 7-245 to 7-248), is VERBATIM to what is provided in Appendix Q on this topic. There is a serious overuse of the Copy/Paste function throughout the document. Typically, an Appendix provides the reader with more relevant information related to the topic being discussed, beyond just the literature cited section. This section of the DRECP alone refers to Appendix Q 23 times! Why not just include the references within the section and consolidate the numerous literature cited sections?

The Preferred Alternative estimates a Plan-Wide Total Impact Area for the Desert Linkage Network of 28,000 acres (Table IV. 7-52) based on the overlap of the DFAs with the Desert Linkage Network times the proportion of the impacts from Covered Activity development anticipated with the DFA (IV.7-263). However, based on a GIS analysis of the overlap of the Integrated Preferred Alternative with the Desert Linkage Network, the actual acreage of the DFAs that overlap the Desert Linkage Network is 205,650 acres – which must be disclosed! There is also an additional 198,177 acres in the Linkage Network identified as Undesignated in the Preferred Alternative. Undesignated areas are described in the glossary as *BLM-administered lands that do not have an existing or proposed land allocation or designation. These areas would be open to renewable energy applications but would not benefit from the streamlining or CMA certainty of the DFAs.* Page II.3-381 under II.3.2.3.4.2 states: "In non-designated lands (i.e. lands not covered by the specific CMAs below), make lands available for disposal through exchange or land sale". Does this mean that nearly 200,000 acres of the Desert Linkage Network would be "available for disposal"? Shouldn't this be factored into the "Impact Analysis"? And fully disclosed in the Total Impact Acreage? Additionally, Future Assessment Areas cover 37,377 acres and Special Analysis Areas cover another 29,342 acres of the Desert Linkage Network.

Between the DFAs, Undesignated, FAAs and SAAs areas, over 470,547 acres of the Desert Linkage Network could be open to renewable energy applications. There are NO maps that show how the DFAs, FAAs, SAAs, Variance Lands, or Undesignated Lands in the Preferred Alternative coincide with the Desert Linkage Network, not to mention transmission corridors! Volume IV is the **Environmental Consequences / Affects Analysis** yet this section repeatedly refers to maps in Volume III, "Affected Environment Figures III.7-26 through III.7-36 in Chapter III.7 of Volume III shows the desert linkage network for the Plan Area and in each ecoregion subarea". Maps must be included in Vol. IV for the entire Desert Linkage Network and each of the six subareas that would be impacted. As Figure 1 shows, several linkages are completely severed or severely constrained by DFAs, FAAs and Undesignated land.

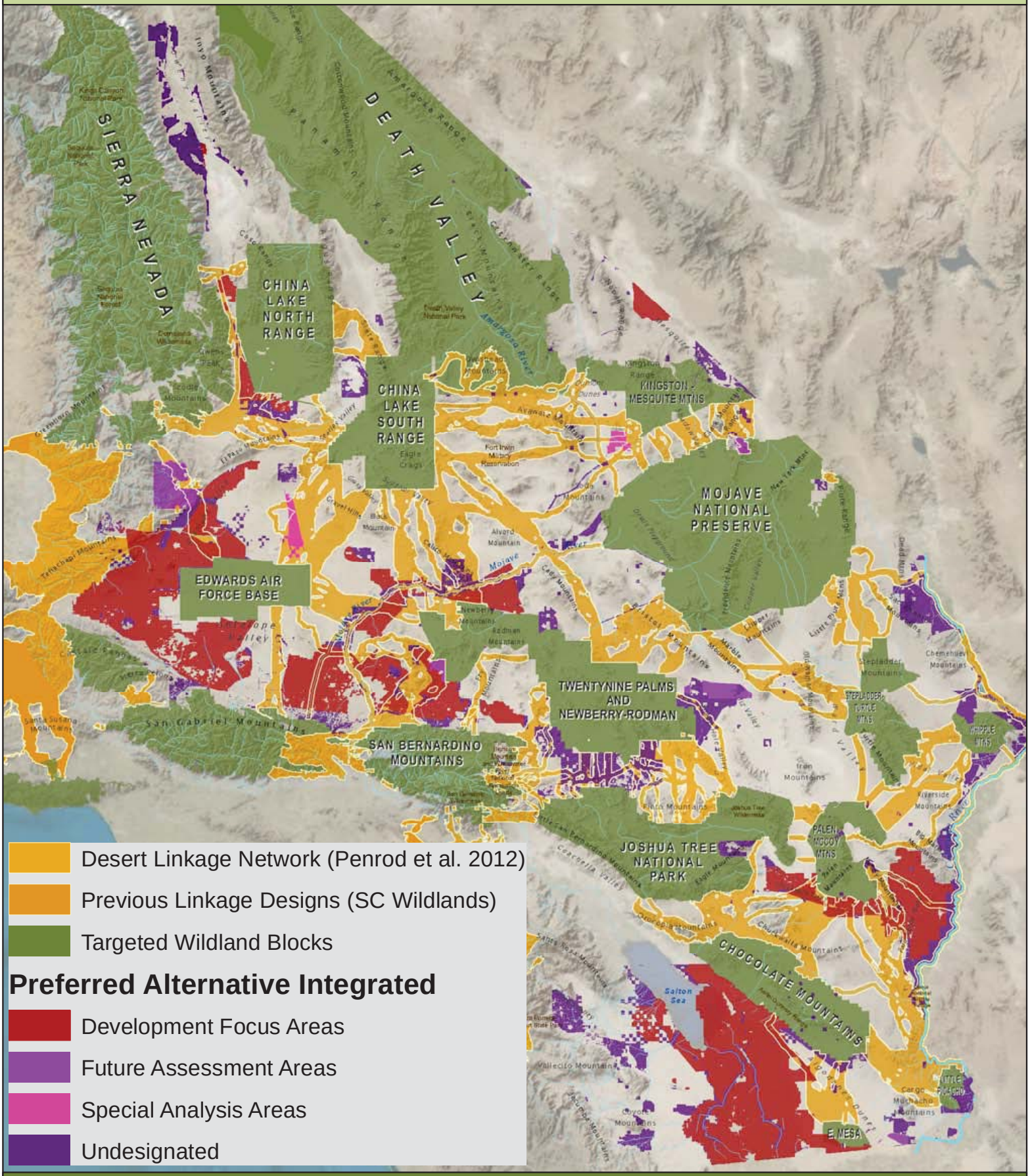
Undesignated Lands: II.3-9 Table II.3-1 Interagency DRECP Plan-Wide Preferred Alternative identifies 1,323,000 acres of Undesignated lands (i.e., BLM Unallocated Land), 709,000 acres of which is within BLM LUPA (Table II.3-42). This 1.3 million acres of BLM land is NOT clearly depicted in FIGURE II.3-1 Interagency Preferred Alternative but instead appears to be lumped with Impervious and Urban Built-up Land (5,547,000 acres in Table II.3-1), which the legend describes as "Existing Developed Areas". This is EXTREMELY misleading. These Undesignated lands overlap several areas of high conservation value, including but not limited to habitat for Covered Species, "Reserve Drivers" (e.g., bighorn sheep mountain habitat, bighorn sheep intermountain habitat, desert tortoise intact habitat and fragmented habitat in the Desert Tortoise TCA Habitat Linkages), and numerous areas of the Desert Linkage Network. Further, while much of the Mojave River itself is designated as Conservation Planning Areas in the Preferred Alternative, Undesignated lands or DFAs are located in the uplands along most of the Mojave River. II.3-381 One of the bullets under II.3.2.3.4.2 Conservation and Management Actions states: "In non-designated lands (i.e. lands not covered by the specific CMAs below), make lands available for disposal through exchange or land sale". Is Undesignated, BLM Unallocated and "non-designated lands" synonymous? Does this mean that over 1.3 million acres of existing public land administered by BLM will be available for "disposal"? Where is the impact analysis regarding these lands?

There is no mention of Undesignated, BLM Unallocated, or Non-designated lands in Volume III Environmental Setting/Affected Environment, not in III.13 BLM Lands and Realty - Land Use Authorizations and Land Tenure or III.7 Biological Resources. This is a serious oversight that MUST be addressed. IV.7-281 is the only place that mentions Undesignated Areas, "*Approximately 471,000 acres were not designated as Reserve Design Lands under the Preferred Alternative that were identified in the conceptual reserve envelope, which is primarily comprised of BLM-administered lands in the Plan Area without BLM LUPA conservation designations over them*". What about the other 852,000 acres of Undesignated lands mentioned in Table II.3-1? IV.13 only mentions Undesignated Lands in reference to FAA, SAA, and DRECP Variance lands but Undesignated Lands cover a far greater area than what is included in these designations. Maps must be included in Volumes III and IV that clearly depict ALL Undesignated lands.

The entire discussion describing the six different subareas of the Desert Linkage Network that "could be adversely impacted in DFAs and transmission corridors" is inadequate (IV.7-264 and 7-265). Each subarea is allocated one poorly written paragraph that vaguely describes impacts,

CALIFORNIA DESERT CONNECTIVITY PROJECT

Figure 1. Desert Linkage Network Conflicts



N

1:2,138,961

0 25 50 75 Kilometers

0 30 60 Miles

e.g., "there are DFAs in a portion of the desert linkage network". Impacts should be analyzed and described in reference to the 22 crucial linkages delineated by Penrod et al. (2012) and further evaluated by the focal species and land facet linkage networks, rather than fictitious ecoregional subareas. The DRECP should disclose where DFAs completely sever or significantly constrain a linkage. As the lead author in Penrod et al. (2012), I should not have difficulty deciphering the descriptions of impacts to the linkage network. Further, this entire discussion is meaningless without MAPS that include detailed annotation of all the areas referenced in the text. Geographical and locational references in the text should be included on the maps (see bold type in following paragraph). Typically, zoomed in maps have more annotation. The maps must clearly and accurately show where DFAs, FAAs, SAAs, Variance Lands and Undesignated lands and Transmission Corridors coincide with the Desert Linkage Network.

This is an example of one of the six poorly written paragraphs allocated to discussing Plan-Wide conservation of and impacts to the Desert Linkage Network (IV.7-264), "*In the Pinto Lucerne Valley and Eastern Slopes subarea, there are DFAs in a portion of the desert linkage network that connects the* ***Grapevine Canyon Recreation Lands*** *to the* ***Granite Mountains*** *in Lucerne Valley; however, no DFAs are located in the habitat linkage between the* ***Ord Mountains*** *and the Granite Mountains across the Highway 18 east of* ***Apple Valley****. There are also DFAs in the linkage that connects* ***Black Mountain*** *to the* ***Mojave River****. DFAs under the Preferred Alternative are sited to avoid and minimize impacts to wildlife movement in this subarea by maintaining movement corridors between the* ***San Bernardino Mountains*** *and the Mojave Desert, including in the Ord Mountains to Granite Mountains linkage area and in the* ***Bighorn Mountain*** *area that connects to* ***Johnson Valley*** *and the* ***Morongo Basin****. General terrestrial wildlife movement may be affected locally by the development of Covered Activities in these DFAs; however, the siting of DFAs, the reserve design, and the CMAs related to wildlife movement and Covered Species would offset the impacts on general terrestrial wildlife movement".* The linkages in the Desert Linkage Network in the vicinity of the Apple Valley and Lucerne Valley DFAs are the Twentynine Palms Newberry Rodman-San Bernardino Connection and the Twentynine Palms Newberry Rodman-San Gabriel Connection (Penrod et al. 2012), incorrectly described above as "connects Grapevine Canyon Recreation Lands to the Granite Mountains in Lucerne Valley". These connections connect the San Bernardino and San Gabriel Mountains of the South Coast Ecoregion to the Newberry Rodman Mountains in the Mojave, not Grapevine Canyon to Granite Mountains, which is only a portion of those linkages. Then it says, "No DFAs are located in the habitat linkage between the Ord Mountains and the Granite Mountains" but the DRECP neglects to say that this linkage, which most closely resembles the San Bernardino-Granite Connection (Penrod et al. 2005) is entirely encompassed within the landscape level connection described in the first part of that sentence! Penrod et al. (2005) was a focal species based connectivity assessment and the Desert Linkage Network used improved methods to make the linkages robust to climate change (i.e., land facet analyses). As currently proposed, the Granite Mountain Corridor ACEC is not sufficiently wide to provide live-in and move-through habitat for the target species or support range shifts in response to climate change.

