

Who owns the weather?
The politics of cloud seeding in northern California

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Elicia Whittlesey

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Bruce Braun

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Elicia Whittlesey
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Let me say this before rain becomes a utility that they can plan and distribute for money. By "they" I mean the people who cannot understand that rain is a festival, who do not appreciate its gratuity, who think that what has no price has no value, that what cannot be sold is not real, so that the only way to make something actual is to place it on the market. The time will come when they will sell you even your rain. At the moment it is still free, and I am in it. I celebrate its gratuity and its meaninglessness.

Thomas Merton, 1966

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INTRODUCTION: The Cloud Seeders

It seems like science fiction. A winter storm moves over California from the Pacific Ocean. A few meteorologists take notice. They work for power companies, irrigation districts, municipalities, research institutes – entities in the business of water. Just before the storm front hits the Sierra-Nevada and Cascade mountains, these few individuals press buttons in an attempt to control the weather. On ridges, mountains, and hillsides, on public and private land, silver iodide generators – plain-looking metal structures with propane tanks – fire up. Silver iodide lifts into the storm, causing water to condense and fall as rain or snow. Cloud seeding’s aim is to wring more moisture from the clouds. By modifying the weather, people induce water to fall in specific areas, in places where particular kinds of infrastructure already extract value from water’s movement and its life-giving properties.

No one’s notified when cloud seeding happens. No one has the right to stop it. Mostly for the sake of private profit, about a dozen of these cloud seeding projects take place across the Sierra-Nevada mountains – and hundreds more around the world.

I started researching cloud seeding soon after I first heard about it on Free Speech Radio News in November 2009. Two things about it struck me. For one, I was surprised that I’d never heard about it before, especially since it was occurring up and down the mountainous spine of California, my home state. I’ve realized that more people have heard about it than I’d first thought, but few give it much thought. Unpacking the mystery of cloud seeding’s invisibility is part of what I’m trying to do in this thesis. I was also intrigued by the resolute inconclusiveness about cloud seeding’s effects. An oft-cited line from the National Research Council is straightforward about this uncertainty: “The experience of six decades of experiments... [have] failed to produce clear evidence that cloud seeding can reliably enhance water supplies on a large scale...” (2007, 117-118). So if nobody even knows if cloud seeding works, what is it really accomplishing? In this thesis, I engage (and unearth) some of the socially relevant questions concerning cloud seeding in a case study of a proposed cloud seeding project in northern California.

As I found out more about cloud seeding, I began to wonder whether it was really all that important compared to other environmental issues. Some seasoned water activists in California seemed to think it wasn't, compared with the groundwater transfers, dam proposals, and selenium releases that they deal with on a daily basis. "I work on bigger-picture stuff than cloud seeding," one activist told me. Cloud seeding doesn't raise the usual red flags, or at least not to the usual degrees: nothing outstandingly toxic, no clear effects on endangered species, no direct privatization of the resulting water. Cloud seeding's risks don't compete with more spectacularly alarming environmental risks, or even the risks of everyday activities. Precisely this comparison – between cloud seeding and other risks – lets cloud seeding often slip out of sight of environmental regulation and public attention.

I do think cloud seeding is worth some attention – for its connections to other water issues in California, for setting a precedent for the grandiose geoengineering strategies that could follow, and perhaps even for its risks. Cloud seeding extends and secures a particular profit-oriented relationship to natural processes. As one northern Californian puts it, cloud seeding "opens up a lot of questions about the other great reservoir of water, that is the sky, and who has rights to it, if anyone has right to it, and what that means" (Rene Henery, personal communication). None of those questions have really been answered. In this thesis, I pose some of these and other questions, and explore ways that they have been answered.

Cloud seeding, in its current form, has been around for about 60 years, although other schemes for modifying the weather (igniting large forest fires, for example, or detonating cannons into the sky), have been around much longer. The technology of cloud seeding emerged in the late 1940s in a General Electric lab in New York, to great scientific excitement. Many historical accounts of cloud seeding try to explain why it hasn't gained more scientific and public credibility, given these apparently promising beginnings (Kwa 2001; Chagnon 1975). These writers ask why it is still such a marginal technology, currently receiving no support from the federal government and very little

from the states. I'm interested, instead, in why such a scientifically marginal technology is so widespread, and how it persists in receiving so little public attention.

Public debate in the U.S. about the merits of cloud seeding seems to have subsided after federal funding was curtailed in the 1970s. Yet seeding projects, both profit- and research- driven, continued. Cloud seeding's potential for drought alleviation, military applications, and private profit maintains interest in the technology.

Cloud seeding has been taken up worldwide since its development (Fleming 2006; NRC 2003). The Chinese government cloud seeded in Beijing to clear the air for the 2008 Olympics. Cloud seeding takes place in Israel, Russia, and Canada, and in at least 24 countries worldwide. Without the knowledge of the American public, the U.S. government used cloud seeding during the Vietnam War to impede army traffic in Vietnam, Laos, and Cambodia. In the 1970s, the National Oceanic and Atmospheric Administration undertook a short-lived effort to change the course of hurricanes using cloud seeding (what course the hurricanes would have taken without cloud seeding is a question that the researchers were unable to answer). Ski resorts use cloud seeding in Colorado to increase snowpack, and farmers cloud seed in the Midwest to reduce the size of hail. In most U.S. states, cloud seeding is virtually unregulated.

My research focuses on cloud seeding in Siskiyou County, one of California's northernmost counties. In Siskiyou County and adjacent Shasta County, the utility company Pacific Gas and Electric (PG&E) wants to do a cloud seeding project to amplify rainfall east of Mount Shasta (see Figure 1). This project is intended to replenish volcanic aquifers in the region and increase the volume of water flowing out of aquifer-fed springs. The project is estimated to increase flow by about 250,000 acre-feet per year¹ on the Pit and McCloud Rivers, where PG&E has a number of hydroelectric dams.

¹ According to a hydrologist at the California Department of Water Resources, "As for estimates of yield, they are just that: looking at the average water production of each of the seeded watershed and applying a factor of between 3 and 5 percent. Most operators claim up to 10 percent, but not all storms are seeded and they may be optimistic. The power companies generally estimate 5 percent of annual runoff" (Maury Roos, personal communication).

Since 2008, the proposed cloud seeding project has been met with spirited opposition from people in the City of Mt. Shasta (population 3,600), located just west of the mountain, and the surrounding rural areas. That fall, two notices of intention appeared in a local newspaper announcing the start of the project. Many locals were disturbed to find out that PG&E was planning to modify the weather. In a number of community meetings, residents of Mt. Shasta and beyond asked questions of the science and regulation of cloud seeding. Are California's environmental review requirements applicable

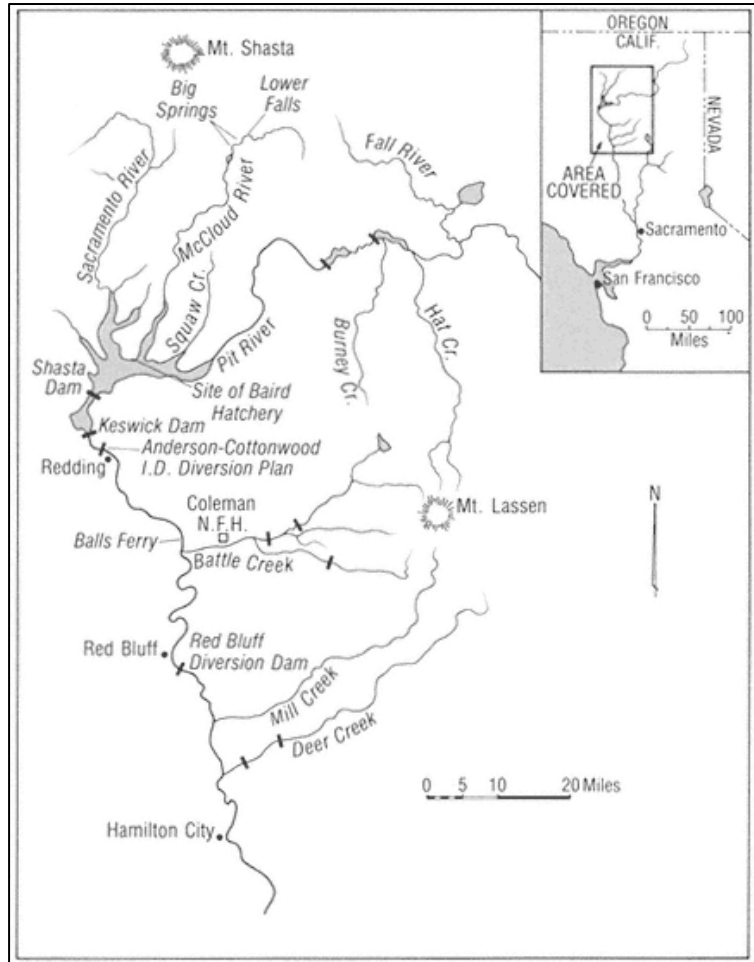


Figure 1: Upper Sacramento River Watershed (from publishing.cdlib.org)

to cloud seeding, they asked? What does the scientific literature say about cloud seeding, and what is known of the effects of silver iodide, the “seeding agent”? Who regulates cloud seeding, and who is responsible for any adverse effects? How can we have a say in the use of the weather above our community?

With the involvement of two national non-profit organizations, Global Exchange (San Francisco) and the Community Environmental Legal Defense Fund (Pennsylvania), a group of Mt. Shasta citizens drafted a Community Water Rights and Self-Governance Ordinance (see Appendix 1). The ordinance, which will be on the city's ballot in November 2010, asserts the community's right to protect its people and ecosystems from water privatization and chemical trespass. If adopted by the city, the ordinance would ban cloud seeding and water withdrawal, change the burden of proof regarding origins of

chemical contaminants, and curtail the activities of corporations within city limits. Through the outreach and publicity efforts surrounding the ordinance, people in the area became aware of cloud seeding, unlike other places where cloud seeding is adopted and performed in relative silence.

To understand how people view and debate the stakes of cloud seeding, I did semi-structured interviews with local and regional government officials, involved citizens, environmental, water, and social activists, scientists, and one PG&E hydrologist. The twenty interviews, conducted in March, April, May, and July of 2010, provided a range of views about the stakes and risks of cloud seeding. I pored over new and old writing on cloud seeding, newspaper articles, technical manuals, scientific reports, and bureaucratic missives. At two city council meetings in April and May, people in Mt. Shasta spoke their mind about the proposed ordinance; I watched these meetings online. Finally, for ideas and inspiration, I attended a workshop called (Re)Claiming the Commons at the U.S. Social Forum in Detroit. I analyzed interviews, articles, and events alike in terms of the three themes of this thesis: risk, ownership, and alternative environmental practices.

One of the questions that originally drove my research was, what are the implications of cloud seeding? But in some ways, that's the wrong question. I began asking instead, what are the conditions that make cloud seeding possible and permissible? Part of the answer to this second question lies in the ambiguity of the answer to the first.

Several central questions motivate this thesis. What conditions – political, economic, regulatory, social – make cloud seeding possible? On what basis have people contested cloud seeding, and how can these efforts be evaluated? What kinds of political practices can and do counter cloud seeding's effects? How do things – such as the weather – get fixed in the public imagination as exploitable resources? What languages and practices effect such transformations? Does cloud seeding – or could it – similarly transform humans' relationship to the weather, and is this the kind of relationship we want to have? How do we conceive of and practice an alternative relationship?

In the first chapter, I analyze one dominant way of understanding and debating cloud seeding – as a “risky” activity. Think of the way we ordinarily talk about risky undertakings: they are dangerous, but promise some worthwhile reward. Risks can nearly always be controlled, reduced to an acceptable level. In some contexts, risks license quick action, and depoliticize, or remove scrutiny from, the object and consequences of the fear-based decisions they inspire. Risks are compelling, worrying, and easily sensationalized – it’s no wonder that the risky elements of cloud seeding are most widely discussed.

But I argue that solely debating cloud seeding’s risks obscures some of its more significant consequences, like the private control of the atmosphere and the entrenchment of certain interests in the landscape. Those kinds of consequences can’t fully be articulated through the language and logic of risk. In this first chapter, I consider how the debate around cloud seeding is articulated with the need for water in California, how it is understood through (and exceeds) the categories of environmental assessments, and how the scientific uncertainty surrounding cloud seeding lends particular patterns to the public conversation. In the last part of the chapter, I analyze Mt. Shasta’s ordinance for the way it casts cloud seeding’s risks and offers precautionary, preventative action, and begins to articulate some of the other concerns that cloud seeding raises.

The second chapter focuses on ways to understand the processes and implications of corporate control of the weather. Using the concept of accumulation by dispossession, I argue that the practice of cloud seeding contributes to securing the weather – privatizing it – as the basis for the private accumulation of wealth. This use of the atmosphere has both concrete and conceptual consequences – the weather is fixed as an exploitable resource in our imaginations, and cloud seeding disrupts other ways of harnessing the water cycle without any process for public consent. Cloud seeding, along with the hydroelectric power system that converts cloud seeding’s water into wealth, disrupts and prevents other technological and livelihood practices in the region’s rivers. Drawing on interviews with members of the Winnemem Wintu tribe, I show how cloud seeding compounds battles over water distribution in the region and further impedes the tribe’s ability to carry out certain practices on their traditional lands. Finally, this chapter takes

another look at the anti-cloud seeding efforts in the city of Mt. Shasta, and evaluates them in terms of this chapter's conception of cloud seeding as corporate control.

Finally, in the third chapter, I take weather modification as an environmental issue that exemplifies a current philosophical puzzle in the geography of conservation: How can environmental politics be conducted without reference to a prior, perfect, external nature? And what alternatives exist to the privatization of a resource? Taking the material qualities of the weather – its changeability, fluidity, and impermanence as a basis, I ask how a politics of the environment could be grounded in these qualities. Drawing on some writings in geography on the importance of considering nonhumans as participants in, not merely objects of, conservation, I turn to the idea of the commons for one way a politics and governance of the weather could be imagined.

Included after the conclusion is a short essay summarizing my opinions and hopes about cloud seeding and the politics I've described in this thesis. This section is written for those who are interested in knowing what I think.

CHAPTER ONE: The production of risk

One of the most disturbing parts...is that after 4-6 years of cloud seeding, it was noticed that clouds tended to stop forming. And water that formed with the non-dissipating silver iodide...[was] flammable.

Cloud seeding opponent, Mt. Shasta City Council Hearing

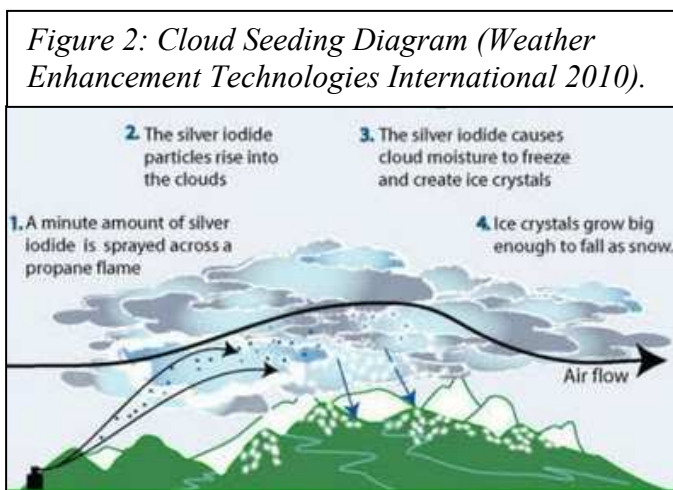
The published scientific literature clearly shows *no environmentally harmful effects* arising from cloud seeding with silver iodide aerosols.

Weather Modification Association Position Statement.

Introduction

In daily experience, weather's ordinariness and unpredictability veil any process that goes into its making. Cloud seeding, a weather modification technique used in California and beyond for increasing precipitation, presents difficulties for perceiving and contesting the profit-driven modification of weather and water cycles. It takes place in a realm and through techniques that are unfamiliar to environmental impact assessments. The distribution and severity of its effects are uncertain. To produce it as a matter of concern, cloud seeding opponents often resort to enumerating its risks. In this chapter, I argue that focusing exclusively on cloud seeding's risks actually makes it easier for cloud seeding to continue.

Cloud seeding is a type of weather modification that aims to enhance precipitation (Figure 2), disperse fog, or reduce the size of hail. In California, only precipitation



enhancement projects take place, primarily in winter, during storms, and over mountains, where water increases are supposed to be highest and the technique most effective (Super et al. 1993). When I refer to cloud seeding, I'm talking about this type. Sent into clouds by ground-based generators or airplanes, artificial ice nuclei

(commonly silver iodide) interact with supercooled water vapor, resulting in increased condensation and – optimistically speaking – increased precipitation. Questions of the

environmental effects of silver iodide, the degree and environmental effects of increased precipitation, the distance and extent of “downwind effects,” definitions of liability and ownership, not to mention cloud seeding’s very efficacy, remain substantially unanswered in scientific literature and public discourse.

Several broad questions motivate this thesis. How do things – such as clouds, or the weather – get fixed in our imagination as resources? What languages and practices effect such transformations? What conditions – political, economic, regulatory, social – make cloud seeding possible? On what basis have people contested cloud seeding, and how can these efforts be evaluated? Partial answers to these questions relate to how cloud seeding is understood through a lens of risk, and how this lens creates certain conditions and obscures important questions. Tom Baker and Jonathan Simon (2002) observe two cultural trends in risk: both “a wide variety of efforts to conceive and address social problems in terms of risk,” and “a reaction against spreading risk” (1). What are the stakes of conceiving and addressing problems as specifically problems of risk? How does risk change the way problems are approached and understood?

Cloud seeding doesn’t quite fit as a problem of risk. As one community activist in Mt. Shasta told me in an interview, “The challenging thing about silver iodide is that I think the people who say that it’s really fairly innocuous are right” (Rene Henery, personal communication). Why are silver iodide’s “fairly innocuous” properties “challenging” to cloud seeding opponents? How does the fact that silver iodide is likely benign erode the grounds for resistance to cloud seeding? In this chapter, I seek to understand the influence of the language of risk on debates about cloud seeding. I analyze how cloud seeding is produced as a question of risk, and what this does for controversies about its desirability.

Both cloud seeding proponents and opponents understand the effects of this technology through a language of risk. In part, thinking through risk constructs problems as technical ones with scientific and bureaucratic solutions. Few risks are too great to be mitigated, and in the process, other questions are forgotten. As Marieke de Goede and Samuel Randalls observe with respect to geoengineering, “questions of politics and ethics are frequently swept away by a banal, technocratic focus on risks” (2009: 871). Do risks galvanize, or do they render invisible? I am primarily concerned with showing how the

languages of risk limits and conditions cloud seeding and weather modification controversies. I draw on writings on risk by a few social theorists, and I use their ideas and insights to navigate the terrain of cloud seeding debates.

In this chapter, I look at how the language of risk obscures and confounds broader questions about cloud seeding, questions like, Who owns the weather? Who has the right to decide how it is used? What kinds of property rights are imagined and secured through the practice of cloud seeding? And what sorts of community-led governance efforts could enact alternative relationships between humans and the weather? Like much recent scholarship on risk, this chapter is “less interested in what a risk is than what is done in the name of risk” (Baker and Simon 2002: 18).

Being attentive to the language of debates about how, and in whose name, weather modification practices are selected and performed lets us imagine other debates that might raise other concerns and enable other conclusions. It gives us more power to craft the debate. What gets heard and what doesn't is partially determined by structures and processes – government agencies, environmental impact assessments, guidelines for public participation and disclosure – that have developed and solidified over the years. So this is as much a critique of the language adopted to question cloud seeding as a critique of the reasons people feel they must adopt that particular language. As such, this chapter contributes to an understanding of how one risk discourse functions: what it includes and excludes, what it enables and forecloses, what it recalls and forgets.