Disruption of landscape connections for species movements and range changes is one of the greatest stressors to ecosystems, especially under climate change. In order to achieve **Goal L1** - NO DFAs should be sited within the Desert linkage Network, desert tortoise linkages, bighorn sheep intermountain habitat and Mohave ground squirrel linkages. All of these species-specific

linkages and landscape linkages should automatically be included in the Reserve Design, either as ACEC, NLCS, Conservation Planning Areas, or SAAs. No Undesignated (i.e., BLM Unallocated) land within these linkages should be "disposed of" but should also be automatically included as ACEC, NLCS, SAAs, or Conservation Planning Areas in the Reserve Design.

Objective L1.1: Conserve Covered Species habitat, natural communities, and ecological processes of the Mojave and Sonoran deserts in each ecoregional subarea in the Plan Area in an interconnected DRECP reserve. COMMENT: Must include desert tortoise Ord-Rodman to Joshua Tree and Fremont Kramer Linkages.

Objective L1.2: Design landscape linkage corridors to be 3 miles wide where feasible, and at least 1.2 miles wide where a greater width is not feasible. COMMENT: It is feasible and desirable to design a linkage more than 1.2 miles wide for the proposed Granite Mountain Wildlife Linkage ACEC with revisions to the Apple Valley and Lucerne Valley DFAs.

Objective L1.3: Protect and maintain the permeability of landscape connections between neighboring mountain ranges to allow passage of resident wildlife by protecting key movement corridors or reducing barriers to movement within intermountain connections, including:
o Chuckwalla-Little Chuckwalla-Palen connections
o Bristol-Marble-Ship-Old Woman connections
o Old Woman-Turtle-Whipple connections
o Bullion-Sheephole-Coxcomb connections
o Clark-Mesquite-Kingston connections
o Big Maria-Little Maria-McCoy connections
o Soda-Avawatz-Ord-Funeral connections
o Clark-Mesquite-Kingston-Nopah-Funeral connections
o Rosa-Vallecitos-Coyote connections
o Panamint-Argus connection
o Palo Verde-Mule-Little Chuckwalla connections
o Palo Verde-Mule-McCoy connections
o Chuckwalla-Eagle-Coxcomb connections
o Eagle-Granite-Palen-Little Maria connections
o Granite-Iron-Old Woman connections
o Big Maria-Little Maria-Turtle connections
o Northeast slope of the San Bernardino Mountains between Arrastre Creek and Furnace Canyon, including Arctic and Cushenbury canyons, Terrace and Jacoby springs, along Nelson Ridge. **COMMENT:** Why is this objective restricted to the list of "connections" above? The majority of the mountain ranges listed above are in the Eastern Mojave and Sonoran regions and therefore not consistent with creating a Plan-wide reserve design (Goal L1). These are not the landscape linkages identified in the Desert Linkage Network (Penrod et al. 2012), nor are they the desert tortoise linkages identified in Figure C-34. Where did this list come from? I did not see it referenced in the document.

Feature Landscape stressors and threats: Goal L3: Reduce, relative to existing conditions, adverse impacts from human activities to natural communities and Covered Species in the Plan Area.

Step-Down Biological Objective L3-A: Through the DRECP planning process, establish Development Focus Areas (DFAs) for Covered Activities in locations that would not disrupt or degrade the function of habitat linkages. COMMENT: Figure 1 clearly shows that DFAs would completely sever and disrupt and degrade the function of several linkages. Please see recommended revisions to the Reserve Design for the Pinto Lucerne Eastern Slopes below. I WISH I had time to conduct this level of detailed review for the entire Desert Linkage Network!

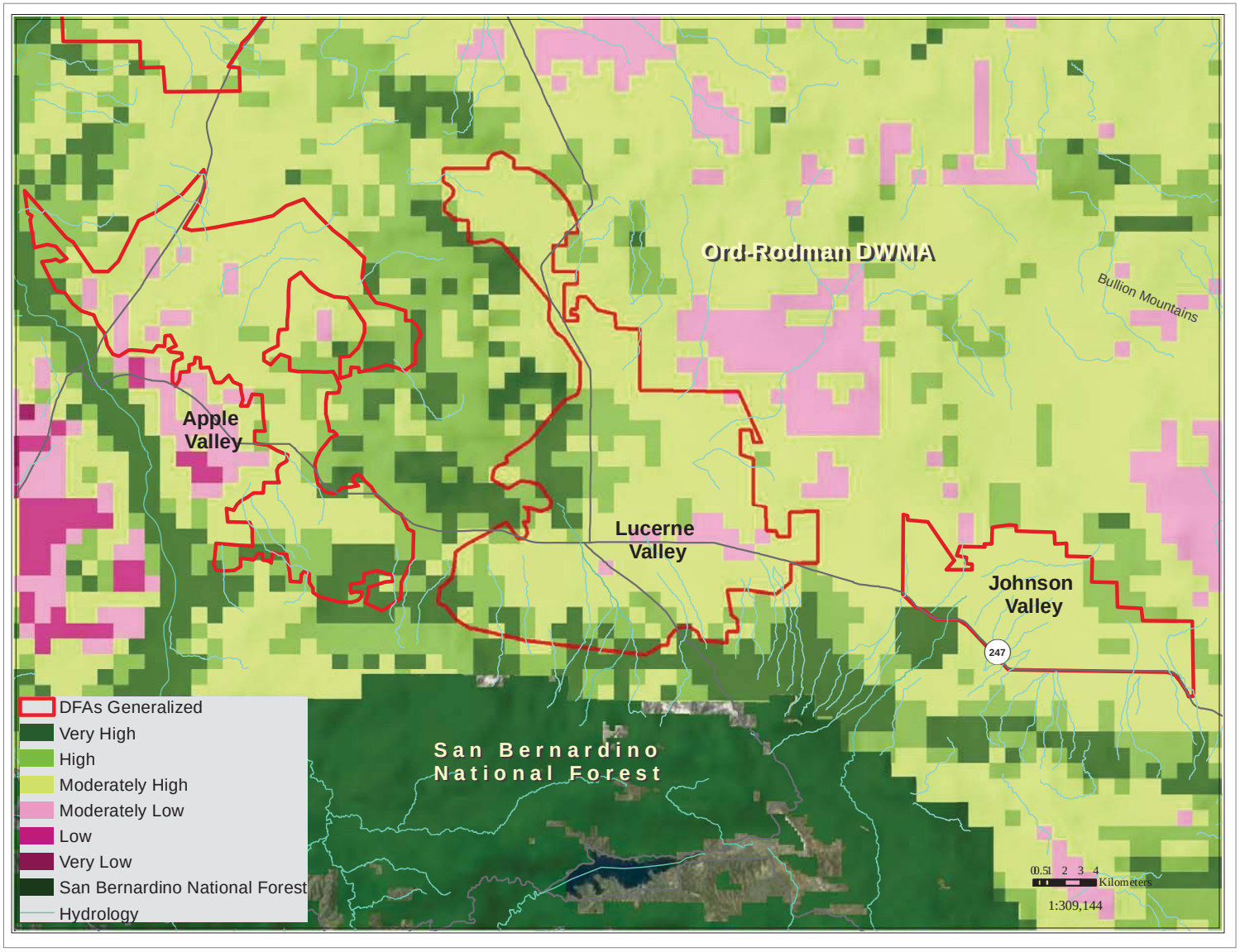
H.2.3 Wildlife Linkages and Connectivity: Figures (H-1 & H-2) depict the wildlife linkages where Covered Activities will be configured to avoid and minimize adverse effects to wildlife connectivity and the function of the wildlife linkage. These areas are referenced in the Section II.3.1.2.5.3, Landscape-Level Avoidance and Minimization CMAs, under the CMA **AM-LL-1**. **Figure H-2 Landscape-level Linkage CMA depicts the ENTIRE Desert Linkage Network and SCML Linkages that fall within the DRECP boundary.**

AM-LL-1: The siting of projects along the edges of the linkages identified in Appendix H (Figures H-1 and H-2) will be configured (1) to maximize the retention of microphyll woodlands and their constituent natural communities and inclusion of other physical and biological features conducive to species' dispersal, and (2) informed by existing available information on modeled Covered Species habitat and element occurrence data, mapped delineations of natural communities, and based on available empirical data collected under the MAMP or other sources, including radio telemetry, wildlife tracking sign, and road-kill information. Additionally, Covered Activities will be sited and designed to maintain the function of Covered Species connectivity and their associated habitats in the following linkage and connectivity areas:
o Within a 5-mile-wide linkage across Interstate 10 centered on Wiley's Well Road to connect the Mule and McCoy mountains.
o Within a 3-mile-wide linkage across Interstate 10 to connect the Chuckwalla and Palen mountains.
o Within a 1.5-mile-wide linkage across Interstate 10 to connect the Chuckwalla Mountains to the Chuckwalla Valley east of Desert Center.
o The confluence of Milpitas Wash and Colorado River floodplain within 2 miles of California State Route 78.
In addition to these specific landscape linkages identified above, the Riparian and Wetland Natural Communities and Covered Species CMAs will contribute to maintaining and promoting habitat connectivity and wildlife movement (see RIPWET under Section II.3.1.2.5.4). The Covered Species CMAs provide additional avoidance and minimization actions for important species-specific habitat linkages (see Section II.3.1.2.5.4).
This CMA must be implemented throughout the Desert Linkage Network!

A Conservation Alternative for the Pinto Lucerne Valley and Eastern Slopes

Conservation Values are particularly high in the Pinto Lucerne Valley and Eastern Slopes Subarea along the Mojave River, through the linkage, and all along the slopes of the San Bernardino Mountains (Figure 2). The Conservation Values Model available on the Data Basin Gateway aggregated several biological themes including natural community diversity, rare species concentrations, concentrations of Covered Species modeled distributions, concentrations of Non-Covered Species modeled distributions, and relative quality of identified wildlife

Figure 2. Coservation Values are High in the Pinto Lucerne Valley Eastern Slopes Ecoregion Subarea



linkages. Virtually all of the proposed Apple Valley, Lucerne Valley and Johnson Valley DFAs scored Moderately High to Very High with very few pixels scoring Moderately Low and no pixels scoring Low or Very Low. Section (II.3, Page 347), describes the Pinto Lucerne Valley and Eastern Slopes Subarea as, "some of the most diverse and threatened habitats in the California desert".

The following section suggests refinements to the current designations in the Preferred Alternative for the Pinto Lucerne Valley and Eastern Slopes subarea and justification for these recommended improvements. As currently proposed the Reserve Design doesn't capture landscape linkages wide enough to support viable populations of the species they are intended to serve or the full diversity of land facets needed to make the linkages robust to climate change. Maintaining and restoring landscape level connectivity is essential to day-to-day movements of individuals seeking food and water, shelter or mates; dispersal of offspring to new home areas; seasonal migration; recolonization of unoccupied habitat after a local population goes extinct; and for species to shift their range in response to global climate change. Plant and animal distributions are predicted to shift (generally northwards or upwards in elevation in California) due to global warming (Field et al. 1999). Full shifts in vegetation communities are expected as a result of climate change (Notaro et al. 2012). The Pinto Lucerne Valley and Eastern Slopes Subarea "spans diverse landscapes of the south-central Mojave Desert and the San Bernardino Mountains, from 1,000 feet to over 6,000 feet in elevation". The northern slopes and foothills of the San Bernardino Mountains contain many springs and seeps, several riparian drainages, and the headwaters of the Mojave River. Riparian systems will be especially important to allow species to respond and adapt to climate change because they provide connectivity between habitats and across elevational zones (Seavy et al. 2009). Thus, linkages must be sufficiently wide to cover an ecologically meaningful range of elevations as well as a diversity of microhabitats that allow species to colonize new areas.

While the Mojave Riverbed itself is identified as a Conservation Planning Area for much of its length, virtually all of the uplands are proposed as either DFAs or Undesignated land that could be available for "disposal" The Mojave River flows from the South Coast Ecoregion through much of the Mojave Ecoregion. It is one of three major rivers in the desert and the only one that traverses from the West to the East Mojave, covering a distance of roughly 80 miles - it is a key wildlife movement corridor. The Mojave River is also essential habitat for several listed and sensitive species with portions of the river designated as critical habitat for southwestern willow flycatcher. According to the USFWS (1986), over 200 species of migratory birds have been recorded in the Mojave River, near the Mojave River Forks Dam Water Conservation Project. These hundreds of migratory bird species use the Mojave River, Deep Creek, mountain lakes, riparian drainages and seeps and springs throughout desert facing slopes of the San Bernardino and San Gabriel Ranges. No DFAs should be sited within the 500 year flood plain and all Undesignated areas along the Mojave River should be included in the Reserve Design to ensure wildlife have access to this essential resource, which will be even more indispensible with climate change.

The hydrology of the northern slopes of the San Bernardino Mountains is not just an essential resource for the flora and fauna. It is also extremely important to recharging groundwater basins in Apple, Lucerne and Johnson Valleys. Massive renewable energy projects use enormous

amounts of water both in construction and maintenance, which could further exacerbate already severely distressed overdraft conditions in these groundwater basins.

As currently proposed the Apple Valley, Lucerne Valley and Johnson Valley DFAs present significant conflicts with habitat and climate change connectivity for Reserve Drivers such as bighorn sheep, desert tortoise, Mojave fringe-toed lizard and the Desert Linkage Network, as well as several other Covered Species, in addition to 31of the 44 focal species addressed by Penrod et al. (2012). There is an approximately 7 mile wide Conservation Planning Area designated between the San Gabriel Mountains and Edwards Air Force Base (AFB), though Military lands are NOT specifically covered by the DRECP. The essential ecoregional connection between the south-central Mojave Desert and the San Bernardino Mountains (i.e., connectivity to areas outside the plan area) warrants the same consideration, especially since this linkage serves to connect vast areas with conservation designations (e.g., NLCS, ACEC and USFS). It is feasible and desirable to conserve functional landscape-level connectivity here.

Here we suggest refinements to the Apple Valley and Lucerne Valley DFAs and complete removal for the Johnson Valley DFA. We created our own Composite Map of Key Reserve Drivers, referred to but not provided in I.3.4.4.3 and Appendix D, D.3.6. The primary data used to create this composite map of Key Reserve Drivers include Desert Tortoise TCA and Linkages (Averill-Murray et al. 2013), Bighorn sheep mountain habitat and intermountain habitat (CDFW 2013), Mohave ground squirrel (Inman et al. 2013, UCSB 2013), and the Desert Linkage Network (Penrod et al. 2012), which were used to make proposed refinements to the Reserve Design (Figure 3). We queried the areas removed from the Apple Valley and Lucerne Valley DFAs and the Johnson Valley DFA using the Site Survey Composite for the Preferred Alternative (i.e., DRECP_Composite_Ecological _Basline_Preferred_Alternative_v5, GIS data downloaded from Data Basin) to identify other Covered Species that would benefit from the proposed changes to the Reserve Design (Table 4). In addition to providing essential habitat for these Reserve Drivers, several other Covered Species will benefit from these refinements including Bendire's thrasher, burrowing owl, golden eagle, Swainson's hawk, least Bell's vireo, southwestern willow flycatcher, yellow-billed cuckoo, tricolored blackbird, mountain plover, pallid bat, Townsend's big-eared bat, alkali mariposa lily, Little San Bernardino linanthus, Mojave monkeyflower, and Parish's daisy.

These refinements would benefit 18 of the Covered Species. According to the DRECP Composite Ecological Baseline, each pixel in the refinements to the Apple Valley DFA (573 pixels) benefit 4 to 11 Covered Species (MEAN 6.9 species), with a total species count of 3,959 in the 573 pixels. Each pixel in the refinements to the Lucerne Valley DFA (787 pixels) benefit 2 to 10 Covered Species (MEAN 6.45 species), with a total species count of 5,080 in the 787 pixels. Each pixel in the Johnson Valley DFA (428 pixels) benefit 4 to 7 Covered Species (MEAN 5.48 species), with a total species count of 2,346 in the 428 pixels.

Natural communities in the areas removed from the Apple and Lucerne Valley DFAs and the Johnson Valley DFA are extremely diverse and include but are not limited to, Californian montane conifer forest, Central and South Coastal Californian coastal sage scrub, Great Basin Pinyon /Juniper Woodland, Inter-Mountain Dry Shrubland, Intermontane deep or well-drained

Figure 3. Refinements to and Removal of DFAs in the Pinto Lucerne Valley and Eastern Slopes Subarea

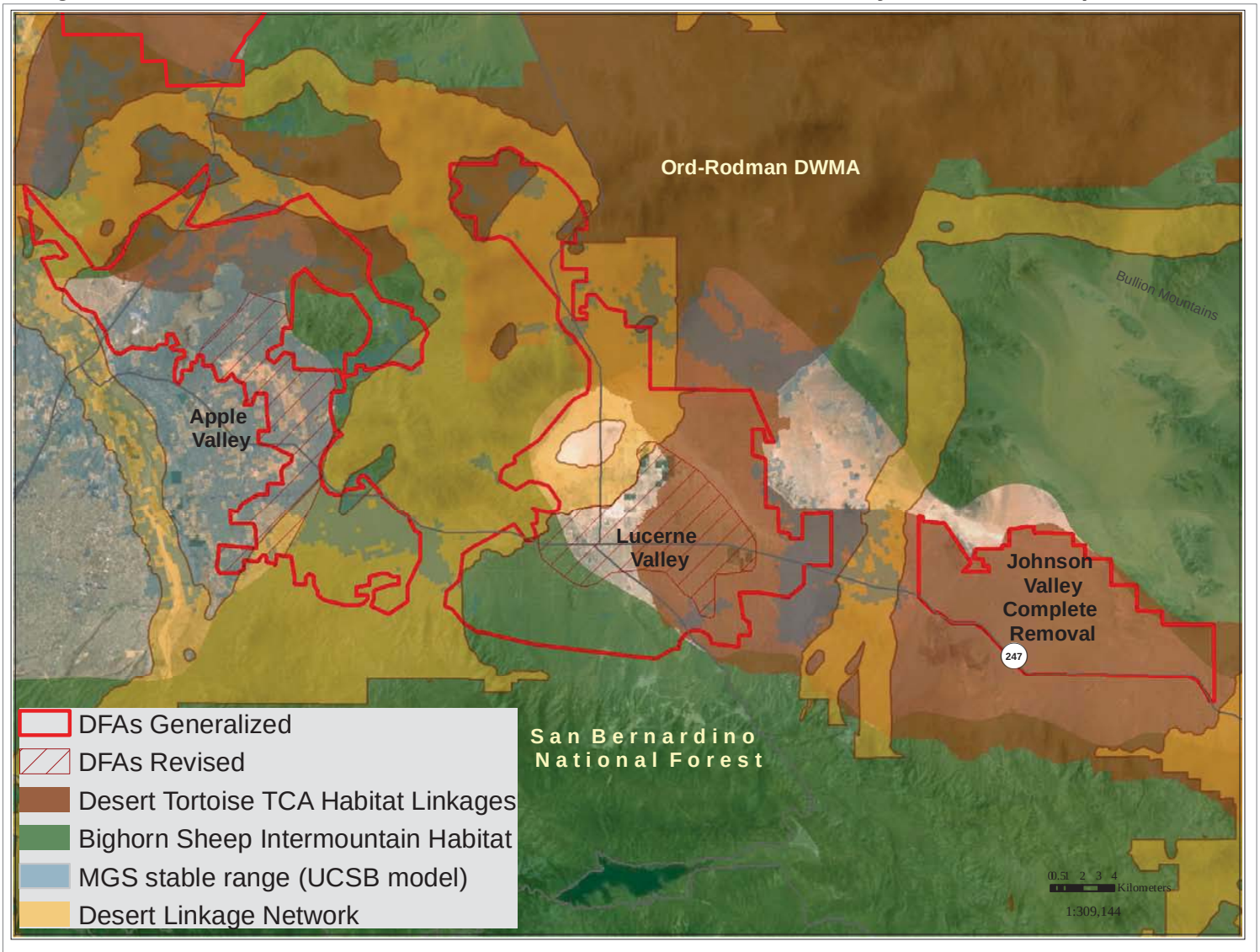


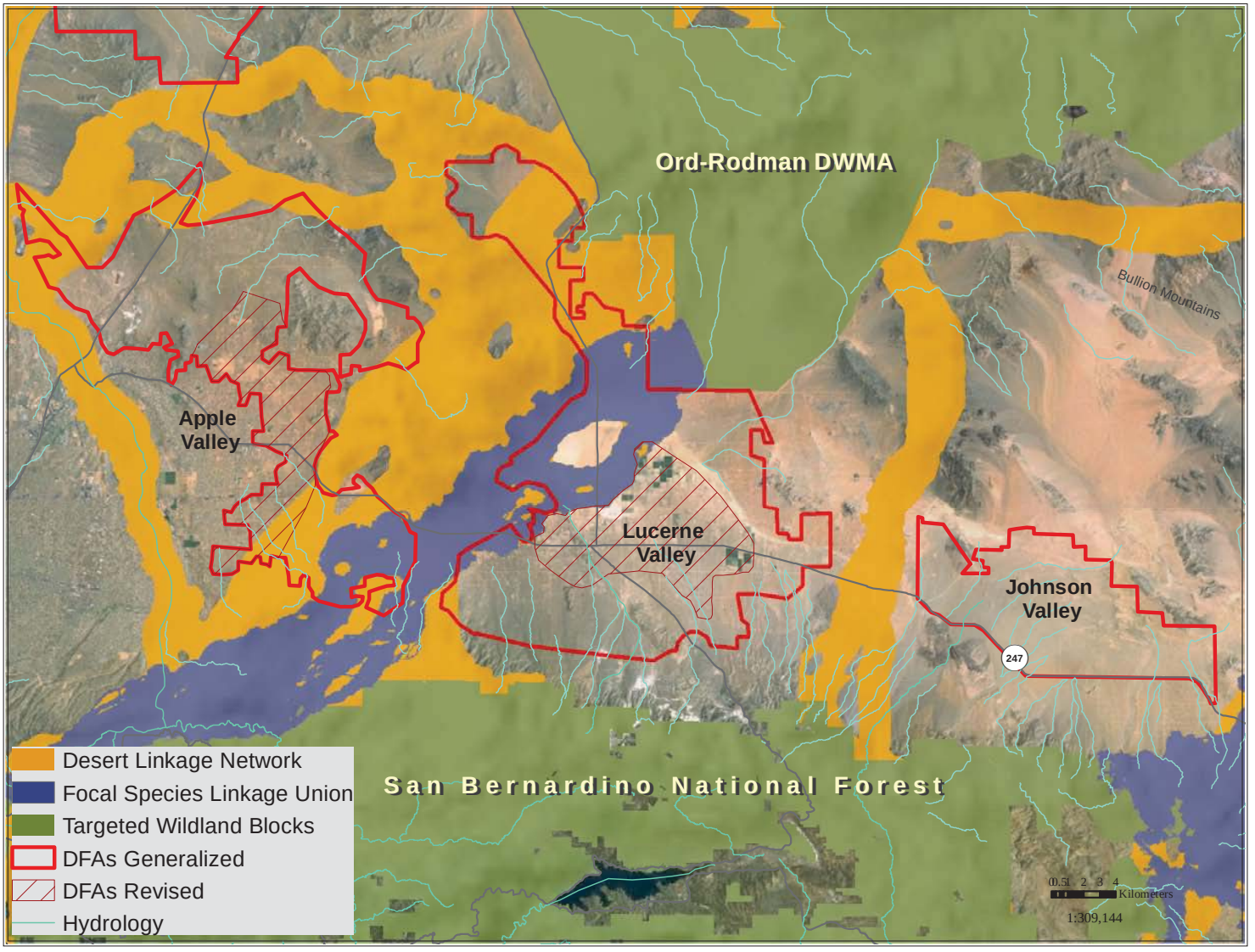
Table 4. Summary of Benefits to Covered Species Using Site Survey Composite for the Preferred Alternative (i.e., DRECP Composite Ecological Basline Preferred Alternative v5, GIS data downloaded from Data Basin).