This chapter comes in five parts. First, I briefly introduce the logic of water distribution in California. Second, through a look at cloud seeding in California, I consider how two central risk-based questions around cloud seeding are developed and promulgated. This section looks at how focusing on risks (and benefits) actually enables risky activities to proceed. Third, I examine the bureaucratic rationality that is summoned in scant cloud seeding regulations and environmental impact assessments, and how the process of environmental review naturalizes and neutralizes risk-based concerns. Fourth, through a foray into cloud seeding science, I hope to show how uncertainty functions in particular ways to further obscure the other kinds of questions that cloud seeding raises. The fifth section examines the use of precautionary logic to address the risk and

uncertainty of cloud seeding, and explores the efforts of anti-cloud seeding activists in Mt. Shasta City to understand cloud seeding as not just a problem of risk.

Prelude: Water in California

On the vernal equinox 2010: California's water is unevenly distributed, both geographically and seasonally. Taking the train West from Reno, Nevada, we head uphill into the Sierra-Nevada Mountains along the Truckee River, a river that flows through the dry Great Basin, from lake to lake and never to the sea. Up toward Donner Summit, voluminous drifts of snow smother trees and smooth out boulders. From the crest westward, most of this water will encounter the vast system that controls water movement in California and beyond. At the summit, the train tips down toward the Central Valley, and firs give way to pines and pines to oaks, and the snow vanishes. It's said that water flows uphill toward money; in California, gravity and topography make things easier – most the water to fall in the state comes to earth at the highest elevations. I'm picked up at the train station in Sacramento; heading north, out of the cities and suburbs, there are farm fields up against the smaller highways.

I suddenly appreciate just how much food California grows, and how much water must be moved to nourish it. The peach trees are blooming now, but they wouldn't last a summer without irrigation. California's Mediterranean climate – a climate with mild winters and a long dry season – scares off rain from May until September. Marc Reisner figures that, of South Dakota, West Texas, and California, it's California that's the unlikeliest place to grow a tomato on rainfall alone. In the Southwest, where I was just yesterday, the Anasazi planted scattered crops, hoping that enough would be blessed by summer rains and unnoticed by rodents. In California, water isn't had by luck. By the summer solstice, the dry season will be on, foothill grasses crisp and dry – and rice fields in the Valley flooded, with stored and melted snow.

California's topography is like a cupped hand. The fertile Central Valley is ringed by mountains. The Valley was once flooded in winter, parched in summer. Now, dams – over 1200 of them – surround the Valley, and there's more water behind dams in California than in all the lakes in Minnesota (not including Lake Superior). Because of the snowmelt that's stored behind dams in spring and sent down rivers and canals in the

rainless summer, some parts of the valley are green year-round. The Central Valley Project (CVP) and the State Water Project (SWP) together comprise a massive network of dams, canals, pumping stations, and irrigation ditches that allocate and transport water across hundreds of miles.

Most water goes to agriculture, some to cities; it seems there's never enough water to go around. Almost all of the potential dam sites have been taken, and environmentalists and dam builders bicker over the remaining ones. Most years, many water rights allocations aren't fulfilled. Agribusiness lobbyists descend on Sacramento. A drought emergency is declared. But one water activist argues that "a drought is not the same as an earthquake. Drought in California is well known. Low water years. Whatever you want to call them. California is known for this. So to try to claim that there's an emergency – akin to a fire or an earthquake – is fallacious" (Barbara Vlamis, personal communication). But the crisis-inspired water planning holds sway. Water is shuffled and reshuffled, with a nervous eye to the future.

Water and risk

There are a lot of adages about water in the Western United States, and one of them, attributed to Mark Twain, observes that "whiskey's for drinkin' and water's for fightin' over." People said this in interviews with me to establish the contentious nature of California's water distribution and in the same breath elaborate on water's scarcity. A Bureau of Reclamation engineer said of cloud seeding, "we'd welcome more water," (Larry Ball, personal communication). The water system is insatiable. The dams are never full. The Bureau of Reclamation's CVP and the State's SWP, meant to alleviate groundwater depletion in irrigated agricultural areas, have only exacerbated groundwater pumping. The cheap, heavily subsidized water encourages expansion and the transition to permanent crops like orchards that demand an inflexible, yearly supply of water (Reisner 1993). Agriculture – which consumes about 80% of the state's water – receives over-allocated and under-priced water delivered by the SWP and CVP (Cooley et al. 2009). The organization and distribution of water can be understood as flows of social power (Swyngedouw 2009), and that's certainly the case in California, where disputes and resolutions about the distribution of water are highly political. (In Reisner's words, the

SWP offers “one of the country’s foremost examples of socialism for the rich” (334.) The urgency of securing more water at low prices to meet the demand they’ve created obsesses California’s water bureaucracies, as it has for decades.

Against the background of the intense desire for water in California, risk becomes, ironically, a useful way to understand its possible effects. Focusing on cloud seeding’s risks makes them calculable, reducible, and therefore acceptable. Risk isn’t the only way to understand and talk about what’s at stake in cloud seeding, but risk is a particularly efficient way for calculating, and then neutralizing, its possible downsides. At the moment water scarcity is evoked to justify its use, cloud seeding slides into a language of risk.

The relationship between risk and benefit is central to the particular techniques of governance related to cloud seeding. Risk is unimaginable without an attendant benefit or opportunity. Risk connotes innovation and promises rewards. Few risks are too great to take. Uncertain science and potential risks are weighed against need: “The challenge to find the right balance between assured knowledge and the need for action is one which must guide the future actions of both scientists and administrators concerned with weather modification” (NRC 2003: vii). I take the concept of risk as a valuable touchstone for identifying the kinds of debates, identities, politics, and governance that it sets into motion. I share Mitchell Dean’s understanding of risk as a way “of representing events so they might be made governable in particular ways, with particular techniques, for particular ends” (1999: 131).

The language of risk produces cloud seeding as a problem of water supply, and places it under the bureaucratic system that governs water as a resource. Through the discourse of risk, water becomes the pertinent natural object and outcome to be managed and controlled. The perpetual failure of water supply in California to meet demand is represented as a crisis that can be remedied. And cloud seeding is represented as a solution to this impending crisis. These representations are crucial for understanding the peculiarly untouchable nature of cloud seeding in California.

Scholars have examined the function of calculation in discourses of social and environmental risk, but scholarship has diverged over its role. For Ulrich Beck, a prominent risk scholar, risk is central to modern industrial society: “the production of

wealth is systematically accompanied by the social production of risk” (1992: 19). Beck takes risk as a social condition to be identified, described, and remedied – we live in a “risk society,” and our relationships to risks define social life. According to Beck, we now live in a period of “reflexive modernization,” a self-critical society haunted by the risks it produces. Today’s society is defined by proliferating risks, and efforts to mitigate these risks cannot keep up with their scope and possibly disastrous severity. Several trends characterize Beck’s risk society. The public treats expert knowledge with suspicion. Scientists can no longer measure the myriad intangible and imminently disastrous risks that compromise human health and the environment: Beck deems these risks incalculable.

Dean argues, against Beck, that “calculable or incalculable,” it’s the risk rationality, rather than the specifics of risk, that are worth examining. For Beck, risk is an ontological condition; for Dean, risk is better understood as a technique of government. Beck is concerned with describing the nature, origins, and scope of the risks he observes; Dean is interested in how efforts to work with things called risks reveal motivations. In Dean’s analysis, risk rationalities license and set loose certain techniques and practices that are worth attending to in particular circumstances. Dean is less interested in making sweeping claims about the way risks characterize modern life than he is in investigating how certain risk discourses support particular actions over others. Dean is interested in what gets called a risk, and why, and what political logic that activity of naming enables. For Dean, risk is “a set of different ways of ordering reality, of rendering it into calculable form” (131) and scientific calculability is largely beside the point. Dean’s approach suggests we see risks in their particular, peculiar circumstances, and asks us to be critical about the proliferation of discourses of risk. It invites us to attend to how risks are calculated, rather than how incalculable they are.

Sheila Jasanoff notes that, through expert definitions of risk, risk is placed “‘out there’ ...as a feature of that world’s natural functioning,” and therefore “it is easy to draw the implication that ‘zero risk’ is unattainable, that harms *will* occur, it is only natural” (2006: 39). It becomes a matter, instead of eliminating risks, of explaining them – and explaining them away. Risks seem both malleable and inevitable. The government only exerts control to diminish risks, which are accepted as natural results of pursuing

benefits. These assessments and subsequent mitigations are designed to identify and produce an acceptable level of damage. As a cloud seeding opponent in Mt. Shasta puts it, “[e]ven when the regulatory process...is working perfectly, it is a system that is designed to permit damage to the environment within parameters, not to protect it.” (Rene Henery, Mt. Shasta City Council Hearing, April 24, 2010).

Risk is conveniently malleable: the risks of not having enough water become linked to the prospect of having more of it. “The significance of risk does not lie with risk itself but with what risk gets attached to” (Dean 131). Cloud seeding links to California’s seemingly insatiable need for water. Of the proposed cloud seeding project in the Pit and McCloud Watersheds, a hydrologist at PG&E says,

It has a high payback potential in terms of water produced, and [power] generation. Of course we’re primarily, only interested in the generation. But there’s a lot of water for California that’s a byproduct. We don’t use the water after it goes through our plants. It’s gravity flow all the way to San Francisco Bay.

Gary Freeman, personal communication

Linking the cloud seeding project to California’s water supply lends legitimacy and an aura of necessity. The water is not merely for private profit, it’s “water for California.”

In talk of cloud seeding and California’s water supply, risks and benefits multiply and mutate. A chain of risks and benefits falls into place, and it becomes unclear what is really paired. The risks of cloud seeding with the benefits of having more water? The benefits of cloud seeding with the risks of not having enough water? The risks (financial costs) of cloud seeding to the benefits (financial gains) of the additional water? Step up and choose a favorite! Remember: the greater the benefits, the greater the risks that can be undertaken. The greater the risks to be avoided, the more extreme remedies that can be sought. Risk and benefit become intertwined, almost interchangeable. Cloud seeding becomes a way to make the water that the dams promise but the weather doesn’t provide. A recent report called “Optimizing cloud seeding for water and energy in California” makes connections between California’s water system and cloud seeding in terms of cost efficiency. “Cloud seeding is much less expensive than other water augmentation technologies and has large benefit-to-cost ratios. Therefore, cloud seeding is an attractive option to help alleviate water supply problems” (Hunter 2007:1).

The construction of exactly what risk means in particular circumstances affects the responsibility for, and distribution of, the risks that are produced. In a study of gold

mining in sub-Saharan Africa, Jody Emel and Matthew Huber argue that the meaning of risk as “risky investment” – rather than as health, environmental or social risks – forces countries and communities to mold themselves to the demands of mining companies, rather than addressing these other risks. For Emel and Huber, “Whether or not the risks articulated are “real” is beside the point; from our perspective they only become real through the process of social struggle over the definition of what is “risky,” and thus, what must be planned for” (2008: 1396). The risks of cloud seeding become real, in part, through arguments and anxieties surrounding water management. The risks invoked with cloud seeding have more to do with running out of water than the consequences of making more of it.

As cloud seeding is subsumed by broader discourses of water scarcity and distribution in California, two sets of questions intended to calculate risk and benefit are invoked. These questions relate to cloud seeding’s efficacy, and to its impact. First, does cloud seeding work – or, as it’s more often posed – how well does it work, and how can it be made to work better? The report on optimizing cloud seeding identifies “the main question” as “how best to achieve additional water through weather modification” (Hunter 2007: 13). Such questions are applied, not open and speculative. In contrast, the National Research Council concludes that research on weather modification “must be directed at answering fundamental scientific questions that will yield results that go well beyond application to intentional modification. The emphasis must be on understanding processes and not on modification” (2003: 67). The second set of questions asks, what are the environmental impacts of cloud seeding? Or rather, how can these levels of risk be appropriately mitigated and deemed acceptable? By the logic of these two questions, any objections to cloud seeding can only be conceived as risk-based concerns. These kinds of questions solidify cloud seeding as a question of risk, thereby narrowing the permissible range of debate.

Because the risks of cloud seeding can be portrayed as slight and negligible, the benefits loom larger. Cloud seeding has been taking place in California since the late 1940s, and there are currently 14 projects spanning much of the Sierra-Nevada mountains and a couple of southern coastal watersheds. In California’s Water Plan, the Department of Water Resources (DWR) estimates that cloud seeding provides 300,000 to 400,000

acre-feet of additional water per year, a 4% increase in runoff (2009: 10-9). Knowing people are alert to potential risks, the document mentions several: downwind effects, silver iodide toxicity, burdensome snow loads, and flooding. These concerns are summarily dismissed by drawing on scientific literature, anecdotes, and unpublished, industry-funded studies (like a study by PG&E - see Marler et al. 2007).

There are several consequences of understanding cloud seeding as a problem of water supply. In the real and fabricated links between cloud seeding and California's water management system, cloud seeding becomes a technology that falls solely under the purview of that expert-controlled system. The public becomes the 'water public': those with an interest in "irrigated agriculture, hydroelectric power...[and] water quality," and "municipal and industrial water users" (Hunter 2007 xvii). It's the water public on whose behalf this system is managed, on whose behalf the benefits are sought and counted, on whose behalf the risks unfold. It's a very specific public with a long history that includes specific ways and reasons for interacting with the state and federal governments about water and its movement and distribution. Wrapping cloud seeding into this system through language is a way of bargaining for time and bolstering legitimacy, both of cloud seeding and of attempts to control water in California.

By assuming that the supposed benefits of cloud seeding are needed by the state's water system, it's as if the Department of Water Resources takes on the risks on the public's behalf, even as it dismisses them. Cloud seeding is cloaked in a veneer of legitimacy, packaged for public consumption as part of a broader plan and strategy to develop and secure water supplies for California. A county government employee in Siskiyou County observes of PG&E's proposed project near Mt. Shasta, "It's part of the California Water Plan, this particular project, evidently. The Department of Water Resources has acknowledged that this is part of their plan. So, to provide power for the people of the State of California, you know, it makes sense" (Ric Costales, Siskiyou County Natural Resource Specialist, personal communication). Through its appearance in the California Water Plan, cloud seeding is presented as if it has been through a process of public participation and consent. As if it's not an ad-hoc collection of money-making ventures on public land and in public skies.

In sum, understanding cloud seeding through risk enables particular techniques of government and management. It allows the occurrence and regulation of cloud seeding to become a problem of water, thereby enveloping and legitimizing cloud seeding through a particular agency with a long-standing interest in securing ever more water. It's an agency that operates under continual crisis, weighing the risks of an impending water shortfall against any benefit, however manufactured and imagined. The quest for water continually justifies emergency measures. Cloud seeding seems destined to happen, just like other measures and projects to secure California's "right" to the water it doesn't have. And the language of risk secures cloud seeding as a problem understood through environmental impact assessments, with the specific logic and categories that these entail.

Environmental regulation and assessments

The proposed cloud seeding project in Siskiyou County is on the cusp of being understood through environmental assessments. In the process of deciding how and to what degree cloud seeding should be regulated, the stakes and effects of weather modification become further understood in risk-related ways that obscure other kinds of concerns. Risks are the bread and butter of environmental regulation and bureaucracy. Amenable to lists, studies, and infinite mitigations, risks are the focal point of many environmental debates. But does the category of risk capture all of the possible implications of cloud seeding? In the process of environmental impact assessments, political, ethical, or cultural issues are reduced to technical matters of perceptible environmental impact. Cloud seeding in particular escapes many of the usual categories and logics of environmental assessments, putting broader concerns even further out of the acceptable range of debate.

In an article about controversies over fish farming in Hawai'i, Krisnawati Suryanata and Karen Umemoto argue that a focus on specific impacts – risks – in environmental assessments hides "intangible" concerns. In the case of mariculture debates, the authors find that "intangible issues underlie many of the grievances, yet they are obscured in the [environmental impact assessment] process that focuses on tangible impacts" (2005: 751). People involved in the assessment process must articulate their claims "in terms that are consistent with the concepts and terminology" defined by the

process in ways that exclude other concerns (2005: 758). Focusing only on impacts and risks severely curtails the kinds of questions that can be raised about cloud seeding.

Cloud seeding is rare enough that it's a novelty for most local government officials. Ric Costales, who works for Siskiyou County, brings me up to date on the communication that has occurred between PG&E and the county government regarding the proposed cloud seeding project. His comments are telling for the stark confusion among local officials about how to handle – and whether to regulate – cloud seeding.

[PG&E] had all these people and they came to the County, and they said this is what we're planning on doing, what do you guys think?... What do you think we need for permits? And [the County supervisors] said, well, we don't know, we've never heard of anything like this before. We'll call around. And so they called around. And nobody has any permits.... And then the air quality guy. He was also at the meeting. And he called around. And nobody required anything, and that was the opinion that got back to PG&E...that we're not sure you need anything.

Well, apparently PG&E took that to mean we were fine and hunky-dory with the project. And see because, even if we were hunky-dory at that point with the project...the requirements are, they still have to let the county know, before they do this. And they didn't. The only way we found out was second-hand. Through the newspaper ad. And the thing that is odd about it is...they had to post that notice to satisfy...Department of Water Resources. See, I thought that was a negative declaration thing, or some kind of formal public process notice that they were putting in the paper. And it wasn't.... And where else in a state agency does that occur, where the state has you do something, and you don't have to have gone through some kind of permit process to get it. And the whole thing was just kind-of a baffling situation.

In California, cloud seeding is virtually unregulated. In 1951, a law was enacted requiring cloud seeders to be licensed and cloud seeding operations to receive permits through state agencies (Stark 1957); these requirements were eliminated in 1984. Today, the state asks only for notification, reporting, and record keeping through the Department of Water Resources (Weather Resources Management Act of 1984). No national regulation of cloud seeding exists. The National Oceanic and Atmospheric Administration (NOAA) requires annual reports. Internationally, weather modification is prohibited as a weapon of war (Fleming 2006) and is otherwise unregulated. Some of the scant social science literature on cloud seeding has suggested the need for more comprehensive regulation, particularly at the federal level (Farhar and Mewes 1975; Farhar 1978). Limiting or curtailing the cloud seeding carried out by private entities depends on the whims of state or local governments or other government agencies claiming jurisdiction.

Cloud seeding projects have frequently bypassed the California Environmental Quality Act (CEQA), which regulates activities that affect the environment and requires research and public disclosure. Public agencies wishing to cloud seed must go through a CEQA environmental review process. But for private entities, it's up to government agencies to decide whether or not a discretionary permit – and therefore environmental review – is necessary. The process of environmental review – and the process of deciding whether environmental review should occur – determines and solidifies definitions of what constitutes “risk,” “impact,” and “environment.” Such concepts condition the terms by which cloud seeding activities intersect with environmental and local regulations, and determine the facets of cloud seeding that are – and aren't – examined in subsequent reviews. Cloud seeding is produced and naturalized as a problem of risk in the ways its effects are delimited and understood. The concepts and requirements of environmental review processes serve to endorse rather than limit cloud seeding, fix notions of the environment as separable and discrete, and perpetuate a language of risk.

Environmental assessments are used strategically to define and defend project parameters and impacts. Environmental assessments “can have a lasting impact on how environmental costs and risks are measured and defined” (Goldman 2006: 119). These assessments are not “just a tool to appease the environmentalists,” but a profoundly important definitional tool in establishing and supporting certain views (120). The cloud seeding project by PG&E eludes ordinary categories and activities, and there's a palpable sense, in talking with local government officials, that there's something ungraspable about cloud seeding, something that's difficult to place in familiar categories. These categories, once solidified around cloud seeding, are instrumental in guiding and conditioning public debate.

PG&E plans to place the cloud seeding generators on timber company land. Because it is private land, they have claimed that no environmental review is necessary, notwithstanding the fact that they plan to produce precipitation over a region spanning public and private land. A definitional struggle occurs over the impact and effects of cloud seeding, questions of property and jurisdiction, and the precise nature of the activity. “[T]here were a number of questions about exactly how we were going to define the uses....And some of that was dependent upon...them develop[ing] the formal

proposal, to really kinda fine-tune exactly how we were gonna classify it” (Greg Plucker, personal communication). Questions of risk are foremost in considering this activity. Based on substantial evidence, is “there is a reasonable argument that the project could have a significant impact on the environment?” (Greg Plucker, personal communication). For the public, making claims that cloud seeding involves risk – in specific, science-based ways – is one way to demand an environmental review process. The practice of quantifying, weighing and rationalizing these risks – whether possible or not – is critical for bureaucratic regulation of cloud seeding.

Cloud seeding in particular spills over the edges of environmental assessments, leaving many questions inadequately addressed. “It’s probably easier with other projects, where people can count the number of traffic cars, or talk about noise impacts or other things that are more tangible and easily understood. Cloud seeding is gonna be a pretty darn complicated – you know, what [are] the issues?” (Greg Plucker, personal communication). Environmental impact assessments of cloud seeding, when they do occur, illustrate how cloud seeding escapes four premises of environmental regulation: that impacts are predictable, discernable, and clearly distinct from what would otherwise have occurred; that humans and the environment are neatly separable; that natural entities fall into discrete categories; and that property rights and claims are clear and undisputed.

First, several arguments by cloud seeding proponents contradict the assumption of environmental impact assessments that impacts of a project are predictable and clearly distinct from “natural” conditions. Three contradictory positions on the possibility of discerning these impacts complicate attempts to object to cloud seeding on the basis of its impacts. The first of these positions holds that the effects of cloud seeding are invisible against the natural occurrence of chemicals in the areas being seeded. Reports on possible effects of cloud seeding gleefully point out that there’s more silver in the environment than what cloud seeding disseminates. “In all the areas where there’s been a lot of cloud seeding...the natural content of the soil has more silver in it than – I mean, it’s kind-of like the cloud seeding effect itself, it’s hard to detect any addition due to cloud seeding because the natural level of silver is so high” (Arlen Huggins, Desert Research Institute, personal communication.) A second argument represents cloud seeding as merely increasing the efficiency of natural precipitation processes, which are variable, unreliable,

unpredictable, and inherently risky to depend on for water supply. “Clouds...are not perfectly efficient at producing precipitation....In winter, the problem is that there aren’t sufficient ice crystals...The idea is to add ice-forming particles” (Arlen Huggins, interview with Andrew Moseman). In this view, cloud seeding remedies naturally risky inefficiencies.

The final position on cloud seeding’s impacts reverses the second one. Rather than claiming that cloud seeding smoothes out natural variability, cloud seeding proponents claim that it actually falls within the range of natural variability and is therefore insignificant. An environmental impact report from 1990 for a cloud seeding program in the Tuolumne River Watershed is particularly telling. It’s a project, sponsored by the Turlock and Modesto Irrigation Districts, that’s still occurring near – and over – Yosemite National Park in Central California. In an EIR for the project, every effect of cloud seeding is deemed “not significant” because “impacts are expected to be...indistinguishable from natural conditions” (EIP Associates, 1990, 4.3-15). Impacts to plants and wildlife, “if any, would be gradual and difficult to distinguish from natural processes because the added snowpack would be well within the natural range of variability” (4.3-19). Similarly, Huggins, a cloud seeding researcher and consultant, claims that cloud seeding’s effects blend with the natural variability, and that whatever impact cloud seeding does have, it’s not detrimental:

[A]s far as we’ve been able to tell, in all of the environmental studies we do with cloud seeding, there’s no harm. Even if you’re changing the snowpack, you’re not changing it greater than the natural variability of the season. So you’re not changing the water to the extent that you would be harming vegetation, or wildlife, or something like that. In a lot of the environmental assessments, that’s what it’s come down to. The change you make is a small percent of what you see on an annual basis, on a decadal basis, and that’s why all the ones that I’ve known have come out with no significant impact. Not to say that you’re not having some kind of impact, but it’s not a detrimental impact.

The very purpose of these projects is to modify the weather and to cause perceptible and profitable increases in precipitation. Yet cloud seeding proponents claim that “natural variability” envelops cloud seeding’s effects (ignoring that variability implies variability, not consistently amplified rainfall). The Tuolumne report even invokes the uncertainty of cloud seeding’s efficacy, a bending-over-backward attempt to achieve a finding of “no significant impact.” By claiming there’s no risk, they accidentally begin to claim there’s

no benefit. These three positions confound attempts to understand cloud seeding's impacts as distinct from natural processes and thereby contributing additional risk.

Second, environmental assessments assume the neat separateness of humans and the environment. Cloud seeding is the only agent of change in a static landscape. Humans are responsible for what is new. In the Tuolumne EIR, a description of the “setting” precedes any discussion of “impacts.” Human “influence” is only discernable in terms of these impacts – the only grounds for rejecting cloud seeding are to argue that it profoundly disrupts some natural harmony. Humans act on a passive, victimized environment. Protecting this fragile environment – or pretending to – is the aim of environmental regulation. But because cloud seeding is disguised as nature itself, risks lost against a background of natural variability, there's no harm that humans must be prevented from doing. Environmental ethics are predicated on these divisions between humans and the environment, impact and setting. Thinking beyond this in ways that matter for cloud seeding is the aim of my third chapter.

Third, environmental assessments work from an assumption that, like a machine, the environment is made of component parts. The Tuolumne River EIR is divided into a mind-numbing array of categories and sub-categories: hydrology and water quality (runoff and flood characteristics, avalanche, erosion), biological resources (aquatic biology, terrestrial biology), meteorology and air quality, land use and recreation, socioeconomics. These categories seem to encompass everything. But they actually serve to sharply delimit public debate: this is the realm of reasonable concerns, this is the meaning of environment. Only specific, science-based concerns responding to topics already presented are invited – and then ignored. Additionally, in many references to the practice of cloud seeding, the “target area” is defined by maps and writing, notwithstanding the utter ambiguity of the reach of seeding agents. Michael Goldman notes that one important function of World Bank environmental impact assessments is to delineate “the exact parameters of the temporal and spatial dimensions of a project” (2006: 118). Importantly, for the sake of environmental impact assessments, effects beyond the “target area” are out of the question, even though the question of downwind effects is, according to Huggins, “really an area that does need more research.”

Finally, EIRs can't do justice to the tremendous ambiguity of questions about property that cloud seeding raises. Two disagreements about process and impact are evident in the Tuolumne report. First, the report claims that environmental review under the National Environmental Policy Act (NEPA) is unnecessary because no "ground disturbance" of federal land would occur – airplanes, rather than ground-based generators, will be used to disperse seeding agents. In a letter hotly opposing the project, the Department of the Interior futilely disagrees. The Department of the Interior argues that ground disturbance is not the only activity that triggers NEPA. Even projects outside of a park can affect those federal lands, and this project is significant for the Department of the Interior "because it is highly controversial, may cause the loss or destruction of significant scientific, cultural and historical resources, and may threaten to violate Federal law" (EIP 1990: 8-52). This debate raises questions about the links between land ownership and use of airspace, and shows that the answers are inconsistent, highly variable, and unresolved. Second, although National Park Service policy prohibits weather modification over National Parks, the report deems it acceptable to cloud seed over Yosemite:

The proposed project would conflict with the stated management policies of the National Park Service, which specifically prohibit weather modification activities over National Park lands because such projects have the potential of altering the natural conditions in the parks. Although the proposed project would conflict with a stated policy, no unavoidable significant effects are expected to occur to the environment as a result of project implementation.

EIP Associates, 1990: 2-8.

The extent and whereabouts of cloud seeding's nebulous effects fail to be captured by the logic of environmental impact assessments.

Through scant regulation and the logic of environmental assessments, cloud seeding is viewed through a lens of risk. Fears of risk and harm carry weight in environmental review processes; cloud seeding offers few risks that are certain enough, and discernable enough, to warrant much concern. Risk-based questions seem natural and commonsense – why else does environmental regulation exist, but to control risk? – yet for cloud seeding, risks are shrugged off, fused with natural variability. Drawing on a language of risk, cloud seeding is almost impossible to stop. Tabulating and mitigating risks – or explaining them away – enables projects to go forward. Questions of risk monopolize debate. And scientific uncertainty plays a critical role in perpetuating the

language of risk surrounding cloud seeding, by both channeling and diffusing particular risk-based questions.

The uncertain science of cloud seeding

The National Weather Service, the National Oceanic and Atmospheric Administration, the National Academy of Sciences, the National Meteorological Association, the International Meteorological Association, all of the heavyweights, refuse to give positive endorsement of cloud seeding, because there's no indication, there's no statistical indication, that it actually works. So therefore they're like well, why would we regulate something that doesn't work? . . .

I know that if the law doesn't says I can't do it, then I can do it. And if the law doesn't believe that I could do it, then they won't have a law against doing it!

Matt Ryan, Rainmaker, personal communication

The actual effectiveness of cloud seeding is fraught with uncertainty. “The experience of six decades of experiments... [have] failed to produce clear evidence that cloud seeding can reliably enhance water supplies on a large scale...” (NRC 2007, 117-118). The paucity of knowledge is not due to a lack of studies, but to the difficulty of studying the phenomenon: “clear evidence is difficult to produce in cloud seeding experiments, as they are not amenable to case-control studies” (NRC 2007, 118). As I noted in the first section of this chapter, two lines of risk-oriented questions motivate much of the research about cloud seeding. The first, an applied question interested in calculating cloud seeding's benefits, asks how well cloud seeding works. The second seeks to establish the negligibility of cloud seeding's environmental risks. In the grips of uncertainty, risks gain visibility but also slip away.

The staunch uncertainty regarding all of cloud seeding's effects – good or bad – perpetuates its unregulated occurrence. Ironically, uncertainty makes it easier to justify cloud seeding and let it bypass environmental regulation. And the indifference towards this uncertainty on the part of the cloud seeding industry begins to open up other questions. If cloud seeding's efficacy is beside the point, what other purposes does it serve? What does this uncertainty reveal about relationships between knowledge and the materiality of natural resources?

Risk invokes uncertainty: it has to do with what our dread of the uncertain future and a calculation of the probability of harm or loss do to our actions in the present. Pat O'Malley (2004) suggests that risk scholars – like Beck and Dean – don't pay enough attention to specific questions of the government of uncertainty. O'Malley accepts the

validity of Dean's point that calculable and incalculable risks alike motivate techniques of government, but argues that uncertainty and risk have different genealogies, meanings, and effects. He invites an examination of what uncertainty or apparent incalculability specifically enable. Looking at uncertainty rather than risks shifts attention from the politics of management to the politics of knowledge. The proponents of cloud seeding are the primary producers of knowledge about its effects and techniques. Studies of cloud seeding's efficacy reliably fail to meet rigorous scientific standards. It's important to ask why this knowledge "is treated as truth and expertise" (Goldman 2006: 130) and how the science of cloud seeding – and lack thereof – functions in broader political contexts. Uncertainty summons the precautionary principle, which "returns us to an epistemology of the relativity of scientific knowledge....Science today interests us less by producing new knowledge than by introducing new doubts" (Ewald 2002: 288, 289).

Two main lines of research – statistical and physical studies – plug away at the plethora of questions surrounding cloud seeding. Physical studies – essentially, observing how properties of clouds are changed by the addition of seeding agents – sometimes indicate that cloud seeding does something perceptible. But "thus far we have been unable to trace the physical effects from the point of seeding to the end product of rain on the ground" (NRC 2003: 40). Statistical experiments evaluate cloud seeding's effect on precipitation. The significance of any apparent effect depends, in these studies, on both the number of events and the degree of variability – the subtler the patterns, the more experimental units are needed to reach high levels of statistical significance. And statistical tests of cloud seeding need a control. Researchers build controls into these experiments in one of two ways – by comparing seed/no-seed storms in the same basin, or by seeding storms in one basin and monitoring a nearby control basin (a basin hopefully uncontaminated by the seeding agents). Some cloud seeders claim that the statistical tests of significance – tests that cloud seeding studies reliably fail – are both unnecessary and too exacting for the phenomenon and interventions they study. "I talk to a lot of water managers....And they will tell you, if you have a 20% chance, and this is all I need to pay for it, I'll take that chance" (Arlen Huggins, personal communication). Uncertainty is no hindrance to cloud seeding's appeal.

Uncertainty functions in specific ways in cost-benefit or environmental analyses; it can favor conceptions of the narrowest possible harm. Jill Harrison points out that, “benefits of restrictive [pesticides] regulations are typically conceived of very narrowly because most impacts of pesticide use are uncertain, long-term, diffuse, and thus nearly impossible to quantify” (2008: 1203). Uncertainty was used to cloud seeding’s benefit in the EIR for the Tuolumne Watershed project. The authors use the uncertainty of its efficacy to minimize the potential for adverse effects, and the uncertainty of its adverse effects to dismiss them.

Silver iodide could have a long-term impact on the productivity of the environment, although no presently known mechanism for toxicity exists. The potential for long-term (at least 100 years) accumulation of silver (or some unknown reaction product) in sediments or the food chain does exist. However, this issue is presently unresolved.

EIP Associates, 1990: 5-5

These mechanisms and relationships may indeed be unclear. But “[t]he question thus becomes, Is anyone looking?” (Steingraber 1998). (And who is looking?)

A 2003 National Academy of Sciences report on weather modification stands by the conclusions of its 1964 report on the subject – that weather modification may be possible, but a much greater understanding of general atmospheric processes and a much different approach to studying them are needed before its efficacy can be determined. The report finds that no studies to date have proved the efficacy of cloud seeding. (Cloud seeding is one of the primary techniques of weather modification.) In fact, nearly all studies to date on the efficacy of weather modification have been inconclusive.

[T]he initiation of large-scale operational weather modification programs would be premature. Many fundamental problems must be answered first. It is unlikely that these problems will be solved by the expansion of present efforts, which emphasize the a posteriori evaluation of largely uncontrolled experiments.

(NRC 2003: 67)

The report identifies “scientific and methodological uncertainties,” and recommends that a research program investigate these specific areas.

The science underlying weather modification is replete with uncertainties and knowledge gaps. These include fundamental microphysics, the effectiveness of seeding methodologies, and the verifiability of modification procedures. . . . Important questions remain regarding liquid and ice nuclei numbers and the nucleation processes; the presence, concentration, and location of supercooled water in clouds; droplet and hydrometeor evolution processes; and the natural variability of all these factors.

NRC 2003: 70

The report presents this lack of knowledge as an impediment to effective and widespread weather modification programs and suggests that even the social and legal questions would be resolved by increased scientific clarity. The report asserts that “sound, validated scientific research results can ultimately provide the critical answers needed to address these political and socio-economic issues appropriately” (NRC 2003: 12). As Steve Hinchliffe observes, “there remains a tendency to assume that agreement...on issues of policy can be produced by referring the case to an existing, or, once temporary uncertainties are banished, soon to be existing natural object” (2001: 199). But what if this uncertainty cannot be banished?

The sense of scientific uncertainty impeding or preventing cloud seeding projects appears in other studies on cloud seeding outside of the weather modification industry. In a chapter from *Legal and Scientific Uncertainties of Weather Modification*, one author attributes cloud seeding’s legal ambiguity in part to the science, arguing that “scientific uncertainties make the facts to which the law is to be applied not fully predictable” (Davis 1977). An editorial in *Nature* laments that cloud seeding faces a poor public reception, and suggests that more research will bolster its validity and pacify the public (2008). In a chapter called “The rise and fall of weather modification,” Chunglin Kwa argues that changing attitudes toward the environment since the 1950s eventually “tipped the scales against weather modification” (2001: 63). Kwa attributes this decline to the influence of rising environmental awareness on federal funding for weather modification (which was drastically curtailed in the 1970s). Without these federal funds, not enough research could be done to fill in uncertainties about weather modification’s effects and satisfy the apprehensive public. Kwa hails weather modification’s descent into obscurity.

But obscurity, born of uncertainty, does not mean that weather modification has vanished – or even declined. According to a hydrologist at DWR, many of the best locations for cloud seeding in California are filled by ongoing programs (Maury Roos, personal communication). In 2001, there were 66 projects in the U.S. and at least 100 worldwide (NRC 2003). Many opponents of PG&E’s Pit-McCloud project told me gleefully that ‘no one even knows if cloud seeding works,’ citing the NRC report. But it’s risk, not uncertainty alone, that finds purchase in environmental regulatory practices. Talk about uncertainty to your local bureaucrat, and his eyes glaze over. And if

opponents argue too strenuously that cloud seeding doesn't work, they're arguing against the risk-based concerns that environmental regulations are designed to capture. Cloud seeding's efficacy is never on trial; its risks are. Unsubstantiated claims about risk find much less traction than unsubstantiated claims about benefits.

For Hinchliffe, uncertainty in decision-making is too often seen as a problem to be solved, rather than a meaningful state to accept and act upon. Such situations force people to objectify nature and reduce uncertainty to a problem of making accurate representations (2001, 186). It sends people back to the available science, scrambling for the best available representation of answers to nebulous questions about the future effects of cloud seeding, no matter how incomplete these representations are. Hinchliffe critiques the precautionary principle – a method for making decisions in the context of uncertainty, more on this in the next section – for the limitations of a “decisionist approach.” In such an approach, there is no room “for recognizing that the assumed object of decision itself may be a contingent human construct which excludes other legitimate concerns, values, and experiences – even if these may not be easily articulated” (Wynne 1997, in Hinchliffe 2001). Ironically, the precautionary principle banishes uncertainty.

Part of the unrelenting uncertainty about the efficacy and effects of cloud seeding has to do with the materiality of clouds. In a section on “uncertainties in defining and tracking the target,” the NRC report finds that,

In many cloud-seeding experiments the experimental units are elusive, hard to define, and difficult to follow in time. In fact, to see a convective cloud as a single entity is an illusion. Clouds are transitory, always evolving and mixing internally and with their environment. These basic properties of clouds make it difficult to keep track of seeded units and to replicate the treatment in successive trials.

NRC 2003: 42-43

That clouds may present intractable problems for determining the efficacy and effects of cloud seeding, and that there may be policy implications of such deep-seated uncertainty, are never considered. What if researchers gave the inner workings of clouds a wider berth, accepting fundamental ambiguities in our knowledge of atmospheric processes? What if decision making were less dependent on scientific certainty, however concocted, and certain representations of nature?

Historian James Fleming underscores the profundity of the murkiness of cloud seeding science: “What is a cloud? is...both a philosophical and a scientific question” (2006: 17). He goes on to elaborate on the uncertainty of cloud physics (2006: 16-17):

Also not well understood is the behavior of complicated ice structures.... Realistic microphysical processes elude numerical weather models. Since cloud and precipitation formation are the bases for all larger scale weather phenomena, and since they occur at sub-grid scales with great spatial and temporal variability, microphysical processes are treated by modelers as at best unrealistic parameterizations with no theoretical basis.

The politics of cloud seeding knowledge suggest that uncertainty is not an impediment to its practice. The knowledge that is available to inform policy carries weight that is disproportionate to its objectivity and validity. But – quite like risk – it is how this knowledge is used, and not its quality or quantity, that help to create the conditions for cloud seeding’s unhampered proliferation. The mist of uncertainty surrounding cloud seeding deflects efforts to regulate it – the need for regulation is deferred until the nagging scientific questions are ironed out. Yet will they ever be? This view pervades: “If researchers could improve their understanding of weather modification, it might then be possible to tackle some of the larger legal and political issues” (*Nature* 2008: 958).

A city ordinance and the logic of precaution

The people of the City of Mt. Shasta understand that responsibility for remedying or simply enduring harmful effects brought about by modifications to weather, the introduction of toxins into the environment, and the privatization of water, is borne predominantly by the public....The people of the City of Mt. Shasta recognize that they are forced to endure or attempt to repair the harm to their environment that they have no commensurate authority to prevent, under current state and federal law. The people of the City of Mt. Shasta adopt this Ordinance to correct that error.

City of Mt. Shasta Community Water Rights and Self-Governance Ordinance, 2009: 2

Efforts by people in the City of Mt. Shasta tackle some of the larger legal and political issues of cloud seeding. In this section, I analyze the particular strategies employed by this northern Californian community to protest cloud seeding. By putting these strategies in conversation with some academic writings on precaution, I point out two areas that may need more clarification for understanding how and why to resist cloud seeding. The first area is the conception of corporate control – what it means and why to work against it – which I explore further in Chapter Two. Second, the conception of nature and change – how to understand the roles and effects of humans in the

environment – I consider in Chapter Three. In this section, I analyze the community’s work in anticipation of these next chapters’ more thorough treatments of two ideas that underpin opposition to cloud seeding. Understanding the basis and rationale for anti-cloud seeding activism is important in understanding how our relationship to weather – and to each other – is being formulated and reformulated in these debates.