Covered Species	Apple Valley (573 pixels)	Lucerne Valley (787 pixels)	Johnson Valley (428 pixels)
Alkali mariposa lily	0	133	0
Bendire's thrasher	518	564	75
Bighorn sheep	194	139	0
Burrowing owl	559	774	428
desert tortoise	408	719	428
Golden eagle	361	484	353
Least Bell's vireo	80	50	7
Little San Bernardino linanthus	0	84	210
Mohave ground squirrel	253	159	0
Mojave monkeyflower	155	113	0
Mountain plover	7	0	0
Pallid bat	570	756	428
Parish's daisy	108	310	0
Southwestern willow flycatcher	4	7	0
Swainson's hawk	29	0	0
Townsend's big-eared bat	567	775	417
Tricolored blackbird	14	14	0
Yellow-billed cuckoo	3	0	0
Total Species Count in Pixels	**3959**	**5080**	**2346**
# of Covered Species per Pixel	**4 to 11**	**2 to 10**	**4 to 7**
Average # Covered Species per Pixel	**6.9**	**6.45**	**5.48**

soil scrub, Intermontane seral shrubland, California Annual and Perennial Grassland, Lower Bajada and Fan Mojavean /Sonoran desert scrub, Mojave and Great Basin upper bajada and toeslope, Mojavean semi-desert wash scrub, Shadscale/saltbush cool semi-desert scrub, North American Warm Desert Alkaline Scrub, Herb Playa and Wet Flat, Sonoran-Coloradan semi-desert wash woodland/scrub, Madrean Warm Semi-Desert Wash Woodland/Scrub, Mojavean semi-desert wash scrub, North American warm desert dunes and sand flats, North American Warm Desert Alkaline Scrub and Herb Playa and Wet Flat, and, Southwestern North American salt basin and high marsh. In addition, there are several unique plant assemblages in this area due to its location at the juncture of the Mojave and South Coast ecoregions. Here, oak woodlands intermingle with Joshua tree and Pinyon-Juniper woodlands amid spectacular rocky outcrops. Ecotones are particularly high in biodiversity and contact zones for evolution.

The Twentynine Palms Newberry Rodman-San Gabriel Connection and the Twentynine Palms Newberry Rodman-San Bernardino Connection of the Desert Linkage Network (Penrod et al. 2012) overlap one another in the area of the proposed Apple Valley and Lucerne Valley DFAs. Figure 4 of the Desert Linkage Network in this region also includes the Focal Species Linkage

Figure 4. Desert Linkage Network Conflicts in the Pinto Lucerne Valley Eastern Slopes Ecoregion Subarea

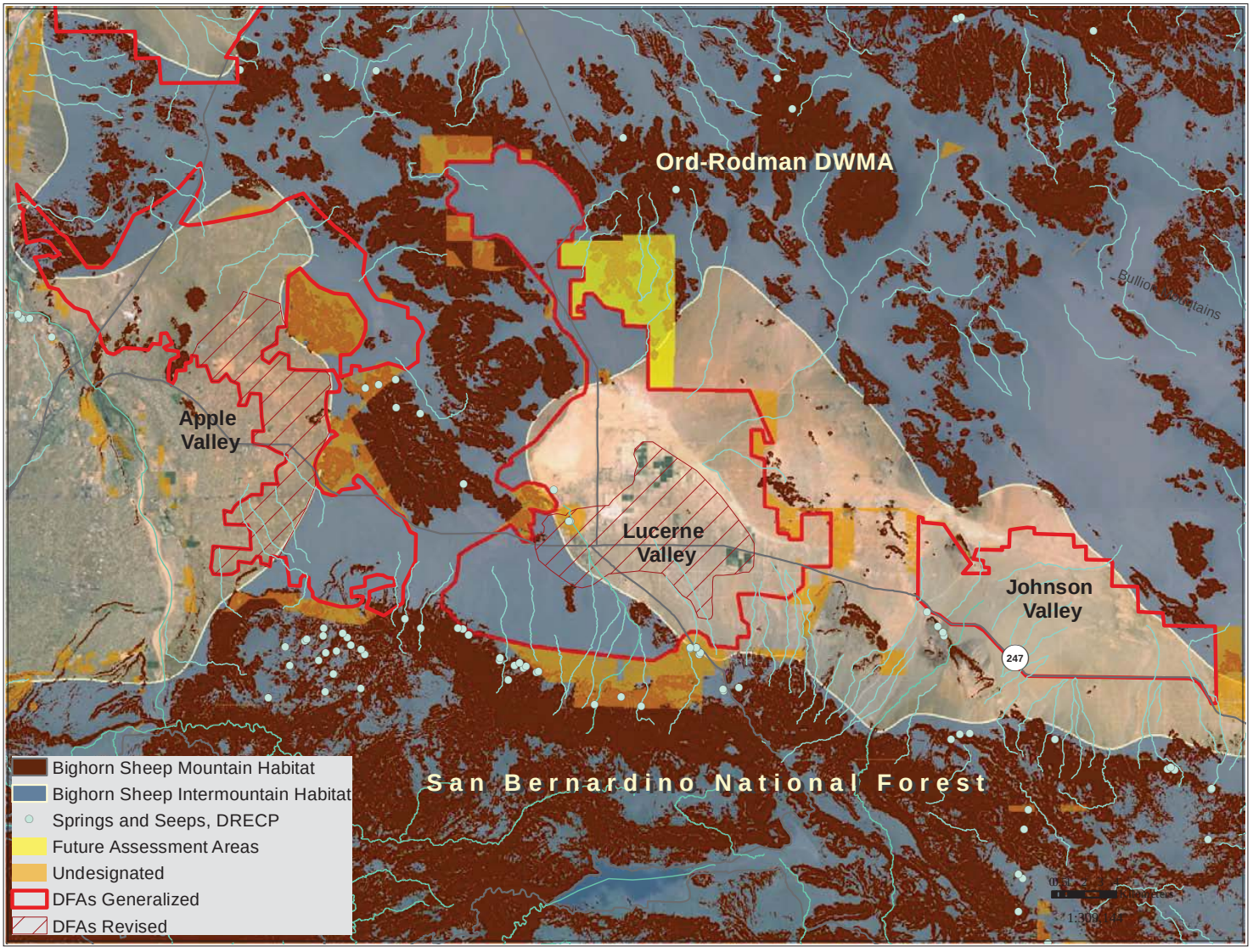


Union (blue) to show the area of the linkage network that was delineated by the land facet analyses (orange). The Proposed Granite Mountain Wildlife Linkage ACEC was designed to connect SBNF with the Bendire's Thrasher ACEC, while the Northern Lucerne Wildlife Linkage is expected to connect the Bendire's Thrasher ACEC to Ord-Rodman DWMA. As proposed, the Granite Mountain Wildlife Linkage ACEC is reduced to about 1.2 miles wide for much of its length south of State Route 18 and more closely follows the linkage design for the San Bernardino-Granite Connection (Penrod et al. 2005), which did not include land facet analyses. Several land facets corridors were delineated between these ranges (see Figures 18 and 19 in Penrod et al. 2012), which are expected to support species movements during periods of climate instability. DFAs are proposed to either side of these proposed ACECs that would constrain the linkage for a distance of roughly 20 miles. Species are then expected to make a hard right to follow Stoddard Ridge around the arm of the DFA proposed in the Northern Lucerne Valley. Objective L1.2 is to "Design landscape linkage corridors to be 3 miles wide where feasible, and at least 1.2 miles wide where a greater width is not feasible". We believe that a greater width is feasible and desirable for the proposed Granite Mountain Wildlife Linkage ACEC. No DFAs should be sited within these areas.

The northern arm of the Lucerne Valley DFA bisects both the focal species and land facet linkage and should be reconfigured to avoid the Desert Linkage Network through this area. The FAA should be included as part of the Newberry Rodman ACEC and NLCS due to its high conservation value (e.g., landscape connectivity, bighorn sheep, intact desert tortoise habitat). In fact, 31 of the 44 focal species evaluated by the Desert Linkage Network are expected to be served by this linkage. The westernmost strand of the Desert Linkage Network that follows the Mojave River for a distance and then arcs to the east toward Newberry Rodman is the corridor with high interspersion of land facets which is expected support species movements during periods of climate instability. The northern part of the Apple Valley DFA bisects this part of the linkage between the Mojave River and the Silver Mountains area of a proposed ACEC and should be included in that ACEC and removed from the DFA.

Figure 5a depicts Desert Bighorn Sheep - Intermountain & Unfiltered Core Habitat (California Department of Fish and Wildlife, April 2013 Draft, A Conservation Plan for Desert Bighorn Sheep in California) in relation to the Preferred Alternative in this subarea. The Desert Bighorn Sheep Mountain Habitat identifies historic, current, and potential core habitat, while the Intermountain Habitat represents the intermountain, lower slope, valley bottom habitat used by desert bighorn sheep to move between mountain habitat. CDFW, also the lead agency on the NCCP, mapped an intermountain connection between San Bernardino National Forest (SBNF) and Ord-Rodman that has a minimum width of roughly 7.8 miles. Bighorn sheep mountain habitat and intermountain habitat largely overlap with the Desert Linkage Network. The upper arm of the Lucerne Valley DFA disrupts intermountain bighorn habitat and should be reconfigured. Further the FAA includes bighorn sheep mountain habitat in close proximity to mountain habitat in the Granite Mountain Linkage and should be included in the Newberry Rodman ACEC and NLCS. Finally, several areas of bighorn sheep mountain habitat are identified as Undesignated and available for "disposal". Bighorn mountain habitat along the perimeter of the proposed Granite Mountain and Northern Lucerne Wildlife Linkage ACECs should be included in the Reserve Design. Further, Undesignated land on the Ridgeline and slopes of the San Bernardino Mountains between the Juniper Flats NLCS and the Carbonate

Figure 5a. Bighorn Sheep Conflicts in the Pinto Lucerne Valley Eastern Slopes Ecoregion Subarea



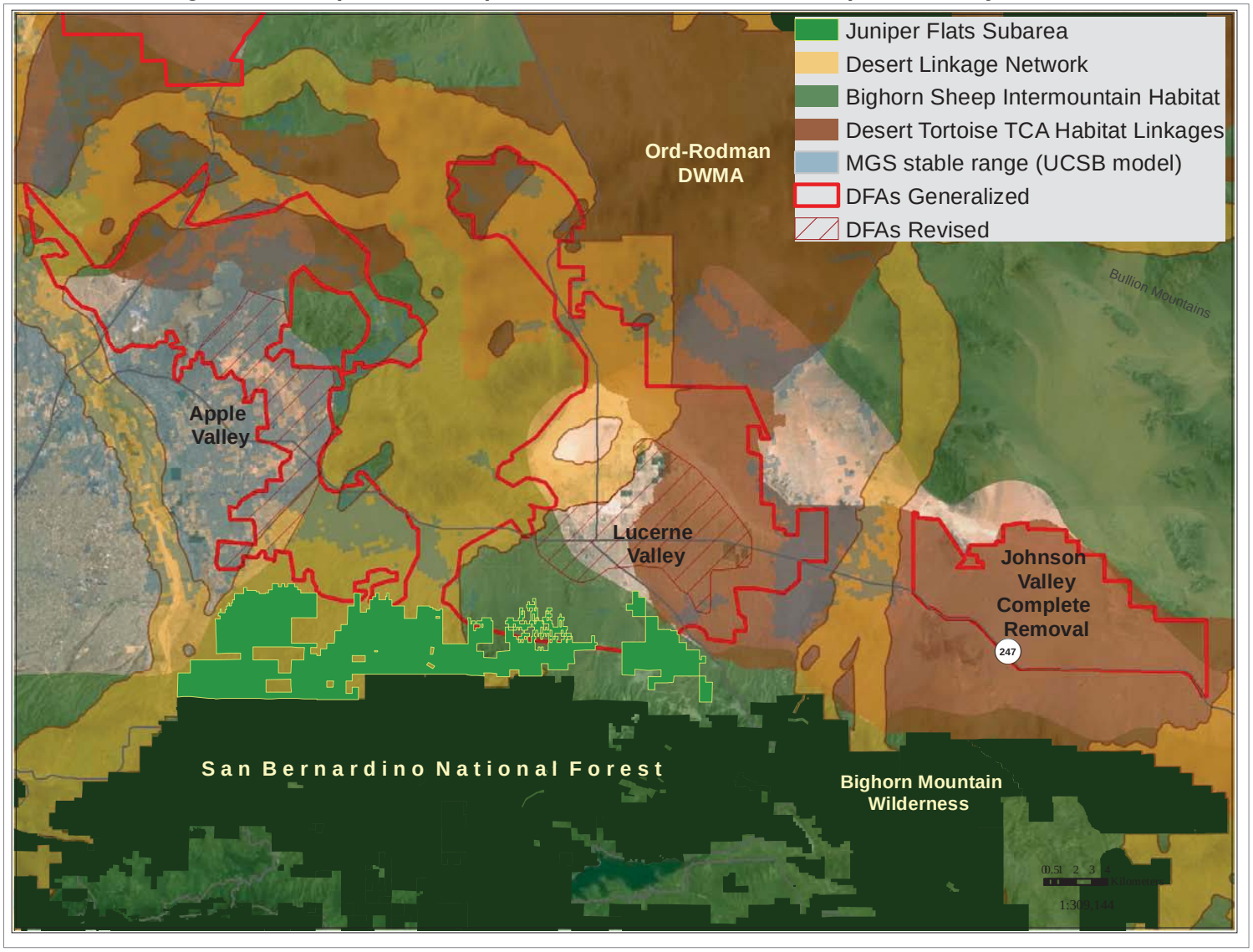
Endemic Plants NLCS (roughly 15 additional miles is the Grapevine Canyon Recreation Area also known as Juniper Flats by the BLM) should also be included in the Reserve Design (Figure 5b), consistent with Step-Down Biological Objective DBSH-B and because there are many springs, seeps, significant riparian canyons, alluvial fans (i.e. rare piedmont fans), and washes in this area essential for bighorn sheep and numerous other species. This area is currently designated as Undesignated in the Preferred Alternative.