After PG&E published two requisite notices of intentions in a local paper in October and November of 2008, concern about the proposed cloud seeding project spread like wildfire. (“Boy, people were comin’ uncorked on my phone,” remembers Ric Costales.) The absence of regulation of cloud seeding lead to more creative methods for opposing an unwanted activity: “A group of us were curious about how we could stop this. And, turns out, there wasn’t any way we could stop it. At least we thought there wasn’t a way we could stop it” (Tatiana Diacoff, Mt. Shasta City Council Hearing, April 24th 2010). They decided to take precautionary action.

The precautionary principle, at its most general, advises that people take action to avert or avoid potential harm. Precautionary thinking is embedded in much environmental and health policy Europe, but is scorned in the United States by mainstream policymakers and influential industries. The precautionary principle seeks to remedy disturbing trends in the management and proliferation of risks and toxins, and to protect human health and the environment. Yet a number of scholars take a sharply critical approach to the precautionary principle, arguing that it has several fundamental flaws that undermine its worthy aims.

The central object of the Shasta community’s efforts, a proposed city ordinance, embodies the precautionary principle and addresses several local water concerns, including cloud seeding. This ordinance, known as the Mt. Shasta Community Water Rights and Self-Governance Ordinance, will be on the ballot in November 2010 for the City of Mt. Shasta. The ordinance’s aims are many and varied. If adopted, it would ban cloud seeding and groundwater withdrawal within city limits, establish standards of “chemical trespass” for silver iodide, abolish corporate personhood within city limits, and enumerate the rights of people and natural systems. Through the ordinance, its proponents aim to take pre-emptive, preventative action against activities with a

perceived potential for harm. The following passage from a local environmental newsletter explains the role of the precautionary principle in the ordinance:

As silver iodide does not occur naturally in our environment, [ordinance] proponents determine that zero is both baseline and threshold for tolerable levels of exposure. If PG&E can prove that cloud seeding is environmentally benign...*before* beginning potentially harmful seeding, this ordinance can be amended.

Once industry and government accept that environmental stewardship is good business, citizens will be actively engaged in determining standards for toxic exposure.... Meanwhile, this ordinance embraces the precautionary principle and prohibits the corporate abuse of precious water resources.

(Cook 2010: 9, emphasis in original)

These activists employ the precautionary principle as a preventative measure in the absence of standards and practices more amenable to environmental health and democratic governance. This work invokes cloud seeding as a problem of risk, but also, more broadly, as a problem of “corporate abuse of precious water resources.” The use of the precautionary principle here seems to inhibit more nuanced understandings of the stakes of cloud seeding, appealing to idealized notions of the environment and community and narrow conceptions of “corporate” activity.

Francois Ewald, a French theorist, observes that the precautionary principle is invoked under circumstances of uncertainty that suggest the threat of serious, irreversible harm. “Precaution starts when decisions must be made by reason of and in the context of scientific uncertainty” (2002: 294). He finds the precautionary principle troubling for its insistence on the “logic of decision,” its urge to preserve “the continuity of the future with the past,” and its reliance on apocalyptic speculation (287, 283). Precautionary logic “applies to what is uncertain – that is, to what one can apprehend without being able to assess” (286). Decisions must take into account the worst possible scenarios and “the craziest imagined views” (289).

The logic of decision poses a dichotomous choice, and requires that available evidence – of any quality – come to bear on deciding what course will be taken. The “logic of decision” is part of what allows the unsatisfactory knowledge that exists about cloud seeding to carry so much weight. In the haste of decision, Shasta activism takes a stab at halting cloud seeding, rather than forging more nuanced understandings of our relationship to the weather. Even as the precautionary principle forces this moment of decision, a kind of break, it looks to the future – any future – with apprehension, and seeks to maintain a comfortable continuity of the past with what is to come. Melinda

Cooper notes that the precautionary principle “advises us on a course of absolute intolerance to the future” and endows suspicions with the force of law, rather than fostering more creative and open political attitudes (2008: 89). De Goede and Randalls suggest that precaution and preemption “depoliticize debate...delegitimate certain kinds of questions” and may create “the worst realities they seek to avoid” (2009: 874). For de Goede and Randalls, the precautionary principle exacerbates uncertainty, promoting an insatiable quest for knowledge and leading to a poverty of political imagination.

For Hinchliffe, the precautionary principle gives rise to three problems: a dearth of analysis, the objectification of nature, and bureaucratic decision-making (2001: 482). Forcing a precautionary decision narrows the range of debate and, as Hinchliffe observes, requires the perhaps inaccurate stabilization of particular understandings of nature. Precautionary logic reduces many decisions, ideas, and representations to one moment, one choice – to the exclusion of a greater diversity of concerns, perceptions, and processes. In Mt. Shasta, precautionary logic also gives rise to a tendency toward wild speculation in anti-cloud seeding discourse. This speculative tendency perpetuates the discourse of risk surrounding cloud seeding, promulgates particular conceptions of the meaning of “corporate control,” and concretizes certain understandings of nature.

I watched a Mt. Shasta City Council hearing in April in which the ordinance was presented and discussed. The decision whether to adopt the ordinance or put it on ballot was delayed until the following month, at which point council members voiced personal reservations and voted to put it on the November ballot. At this first meeting residents of Mt. Shasta spoke largely in favor of the ordinance. Listening to their words and reasoning, my understanding of the limits of discourses of risk and precaution crystallized. The City Council chamber was fuller than it had been in years, and people spoke passionately about the region’s clean water and the community’s overwhelmingly positive response to their organizing efforts. But I was struck by the – to me, stark – exaggeration of the severity of cloud seeding’s threats to the environment.

One of the most disturbing parts...is that after 4-6 years of cloud seeding, it was noticed that clouds tended to stop forming. And water that formed with the non-dissipating silver iodide...[was] flammable.

There’s articles out this week, up in northern China there was a cloud seeding incident, and it was a deadly storm, there were people that died, and they’re pretty sure it was from

cloud seeding. And there's an article about cement dropping from rains in Russia when they're cloud seeding.

Why is it that people feel the need to make statements based on exaggerated, fear-based claims? They must do so in part because precautionary action requires such speculative, worst-case-scenario thinking, inviting dire scenarios in order to justify drastic action.

One ordinance proponent points out that the preemptive, rights-based approach is taken in the ordinance. Ordinance proponents believe that in a regulatory approach to cloud seeding, “it’ll come down to [their] expert says that this many parts per million won’t hurt people even though it’s listed as a toxic substance... And then we can have experts say, well yes it does. And that would go on and on and on. And so our approach with the rights-based ordinance circumvents all of that baloney” (Ed Gardiner, personal communication). It aims to avoid, in other words, the enabling, regulatory logic of risk, impact, and mitigation. Yet anti-cloud seeding discourse still relies on questions of risk, science, and uncertainty in the justifications for precautionary action. Though trying to preempt regulatory logic – which limits harm rather than prohibits it – ordinance proponents draw on this same kind of logic to justify the proposed decision. The ordinance has not escaped the pitfalls of regulatory thinking, only deployed them differently. Shasta activists have not fully extracted cloud seeding from the impact-obsessed discourse of risk. While the results may differ, the language is substantially unchanged.

Shasta activists also consider cloud seeding troubling in part because it’s a “corporate” activity, but this objection still perpetuates a language of risk – corporations as inherently risk-producing – and solidifies particular understandings of nature and community. Activists in Shasta speak of cloud seeding as a kind of forced imposition on natural processes: “they’re coercing the water for their benefits, private profit maximization....” (Angelina Cook, personal communication). Shannon Biggs, from Global Exchange, a non-profit organization in San Francisco, helped draft the ordinance and craft the language of the local cloud seeding debate. In an interview, she speaks of corporate activity as inherently unnatural:

What do I think about corporate ownership of clouds and modifying the weather in order to suit the needs of corporate interests so that they can try to change weather patterns throughout the whole state in order that they might collect rain above their reservoir and own it?... That to me seems fundamentally against nature....

Communities, on the other hand, are part of nature: “[Regulatory law] doesn’t allow community residents to act as stewards of the environment, of which they are a part” (Shannon Biggs, personal communication). These assertions raise several questions. How do we know that the community has the best interest of water resources at heart? Who is part of this community, and who isn’t? Why are corporate activities qualitatively different from non-corporate ones?

Using notions of a pure, original nature in order to dispute capitalist appropriations of nature may foreclose on other practices that could be read as interfering with some natural order. In the ordinance, a “natural water system” is defined as “the natural and unmanaged circulation of water between atmosphere, land, and sea by evaporation, precipitation, and percolation through soils and rocks” (2009: 11). Where can an unmanaged water system be found? One ordinance proponent responds to people who are hesitant to support the ordinance by saying, “it’s not politics, it’s your water!” Invoking water as apolitical – as a stable, universal category – limits, perhaps prematurely, the ways that it can be used and perceived. During the April 26 hearing, many ordinance proponents appealed to nature as pristine, and opposed cloud seeding on the grounds that it substantially changes nature’s inherent purity.

Please look at this ordinance as a way...to say we love Mount Shasta and we want to keep it pristine, and the way that God intended it to be. Not fake.

I’m here tonight to speak my voice to you, to support you in assisting us, and us assisting you, to pass this ordinance, to love and respect nature, and to allow her to go on the way that she was created, untampered with by big business and corporations.

These kinds of statements willfully ignore the substantial changes that humans have made and continue to make on hydrological and biological processes. The environment is understood as external, vulnerable, impacted. It’s extraordinarily challenging – yet necessary – to figure out how to assert an environmental ethic that acknowledges the profound interconnectedness of what we know as nature and human. Until this can be addressed, cloud seeders have the upper hand when they point out that “the problem with saying it’s unnatural is that as a human species...we’ve been modifying weather systems on a much larger scale than cloud-seeding projects” (Arlen Huggins, interview with Andrew Moseman, 2009).

The tension between precautionary action and environmental change is also acknowledged by some of Shasta's water activists. Rene Henery sees the precautionary principle as a useful tool, but not without flaws. In his view, the precautionary principle is

a reflection of a deeper decoupling which I think is the reason we're struggling with this in the first place....There's a big process, an ongoing process, of getting in touch with our dynamic environment. Some people would say getting back in touch, but I think it'll be new. So just getting back in touch with our dynamic selves, our relation to our environment, how that relates to place, time. And then that process will, once we've done that, by definition, continue to change. Because it'll be all grounded in that dynamism. And there's a lot of things like the precautionary principle that I think could help move us from where we are back in that direction, or at least protect things while people are hearing out what the hell is going on.

For Henery, there is no past nature to return to: whatever relationship is forged with the environment is a new one, though it's no less vital to get in touch with this environment even though the past is ungraspable. How to embed this understanding in the strategies of environmental politics is an immense challenge. Even in Henery's statement, "back" slips in, even though he's speaking of a kind of politics where there's no "back" to return to. How can views of this dynamism become part of environmental politics, and become part of the discussion in a way that still supports environmentalist aims? It's a view I don't see reflected in the language of the ordinance, in literature supporting it, and many statements at the two hearings. The ordinance fixes nature as comfortably and indisputably known. The two views are clearly in tension – if not quite in conversation – in anti-cloud seeding activism in Mt. Shasta. But my research did not occur at a time that would have allowed me to hear much of the dialogue among Mt. Shasta residents in crafting the language of this effort.

Ordinance proponents avert the question of the profound modification of the environment by humans by appealing to the right of communities to decide what affects them. The ordinance asserts that be it natural or unnatural, people should have a say in whether or not cloud seeding takes place, defining self governance as "the inalienable and legitimate authority of the people of the City of Mt. Shasta to decide as a community the future of their community..." (11). This can be understood as a call for "collective choice rights," which "give individuals the right to participate in deciding on the future of the resource" (Suryanata and Umemoto 2005: 751). One of the core problems with cloud seeding regulation and non-regulation, as the people in Shasta see it, is that there is no process for claims on the weather to be democratically decided. The ordinance addresses

this problem: this approach “just says we have the right to say no and we are saying no” (Ed Gardiner, personal communication). Yet in rejecting cloud seeding so forcefully, an opportunity for articulating other relationships to the weather may be partially lost.

These conceptions of nature, community, and corporate activity foreclose more nuanced understandings of what the practice of cloud seeding achieves, understandings that might lead to different political practices. Precautionary thinking positions political work as against what might happen, rather than asking that people articulate what they want the world to become. The activism around Mt. Shasta’s ordinance, although it proposes some new ways to understand and oppose cloud seeding, perpetuates a logic of risk in a way that still neutralizes and obscures some of the other important questions.

Conclusion

Cloud seeding is produced as a problem of risk in the ways that it is understood as a question of water supply, through the logic of environmental assessments, and as a problem of uncertain scientific knowledge. Its risks are easily dismissed or transferred – to water scarcity, to preexisting levels of silver, to a pathologically inefficient environment. Cloud seeding may indeed be troubling, but the concept of risk doesn’t quite get at why. Existing environmental regulations, even when applied to cloud seeding, don’t capture the questions cloud seeding raises. The discourse of risk is smooth and opaque: there’s no way for cloud seeding’s opponents to bring it to a halt.

In this chapter, I’ve hoped to show that cloud seeding is partially justified through appeals to the need for water in California. Focusing on cloud seeding’s risks sets up cost-benefit calculations, and additional water outweighs almost any risk. Through environmental assessments, cloud seeding’s risks further monopolize public debate even as they are arguably enveloped by natural variability. Questions of property, the relations between humans and the environment, and the dynamism of the environment itself are forgotten in an effort to pin down the elusive impacts of cloud seeding. The profoundly uncertain science of cloud seeding further stalls public debate around effects other than risk, deferring legal and political questions until after cloud seeding’s efficacy and effects are resolved – which, due to weather’s materiality, they may never be.

Shasta's novel approach to stopping cloud seeding at once relies on and moves past a language of risk. The conception of risk involved in the proposed ordinance relies heavily on overstating cloud seeding's potential effects on an untouched environment. Moving beyond risk, Shasta activists also bring up – in a reactionary way – the question of corporate control of the weather. Understanding the question of corporate control in more detail is the aim of the next chapter.

CHAPTER TWO: Who owns the weather?

At the heart of the question “Who decides how much rain the clouds should surrender?” is a more fundamental one: “Should humans ‘own’ the weather?” By engaging in cloud seeding, corporate managers have answered both of these questions.

Mount Shasta Community Rights Project 2010: 48

I’m pretty sure PG&E is well aware that there’s no data to back up whether these cloud seeding programs actually work. But what I see is that they’re building up some kind of history so that they are able to politically take more water.... So they can just say, hey, we’re producing more water here, let us use more water for power generation.

Mark Miyoshi, Winnemem Wintu Tribe

Introduction

This chapter’s core questions are unusual ones. Who owns the weather? Who has the right to use, modify, and benefit from weather systems? How does cloud seeding answer these questions, even as they are left substantially unanswered?

These are awkward questions to ask and to attempt to answer. I did an interview with Tom Stokely, a retired land use planner from a northern Californian county and a lifelong water activist. We were having a mutually interesting conversation about the politics of water in the San Joaquin Valley, when I decided to yank the conversation in the direction of my more narrow inquiry. I ask, “Who do you think the weather belongs to?” He shifts uncomfortably and scrapes his chair back against the floor of the porch. He laughs. “It doesn’t belong to anyone. It just belongs to the earth. It’s gonna do what it’s gonna do.” I press, trying to redeem my question, “Who do you think should have control over doing things in it?” He doesn’t give much of an answer. I sense he feels like he’s been asked a rhetorical question in folk storyteller Utah Phillips’ sense: “a question you ask just so you can show off. The answer you’ve already figured out.”

But I ask this question, Who owns the weather?, in all seriousness and sincerity. The weather’s relationship to humans is a difficult one to articulate. The failure to answer this question in a compelling and consistent way lends credence to the ways and places that it is answered, however subtly. In the skies above Siskiyou and Shasta Counties, this question may be answered. It is answered wherever cloud seeding takes place, in meteorologists’ offices, in watersheds and waterways, in dams and diversions, and in the flash and heat of silver iodide lifting into a winter storm. It is answered in the ways the connections between private lands and public skies are articulated and established. It is

answered in the ways cloud seeding extends a water management system upward into other phases of the water cycle, deepening capitalist relations in the landscape.

Risk monopolizes debates about cloud seeding, but other questions, hunches and observations haunt the edges of public and private conversation. First, I briefly describe significant political issues surrounding the Pit and McCloud River. Second, I attempt to give an account of cloud seeding as a practice of accumulation, or corporate control, using the concept of accumulation by dispossession. Third, I look at possible implications of cloud seeding as accumulation strategy for private property claims. Fourth, I examine the nature of what is being dispossessed. Rather than dispossessing directly people's right to use the weather, cloud seeding interferes with more complex and interconnected kinds of environmental practices and processes. Dispossession of resources are connected to other, prior practices of accumulation by dispossession – like the building of dams and inundation of indigenous lands – and so may obscure who and what is being dispossessed in one particular instance. Lastly, this chapter attends to the alternative notions of water governance asserted by Mt. Shasta's proposed ordinance, considering what kinds of alternative political strategies arise – and might arise – from understanding cloud seeding as a problem of corporate control.

Cloud seeding does not precisely follow widely observed processes of capital accumulation, in part due to the material characteristics of the weather and the substantial absence of a defined social relationship to it. Cloud seeding takes place in a realm that lacks the material and legal assurances that make privatization conventionally possible. In the practice of cloud seeding, there's an opportunity as much as a threat: cloud seeding underscores the urgency of articulating, perhaps for the first time, socially and environmentally just methods for guiding human interactions with the weather. As Silvia Federici writes,

“[t]he neoliberal attempt to subordinate every form of life and knowledge to the logic of the market has heightened our awareness of the danger of living in a world in which we no longer have access to seas, trees, animals, and our fellow beings except through the cash-nexus. The “new enclosures” have also made visible a world of communal properties and relations that many had believed to be extinct or had not valued until threatened with privatization. Ironically, the new enclosures have demonstrated not only that the commons has not vanished, but also that new forms of social cooperation are constantly being produced....” (2010: 284).

For those who oppose weather modification, is it possible to use the practices and possible threats of cloud seeding as a way to investigate and experiment with new forms of social cooperation and resource use?

River geography

PG&E's cloud seeding project would take place in the Pit and McCloud River watersheds, where the company has significant hydroelectric power projects. Claims to the right to modify the weather connect to preexisting uses of land and water, and intersect with ongoing debates about where, why, and for whom water should flow.

For over 60 years, the flows of water in the upper Sacramento River area have been significantly controlled, primarily through dams for irrigation and hydroelectric power. Shasta Dam is the centerpiece of the California Water Project. Built in the 1940s by the Bureau of Reclamation, it holds water from the Pit, McCloud, and Sacramento Rivers at their confluence in a massive, many-fingered reservoir. The Sacramento flows out of Shasta Reservoir and down to the San Francisco Bay. A proposal to raise the height of Shasta Dam by 6 to 200 feet sparks debate about the effects of inundating even more of the land that's culturally important to local Native American tribes like the Winnemem Wintu (Garret 2009). And government agencies puzzle over strategies to return salmon to stretches in the rivers above the impasse of Shasta Dam.

The upper Sacramento River is the northernmost river that enters Shasta Reservoir, originating West of Mt. Shasta and flowing through a canyon shared by Interstate 5 before entering the reservoir. The southernmost river, the Pit, is a long, low-elevation river that flows from the northeastern corner of California, and its flows are highly managed by PG&E for hydroelectric power (see Figure 3). The McCloud River, the middle river, starts from water emerging from springs on the east side of Mt. Shasta.

Twenty-four miles above Shasta Reservoir, at Lake McCloud, over $\frac{3}{4}$ of the McCloud River's water is sent by tunnel to PG&E's Iron Canyon Reservoir and then to a power plant on the Pit River, as part of PG&E's McCloud-Pit Hydroelectric Project. This project, nearly 50 years old, includes four reservoirs, three powerhouses, five dams, two tunnels and an afterbay, and spans over 1,600 acres of federal land (FERC 2010). The

project generates about 1,542.2 gigawatt-hours of power each year (FERC 2010), an amount roughly equivalent to 0.6% of California's annual electricity consumption.

As part of a Federal Energy Regulatory Commission (FERC) relicensing that will define management of the rivers for decades to come, PG&E proposes to continue using its hydroelectric infrastructure on these rivers, and to add three new generation facilities, two at the dam on the McCloud River. The outcome of the relicensing will secure PG&E's right to modify rivers – and its rationale for cloud seeding – for decades to come. For the past several years during the relicensing process, federal and state agencies, local tribes, and conservation groups have debated with PG&E over different flow regimes below Lake McCloud, environmental mitigation measures, future fish passage, and effects on cultural sites and plants gathered for healing. This fraught geography of water distribution influences the stakes and positions of people concerned about cloud seeding.

Weather modification as accumulation strategy

The literature in geography on “corporate control” examines the methods and the ecological and social implications of moving resources from public to private control, and the governance regimes that accompany these shifts (Mansfield 2007; McCarthy and Prudham 2004; Bakker 2003; Castree 2003). Analyses of the implications of corporate control are inextricable from analyses of corresponding shifts in property rights regimes, often marking a shift from “public” to “private” property. The atmosphere is readily understood as “the quintessential commons” (Angelina Cook, personal communication). And cloud seeding can be understood as a process of enclosure of the productive potential of the weather, a process that converts public resources to private ones.

Cloud seeding, perhaps more than other instances of expanding accumulation strategies, does little to disrupt or change prior laws or governance practices. It is connected to a regime of water use that has already dispossessed other kinds of lives and practices in the region. The weather is extraordinarily unregulated; additional privatizing claims on water cycles through cloud seeding can often go unnoticed for what they are. Because of the lack of preexisting claims and frameworks, PG&E exercises a claim on the weather with relative ease. But the degree to which cloud seeding secures rights of

property to weather and water, and the degree to which the concept of property is even adequate for understanding cloud seeding's implications, is uncertain. Some concepts from the geographical literature on corporate control clarify the stakes of cloud seeding.

For Karl Marx, the concept of primitive accumulation describes the violent seizure of common land and resources for the sake of creating private property. Private property is a prerequisite for capital accumulation and the formation of a class society, and Marx understands primitive accumulation as an early stage in the transition from pre-capitalist to capitalist societies. For Marx, primitive accumulation

is a process which operates two transformations, whereby the social means of subsistence and production are turned into capital, and the immediate producers are turned into wage-labourers. So-called primitive accumulation, therefore, is nothing else than the historical process of divorcing the producer from the means of production.

Marx, 1990: 874-875

Marx's treatment of primitive accumulation emphasizes the violence inherent in the seizure of land, calling it the "systematic theft of communal property" (886). In Marx's account, primitive ("original") accumulation in Britain was mostly completed before his time, becoming increasingly embedded in state institutions that strengthen private property claims – "the law itself now becomes the instrument by which the people's land is stolen" (885). Ultimately, primitive accumulation of common lands "conquered the field for capitalist agriculture, incorporated the soil into capital, and created for the urban industries the necessary supplies of free and rightless proletarians" (895). Primitive accumulation and resulting processes transform social relations, material practices, and the ways that resources are understood and represented (Bridge and Perreault 2009: 487).

The concept of primitive accumulation is used in contemporary studies of the political, social, and ecological consequences of capital's expansion. Primitive accumulation is now commonly understood to be an ongoing process even within capitalist societies, rather than simply a discrete stage in the transition to capitalism. To mark this modified understanding, David Harvey calls it "accumulation by dispossession," a term that also captures the social implications of disrupting subsistence livelihoods as resources are appropriated for capital accumulation. Accumulation practices include the "conversion of various forms of property rights...into exclusive private property rights,...suppression of rights to the commons,... commodification of labour power and the suppression of alternative forms of production and consumption"

(Harvey 2005: 159). The mandate for neoliberal governments is to secure private property rights and set up the conditions for capital accumulation (Harvey 2005: 2, 19). Not only do direct enclosures privatize common resources, but also, through law and practice, enclosures secure “the right to profit from the use of such resources irrespective the effects this use generates” is secured (Glassman 2006: 619). Accumulation by dispossession manifests as regions or resources enter capitalist markets for the first time, displacing other forms of production (Sneddon 2006), and in other kinds of expansionary capitalist projects like the genetic modification of seeds (Kloppenborg 2004).

Cloud seeding is a form of accumulation by dispossession. It encloses a resource that is, by default, public, and establishes the right to private control over weather and water systems. Yet it does not displace or uproot preexisting livelihoods or practices that specifically tap into the productive potential of the weather. It does not upend or contradict existing legal systems for defining and legitimating ownership of atmospheric water. It does not appear to alter existing water rights regimes, for “state law says that water gained from cloud seeding is treated the same as natural supply in regard to water rights” (DWR 2009: 10-9). It does not erase or overtake existing institutions for determining the right to modify weather systems – for there are no such institutions. Cloud seeding performs a particular relationship between humans and the weather by allegedly altering the internal workings of the weather. It works at the frontier of turning something into a resource. Unlike other instances of accumulation by dispossession, where people’s livelihood’s suffer from capitalist appropriation of resources, cloud seeding doesn’t enact a direct dispossession. It secures a vision and practice of the water cycle as vehicle for private profit, working against other visions and practices.

The concept of accumulation by dispossession describes the way that cloud seeding is an act of transition. Cloud seeding links a resource – atmospheric water – to circuits of capitalist production. Capitalist logic is already embedded in infrastructure that controls water movement, and cloud seeding, as an extension of this system, subtly shifts familiar managerial, profit-driven conceptions and practices to the relationship between humans and the weather. Cloud seeding deepens capitalist relations in the landscape, reinforces particular existing property claims region, and ensures the viability of particular uses of water.

PG&E pursues cloud seeding in order to meet growing demand for power, to continue the expansion of electricity production and consumption. For PG&E's proposed project near Shasta, presumed increases in aquifer levels and spring runoff would fill the dams on the Pit and McCloud Rivers and increase the rivers' flow.

The lower portions of those two rivers are volcanic. There's probably dozens, if not hundreds, of layers of volcanic flows of the Cascade volcanoes that make up the headwaters in that area... We're looking at cloud seeding there to recharge the pressures in the aquifers. Put them up a little bit higher. For example, of the tributaries going in to the lower Pit, almost 90% of their flows are from the basin flows, groundwater flows, springs, large springs. So this would be a project where we would hope to cloud seed and get additional precipitation from the storms, build up the head on the groundwater tables, and increase the flow of the springs, which would flow, each day of the year it would come into our large forebays and afterbays of the hydroelectric project. And that would provide us with peaking, additional peaking power....

It's all gravity flow, we're not gonna have to pump that ground water back out. The headwaters are at a higher elevation, so it just comes forth out of these springs, that suddenly emerge, and they dump into the river.

Gary Freeman, PG&E Hydrologist, personal communication

Greatest demand for energy in California is during the hot summer months, when the amount of water in reservoirs and the capacity for hydropower generation are lowest. Harnessing and improving upon the productive potential of the weather allows PG&E to respond to a demand for summertime power supply. Throughout the year, minimum releases of water downstream are required – not all the water can be stored, and the dams, rarely filled to capacity, lose water after the period of spring runoff. Climate change would make the spring runoff come even earlier, making dams even less effective for water storage. Increasing the amount of runoff and delaying snowmelt (as cloud seeding projects claim to do by a day or two) would directly increase power production and the profits from its sale. According to PG&E meteorologist Byron Marler (cited in Hunter 2007), the value of the hydroelectric use of water is about \$100 per acre-foot, and cloud seeding operations, as estimated by DWR, cost between \$1 and \$20 per acre-foot (Hunter 2007: 24). This particular cloud seeding project would produce about 250,000 acre-feet of additional water per year, as estimated by PG&E (DWR 2009). At a profit of \$80 per acre-foot, that's \$20 million a year anticipated from cloud seeding.

Cloud seeding marks a different kind of strategy in water control and management, as water projects continually fail to produce “enough” water and power for the state. Accumulation by dispossession is capital's response to barriers to continued accumulation such as ecological degradation or social opposition (Bakker 2003: 29-30).

These shifts in accumulation strategies are evident in water management systems, systems that “materially embody successive phases of capital accumulation” (Bakker 2003: 43). In California, the use of cloud seeding is an attempt to increase the supply of water available to private interests, a goal that has already resulted in prolific dam- and infrastructure- building. Water is a vital element of production processes, whether by nourishing plants or tumbling through turbines.

Now, as most dam locations have been taken and new dams face well-organized opposition, cloud seeding performs a new method for securing more water and managing its seasonal and annual distribution. Weather modification is cheaper than building more dams, and “furthermore, new dams and reservoirs are frequently opposed by environmental groups” (Hunter 2007: 25). Cloud seeding moves inward. It’s aim is to get inside one moment of the circulation of water in order to increase the efficiency of precipitation and control its distribution. As observed more widely of accumulation processes, cloud seeding is one instance in which capital increasingly pursues “intensive” rather than “extensive” accumulation strategies (Bakker 2003: 30). “[F]aced with the loss of extensive nature, capital regrouped to plumb an everyday more intensive nature” (Katz 1998: 47). Accumulation by dispossession works at capital’s frontiers, and some of these frontiers have moved inward – and upward. Cloud seeding represents the intensification and expansion of a water management system that secures, transports and allocates water for private profit.

This intensification disguises modifications as natural, rationalizing pre-existing processes as new avenues for capital accumulation. Martin O’Connor argues that with the expansion of capital, “the erstwhile exterior domain (of “nature”) is redefined as an element of valuable capital, present within the world as a productive system, and itself to be rationally managed as a productive enterprise” (1994: 129). For PG&E, the goal of cloud seeding is to “improve the precipitation efficiency of cloud systems” (Freeman et al 2006). The practice of cloud seeding links the cyclical circulation of water to capital accumulation. In Eric Swyngedouw’s study of water distribution in Ecuador, he links the circulation of water to the circulation of money, noting that “accumulation is dependent on the swiftness by which money circulates through society” (2004: 31). It is not the volume of water, in some sense, but the expanse, efficiency, and speed of its circulation

that matters for capital accumulation. Cloud seeding extends the modification of the hydrological cycle into its upper reaches. It secures atmospheric water as a realm and resource for capitalist growth and as a basis for accumulation. In Jack Kloppenburg's history of plant biotechnology, he traces "the historical transformation of the seed from a public good produced and reproduced by farmers into a commodity that is a mechanism for the accumulation and reproduction of capital" (xvi). Through cloud seeding, the weather may be undergoing a similar transformation.

PG&E legitimates its attempt to control the water cycle by arguing that cloud seeding is acceptable given existing land ownership regimes and the necessity for additional water. In a powerpoint presentation given to the Siskiyou County Board of Supervisors in 2006, representatives from PG&E make claims about the company's right to be seeding clouds, but not too strenuously. PG&E need not argue against other claims on the use of weather and atmospheric water. And the company already substantially controls the flows on the Pit and McCloud Rivers – now all it wants to do is to increase these flows.

In the presentation, PG&E explains the project design: the "modeling results" indicate that, for the Pit and McCloud watersheds, a "ground based program provides more opportunities for operation and provides greater value" than aircraft-dispersed seeding agents (Freeman et al 2006). The design of the program is depoliticized, explicitly taking into account only technical considerations, not legal or social ones. The presentation provides maps that define the "target area" and the location of seeding generators, presenting these as technical prescriptions rather than contestable claims. The actual questions of the ownership of the weather or right to modify it don't enter PG&E's arguments. In fact, "weather" is de-emphasized, occurring only three times in the text of the presentation – words like "cloud system" or "winter storm" are used instead, words that invoke a more piecemeal, technical conception of weather modification.

Land ownership appears to be connected – for PG&E – to the right to cloud seed regionally. "Strategically located private land does exist in [the] region," the presentation assures its audience – the generators are located on land belonging to two timber companies, Sierra Pacific and Roseburg. The Forest Service – which owns much of the land in the Pit and McCloud Watersheds – had requested that PG&E search out private

land rather than locating the generators on public land “primarily because of [the Forest Service’s] environmental requirements, that sort of thing” (Gary Freeman, personal communication). According to Freeman, the timber companies “were basically fine with us doing it.” The right to seed clouds is established in these arguments and the actions that ensue: PG&E has already installed some of the cloud seeding generators, despite needing a permit for them from Siskiyou County (Gary Freeman, personal communication). Does land ownership entitle someone to modify the weather above that land? Apparently so, but that right is assumed, not explicit.

Cloud seeding installs a particular relationship between people and the weather and invokes mechanistic conceptions of weather systems. Through cloud seeding, people relate to weather as consumers of the electric power it contributes to producing. Mansfield observes that acting on the concept of property “disciplines both owners and non-owners to become market subjects” (2007: 396). Understanding cloud seeding requires us to think of the weather’s inefficiencies, to think of the weather as a machine. Think of “the moisture-laden air space as the reservoir...; the cloud is the inverted well shaft and pumping equipment; and nucleation, whether natural or artificial, is the energy which pumps water down to earth (Stark 1957: 704). For Scott Prudham, commodification ties nature to systems of representation that work “as regimes of calculation and expertise that...make nature and territory ‘legible’ and governable” (2009: 130). Cloud seeding enacts these subtle changes in people’s orientation to and perception of weather systems.

Accumulation by dispossession describes the migration of capitalist logic into formerly untapped, uncontrolled resource. Entering a realm of potential accumulation with virtually no regulation and no pre-existing uses, PG&E can assert its control over ground and atmospheric water without having to debunk other claims. It’s an open question whether weather modification constitutes “a violation of trust or an improper alienation of public property rights in the weather without concomitantly adequate protection of the social interest” (Franzen 1971: 528-529). Is it safe to assume that the use of the weather as an accumulation strategy is in society’s best interest, despite the lack of a process for assessing people’s opinions about weather modification?

Property

The concept of property is not a wholly adequate way to understand the stakes of cloud seeding, in part because of the materiality of the weather – its unceasing movement, instability, unpredictability, insubstantiality. Furthermore, understanding cloud seeding as being merely about weather, or water, is inadequate – it is perhaps also about controlling the kinds of transformations that water can produce. Yet questions of property are often asked of cloud seeding, and partially delineate its stakes. So what are the implications of cloud seeding as accumulation strategy?

Several kinds of strategies and processes describe further strategies to secure forms and uses of the hydrological cycle – commercialization, privatization, commodification. Commercialization is simply the application of market-based techniques and goals to formerly publicly managed resources – pricing, efficiency, profit maximization. Privatization encompasses two related processes – the conversion of common resources to private property, and the shift – more generally – from public to private control. Both of these faces of privatization concern the “allocation of resources through practices of ownership and control” (Mansfield 2007: 393). Cloud seeding performs a kind of privatization of the atmosphere, atmospheric water, and the conditions of water’s circulation. It installs a particular regime of use, property, and territory where none explicitly existed.

Cloud seeding commodifies water by harnessing and directing water’s productive potential. Commodification is a process that renders something exchangeable through the medium of money, and occurs to a variety of degrees. For Scott Prudham, commodification “entails the proliferation of circuits (including in biophysical ones) through which this capital as value-in-motion may flow” (2009: 128), and cloud seeding enhances the productivity of one such circuit. PG&E’s cloud seeding project essentially proposes to speed up the circulation of water in part of the water cycle: cloud seeding will increase the quantity that flows from sky to ground, from volcanic aquifers to artesian wells, from springs to rivers, and through hydroelectric power plants that create electricity. John Thornes and Samuel Randalls point to three types of commodification of the atmosphere: of its material, its properties, and knowledge or predictions about it (2007: 274). For them, cloud seeding as a technology is itself a commodity, “a

commodification of nature as internal” (2007: 274). Because cloud seeding “improves upon” the workings of pre-existing processes – similarly to genetic engineering – it also, in some ways, claims the original processes as proprietary. PG&E enacts partial commodification of the water it produces through cloud seeding. The materiality of weather and water prevent full commodification, which would require that the commodity be completely privatized, separable and alienable (Castree 2003: 285).

How could cloud seeding constrain future use and ownership of the weather and water and the practices that affect them? Does PG&E “own” the weather through the practice of cloud seeding? Property can be understood, most broadly, as “the relationship between persons with respect to things” (Whatmore 2002: 60). Conventionally, property comes with the right to use and control it, the right to benefit from it, the right to sell it, and the right to exclude others from it. Does it matter if PG&E doesn’t possess a deed to the weather, if it acts on all the rights associated with property ownership? Through government inaction and deregulation, PG&E is granted the right to use and control the weather and to profit from the precipitation that results from weather’s modification. By California state law, PG&E does not own the resulting water. But they’re not in the business of selling water, only controlling its cycles. Until a competing use is asserted, PG&E functionally “owns” the weather. And if this is indeed the case, how can such a privatizing claim be counteracted?

Efforts to deal with the property implications of weather modification are few and dated, corresponding to a period of heightened national attention. The legal aspects of weather modification – and especially questions of property – remain profoundly murky. “Our legal system...is not geared to solve weather modification problems” being concerned instead with questions of ownership and property rights – and “property concepts do not address themselves to cloud dynamics [and] man’s [sic] harnessing of the weather” (Kirby 1978: 58).

Concepts of property mediate the few court cases concerning the rights and liabilities of cloud seeding. Only three states have case law dealing with the ownership of atmospheric water, and these rulings are contradictory. In Texas, a landowner owns the water passing above the land’s surface; in Pennsylvania, this right can be deprived by government-permitted cloud seeding (Bomar 2006). In New York, a landowner does not

have a right to the atmospheric water passing above the land. In an early case, a judge ruled that a resort owner wanting to prevent the cloud seeding being done to augment New York City's water supply "clearly [has] no vested property rights in the clouds or the moisture therein" (cited in Fischer 1975: 641). One legal commentary takes up the question of whether weather modification can alter water rights – whether the cloud seeder has rights to the additional water produced. In examining the doctrine of prior appropriation, and cases regarding "developed" waters, Fischer concludes that yes, water produced through cloud seeding

is available to the developer without regard to the rights of other appropriators on the stream. He [sic] may use it directly or he may store it for later use. ... That the induced moisture should fall to the earth with other rain or snow, or should become co-mingled with other droplets on the ground or under it, or flow with other waters in the streams, is of no consequence (1975: 645).

Although currently in California no water rights are attached to cloud seeding, cloud seeding does exert a very real privatizing claim on atmospheric water that could translate into significant control over the distribution of the water supposedly produced by cloud seeding. In Colorado, permits are available for securing the right to use the surface water created through cloud seeding (Bomar 2006). Looking at cloud seeding as a kind of claim to weather and water and private property identifies some of the possible consequences of the privatization of otherwise public resources.

But is the concept of property wholly adequate to understanding the problems of cloud seeding? A Yale Law student writing in 1972 asks whether property is a valuable category for understanding the legal implication of weather modification. Jamie Harris observes that, as scholars combed common law for analogous cases to cloud seeding, "[i]t was simply assumed from the start that 'property' was a relevant category. In fact, most of the legal writers defined their whole view of the problem only in terms of property. ... That weather modification might involve important human values unrelated to land ownership... did not seem to be apparent" (1972: 39-40). Harris suggests that a "systemic ecological approach" encompasses "a vastly more complex and subtle range of problems" and suggests that broader implications, beyond property, be considered (40). Property, for Harris, defines the stakes of cloud seeding too neatly and too narrowly. Looking at property, it is tempting to try to secure and identify property rights regimes, instead of examining what it would mean to consider the weather beyond conceptions of

property. Property insists that things exist as discrete, identifiable resources, and can't encompass instances where resources are interdependent and comingle. Are resources like the weather inherently and inalienably public – common – resources, resistant to be categorized as any one person or company's property?