This land known as the Juniper Flats subregion by the BLM stretches from the Mojave River to the Cushenbury Grade (Figure 5b). The area is continuous with the San Bernardino National Forest, which encompasses over 600,000 acres and boasts over 600 significant cultural sites. There are several unusual and unique plant assemblages here, with oak woodlands intermixed with pinyon-juniper and Joshua trees and spectacular rock outcroppings. The area is extremely close to the Pacific Crest National Scenic Trail and Deep Creek, which has been nominated as a National Wild and Scenic river as part of the Feinstein Bill. The Juniper Flats area has been submitted to the BLM for consideration for NLCS designation and over 25 NGO's and individuals have endorsed this effort. SC Wildlands strongly supports an NLCS designation for this remarkable area.

Goal DBSH1: Conserve the desert bighorn sheep Sonoran–Mojave desert metapopulation) across the DRECP area within well-distributed habitat areas in mountain ranges and intermountain linkages. Emphasize conservation in areas where herds are most likely to be adaptive and resilient in response to the effects of changes within their metapopulations, including, range shifts, contractions, expansions, local extirpation, and recolonization, as well as environmental changes in climate, temperature, and precipitation. **Comment:** We expect that the Twentynine Palms Newberry Rodman-San Bernardino Connection will be especially important to the Cushenberry Herd of bighorn sheep in a warming climate for access to water resources (e.g., seeps, springs, riparian habitats).

Step-Down Biological Objective DBSH-B: Protect, maintain, and manage for the duration of the NCCP on BLM LUPA conservation designation lands and prioritize for conservation on non-BLM lands substantial representative desert bighorn sheep habitat in the following areas:
o Newberry, Ord, and Rodman Mountains
o North San Bernardino Mountains
o El Paso Mountains
o **Corridors** between the North San Bernardino Mountains and Newberry Mountains
o Corridors between the San Gorgonio Wilderness Area and the western extremity of the Little San Bernardino Mountains
o Portions of the valley habitats between the Palen-McCoy Mountains, Chuckwalla Valley between the Eagle Mountains and the Chuckwalla Mountains
o Portions of the valley habitats between the Little Chuckwalla Mountains, Palo Verde Mountains, McCoy Mountains, Mule Mountains
Comment: The Granite Mountains Wildlife Linkage ACEC as currently proposed is a "corridor" to the south of SR-18 but with our proposed modifications to the DFAs it will be a landscape-level linkage.

Figure 5b. Juniper Flats Proposed NLCS in Relation to Composite of Key Drivers



Conservation and Management Actions for bighorn sheep are pretty slim and the DRECP says, "Within DFAs on BLM-administered lands Desert Bighorn Sheep CMAs would be implemented to the extent feasible and allowable under existing permits, leases, and allotment plans". Why only to "the extent feasible" rather than to the maximum extent possible? Does this mean CMAs would not be implemented on lands not administered by BLM within the DFAs?

- **AM-DFA-ICS-34:** Access to, and use of, designated water sources will not be affected by Covered Activities in designated and new utility corridors.
- **AM-DFA-ICS-35:** Transmission projects and new utility corridors will minimize effects on access to, and use of, designated water sources.

The proposed Granite Mountain Wildlife Linkage ACEC is described in Appendix L. The Relevance and Importance Criteria states, "the area is critical for bighorn sheep, golden eagles, desert tortoise and prairie falcons and several other species. Additionally, numerous rare and sensitive plants have major populations here, making the area regionally important". Goals: "Protect biological values including habitat quality, populations of sensitive species, and landscape connectivity while providing for compatible public uses". One of the Objectives is to "protect and enhance sensitive wildlife habitat" with the following species listed: desert tortoise, LeConte's thrasher, San Diego pocket mouse, prairie falcon, golden eagle, and Mohave ground squirrel. All species listed in Table 4 should be included here (e.g., least Bell's vireo, southwestern willow flycatcher). In addition, a number of focal species selected for the Desert Linkage Network are expected to be served by this linkage and should be included in this list: puma, badger, kit fox, bighorn sheep, mule deer, little pocket mouse, southern grasshopper mouse, pallid bat, burrowing owl, loggerhead shrike, Bendire's thrasher, crissal thrasher, cactus wren, greater roadrunner, chuckwalla, desert night lizard, desert spiny lizard, Great Basin collared lizard, rosy boa, speckled rattlesnake, Mojave rattlesnake, Bernardino dotted blue, desert green hairstreak, desert metalmark, and yucca moth. These would be good candidate species for monitoring wildlife movement and habitat linkage function for the MAMP's Landscape and Ecological Processes Effectiveness Monitoring. Another Objective is to "protect populations of sensitive plants"; the following species should be added to the 4 existing plant species currently on the list: *Canbya candida*, *Sidalcea neomexicana*, *Plagiobothrys parishii*, *Phacelia parishii*, *Puccinellia parishii*, *Mimulus mohavensis*, *Leymus salinus* ssp. *mojavensis, Eriophyllum mohavense*, and *Calochortus striatus.* In addition, two focal species, *Yucca brevifolia and Yucca* schidigera, from Penrod et al. (2012) should be included.

One of the primary goals for the Desert Tortoise Linkages (Goal DETO2) is to "Maintain functional linkages between Tortoise Conservation Areas to provide for long-term genetic exchange, demographic stability, and population viability within Tortoise Conservation Areas. Emphasize inclusion of high value contiguous habitats pursuant to Nussear et al. (2001) and avoidance of disturbance in habitat with high desert tortoise habitat potential (see Figure C-35)". It is Nussear et al. 2009, not 2001! Nussear et al. (2009) identifies much of the Apple Valley, Lucerne Valley and Johnson Valley DFAs as highly suitable habitat for tortoise (Figure 6).

There are several areas where the Lucerne Valley and Johnson Valley DFAs conflict with two desert tortoise linkages in the Western Mojave Recovery Unit, Fremont-Kramer to Ord-Rodman Linkage and the Ord-Rodman to Joshua Tree linkage (Figure 7). The upper arm of the Lucerne Valley DFA coincides with intact desert tortoise habitat in the Fremont Kramer to Ord-Rodman

Figure 6. High Value Desert Tortoise Habitat in the Pinto Lucerne Valley Eastern Slopes (Nussear et al. 2009)

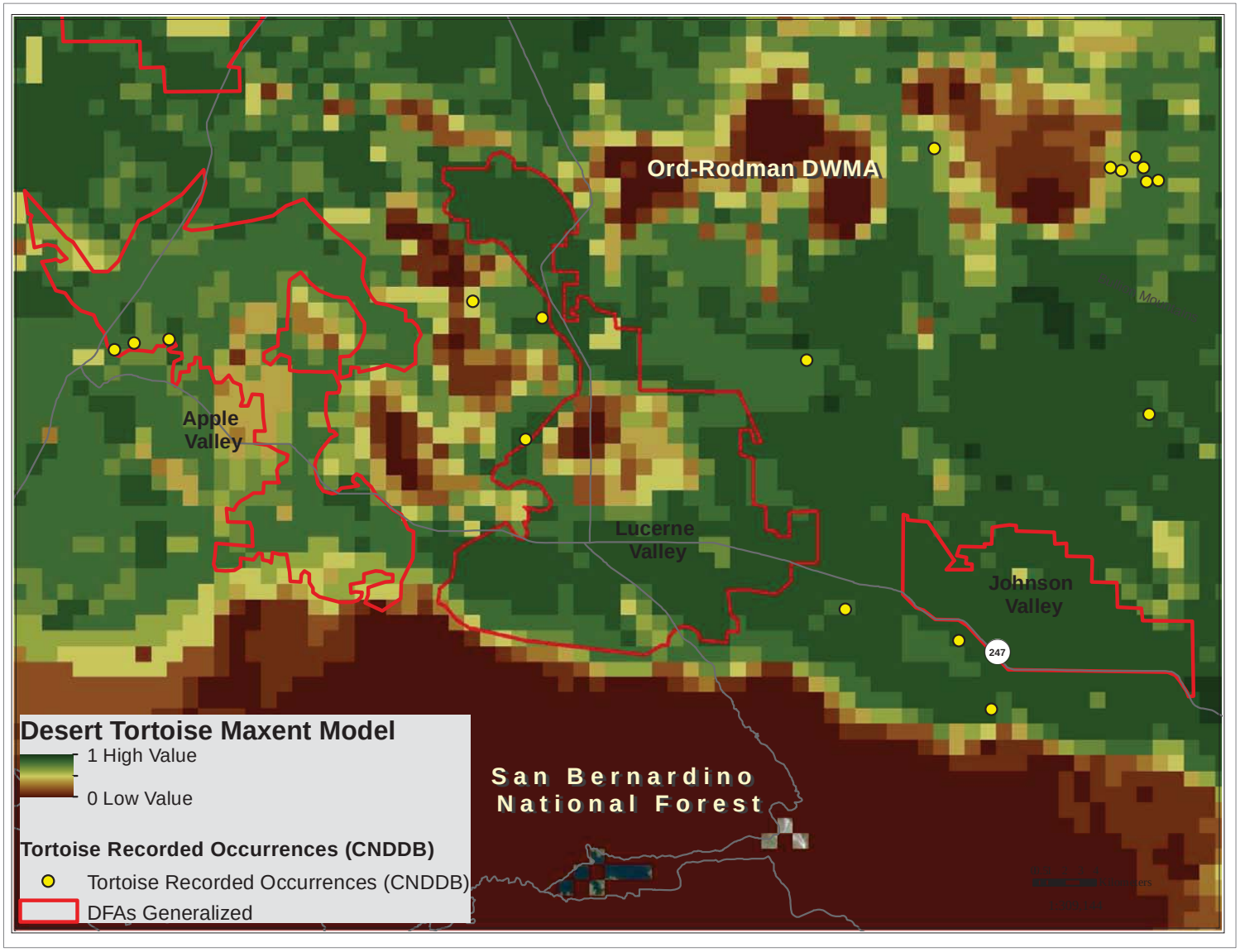
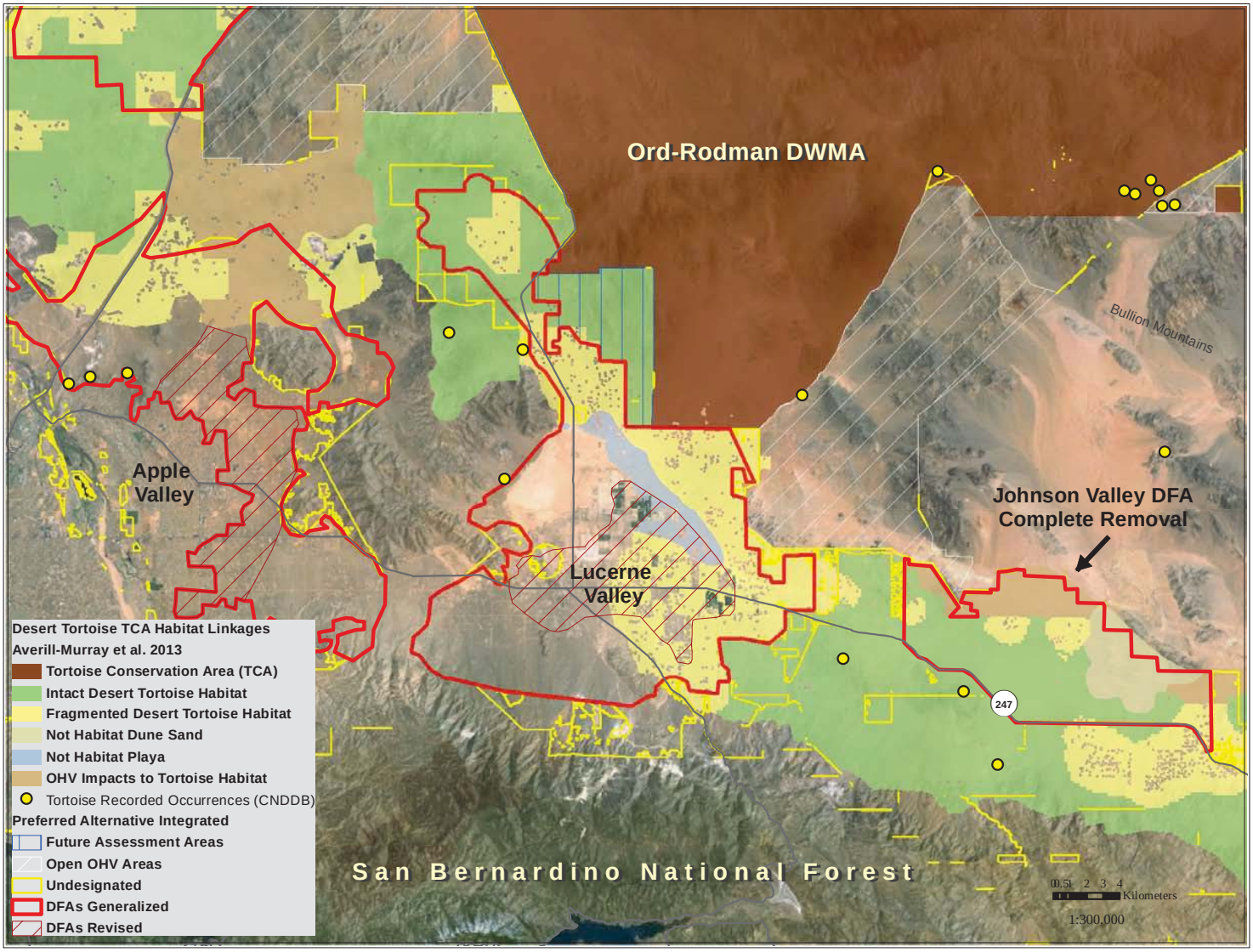


Figure 7. Desert Tortoise TCA Linkage Conflicts in the Pinto Lucerne Valley Eastern Slopes



Linkage and the FAA that is sandwiched between this DFA and the Ord-Rodman TCA is made up almost entirely of intact desert tortoise. This area of the Lucerne Valley DFA and the FAA is also in conflict with the Desert Linkage Network, Bighorn sheep intermountain habitat, and other Covered Species (e.g., Bendire's thrasher, burrowing owl, golden eagle). In addition, the Lucerne Valley DFA as currently proposed completely severs the northern segment of the Ord-Rodman to Joshua Tree Linkage and would severely compromise the function of this linkage (See AM-DFA-ICS-6 Comment). The great majority of the Johnson Valley DFA is also intact desert tortoise habitat that falls within the Ord-Rodman to Joshua Tree Linkage. These DFAs must be reconfigured to AVOID these Desert Tortoise Linkages.

In addition, the southern segment of the Ord-Rodman to Joshua Tree Linkage to the southeast of the Johnson Valley DFA is also identified as "Fragmented Desert Tortoise Habitat" (Figures C-35 and C-36) and much of it is delineated as "Undesignated" land, which would be available for "disposal". While there are ACEC and NLCS lands proposed on the western fringe of the desert tortoise linkage, these proposed designations do not capture the most permeable route for the tortoise. While the raster data for the least-cost corridor analyses was not available on Data Basin as part of the Desert Tortoise TCA and Linkages data, I know this analysis well enough to know how it looks when converted to a shapefile. BLM has checkerboard ownership in this segment of the linkage and several of the adjacent parcels are NOT developed that would allow for the design and implementation of a "landscape linkage corridor…at least 1.2 miles wide" (Objective L1.2). As such, this segment of the linkage should be identified as a Conservation Planning Area. All desert tortoise linkages should be included in the Reserve Design in order to achieve Goal DETO2 (Desert Tortoise Linkages)**, "**Maintain functional linkages between Tortoise Conservation Areas to provide for long-term genetic exchange, demographic stability, and population viability within Tortoise Conservation Areas". The Western Mojave Recovery Unit and the associated linkages may be especially important to allow the tortoise to adapt to climate change, as indicated in Section III.7.4, "According to climate change models, conditions currently present in parts of the Colorado/Sonoran Desert are expected to expand to other parts of the Plan Area (Allen 2012), with an associated shift in vegetation (Notaro et al. 2012).

AM-DFA-ICS-5 Comment: If "Covered Activities, except for transmission projects in existing transmission corridors, will avoid the desert tortoise conservation areas (TCAs) and the desert tortoise linkages identified in Appendix H", why are ANY DFAs sited in TCAs and linkages? Further, why are any areas of the tortoise linkages "Undesignated" and therefore "available for disposal"? As one of the Reserve Drivers, all desert tortoise TCAs and linkages in ALL Recovery Units should be included in the Reserve Design!

AM-DFA-ICS-6 Comment (1): A population viability analysis (PVA) should have been conducted Plan-Wide for desert tortoise as part of the DRECP process. This information should have been presented in Vol. III to assess existing recovery efforts under baseline conditions and in Vol. IV to compare the potential impacts of habitat loss proposed under each Alternative. AM-DFA-IC-6 refers to "the maintenance of long term viable desert tortoise populations within the affected linkage". While each of the desert tortoise linkages identified in Figure H-7 provide live-in and move-through habitat, these linkage are intended to provide connectivity between the TCAs to maintain the viability of the entire population. As stated in Section III.7.6.1.1, " Linkage habitat are important areas identified by Recovery Implementation Teams, such as

important genetic linkages identified by Hagerty et al. 2010 (cited in USFWS 2011a) that are important to maintaining the species' distribution throughout its range". A PVA for a "linkage population" doesn't make sense.

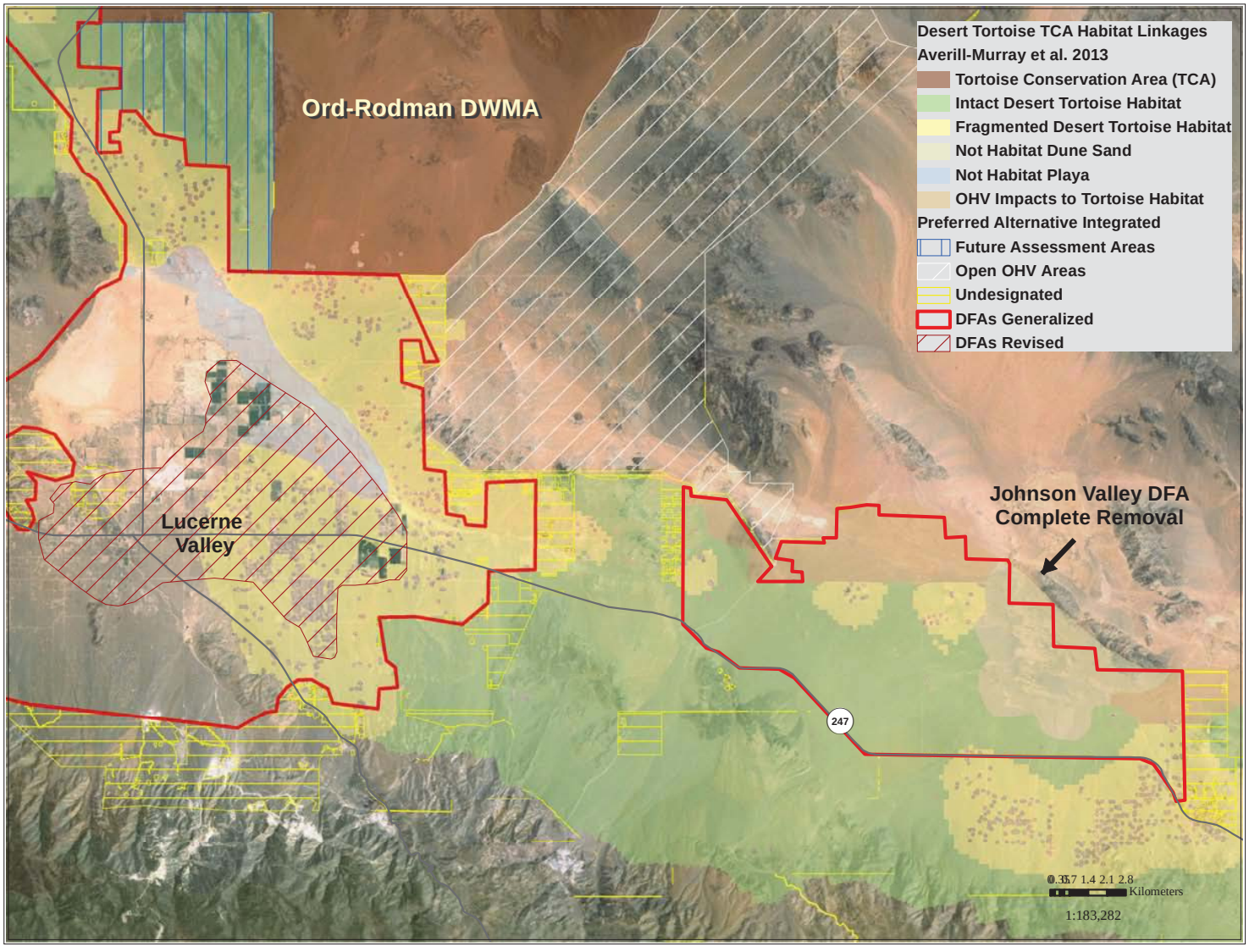
AM-DFA-ICS-6 Comment (2): "Covered Activities that would compromise the viability of a linkage population or the function of the linkage, as determined by the DRECP Coordination Group, are prohibited and would require reconfiguration or re-siting".

AM-DFA-ICS-7: Covered Activities will be sited in lower quality desert tortoise habitat in desert tortoise linkages and the Ord-Rodman TCA, identified in Appendix H.
COMMENT: Identified where? Figure H-6 Desert Tortoise Survey Areas? Figure H-7? Neither of these maps depict "lower quality desert tortoise habitat". If Figure H-6, is the "lower quality desert tortoise habitat in the "No Survey Areas" identified in the legend, or in the "No Survey Areas" and "Clearance Survey Only Areas". If so, that would imply that the "Protocol Survey Areas" are higher quality desert tortoise habitat, which would reinforce comments made above for AM-DFA-ICS-5 and AM-DFA-ICS-6. Figure H-7, Desert Tortoise Conservation Areas, identifies the majority of the Apple, Lucerne, Johnson Valley DFAs as Protocol Survey Areas with some smaller areas identified as Clearance Survey Areas.

The Lucerne Valley DFA as currently proposed completely severs the northern segment of the Ord-Rodman to Joshua Tree Linkage (Figure 8) and would severely compromise the function of this linkage (AM-DFA-ICS-6). The analyses conducted by USFWS (Averill-Murray et al. 2013) indicate that this area is relatively permeable to tortoise movement and this entire area is identified as highly suitable in the desert tortoise Maxent model (Nussear et al.2009). This area of the linkage is identified as Fragmented Desert Tortoise Habitat in Attachment B to Appendix D but an evaluation of aerial imagery in this area reveals that existing rural development here is relatively sparse and the majority of residential properties in this area are unfenced. This area of the linkage should not be written off, especially since one of the overarching Biological Goals is to, "Preserve, restore, and enhance natural communities and ecosystems including those that support Covered Species within the Plan Area". The distance between the Ord-Rodman TCA and the Intact Desert Tortoise Habitat in the Old Woman Springs Wildlife Linkage ACEC is roughly 7 miles, fully within the movement capability of an individual tortoise. Sazaki et al. (1995) estimated dispersal distance for pre-breeding male tortoises to be between 6.21-9.32 miles. This DFA must be reconfigured to completely avoid this linkage. Further, the playa habitat to the west of the tortoise linkage, although not tortoise habitat, could buffer the tortoise linkage from Covered Activities in the remaining DFA, while also providing habitat for other Covered Species (e.g., burrowing owl, pallid bat, Townsend's big-eared bat) .