Questions of property always show up in the few places where the social and legal implications of cloud seeding are raised alongside the scientific ones: “What happens...when one country wrings excess water out of a cloud before it drifts over a similarly parched neighbour? How does one engage cross-border negotiations on atmospheric rain, when terrestrial water...itself is so contentious? Who actually owns the weather?” (*Nature* 2008: 958). But perhaps weather can never be adequately understood as solely a question of property, and demands a different approach for guiding human interactions. The reticence to accept weather's unwieldy unpredictability and to ask how it challenges existing conceptions of property makes it possible to defer tackling these questions indefinitely. The problem of clouds-as-property will not be resolved with better science, contra the view that “once the applicable scientific principles are understood fully, a rational application of law to weather-modification practices can be achieved” (Bomar 2007).

Chris Sneddon's study of fisheries in Cambodia shows how particular physical characteristics condition processes of accumulation, illustrating ways that accumulation processes intersect with complex networks of physical processes and connections. Like the weather, fisheries “defy any straightforward assignment of property rights” (174). Sneddon's primary concern is to illuminate what “difference...nature...makes to processes of accumulation” (2007: 168). He argues that the materiality of fisheries in Cambodia conditions the accumulation process through the fisheries' seasonality and diversity, making the routes to accumulation “circuitous.” Looking at materiality, he argues, illuminates “the means...of production itself, not just as objects of accumulation, but as a network of biophysical processes that produce “resources” in the first place” (173). The management regimes that accumulation practices displace and install are more complex than simply communal management of the commons giving way to private property rights. For Sneddon, understanding fisheries conflict as accumulation by dispossession is useful yet incomplete; it is also necessary to study the particular

connections and networks of physical conditions and processes that give rise to the resource in question (186). Weather similarly conditions and complicates the process of accumulation that it is subject to through cloud seeding.

In harnessing the weather for private profit, cloud seeding converts clouds, the weather, and the atmosphere into resources, a conceptual shift that could presage many other uses. Cloud seeding performs a particular relationship between humans and the weather. Through the practice of cloud seeding, the atmosphere becomes an acceptable realm for private, unregulated enterprise and experimentation. If this conception of the atmosphere goes uncontested, could the geoengineering schemes dreamed up to combat climate change follow more easily? Manfield suggests that private property can be challenged “not for what it leaves out, but for not being forthright about the complex relations it embodies” (2007: 401). The privatization of the weather suggests several subtle implications are that rarely discussed in debates about cloud seeding.

Cloud seeding as an accumulation strategy functions in some ways like other accounts of accumulation by dispossession. It makes claims on a resource that was, by default, public, and begins to modify that resource for private profit. The technology of cloud seeding is related to current regimes of water use and control, and further legitimizes particular ways of using rivers and water systems. In doing so, cloud seeding contributes to displacing alternative forms of production and consumption that could be occurring through alternative water cycles. In the next section, I explore some of the practices that are displaced as the Pit and McCloud Rivers are used for hydroelectric power.

Cloud seeding diverges from other instances in that its process of accumulation does not yet have settled claims and property rights. Government neglect enables cloud seeding to make a claim on the right to modify the weather, but, in most places, laws have not yet crystallized around the private use regime that cloud seeding proposes. Because of the delay in formulating a private property rights regime around the weather, anti-cloud seeding activists may have an opportunity. Opposition to cloud seeding could formulate a new set of rules guiding the use of the weather, rather than simply combating the murky, ill-defined rights that cloud seeding presupposes. In the last section, I examine some of the strategies people in Mt. Shasta have taken to stop cloud seeding.

Claiming water cycles

Because few would claim to be using the weather for their livelihoods in a way that is threatened by cloud seeding, it's hard to tell who is dispossessed in this process, and of what resource. Sneddon's analysis of resource "complexes" helps show, though this is not his aim, how the effects of dispossession may exist across a range of interconnected resources rather than simply the one being appropriated. Cloud seeding – as connected to hydroelectric power production – dispossesses certain versions of the water cycle. This section looks at cloud seeding's intersections with the efforts of the McCloud River tribe, the Winnemem Wintu, to regain access to, and control over, traditional territory and culturally important cycles – the flows of water and salmon. These two opposed visions of regional water systems – PG&E's, and the Winnemem Wintu's – clarifies further what's at stake in the practice of cloud seeding. The importance of cloud seeding lies partly in questions of ownership and property, insofar as these support specific uses over others. Through cloud seeding, certain visions of water cycles are dispossessed and others solidified. Cloud seeding, most broadly, is about being able to control the particular transformations that water enables and engenders.

Cloud seeding, and the hydroelectric power system that it's attached to, prevents other practices surrounding the flow of water. It disrupts and perhaps dooms practices that run counter to the ethic of water use and appropriation that cloud seeding suggests. As David Harvey puts it, accumulation practices convert common property into private property, suppress rights to the commons and alternative forms of production and consumption (2005: 159). As facilitators of a U.S. Social Forum workshop "(Re)Claiming the Commons" observed, the corporate appropriation of common resources does not just take the resource and the related infrastructure. Corporate appropriation hijacks the community's effort to do something else with the common resource. Accumulation by dispossession is not just about what kinds of practices are curtailed, but speaks to what sorts of future, alternative environmental practices are prevented. Cloud seeding interferes with alternative productions of nature, both directly and through association with the regime of hydroelectric development that dominates regional water systems.

The Winnemem Wintu, a small tribe with about 120 official members, claim the McCloud River Watershed as their traditional territory. The large springs on the east side of Mt. Shasta are both the tribe's and the river's origin. Because the Winnemem Wintu are not a formally recognized tribe, they have no reservation land; they have to negotiate for access to, and use and protection of, sacred or important sites located on government and private land in the region. Much of their traditional land was inundated by Shasta Lake in the 1940s, and more is threatened by the proposal to raise Shasta Dam another 6 to 200 feet. A Bureau of Reclamation engineer says that the plans to raise Shasta Dam have been slow because of opposition by the tribe and environmentalists. "There's even issues on the lake with an Indian tribe that's not really a federally recognized tribe that claims that a part of their sacred land would get inundated if the lake was raised any more" (Larry Ball, personal communication). As Bradley Garrett puts it, "the tribe's remaining cultural properties are under continual threat of loss and/or destruction, leaving the tribe's ability to practice traditional ceremonies crippled by legal battles and fights against the continual assertion of United States hegemonic power over tribal cultural identity" (2009, unpaginated).

Members of the Winnemem Wintu have spoken out against cloud seeding, seeing it as a further hindrance to their ability to carry out traditional practices in the watershed. Cloud seeding strengthens PG&E's claims to particular uses of the region's rivers, making the Winnemem Wintu's efforts to change flow regimes to support other practices even more difficult. And the use of silver iodide in cloud seeding raises concerns, for the Winnemem Wintu, about the safety of continuing to consume water and plants for traditional practices.

The Winnemem Wintu historic lands starts at...Mt. Shasta, runs down the south face, includes the upper Sacramento and lower Sacramento River watershed down to the lake, as well as the McCloud River, all the way down the canyon. And we have over 400 historic sites within this land. This is where a lot of the PG&E cloud seeding generators are already placed, and there's plans to put even more of them on private land that is also our traditional land....

The Winnemem Wintu feel that any water manipulation by any corporation, which...includes cloud seeding, and damming and diverting our river water for profit, is a continuing assault on our traditional lifeways, and therefore upon our entire culture.

Luisa Navejas, Mt. Shasta City Council Hearing, May 24, 2010

The Winnemem Wintu find their practices at odds with current and planned uses of regional rivers. Cloud seeding directly and indirectly disrupts the Winnemem Wintu's

ability to carry on cultural activities, in particular making them concerned that sacred sites, springwaters and plants used for healing will become contaminated by silver iodide. Some of the cloud seeding generators are located within a mile of the Winnemem Wintu's sacred sites.

If you look at the generators, you obviously see that they're at ground level. And the silver iodide that's produced, there's going to be a heavy concentration directly downwind from the generators. And immediately downwind from these generators are areas where we pick herbs or material, or there's sacred sites, or there's streams.

Mark Miyoshi, personal communication

PG&E's claim right now is that the generators are put on private land. Therefore they don't have to respond to anybody. It's like, OK, are you gonna keep seeding on the private land, or is the seeding going to come over and fall into our sacred sites, our water systems, places that we pray, places that we take water? Is it gonna impact that? If it is, then...where the generator sits doesn't matter if it's on private land or not.

Caleen Sisk-Franco, personal communication

We still use our traditional herbs for healing. Many of them are roots. And in the studies that I've read, the silver iodide did not only collect in the bodies of the fish, there was high concentrations in the roots of some plants. So we are picking these roots, and we're giving them to people who already have a depressed immune system – they're sick – we treat people with cancer, all kinds of illnesses. We're using the poultices that go into their system...they're drinking large amounts of the teas to purify their system. If it has silver iodide in it, we question whether it's doing any kind of purification at all.

Luisa Navejas, personal communication

Cloud seeding could interfere with the desirability and feasibility of reintroducing salmon as a food source, which the Winnemem Wintu hope to do.

If we're bringing salmon back we're bringing it back as a major food source. And we feel like the silver iodide, so much is unknown about it...There is no exact science that says that it doesn't bioaccumulate in our systems as well as in fish, if we're eating fish.

Luisa Navejas, personal communication

Like cloud seeding, the control of water in hydroelectric power constitutes neither property nor ownership per se, but establishes control over a certain regime of use that disrupts other possible uses of the rivers – especially the migrations of salmon. As Caleen Sisk-Franco puts it,

I think that they [PG&E] know...that the salmon are going to be allowed back into these rivers above the dams. Which affects PG&E. So now...if they have to run more water down the McCloud because of the salmon, then they're gonna make less money on the Pit, because they're not gonna be able to channel that water over there.

PG&E already substantially controls the water on the Pit and McCloud Rivers. All but about 200 cubic feet per second of the McCloud River's water is pumped through tunnels to the Pit River, where a series of three hydroelectric power plants and associated

infrastructure extract profit from the water's movement. The infringement of dams and hydroelectric facilities on traditional lands is explicitly acknowledged. The draft EIR for the Pit-McCloud project relicensing acknowledges that removal of the dams would "allow the Tribes to potentially re-establish some of their traditional uses of the river that occurred prior to impoundment" (FERC 2010: 57-58). In the FERC relicensing process, several issues are being decided that could be critical to salmon's future survival on the McCloud River.

So they pump water over McCloud, over that holding tank, and then run it down 1500 feet to generate power on the Pit. And that's what they don't want to change. And what we're fighting for, in the FERC relicense, is one, a fishway around the dam, two, raising the flow. And right now, the Forest Service is asking that the flow be raised to 300 [cubic feet per second]. Which isn't much, but the resistance is enormous.

Caleen Sisk-Franco, personal communication

Cloud seeding disrupts plans to re-create certain livelihood practices in the region and ongoing place-based cultural activities. The feasibility of realizing particular versions of the water cycle becomes incrementally more distant as PG&E further intensifies its practices of accumulation in the watersheds.

Mark Franco points out that hydroelectric facilities have so profoundly changed the Pit River, returning salmon to it is no longer possible: "[PG&E has] messed it up so badly that they're not even anticipating putting salmon back into the upper reaches of the Pit where they used to have salmon" (personal communication). In the draft EIR prepared by FERC for the McCloud-Pit project, the possibility for salmon to inhabit the McCloud River, and thus affect the kinds of flows and facilities required of PG&E project management, is dismissed. In spite of the recommendations of the National Marine Fisheries Service (NMFS), the report concludes:

None of the listed anadromous salmonids would be expected to have access to habitat in the lower McCloud River until upstream migration of listed species is implemented through Lake Shasta. Therefore, at this time, the modification of project structures or operations...as recommended by NMFS would provide no benefit for listed species at this time (FERC 2010: 143).

The conditions of the relicensing make no provisions for the return of the salmon. The draft EIR considers the salmon and the tribes separately: the salmon are not understood as a cultural matter, depoliticizing the struggle over their return. The section on cultural resources is mostly concerned with "lithic scatter" and archeological sites, not sites of contemporary healing, ceremonial, and everyday practices that are located throughout the

region. Yet the Winnemem Wintu consider their fate to be linked to the fate of the salmon: According to Sisk-Franco, “What happened to the salmon happened to us. The fish have been diminishing in numbers, and so have we” (McKinley 2010). The report denies the social and cultural qualities of ostensibly natural entities, and in doing so erases claims to alternative versions of the water cycle. For Noel Castree, one ideological function of a separate nature is to disguise capital accumulation (2001:191). If the flows of water and salmon are understood as pure nature, as technical matters for expert scientists, claims that these entities can appear through different forms and practices can be more readily dismissed. Yet failing to acknowledge the cultural weight of landscapes and waterways condones practices that constitute, for the Winnemem Wintu, “a continuing assault on our traditional lifeways, and therefore upon our entire culture” (Luisa Navejas).

‘Who regulates the atmosphere? We say we do’

This is all about organizing common stakeholders to say, this is my atmosphere, these are my groundwater resources – they’re also yours, they’re everybody’s – and it’s up to us, as a collective, collaborative, grassroots body of government to manage them. And that’s really reclaiming our rights and responsibility to manage our natural resources in ways that we feel are best for our current and future generations.

Angelina Cook, Shasta Water Rights Activist

What we’re saying, leaving [regulations] that way, is that corporations own the water that’s falling from the sky.

Ed Gardiner, Shasta Water Rights Activist

What kinds of strategies could effectively counter the kinds of privatizing claims that cloud seeding enacts? For the editors of *The Commoner*, “the reality of enclosures...not only defines the precondition of capital’s existence, but also helps to disclose the secret to alternatives to capitalism” (2001). What does cloud seeding threaten, and how can it be counteracted? And what sorts of strategies have been used to challenge cloud seeding’s privatizing claims?

Activists in Shasta attempt to counter PG&E’s use of the weather by putting forward a method for community governance of water resources, primarily by asserting the community’s right to self-governance and to speak for nature. Organizers in Shasta portrays cloud seeding as a problem of risk and of corporate control, intervening with an assertion of rights and community governance to ward off cloud seeding’s environmental

and ambiguously corporate threats. Cloud seeding installs, however subtly, a particular governance regime that posits particular understandings of weather as resource and private property. Privatization threatens local self-determination and forecloses on future, alternative uses of resources. Shasta activism proposes to take control of, and redirect, the distribution of wealth that water enables.

People in Shasta object to “corporate control” for its presumably weighty environmental threats, asserting in the ordinance “the right of the people and ecosystem to natural water cycles.” Opposite “corporate control” is “nature,” protected – and spoken for – by the people. Yet could activism forward a different use – rather than a staunch non-use – of weather and water cycles? The final chapter takes up this question, and in this section I look at notions of property, governance, community, and rights that cloud seeding activists in Shasta put forward. Anti-cloud seeding work in Shasta marshals one possible set of aims and concepts to assert an alternative water governance regime. This work and other potential strategies constitute possible alternatives to the kind of weather and water use cloud seeding enacts.

Does cloud seeding activism in Shasta pose an alternative to corporate control of the weather, an alternative that fully addresses the distinct, specific processes that cloud seeding presents? My sense is that the work in Shasta doesn’t directly confront, with directly analogous alternatives, the privatizing claims by PG&E made on regional weather and water systems. It partially counterposes these privatizing claims, drawing on notions of the commons and of the rights of nature to dispute PG&E’s actions. As Karen Bakker argues, the use of “commons” as an organizing concept might be more effective and compelling in challenging privatization than the widely used discourse of rights (2007). For Bakker, some “alter-globalization” activists usefully disrupt the public/private binary, creating “space for the construction of alternative community economies of water” and “counterpos[ing] various forms of the commons to commodity-based property and social relations” (447). She argues that “the ‘commons’ is an effective strategy for combating privatization because it correctly opposes a collective property right to private property rights” (447).

Organizers in Shasta draw on ideas of the commons, but the thrust of the ordinance is to establish an array of rights that condition future governance. In Shasta,

this emphasis on rights may limit the kinds of governance strategies that could be articulated to counter private weather and water control. As Sarah Whatmore puts it, the first requirement of any governance regime is to define its object (2002: 97), and this definition conditions further interactions. Because the object here is “natural water cycles,” the kinds of politics that can form to counterpose cloud seeding are limited. The drive is to regulate – and refuse – cloud seeding, not necessarily to assert new forms of communal production. Organizers in Shasta assert the right to decide, but not as strongly the right to harness the productivity of water cycles.

The campaign around the local ordinance skirts the question of property, allowing some of cloud seeding’s property claims to remain unchallenged. People in Shasta confront the question of property primarily by asserting the rights of nature. Here, property is important, not only in establishing who can use or control the weather, but in determining who can claim that they’ve been adversely affected by weather modification. In the Shasta ordinance, the “rights of nature” functions to widen, beyond and instead of property, who can claim in court to be adversely affected by cloud seeding. A hundred-page document explaining the proposed ordinance, written by community members and members of two national organizations, outlines the potential implications of the “rights of nature” language.

A real limitation imposed “legally” against people protecting their natural environment and quality of life pertains to the judicial concept of “standing.” In general, U.S. law recognized property rights as the basis for court decisions, and only infrequently rules in favor of civil, human, and political rights....If there is no property interest, the court will likely declare that the citizen has “no standing.”...[T]he court sees no immediate and direct interest held by the citizen unless it is a property interest. However, by legally recognizing that natural communities and ecosystems possess inalienable rights to exist and flourish, the legal equation is changed. And by authorizing community residents to advocate for those rights, on behalf of the ecosystem, the ordinance empowers citizens to protect their natural environment even if they have no property interest in it.

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By enumerating the “rights of nature to exist and flourish,” the Shasta ordinance lays groundwork for a particular kind of community governance based on protecting existing water and environmental systems. The ordinance does not intend to establish nature as property, because “existing frameworks of law which treat nature as ‘property’ under law are not preventing the degradation of nature and are in fact accelerating it” (Mt. Shasta

Water Rights: Who Decides? 2010: 24). For organizers in Shasta, rights constitute an alternative to property that articulate a basis for decision-making around resource use.

For Shasta organizers, “[t]he ‘law of conquest’ over earth’s life-giving waters is the law of the land in California. But the Right to Water trumps the archaic and unjust law of conquest. Fundamental rights are a higher law” (Mount Shasta Community Rights Project 2010: 49). But what does this conquest of waters entail? Calling it a “law of conquest” seems to incompletely identify the kind of process cloud seeding enacts. Karen Bakker suggests that “to be most effective, resistance strategies should be formulated to address the particulars of privatization” (in Mansfield 2007: 403). Countering the kind of regime cloud seeding puts in place might call for more direct assertions of atmospheric governance by the people. Does the “rights of nature” language truly assert alternative claims? Are these rights indeed at odds with cloud seeding? Does cloud seeding interfere with people’s access to or use of water? Who decides what “exists and flourish” means, and who counts as “community”? Are all kinds of property – private, public, collective – equally destructive of water and environmental quality? To what degree does “the rights of nature” actually challenge or reformulate existing property regimes?

For Karen Bakker, “‘rights talk’ offers us an unimaginative language for thinking about new community economies” because this language “risks reinforcing the public/private binary upon which this confrontation is predicated, occluding possibilities for collective action beyond corporatist models” (2007: 447). For Bakker, the language of rights is easily co-opted by corporations claiming to advance the very rights that activists want recognized. The language of rights individualizes the efforts of people concerned about the use and distribution of water, and works in a defensive mode, giving people the right to sue for damages rather than necessarily opening up space to perform and articulate alternative uses.

In the organizing efforts in Shasta, there are also moments of assertive alternatives to water use in the region. One idea is to distribute the region’s water in other ways: “we do have lots of amazing water. And I’m not opposed to sharing it. I am opposed to selling it for private profit maximization. I would love to see a small little cottage bottling business that uses reusable glass jugs and biofuel water tankers that gives

the water away, but maybe sells the bottles” (Angelina Cook, personal communication). Other ideas about alternative uses of water include the suggestion that value-added water products – like beer, or the fermented tea called kombucha – be made and sold by community members. To some degree, these ideas for water use and sharing still fall within capitalist modes of relating to nature as resource and people as consumers. Private property – just not privatized water – is central to these alternative conceptions of water use. What would water uses look like if we followed *The Commoner*’s hint that “to the enclosure of land, water, services, education, knowledge, we counterpoise different forms of commons”? (2003). What might atmospheric water-as-commons look like, and how might it be governed?