The Johnson Valley DFA as currently proposed (Figures 7 and 8) would severely compromise the function of the Or-Rodman to Joshua Tree linkage. This proposed DFA is roughly 27,258 acres, much of it Intact Desert Tortoise Habitat as identified in Attachment B to Appendix D and Figures C-35 and C-36. The area of intact habitat in the linkage currently ranges in width from roughly 5 to 8 miles wide. The proposed Johnson Valley DFA would reduce the width of the linkage to about 3 miles wide in this stretch of the linkage. The average home range size for desert tortoise in the Western Mojave Recovery Unit is 125 acres (USFWS 1994, Boarman 2002). Would this significant reduction of intact habitat allow for "the maintenance of long-term

Figure 8. Desert Tortoise Ord-Rodman to Joshua Tree Linkage Conflicts



viable desert tortoise populations within the affected linkage (AM-DFA-ICS-6)"? This entire DFA is identified as highly suitable in the desert tortoise Maxent model (Nussear et al.2009) and the great majority of it is BLM land. This linkage must not be written off, especially since one of the overarching Biological Goals is to, "Preserve, restore, and enhance natural communities and ecosystems including those that support Covered Species within the Plan Area". We recommend complete removal of this DFA to avoid this linkage in order to "maintain functional linkages between Tortoise Conservation Areas to provide for long-term genetic exchange, demographic stability, and population viability within Tortoise Conservation Areas" and meet the intent of Goal DETO2 (Desert Tortoise Linkages).

Objective DETO2.1a (Desert Tortoise Linkages): Protect, manage and acquire desert tortoise habitat within the following linkages (see Figure C-34) with special emphasis placed on areas of high habitat potential and areas identified as integral to the establishment and protection of a viable linkage network (see Figure C-36). Ensure the long-term connectivity of Tortoise Conservation Areas by maintaining desert tortoise habitat that is of sufficient size and contiguity for maintenance of viable populations within each linkage.
o Ord-Rodman to Superior-Cronese to Mojave National Preserve
o Superior-Cronese to Mojave National Preserve to Shadow Valley to Death Valley National Park Linkage
o Joshua Tree National Park and Pinto Mountains Desert Wildlife Management Area (DWMA) to Chemehuevi Linkage
o Death Valley National Park to Nevada Test Site

DETO2.1a COMMENT: Figure C-34 depicts 9 different desert tortoise linkages yet only 4 are listed here, all of which occur in the Eastern Mojave Recovery Unit and the Colorado Desert Recovery Unit. Why are none of the linkages associated with the Western Mojave Recovery Unit included here? For example, the Ord-Rodman to Joshua Tree Linkage includes a contiguous, fairly wide strand that is either intact desert tortoise habitat or fragmented tortoise habitat with High Habitat Potential (C-36). As a "Reserve Driver" Covered Species and Non-Covered but Addressed Species associated with the Western Mojave are reliant and at the mercy of the agencies to create a VIABLE PLAN-WIDE Linkage Network for ALL native species and ecological process of interest in the DRECP Region.

Objective DETO2.1b (Desert Tortoise Linkages): Protect, maintain, and acquire all remaining desert tortoise habitat within linkages already severely compromised, specifically the following (see Figure C-34):
o Ivanpah Valley Linkage
o Chemehuevi to Chuckwalla Linkage
o Pinto Wash Linkage

DETO2.1b COMMENT: Why is the Ord-Rodman to Joshua Tree Linkage not included here? Or, the Fremont Kramer to Ord-Rodman Linkage? This objective should read: Protect, maintain and restore all remaining desert tortoise habitat within linkages already severely compromised, specifically the following (see Figure C-34 through C-36):
o Ivanpah Valley Linkage
o Chemehuevi to Chuckwalla Linkage

o Pinto Wash Linkage
*ADD Ord-Rodman to Joshua Tree Linkage
*ADD Fremont Kramer to Ord-Rodman Linkage

Objective DETO2.1c (Desert Tortoise Linkages): Protect intact habitat (see Figure C-35) within the following linkages to enhance the population viability of the Ord-Rodman Tortoise Conservation Area.
o Ord-Rodman to Joshua Tree Linkage
o Fremont Kramer to Ord-Rodman Linkage

DETO2.1c COMMENT: The DRECP refers the reader to Figure C-35 Desert Tortoise Biological Goals and Objectives but the LEGEND on this map refers to Objective DETO2.1d in relation to the Ord-Rodman to Joshua Tree Linkage and the Fremont Kramer to Ord-Rodman Linkage but DETO2.1d doesn't exist under Goal DETO2 (Desert Tortoise Linkages). However, Figure C-36 Desert Tortoise Biological Goals and Objectives and Habitat Potential does identify DETO2.1c for these two desert tortoise linkages. There is no explanation for the legend in Figure C-36 but one must assume that the High and Low following the BGOs relate to High Habitat Potential and Low Habitat Potential. The "Fragmented Habitat" in both of these linkages identified in Figure C-35 is also identified as having High Habitat Potential in Figure C-36. Protecting only "intact habitat" in the Ord-Rodman to Joshua Tree Linkage will do nothing to enhance the population viability of the Ord-Rodman Tortoise Conservation Area if ALL of the habitat within the linkage between the TCA and the intact habitat is entirely within a DFA! Shouldn't the tortoise linkages enhance the population viability of all of the TCAs (e.g., Joshua Tree, Fremont Kramer)?

Step-Down Biological Objective DETO-B: Protect, maintain, and manage for the duration of the NCCP on BLM LUPA conservation designation lands and prioritize for conservation on non-BLM lands substantial representative areas of desert tortoise habitat in the following areas:
O Desert Tortoise Research Natural Area
O Fremont-Kramer Desert Wildlife Management Area and Critical Habitat Unit
O Ord-Rodman Desert Wildlife Management Area and Critical Habitat Unit
o Portions of the Superior-Cronese Desert Wildlife Management Area and Critical Habitat Unit
o Portions of the Chuckwalla Desert Wildlife Management Area and Critical Habitat Unit
o Portions of intact desert tortoise habitat in the Colorado Desert
o Fremont Kramer to Ord-Rodman Linkage
o Chemehuevi to Chuckwalla Linkage
o Portions of the Ord-Rodman to Joshua Tree Linkage – WHY only portions?

Step-Down Biological Objective DETO-C: Establish long-term conservation to protect, manage, and enhance habitat value for 266,000 acres of desert tortoise habitat that contributes to the DRECP NCCP reserve design in and around the following areas: Desert Tortoise Research Natural Area, Fremont-Kramer Desert Wildlife Management Area and Critical Habitat Unit, Ord-Rodman to Joshua Tree Linkage, Fremont Kramer to Ord-Rodman Linkage, Pinto Wash Linkage, and Chemehuevi to Chuckwalla Linkage. COMMENT: FAA just outside of Ord-Rodman ACEC/NLCS is intact desert tortoise habitat, mountain and intermountain habitat for bighorn sheep, part of land facet linkages and habitat for numerous focal species in the Desert

linkage Network, and other Covered Species (e.g., golden eagle, burrowing owl). In the Overview of the Preferred Alternative II.3.1.1., it says "The current known value of these areas for ecological conservation is moderate to low". Please! The current known value of this FAA for ecological conservation is very high.

Step-Down Biological Objective DETO-D: Maintain and manage for resource values on BLM LUPA conservation designation lands habitat for desert tortoise in the following areas:
o Remainder of the Ord-Rodman to Joshua Tree Linkage
o Fremont Kramer to Ord-Rodman Linkage

Figure 9 shows areas of the Apple and Lucerne Valley DFAs that conflict with the Mohave ground squirrel. While the Pinto Lucerne Valley and Eastern Slopes Subarea is outside of the Mohave Ground Squirrel Conservation Area, there are historical recorded occurrences in this subarea and specifically in the Apple Valley and Lucerne Valley DFAs. This subarea lies at the southernmost extent of this species distributional range (Inman et al. 2013) and several areas in this subregion are expected to remain relatively stable (Davis et al. in press) under an uncertain climate.

We trust that the above discussion of Reserve Drivers provides sufficient evidence and justification for modification to the Reserve Design in the Pinto Lucerne Valley and East Slopes Ecoregion Subarea. We have also included a composite figure for the other species listed in Table 4 that are also expected to benefit from these modifications to the Apple and Lucerne Valley DFAs and the removal of the Johnson Valley DFA (Figures 10).

Summary: Under the current pace of development, natural resource agencies need to make near-term decisions in the face of existing land use pressures as well as long-term change. The one thing that is certain about climate change is that it is highly uncertain. Penrod et al. (2012) did not design corridors using complex models of future climate and biotic responses to climate change. Such an approach uses 4 models, with outputs of each model used as input to the next model. Specifically modeled future emissions of CO2 (1st model) drive global circulation models (2nd) which are then downscaled using regional models (3rd) to predict future climate. Then climate envelope models (4th) are used to produce maps of the expected future distribution of species. We avoided this approach for two reasons: (1) Each of the 4 models involves too much uncertainty, which is compounded from model to model and from one predicted decade to the next. In 1999 the IPCC developed 7 major scenarios of possible CO2 emissions during 2000-2011. The total emissions over the century vary by a factor of 6 among scenarios. *Actual emissions during 2000-2010 were higher than the most pessimistic scenario*. For a single emission scenario, different air-ocean global circulation models produce markedly different climate projections (Raper & Giorgi 2005). Finally climate envelope models may perform no better than chance (Beale et al. 2008). Because these sophisticated models have not simulated the large shifts during the last 100,000 years of glacial oscillations, Overpeck et al. (2005:99) conclude the "lesson for conservationists is not to put too much faith in simulations of future regional climate change" in designing robust conservation strategies. (2) These models produce outputs at a spatial resolution too coarse to support decision making in the California desert. The downscaled climate projections have minimum cells sizes measured in square kilometers. Penrod et al. (2012) used an alternative "land facets" approach to design climate-robust linkages that maximize continuity of the enduring features (topographic elements such as sunny lowland flats,

Figure 9. Mohave Ground Squirrel Conflicts in the Pinto Lucerne Valley Eastern Slopes