For organizers in Shasta, the ordinance asserts a kind of governance based on the commons and articulated through local government structures.

No only does [the ordinance] reclaim common jurisdiction over natural resources, but it also governs atmospheric and groundwater systems as though they were part of the same system....Because our groundwater and surface water resources are all part of the same hydrological system...and so up here, the surface waters in California are protected under the public trust doctrine. However groundwater and atmospheric waters are not. They are pretty much up for grabs....

It’s the big question. Who regulates the atmosphere. We say that we do. But there’s no real indication that that’s the case. This ordinance is an attempt to say that our community regulates the atmosphere that is above our community.

Angelina Cook, personal communication

What will the implications of the ordinance be, if it is adopted? To what degree will the city government be willing to use the ordinance proactively? How can and will it be used by citizens of Mt. Shasta? Will it be effective in stopping cloud seeding in Siskiyou County? To what degree does the ordinance formulate a different relationship between people and atmospheric water? Will the ordinance be violated? If the ordinance is never violated, what sorts of changes have really been enacted?

People in Shasta use the idea of the public trust to assert the city government’s responsibility to manage common property resources. One proposal for alternative governance of the atmosphere could inform efforts to assert governance of the weather that goes beyond opposition to corporate uses. Mary Wood, a law professor at the University of Oregon, proposes that the public trust doctrine infuse natural resource management, particularly the government’s role in protecting the atmosphere. She thinks that the concept of the public trust is underdeveloped, and could be applied to protecting

transboundary resources like the oceans or the atmosphere. Invoking the public trust doctrine “means that the public owns in common certain property interests in natural resources and land within the territory, and that the government is the people’s designated trustee with the obligation to protect such property on behalf of the citizens” (2009: 66). The public trust doctrine – and the work in Mt. Shasta – leads one to ask, What are the limitations of asserting governance of the commons through existing government structures, instead of articulating new, non-governmental institutions or movements?

Constrained by the jurisdiction of the city through which this ordinance may be adopted, people are hesitant to assert control or ownership over spaces beyond the conventionally more straightforward spaces of land, water, ecosystems, bodies, and city limits. For one organizer, “the very essence of what we’re trying to do is to engage diverse stakeholders in our local water issues. But we’re having to navigate our current political structure, which has limited us to the confined limits of Mt. Shasta” (Angelina Cook, personal communication). Working through the city government has its advantages, but it forecloses on more experimental forms of social and environmental relations. Shasta activists fix cloud seeding as a problem of water, paying little attention to the privatizing claims on atmospheric spaces that are being made. Cloud seeding’s movement to fix atmospheric water as an exploitable resource – both physically and conceptually – isn’t directly confronted by the ordinance’s language, except to maintain that water cycles remain natural and unmanaged.

In the urgency of the decision, and in the invocation of community, the broader accountability and responsibility of higher levels of government to regulate and control cloud seeding is unexamined. As Bakker points out, it is sometimes the case that “in celebrating community resourcefulness, we risk condoning both government inactions and corporate misconduct” (2008: 239). And by relying on two national organizations – Global Exchange, and the Community Environmental Legal Defense Fund – for frameworks, languages, and approaches, anti-privatization strategies across the country are constrained and standardized. By using pre-determined frameworks to address diverse struggles, local efforts risk losing a degree of specificity and relevance to the problem at hand, even as the local organizers in these struggles gain experience, institutional support, and legal advice.

How could organizing in Shasta have evolved differently, without reliance on a predetermined language of rights? Without the format of a city ordinance, what other government agencies could be addressed, or what kind of governing institutions created? “What difference does it make to imagine a given commons at one scale versus another?” (McCarthy 2009: 510). Could activism against cloud seeding locate a struggle not in bodies and watersheds but in the weather, linking up with other places that cloud seeding occurs in or effects? What alternative conceptions of property – or what new relationships to the weather – could be posed to counter cloud seeding?

Conclusion

Cloud seeding can be understood as a practice of accumulation, in which the productive potential of the weather is harnessed for private rather than public gain. Unlike other instances of accumulation, cloud seeding does not directly dispossess an existing regime of use and ownership as it establishes the right of private entities to modify the weather. But it contributes to the incremental, ongoing disruption and destruction of the Winnemem Wintu’s place-based cultural practices and alternative visions of the water cycle. Although few exists practices in the region directly employ the weather, the effects of cloud seeding could displace other practices across the watersheds.

Currently, the implications – and legal theory – of cloud seeding as an accumulation strategy remain unclear. What rights are associated with cloud seeding? How is property related to cloud seeding, and is it even an adequate way to understand the rights and liabilities associated with cloud seeding? Understanding cloud seeding as a form of corporate control provides ways to object to it other than through the enabling discourse of risk. PG&E effectively owns the weather through the control that cloud seeding exerts. Understanding and identify the stakes of different methods of internal transformation, primitive accumulation, and privatization at work in cloud seeding attunes geographers and water activists to the kinds of politics that might veer weather modification practices toward more democratic forms.

In the City of Mt. Shasta, cloud seeding opponents call primarily on the “rights of nature” to oppose the corporate modification of weather and assert community governance of the atmosphere. This approach seems limited by the level of government

the activism addresses, by the choice to emphasize “rights” over “commons,” and a tone that opposes cloud seeding rather than re-formulating people’s relationship to the weather. These efforts appeal to nature as static and vulnerable, and are reticent about proposing alternative activities involving the region’s water and the world’s weather. In the next chapter, I further consider what governance of weather as commons – with nonhumans as participants – might look like.

CHAPTER THREE: Weather as Commons

I think humans need to learn how to adapt to natural systems and work with natural systems rather than dominate or manipulate them, especially for narrow interests.... There's no better place...to restore human systems and align them with ecosystems.

Angelina Cook

We have no idea how many people on the planet could support if we were relating to our environment in a way that was focused around its flourishing, and its abundant regeneration, as opposed to extracting things from it as if it was decoupled from us.

Rene Henery

Introduction

This chapter attempts to come to terms with cloud seeding's challenge to articulate and practice other relationships to weather and water systems. It asks how cloud seeding could give rise to a politics of water that isn't grounded in pre-given visions of a past nature, but instead works in creative, experimental mode. How does the materiality and productivity of the weather affect and inform activist and capitalist practices and strategies? What does the weather's transformative potential ask from environmental politics? This chapter is informed by studies of the social construction of nature, by what it might mean to relate to the world as a "commons", and by efforts to conceive of new actors and ways of governing in environmental politics. Because property is not a wholly adequate way to understand cloud seeding's stakes and alternatives, a politics of cloud seeding may suggest the need for a different way of conceptualizing human/environment relations.

These kinds of thought projects speak to the heart of environmental concerns – articulating an environmental ethic. There's a pervasive sense that, as Steve Hinchliffe puts it, humans and environments are 'out of joint', and for conventional environmental politics, this means that "somewhere and at some point in the dark past of urban-industrial society, the joints between people and their environments have been ruptured" (2002: 207). Hinchliffe wants to avoid a politics and ethics that rest on a past, universal nature, and suggests instead that we take being out-of-joint as an opportunity, not to re-create old connections, but to attentively experiment with a "politics of inhabitation". For Hinchliffe, new forms of environmental politics might look to creating new connections or reinforcing existing ones among humans and nonhumans. New environmental politics

cannot simply appeal to nature as a realm outside human affairs “as a stop to all debate and struggle” (Hinchliffe et al. 2005: 643).

The tension between these two views – the narrative about the dark past, or a focus on practices of connection – is evident in the quotes that begin this chapter. The speakers’ aims are the same, but the problem is posed differently. For the first speaker, humans and nature are separate, and the project is to fit society into nature’s moral and ecological order: nature is blueprint and model. In the second quote, the problem is that nature and society are *perceived* as separate, but not actually distinct: remedying this conception might lead to a different kind of relationship among humans and nonhumans. Without an original nature to appeal to, how do we adjudicate among these different kinds of connections and practices, and who has the authority to do so? What kind of environmental politics can work from conceptions of nature as social, ever-changing, and slipping through easy categories? And how can environmental politics accommodate the nature of clouds and the weather, with physical properties that epitomize the dynamic qualities that thinkers like Hinchliffe are trying to understand?

So instead of debating whether or not cloud seeding should take place – a line of questioning embedded in a discourse of risk – perhaps there are other ways of posing questions around cloud seeding. Instead of countering the unregulated private modification of weather, what sort of alternative relationship among humans, the water cycle, and other living things could be performed? Can we take cloud seeding’s relative novelty as an opportunity, and refrain from installing the conventional split between nature and society and using familiar categories to debate its effects? As Sarah Whatmore puts it, we think these issues exclusively along an “axis between extinction and abundance” (2002: 34), and this kind of imaginary curtails the kinds of politics that can be undertaken. Could the weather inspire more generous, open political practices?

In popular discourse on the environment, scarcity is a common trope. It’s understood as a problem to be solved, requiring judicious management and exacting, ungenerous allocation. A politics of scarcity authorizes – and demands – efforts toward increasing control and regulation. The actions it elicits are tentative and constrained. It delimits what can’t be done rather than pointing to what is possible. A politics of abundance, on the other hand, might anticipate a more cooperative, collaborative

organization of human behavior. It might point to creative openings and opportunities rather than the necessity of sacrifice. The difference between abundance and scarcity might be thought as the difference between gratitude and guilt. In both cases, we are indebted to others, but in one we give willingly and in the other reluctantly. We either recognize the resource as more deeply shared, or seek to make it ever more securely private. Is it possible to locate an environmentalist politics closer to abundance than scarcity? Could some of the issues that cloud seeding raises help to inspire such a politics?

Instead of performing a loss or threat, cloud seeding enacts some more invisible change, and alerts us to resources that are ours but which we have not claimed. Cloud seeding aims to amplify the water cycle rather than curtail it. It does not induce scarcity, but offers localized abundance. We are used to something becoming political only when it is about to be lost or changed. What if we consider the environment always political, and always changing? Which changes do we wish to endorse, and which condemn? The question is – to quote Neil Smith – “*how* we produce nature and *who* controls the production of nature,” not “whether and to what extent nature is controlled” (1984: 63).

In this chapter, I first discuss some literature that considers how to advance a politics of nature that doesn’t take the definition of nature as given. I consider how the Winnemem Wintu’s efforts to bring salmon back to the McCloud River might relate to this broader project for environmental thought, a project of re-imagining and practicing different kinds of relationships between humans and nonhumans. I then move through some ways nature is understood to be productive, and what this might mean for activist strategies. Turning to the qualities of the weather particularly, I consider how it might justify a politics of abundance. Finally, I return to the idea of the commons, and point out some challenges for imagining the weather as a commons.

Defining a common world

To live ethically in a world characterized by things that defy or disregard settled categories – like “nature” and “society” – several thinkers suggest that we expand our notion of politics to include nonhumans. Such ethical practices require attentiveness to the ways in which things may reject accepted understandings of them. How can a politics

that is open to the future, and open to different possible ways of living together, be carried out?

French sociologist of science Bruno Latour is one of the greatest proponents of a new view of society, in which humans and nonhumans alike are seen as formative in shaping social outcomes (2005, 2004). In fact, for Latour, the perceived split between humans and nonhumans is entirely artificial, a construct of our “modern” society. The very attempt to categorize gives rise to a multiplicity of hybrids. Latour’s “actor-network theory” proposes a method for tracing the contributions of humans and nonhumans alike to controversies and outcomes. In his book *Reassembling the Social* (2005), Latour insists that we should not “limit in advance the sort of beings populating the social world,” and be imaginative about the ways nonhumans intervene in what are commonly thought to be purely human affairs: science, technology, politics (16). Latour defines politics as “the progressive composition of collective life” (40). Put another way, this kind of politics is “conducted without references to the definitional separation of nature and society or to an already assumed common world” (McLean 2009: 237). Latour wants controversies and their objects to remain open, unsettled, and unresolved as to what any final society might look or feel like. These propositions are radical, and they demand that we ask new questions in order to understand environmental issues. Who among the human and nonhuman beings can and will participate in the collective shaping of these spaces – and of the beings themselves?

Steve Hinchliffe, Sarah Whatmore and their colleagues take Latour’s insights into the realm of the practice of conservation in cities. They are interested in participating in a world where “things matter through the fraught processes of engaging with human and nonhuman worlds” (Hinchliffe et al. 2005: 644). Hinchliffe et al. “experiment” with figuring out how to find and come to know urban wildlife. The researchers challenge themselves to “learn to be affected” by water voles, and to let the voles “object” to what’s being said about them. “The site and its inhabitants are involved, too, and so learning to be affected is a collective endeavor” (652). Hinchliffe and colleagues understand ecological politics as “ontological struggle,” not as an effort to make better representations but an effort to engage nonhuman actors in new kinds of practices. In ontological politics, realities are enacted rather than pre-given (Hinchliffe and Whatmore

2006: 124). Allowing for the nonhuman to *participate* in conservation, rather than be merely its object, allows for openness, difference, and unexpectedness. For Hinchliffe, “conservation practice works with natures that are being reconstituted. Their stability is not given before political ecology starts its work. And any stabilities that are produced need to be provisional, working categories” (2007: 148). Practices attend to process rather than outcome, rely on “vernacular” rather than expert knowledge, and take the time to “learn to be affected” by nonhuman others. Hinchliffe argues for a politics of inhabitation rather than representation, in which things can “object” to the stories that are told about them. A form of address that treats nonhumans as participants rather than objects might make this participatory kind of conservation possible.

Underlying this concern to articulate a new environmental politics is the sense that there is something profoundly incomplete, and even impossible, about representation. Representation means the way certain words, ideas, or understandings stand in for elements of the “external” world. This assumes a permanence and stability of the thing being represented, and an accuracy of the means through which that object or process is known and communicated. Conventionally, people take the accurate representation of nature (usually through science) to be the basis for environmental decision-making. Latour modifies that convention, contending that “since the settlement of a controversy is *the cause* of Nature’s representation not the consequence, we *can never use the outcome – Nature – to explain how and why a controversy has been settled*” (1987: 99, emphasis in original).

Hinchliffe et al.’s study of water voles illustrates how initial conceptions of water vole behavior actually prevented researchers from coming to know the particularities of urban water vole ecology. In that study, a population of urban water voles surprises researchers by exhibiting behaviors not shown by rural water voles – the voles share living spaces with the brown rat, traditionally thought to be a predator. At first, the researchers thought that water voles would be absent wherever rats were present. But water voles can apparently learn different behaviors depending on their environments, requiring entirely different conceptions about what (urban) water voles are and can do than what ordinary practices of science presuppose. Researchers must learn to identify water voles from behavior, by looking for traces like footprints and droppings, and learn

to look for these traces in unlikely places. If water voles are thought to exist as sets of changeable behaviors rather than fixed, static entities, and if not all individuals in a species are considered identical, it is necessary to let differences and particularities play a role in conservation and allow the water voles to object to what's said about them. For Hinchliffe et al., it is “the ability to address nonhumans as colleagues in the process of producing new knowledge that makes new knowledge possible” (2005: 653). The water vole challenges conventions of representation, standard research practices, and the satisfactoriness of the nature-society dichotomy. With the participation, rather than representation, of nonhumans, conservation might be more effective for the beings it seeks to help thrive.

For Sarah Whatmore, in her book *Hybrid Geographies*, the pivotal role of “the wild” in environmentalism – the continual reference to something external and unchanging – “is a spatial imaginary which has helped to deprive us of a language of connection, or kinship, beyond the ‘human’ and the basis for more relational ethical practices” (2002: 34). She observes that the wild as a “strategic site” is hard to give up, partly because environmentalism “has become too bound up with a cartographic heritage of species distribution and density, along an axis between abundance and extinction” (34). Rethinking the wild as also ‘inside’, she suggests, makes everyday interactions with nonhumans political in ways “that sustain, rather than simply destroy, the meaning and well-being of wildlife” (34). For Whatmore, hybridity is “a mode of worldly inhabitation that precedes the urge to separate out the social from the natural rather than a gesture towards their reconciliation” (98).

What geographers like Whatmore and Hinchliffe offer is the prospect of a more playful creativity in practices of conservation. How can we let nonhumans have a part in the making of spaces? Who among the human and nonhuman beings can participate in the collective shaping of these spaces? By destabilizing our confidence about what nature and society really are, we're compelled to reconsider our practices of ecology. What would a language of connection that responds to the undemocratic appropriation of weather through cloud seeding look like? How do we get away from thinking conservation merely along the “axis between abundance and extinction”? Where do we

find examples of participatory conservation, in which nonhumans are permitted to be unstable, changing entities?

In some ways, this more experimental ecology can be found in the practice of restoration. Proposals to rework – or restore – water systems intrigue me. Water’s seeming docility belies its occasional defiance. We persist in projecting ideals onto its flow, and it persists in taking those on and making them fail. As much as projects to restore rivers hark back to some past and perfect nature, they are also explicitly projects of making, of human and nonhuman entanglements. If done with any measure of humility, restoration projects are also explicitly experimental. The consequences aren’t known, only guessed. Restoration’s name belies a more tentative practice. Restoration, at its most basic, is a way of changing the landscape in a way that attends to the needs of nonhumans. Can it be done without reference to settled categories, and without predetermined ideas about how it should turn out or what it should involve?

One set of ecological practices that counterpose cloud seeding are the Winnemem Wintu’s efforts to restore salmon to the McCloud River. The Winnemem Wintu told me that, in the 1800s, the U.S. government wanted to take salmon from the McCloud River and establish salmon fisheries around the world, including in New Zealand. And so the Winnemem made a deal with the salmon, that the salmon would always be able to come back to the McCloud River. But “that agreement we made with the fish was broken in the 1940s, when [the U.S. government] made [Shasta] dam” (Mark Franco, personal communication).

When I spoke with Winnemem Wintu members, they had just returned from New Zealand, a trip that was pivotal for forwarding their future aspirations for returning salmon to the McCloud River. The Winnemem’s model and inspiration for restoring salmon are the Maori of New Zealand, who keep a culturally important eel alive through practices of connection. When hydroelectric dams built on rivers blocked the passage of the migratory eel, the government built ‘eel ladders’ around the dams, but the eels didn’t use them. So the Maori devised ways of capturing and trucking the eel around the dams so that it could still reach the upper stretches of the rivers (Prosek 2010). Salmon run in rivers with the eels, salmon that were taken in the 1880s from the McCloud River fisheries and introduced around the world. The Winnemem Wintu went to New Zealand

to apologize to the salmon for allowing Shasta Dam to be built, thereby severing the salmon's connection to the McCloud River. And the trip also strengthened connections between the practices surrounding the Maori's eel and the Winnemem Wintu's hopes of returning salmon – brought from New Zealand, of McCloud River genetic stock – back to the McCloud River.

We want to set up our own hatchery, up above all of the dams, raise the fish to a point where we can take them below the dams. That way they know the water, will start to genetically imprint that water....In the interim, we're working on getting waterways built around the dams. So we're getting the fish used to smelling McCloud River water. So when the waterways come back, the fish can pick it up....

Mark Franco, personal communication

There are disagreements about what constitutes a “native” salmon – why bring salmon from New Zealand, when there are still salmon runs in the Sacramento River? This notion of what constitutes a “native” salmon is mobilized to keep the power to determine the future practices of fisheries in “expert” hands. The Winnemem Wintu speak of a flexible, recombinant ecology: practices learned in New Zealand, and fish from New Zealand, would reshape and repopulate the McCloud River. As PG&E works toward cloud seeding, other practices occur that engage a language of connection between humans and nonhumans in the same landscape.

Bringing back the salmon is symbolically important and politically difficult. The survival of the salmon would be an indicator, for the Winnemem, of healthy relationships throughout this watershed. “If the salmon can thrive in the McCloud River, it means that all those other things are put in place” (Luisa Navejas, personal communication). As Henery's quote at the beginning puts it, the Winnemem Wintu attempt to relate to the environment “in a way that [is] focused around its flourishing, and its abundant regeneration.”