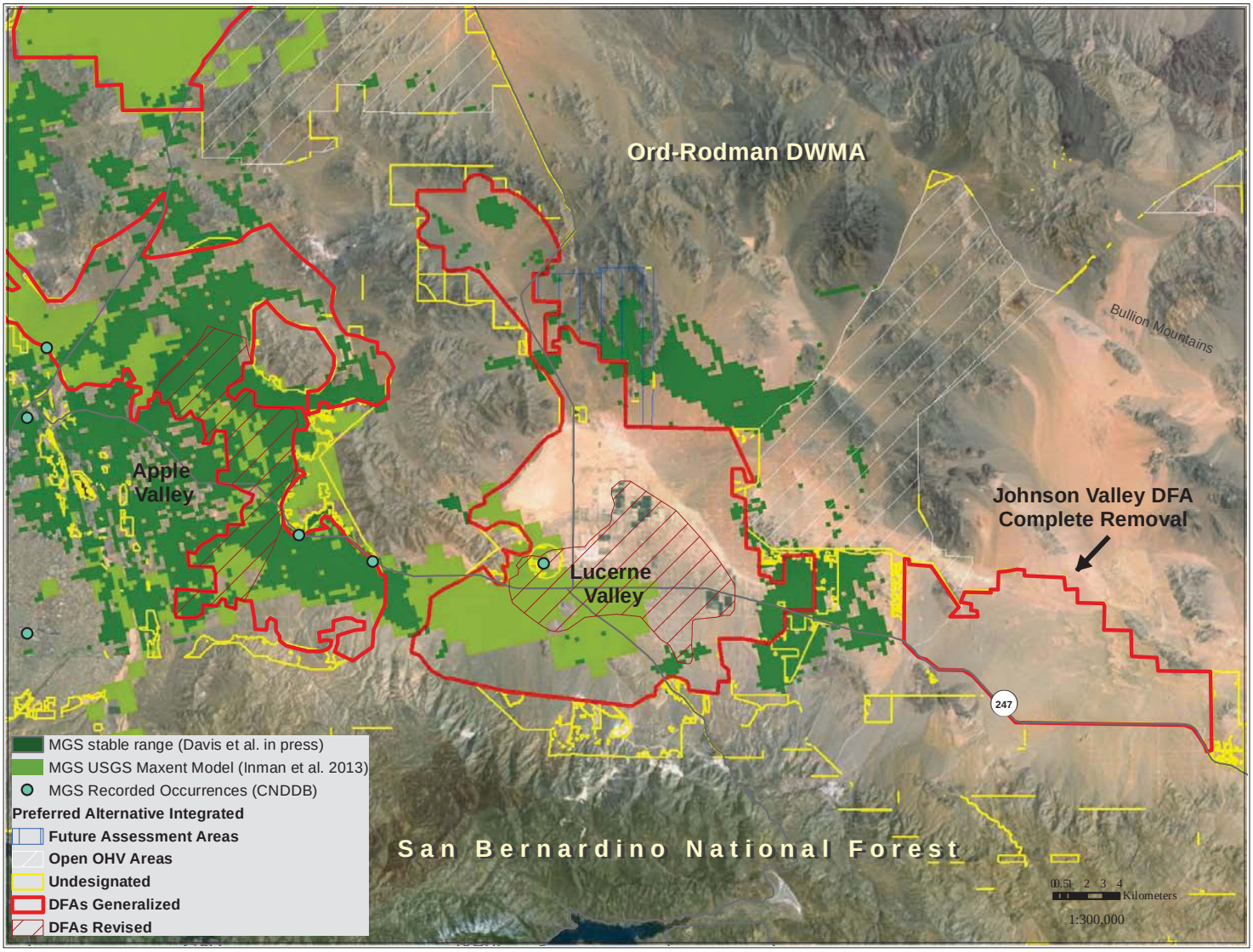
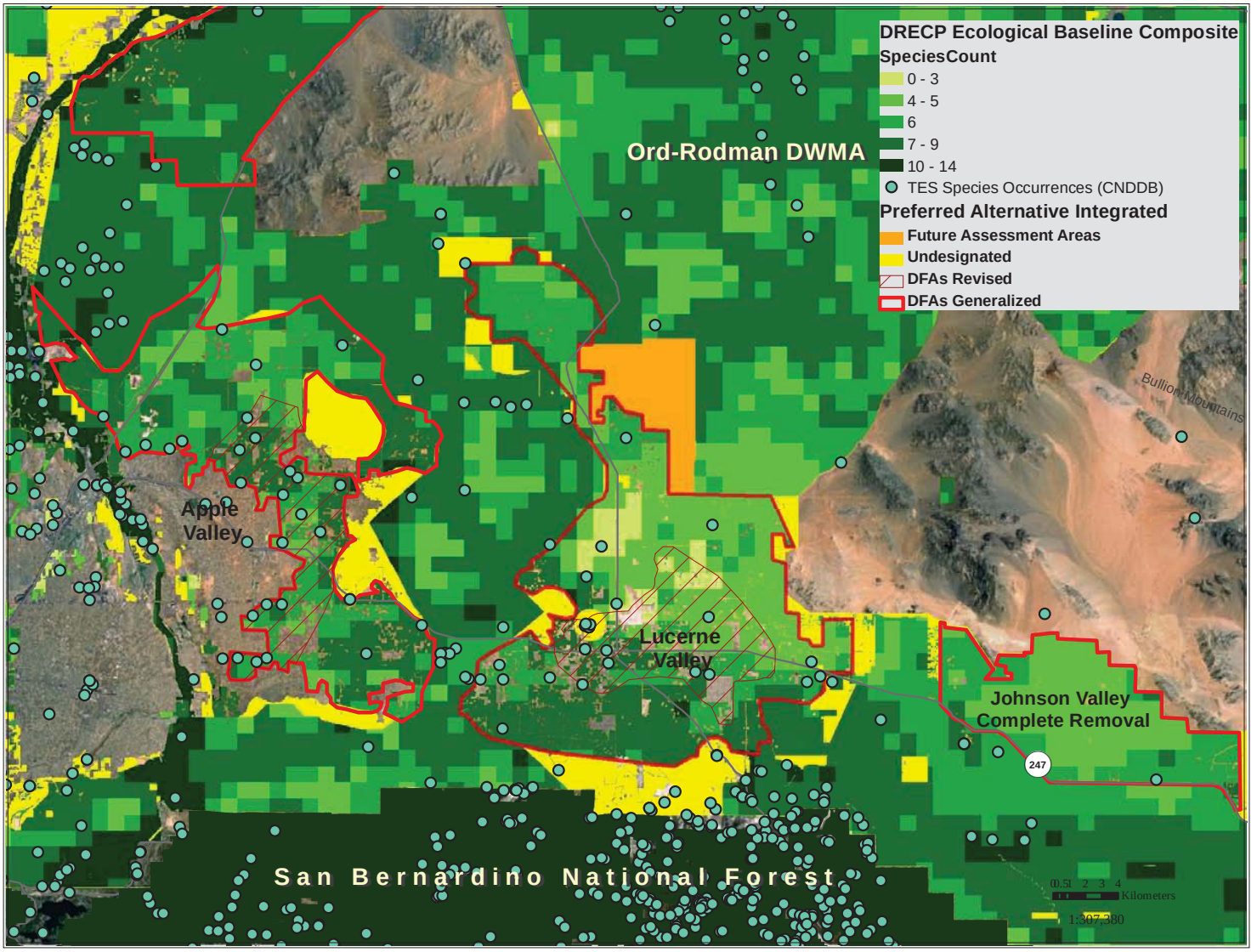


Figure 10. Covered Species Count in the Pinto Lucerne Valley Eastern Slopes



or steep north-facing slopes) that will interact with future climate to support future biotic communities. Enduring features reflect the stable state factors, namely topography, geology, and time. The uncertainties of the land facets approach are almost certainly less than the 6-fold uncertainty in emission scenarios multiplied by the uncertainty in general circulation models multiplied by the uncertainty in regional downscaling multiplied by the uncertainty in climate envelope models.

The Desert Linkage Network (Penrod et al. 2012) was designed to accommodate species movements, range shifts, and continued ecological functions during climate change. The Plan Wide Preferred Alternative includes 2,024,000 acres of DFAs and transmission corridors but says only about 177,000 acres will actually be impacted. If 177,000 acres is all that is truly needed to meet renewable energy goals, then ***ALL*** areas of the Desert Linkage Network (Penrod et al. 2012), Desert Tortoise TCA and Linkages (Averill-Murray et al. 2013), Bighorn sheep mountain habitat and intermountain habitat (CDFW 2013), and Mohave ground squirrel important habitat (Inman et al. 2013, UCSB 2013) should be included in the Reserve Design. Strategically conserving and restoring functional connections between large wildlands is an effective countermeasure to the adverse affects of habitat loss and fragmentation, and it is an essential mitigation measure for climate change.

In Volume 1 Chapter 1.2, Legal Framework, the DRECP says, "*To approve the DRECP as an NCCP, CDFW must find, based upon substantial evidence in the record, that the NCCP:*

4. Develops reserve systems and conservation measures in the Plan Area that provide for, as needed for the conservation of species, all of the following: (a) conserving, restoring, and managing representative natural and seminatural landscapes to maintain the ecological integrity of large habitat blocks, ecosystem function, and biological diversity; (b) establishing one or more reserves or other measures that provide equivalent conservation of Covered Species within the Plan Area and linkages between them and adjacent habitat areas outside of the Plan Area; (c) protecting and maintaining habitat areas large enough to support sustainable populations of Covered Species; (d) incorporating a range of environmental gradients (such as slope, elevation, and aspect) and high habitat diversity to provide for shifting species distributions due to changed circumstances; and (e) sustaining the effective movement and interchange of organisms between habitat areas in a manner that maintains the ecological integrity of the habitat areas within the Plan Area".

CDFW cannot approve the DRECP as an NCCP because there is NOT substantial evidence in the record that "ALL" of the above conditions have been met.

Thank you for the opportunity to provide comments on the DRAFT EIR/EIS for the DRECP. SC Wildlands is available to consult with the natural resource agencies to ensure that connectivity is adequately and accurately addressed in the DRECP.

Respectfully Submitted,
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Literature Cited

Averill-Murray, R.C., C.R. Darst, N. Strout, and M. Wong. 2013. Conserving population linkages for the Mojave desert tortoise (Gopherus agassizii). Herpetological Conservation and Biology 8(1):1-15.

Beale, C. M., J. J. Lennon, and A. Gimona. 2008. Opening the climate envelope reveals no macroscale associations with climate in European birds. Proceedings of the National Academy of Sciences 105:14908-14912.

Beier, P., and B. Brost. 2010. Use of land facets to plan for climate change: conserving the arenas, not the actors. Conservation Biology 24:701-710.

Boarman, W. I. 2002. Desert tortoise (Gopherus agassizii). In Boarman, W. I. and K. Beaman (eds), The sensitive plant and animal species of the Western Mojave Desert. U. S. Geological Survey, Western Ecological Research Center, Sacramento, Ca.

California Department of Fish and Wildlife, April 2013 Draft, A Conservation Plan for Desert Bighorn Sheep in California

California Natural Resources Agency. 2014. Safeguarding California: Reducing Climate Risk An update to the 2009 California Climate Adaptation Strategy.

California Natural Resources Agency. 2009. 2009 California Adaptation Strategy: A Report to the Governor of the State of California in Response to Executive Order S-13-2008

Davis, F. et al. *In Press*. Cumulative Biological Impacts Framework for Solar Energy in the California Desert.

Field, C.B., G.C. Daily, S. Gaines, P.A. Matson, J. Melack, and N.L. Miller. 1999. Confronting climate change in California: ecological impacts on the Golden State. Union of Concerned Scientists and Ecological Society of America, Washington D.C.

Heller, N. E. and E. S. Zavaleta. 2009. Biodiversity management in the face of climate change: a review of 22 years of recommendations. Biological Conservation 142:14-32.

Hunter, Jr., M. L., G. L. Jacobson, Jr., and T.Webb, III. 1988. Paleoecology and the coarse-filter approach to maintaining biological diversity. Conservation Biology 2:375-385.

Inman, RD, Esque TC, Nussear KE, Leitner P, Matocq MD, Weisberg PJ, Diltd TE, Vandergast AG. 2013. Is there room for all of us? Renewable energy and Xerospermophilus mohavensis. Endang Species Res 20:1-18.

Notaro, M., A. Mauss, and J.W. Williams. 2012. "Projected Vegetation Changes for the American Southwest: Combined Dynamic Modeling and Bioclimatic-Envelope Approach." *Ecological Applications* 22:1365–1388.

Nussear, K.E., T.C. Esque, R.D. Inman, L. Gass, K.A. Thomas, C.S.A. Wallace, J.B. Blainey, D.M. Miller, and R.H.Webb. 2009. Modeling habitat of the desert tortoise (Gopherus agassizii) in the Mojave and parts of the Sonoran Deserts of California, Nevada, Utah, and Arizona. U.S. Geological Survey Open-File Report 2009-1102.

Overpeck, J., J. Cole, and P. Bartlein. 2005. A 'paleoperspective' on climate variability and change. Pages 91-108 in T. E. Lovejoy and L. Hanna, editors. Climate change and biodiversity. Yale University Press, New Haven, Connecticut.

Penrod, K., P. Beier, E. Garding, and C. Cabañero. 2012. A Linkage Network for the California Deserts. Produced for the Bureau of Land Management and The Wildlands Conservancy. Produced by Science and Collaboration for Connected Wildlands, Fair Oaks, CA www.scwildlands.org and Northern Arizona University, Flagstaff, Arizona http://oak.ucc.nau.edu/pb1/.

Penrod, K., C. Cabañero, P. Beier, C. Luke, W. Spencer, and E. Rubin. 2005. South Coast Missing Linkages Project: A Linkage Design for the San Bernardino-Granite Connection. South Coast Wildlands, Idyllwild, CA. www.scwildlands.org.

Raper, S. C. B., and F. Giorgi. 2005 Climate change projections and models. Pages 199-210 in T. E. Lovejoy and L. Hanna, editors. Climate change and biodiversity. Yale University Press, New Haven, Connecticut.

Sazaki, M., W. I. Boarman, G. Goodlet, and T. Okamoto. 1995. Risk associated with long distance movements by desert tortoises. Proceedings of the 1994 Desert Tortoise Council Symposium 1995:33-48.

Seavy, N.E., T. Gardali, G.H. Golet, F.T. Griggs, C.A. Howell, R. Kelsey, S.L. Small, J.H. Viers and J.F. Weigand. 2009. Why Climate Change Makes Riparian Restoration More Important than Ever: Recommendations for Practices and Research. Ecological Restoration 27(3): 330-338.

U.S. Fish and Wildlife Service. 1994. Desert tortoise (Mojave population) recovery plan. Portland,
Oregon.

UCSB. 2013. Mojave ground squirrel Species Distribution Models.

DRECP APPROACH Margules and Pressey 2000; Carroll et al. 2003; Moilanen et al. 2009

U.S. Fish and Wildlife Service. 2011. Revised recovery plan for the Mojave population of the desert tortoise (Gopherus agassizii). U.S. Fish and Wildlife Service, Pacific Southwest Region, Sacramento, California. 222pp.

1986. USFWS. Fish and Wildlife Coordination Act Report Mojave River Forks Dam Water Conservation Project. Prepared for Army Corps of Engineers. Prepared by Ray Bransfield, US Fish and Wildlife Service.