Mark Miyoshi: We need to restore salmon but beyond that we need to restore the conditions to allow salmon to survive. And really that's how people are gonna survive....

Luisa Navejas: And not just survival either. It's more thriving.

The understanding of the salmon is flexible: salmon are defined by both behavior and genetics, organisms that, once transplanted from New Zealand, are supposed to learn their way through Californian water systems. Their migration would be both affected and aided by humans.

Does focusing on the inextricably social and cultural qualities of nonhumans free humans up to work with them and address them? And how does an environmental politics based on nature's flourishing change human practices? These types of practices have to be brave enough to imagine nature as resilient, as changeable, and to adapt knowledge and ways of life to unexpected behaviors. And how do conceptions of whether nature is abundant or scarce, productive or diminishing, matter for these kinds of political practices?

Nature's productivity

But, someone might ask, isn't it naïve – or even dangerous – to talk about thriving and abundance when environmental issues loom so large on the earth and so small in most people's consciousness? Doesn't scarcity better capture the truth – and the urgency – of reforming our environmental practices? Perhaps. But in the next two sections, I consider how an alternative understanding of the productivity of the environment might inform different practices – and relationships – among humans and nonhumans. Common resources, like the atmosphere, are thought to be prone to overexploitation and defined by scarcity and limits. But cloud seeding might require an understanding of natural processes as more malleable and mutable. In these two sections, I first consider some ways scholars have understood the productivity of nature for capital and in activist politics, and then consider how weather and water's transformative capacities could be understood as a form of productivity.

Capital continually finds more points of transformation to control resources, and to divert them, to money-producing ends. Social scientists have worked to differentiate between the processes capital goes through to control different kinds of resources, particularly living as compared to nonliving entities. How do we understand the productivity of different kinds of substances, and how does that matter for capitalist appropriation – and activist strategy?

In *Life as Surplus*, Melinda Cooper analyzes the increasing migration of commercial processes into the sphere of biology. Cooper argues that investment in biotechnology in the 1970s identified genetic reproduction as the new site of capitalist expansion. Neoliberalism has tightly linked the productive capacities of life and

biological reproduction to continued economic growth. The productive capacity of life at a cellular level is now tied to the production of surplus value for capital. Cooper contends that activists politics should not adopt a politics of scarcity, but should rather be attentive to the sense of possibility in the appropriation of life's productivity. Cooper asks, "how can we counter the relentless push to drive beyond the actual limits of the earth without sanctioning the politics of scarcity?" (2008: 49). For Cooper, "an effective ecological counterpolitics...needs to operate on both levels," forging ahead with the politics of scarcity around problems like oil depletion *and* crafting a new politics that works "in the prospective mode," detecting and preempting "the new forms of scarcity that are being built into the promise of a bioregenerative economy" (2008: 49-50). The productivity and generativity of life, she argues, should inform any politics that protests its commodification. But is life's ability to reproduce – its inherent productivity – unique to biological entities? Is a politics of abundance only suitable to movements based around life's productivity?

In an article theorizing nature-centered production, William Boyd, Scott Prudham, and Rachel Schurman distinguish sharply between biologically and non biologically based industries using Marxian concepts of 'formal' and 'real' subsumption (2001). (These concepts ordinarily describe the degree of human labor's integration into capitalist markets.) Boyd et al. seek a theoretical understanding of the role of different kinds of nature in nature-based industries, and in doing so make a stark distinction between the processes of extraction (non-biological) and cultivation (biological). For the authors, formal subsumption describes "extractive industries" – the use of nonbiological material properties and processes in capitalist production. In formal subsumption, nature is confronted as external, but capital is "unable to directly augment natural processes" (557). Capital is forced to "circulate around nature," and capitalists cannot "control, intensify, manipulate, or otherwise 'improve' upon nature to suit their purposes" (563, 562). Real subsumption, for the authors, applies only to biologically based industries, in which living systems are industrialized and "made to operate as productive forces in and of themselves" (557). Under real subsumption, nature is "(re)made to work harder, faster, and better" (564). The real subsumption of nature can be understood as "a new and

distinct avenue for productivity advance through ‘improving’ nature directly rather than simply making labor more productive” (565).

Underlying these distinctions is the sense that nonbiological resources are essentially finite while biological ones are inherently productive. But strangely, in Boyd et al.’s account, cloud seeding seems to fall into the biological category: it is, unrepentantly, an attempt to make nature work “harder, faster, and better” and more efficiently, to speed up the circulation of water through the condensation process in clouds, by building up aquifer pressure, and forcing more water out of springs. If water and weather are biological under these distinctions, are these distinctions always useful for theoretical understandings of nature’s productivity? Living and nonliving things alike are constituted by physical and chemical properties and processes, by shifting configurations of some of the same materials. Water and weather are not biological: they don’t reproduce, in the sense life does. Water inhabits life, and partially constitutes it. Perhaps there’s something notable about the speed and importance of water and weather’s transformations that becomes more evident by blurring the distinction between living and nonliving.

Chris Sneddon, in his study of the primitive accumulation of fisheries in Cambodia, is interested in the conditions of production, “not just as objects of accumulation, ...but as a network of biophysical processes that produce ‘resources’ in the first place” (2006: 173). Sneddon queries Boyd et al.’s neat distinctions, asking “what about those instances when appropriation of nature is neither industrial nor easily identified as exclusively biotic or abiotic?” (174). He argues that fisheries should be thought of as “complexes of nonhuman entities that engender a resource” (178): fish populations are utterly dependent on flood regimes and seasonality. Is the distinction between biotic and abiotic adequate for understanding the ways in which nature is productive for capital – and what kinds of activists strategies might effectively oppose nature’s private appropriation? His analysis is meant to highlight “how the materiality of resources – in this case fish and fisheries – might serve as a basis for innovative political thinking and practice” (187). How can political practice be informed by resources that are engendered by “complexes” or “networks,” resources that are inextricable from a range of other processes?

The weather is productive not in the same way life is, but in ways that other nonliving resources aren't, or aren't as obviously. If weather is conceived of as a particular kind of productive, transformative resource, held in common across the world, how might its qualities shape activist politics?

Weather's transformations

From now on, not only does [the weather] doubtless depend on us, but, in return, our lives depend on this mobile atmospheric system, which is inconstant but fairly stable, deterministic and stochastic, moving quasi-periodically with rhythms and response times that vary colossally.

Michel Serres (1995: 27).

The weather challenges established habits and conceptions concerning human interactions with the natural world. Science can't be relied upon to consistently speak for the weather: it is a chaotic system, theoretically impossible to predict more than two weeks in advance. The weather moves and changes, and doesn't manifest either as a single entity or as a collection of many. It trespasses across boundaries defined by land ownership or government jurisdiction. The space of the weather is vast and ambiguous. Early scientists had trouble classifying clouds because of "their ability to mutate rapidly from one form to another in a smooth, fluid continuum within an evolving chaotic world of vapor" (Stephens 2003: 443). As one atmospheric scientist puts it, "How could any classification, which by its nature suggests permanence, capture a sense of endless mutability?" (Stephens 2003: 443). How might weather's qualities, its resistance to categorization and modeling, be understood in terms of productivity?

The weather has no ultimate form, is shared across the world, and is irrevocably "social" - influenced by emissions, changes to the earth's surface, cloud seeding. Could the weather inspire an expansive, democratic politics of weather that related to the world as a flourishing rather than defined by scarcity, as social rather than purely natural? In this section, I consider how that the transformative qualities of the weather could be understood, and I suggest that perhaps weather's productivity can be thought of in terms of its transformations: whoever controls these moments of the transformations, what water engenders or enables, controls the water cycle's productivity.

Clouds are liminal: fluxing between heaven and earth, form and formlessness, air and falling rain. They take no original or ultimate form. For Hubert Damisch, "cloud, in

the ever changing variety of forms, may be considered the basis, if not the model, of all metamorphoses” (2002: 23). In his study of the function of clouds in Renaissance painting, Damisch offers several observations that are useful for thinking about the meaning and material of clouds. In describing Leonardo da Vinci’s simultaneously scientific and artistic view of clouds, Damisch writes of the cloud as “a body without a surface but not without substance for, like mist, it is the product of a *thickening of the atmosphere*, a contraction of the humidity dispersed in the air” (2002: 157, emphasis in original). For da Vinci, clouds were a good illustration

of the universal liaison that links together all the parts of nature, and of the mixture and ceaseless permutation of the elements, the separation of which dispersed chaos but which seem here to return to their primordial indistinctness and to change into one another, producing unstable masses the formation, evolution, transformations, and resolution of which are accompanied by perturbations and precipitations that upset the order of the world and its visible configurations: rain, lightning, snow, hail, and wind (158).

The weather is a link, a fluxing instant, a coalescence of physical processes and chemical properties. Clouds demand a process-based understanding of the environment: they are so transitory and indistinct they lack surface altogether. Clouds are mere “thickenings” of the atmosphere, thickenings that metamorphose and perturb, engendering further transformations.

The weather exhibits a kind of creativity: in its movement and process, it tumbles into novelty. Clouds shift shapes while we watch: from fish to rabbit to face to a plain thunderhead and a stutter of lightning. Water transforms, from liquid to gas to solid and back to liquid, in the evaporation, condensation, and precipitation of the water cycle. Water’s movement is relentless, driven by heat and cold, sunlight and gravity, thirst and greed, pines and humans. It expresses the desires for shape-shifts that arise from unidentified others, humans included but not the only ones. Water moves through turbines and granite canyons, supporting life and the production of electricity alike. Creativity might be not so much giving rise to something ostensibly new, but the dynamic processes at work in everything, both human and nonhuman.

Water’s restless movement, its cascade of transformations, engenders others. Ceaselessly moving, water comes to where life needs it and causes life to work around its idiosyncratic patterns. There is no origin, only an energetic movement, dissolution, and reconstruction of the forms that water moves through and enables. Cloud seeding

intervenes in one moment of this ceaseless movement, allegedly amplifying the efficiency's of waters conversion from super-cooled liquid to solid. But there are also other ways to understand the implications of what cloud seeding enacts and displaces. Along with the existing regulatory regime and uses of the rivers, cloud seeding narrows the range of permissible shape-shifting and writes a logic into it. Richard White writes his history of the Columbia as a story of energy. "The flow of the river is energy, so is the electricity that comes from the dams that block that flow. Human labor is energy; so are the calories stored as fat by salmon for their journey upstream" (1995: ix). The ways that this energy can manifest are many, and controlling the points of transformation, as cloud seeding does, harnesses this energy's productivity. Perhaps weather leads us to this question: who has a say in transformations – when and where they occur, and what they produce?

The materiality of clouds creates problems for traditional approaches to environmental ethics and the environment's productivity. I wonder whether it's useful to think of cloud seeding as a process of alchemy, of controlling and possessing certain transformations and metamorphoses rather than being a process of making more of anything. Cloud seeding intervenes in a moment of transition, prompting precipitation to allegedly fall in one place instead of another, changing the fate of thousands of water droplets. Cascades of transformations look like productivity: what else is alchemy but turning everything into gold. This is productivity not in the sense of creating more, but creating something different. Weather might inspire an environmental politics that is attuned to novelty and transformation. It speaks to an abundance not of quantity, but of possibility. For Paolo Virno, "exit" from capitalist systems "hinges on a latent kind of wealth, on an exuberance of possibilities" (2004: 70). If this sense of abundant possibility were to pervade environmental thinking, how might activist practices look different?

Weather systems exemplify an understanding of the world that sees it as process, as an ongoing movement of possibilities and engagements. Weather is unstable and continually remade, and it is infused through and through with the influence of human activity. We are all subject to the weather, and through it, we hold something in common. Working to create a new relationship to the weather challenges us to think differently about how to relate to nonhuman processes and systems.

The practice of the commons

The commons can be understood as “resources or other assets that members of a group of people have direct access to and some degree of control over by virtue of their membership in a community, without such relationships necessarily being mediated through the legal and economic structures of states or formal markets” (McCarthy 2009: 498). More generally, commons are “alternative, non-commodified means to fulfill social needs” or “forms of direct access to social wealth” (De Angelis 2003: 1, 7). This section draws on conversations in a workshop on the commons at the U.S. Social Forum and asks how the traditional notion of the commons might accommodate more experimental veins of environmental practice. Why retain the notion of the common? I bring it back in here because it has some resonance among communities of people with an interest in the environment. Though the term carries baggage, if its connotation can be changed, a very basic premise of environmentalism would have shifted. The notion of the commons is also useful because is currently being applied more broadly to the means of social reproduction, and it’s used in ways that are conceptually helpful for breaking out of habitual ways of thinking about the materiality (and finitude) of the environment. So in this section, I ask: Is there a way to articulate and practice a commons that doesn’t reduce nature to a static, stable category, and that invites participation from and provides benefits to humans and nonhumans alike across many landscapes?

In a “people’s movement assembly” called “(Re)Claiming the Commons” at the U.S. Social Forum in Detroit in June 2010, dozens of social and environmental activists from the Midwest and beyond discussed creative and experimental strategies for claiming the commons. “See it, name it, claim it,” was the workshop’s slogan, and the facilitators emphasized that it is through practices that common resources remain in the hands of the people. Seeing and naming these commons was easy: lists of them populated the windowless walls of a meeting room in downtown Detroit’s Cobo Hall. But coming up with strategies to reclaim these commons was more difficult, requiring knowledge of current patterns of ownership and regulation, no matter how ambiguous. Claiming the commons requires rallying a certain constituency, finding or creating governance structures, and positing a relationship between humans and that resource.

The facilitators of the conference defined the commons provisionally as “anything that we call public or that was public,” while urging participants to “rethink what public means.” They took it as given that the commons needs to be regulated, but that this regulation may not appear restrictive or even be carried out by the government. Observing the increasing encroachment of private uses and property regimes on former commons, they urged people to define strategies to take back these commons. For the facilitators, claiming something as a commons is a way of making it a political issue. They insisted that “even the notion of property – it’s a wrong notion about what the commons are.” Instead, “it’s about what we do.” As Melinda Cooper puts it, “what is called for is something like a creative sabotage of the future; a pragmatics of preemptive resistance capable of actualizing the future outside of the policeable boundaries of property right” (99).

The workshop’s core challenge was to figure out how to exercise one’s right to the commons. What corporate appropriation of common resources does, the facilitators argued, is to not just take the resource and the related infrastructure, but also the community’s effort to do something else with it. Making the government accountable to managing the commons is one way to protect the use of the commons by the people, but it’s not the only way. A community – self-defined – can implement a commons.

Is there a way that the traditional concept of the commons as common resources, governed and managed by and for humans, can be bound more tightly to Latour’s notion of “collectives” and the progressive definition of a common world? Can a looser, open sense of what the world can become inflect the social resonance of the idea of the commons? Bakker suggests that the commons will help provide politically progressive strategies, “particularly if our definitions of prospective ‘commoners’ are porous enough to include non-humans” (2007: 448). Such a modified notion of the commons would include actors that are not only human, and not necessarily living, in the process of shaping a shared existence. A modified notion of the commons would not expect a permanent management regime, but a malleable one, corresponding to changes in participants or in the common world. If we are to define a commons of the weather, we have to think this flexibly. It’s not merely a matter of defining the spatial extent and abundance of a resource and designing rules for the people who use it. If it explicitly

includes nonhumans, the commons can be a creative practice of forming connections and letting them dissolve in a way that is attentive to those that are traditionally excluded from the process of making common worlds.

This version of the commons is not merely about asserting communal property rights rather than private ones. Instead, it could open up space to imagine alternative social/environmental practices that are not determined in advance by existing regimes of exploitation. Private property forecloses on more democratically determined uses of, and associations with, things we typically think of as nature. Property limits the environment's changes to a narrow range of interest and profitability. As exemplified by the weather, the world has any number of latent possibilities. These possibilities are constrained by private ownership and by imaginations that insist on conjuring a static, distant world. A practice of the commons formed with nonhumans might be determined by a greater number of whims, interests, and entities. In this flexibility of living together, informed by a greater diversity of interests and with a broader sense of the wealth of transformations, environmentalists may find an exuberance of possibilities. In a freer, more democratic relationship to the world, made available by the commons, the world's transformations can take place to different ends and adopt different logics.

But the commons is haunted by its "tragedy," the notion that common resources are always overexploited, and only private property regimes can force rational actors to follow their own self-interest and protect a given resource. This mentality treats the commons as inherently scarce and finite, and humans as dangerously short-sighted and selfish. It's necessary to re-articulate the notion of the commons as resources collectively governed in a way that allows them to flourish and change. A sense of possibility, rather than fear of scarcity, might free up relationships between humans and the environment.

The idea of the commons as a practice demands that we ponder how nature can be produced, not in what form it should be protected. Paying attention to how nature is produced, by and for whom, can reveal the processes by which it is claimed and altered. How can the weather be claimed in practice, and produced democratically? Mt. Shasta's proposed ordinance focuses squarely on cloud seeding's possible risks to water, humans, and wildlife. It shies away from claiming the space of the weather for collective experimentation and different ways of living together.

Imagining commons as ever-changing associations of humans and nonhumans also demands that we consider who decides what forms the world takes. How can this be done democratically, and in a way that includes nonhumans in decisions?

For Massimo De Angelis, the commons is made up of two practices: demanding or seizing the commons, and being in community. Communities, for De Angelis, are “social networks of mutual aid, solidarity, and practices of human exchange that are not reduced to the market form” (2003: 5). He cautions against defining a community specifically as belonging to a locality, thereby dismissing the many global connections that sustain everyone’s way of life. What if a weather community were articulated more broadly, beyond the right of citizens in a small town to be free from cloud seeding? The ordinance, in some ways, reduces weather to property, as belonging, when it exists above them, to the people in Mt. Shasta. Is there a way to ask others to participate in producing or reinforcing new kinds of transformations, and invite a broader conversation about new ways of living together?

Hinchliffe enjoins conservationists to find new types of relationships with nonhumans – new types of “conviviality.”

It is not enough to decide to include nonhumans in collectives, or to acknowledge that societies live in a physical and biological world, as useful as these steps may be. The crucial point is to learn how new types of encounter (and conviviality) with nonhumans... can give rise to new modes of relation with humans, ie to new political practices (Paulson 2001: 112, quoted in Hinchliffe et al. 2005).

The weather could perhaps inspire such “new encounters,” ways of living together that are attuned to capacities for change and transformation. How does one participate as a part of a collective that includes the weather, something that is in a state of constant movement and transformation, a commons both local and global? Could activism against cloud seeding locate a struggle not in bodies and watersheds, but in the weather? Perhaps anti-cloud seeding efforts could be pitched as an invitation. An invitation to take the possibility of creating a new relationship with the weather to wherever one may live or travel. In doing so, perhaps these acts of cultivating a commons will make possible a wider range of transformations.

Conclusion

Peel back the language of risk that obscures cloud seeding's other effects, and one will find an instance of private appropriation of the weather through practices of control. Though questions of property and ownership are incompletely institutionalized, PG&E effectively owns the weather that it would modify with cloud seeding. In controlling flows of water, PG&E disrupts and preempts other, more democratic instances of resource use. One such potential use may be modeled on the idea of the commons. Taking the idea of the commons both as it is meant in social movement language (as communities appropriating the means of social reproduction) and in the language of resource management, this chapter moves beyond both languages to wonder what it would mean to claim the weather as a commons, especially given the weather's particular productivity.

Following injunctions by geographers that conservation practices attend to nonhumans as participants, not merely objects, this chapter travels through writing on the productivity of nature, and some ideas about the weather's productivity, to ask how the weather would shape a commons formed around it. A commons of the weather would have to be responsive to its changeability, its transformations, and its expansiveness.

CONCLUSION: What was scattered, gathers

In the National Academy of Science's most recent report on cloud seeding, Box 1.1 speaks to the "Socio-economic Implications of Weather Modification." Box 1.1 occupies half a page. It states placidly, confidently, that "sound, validated scientific research results can ultimately provide the critical answers needed to address these political and socio-economic issues appropriately" (2003: 12). But can they? What are the consequences of using scientific facts to resolve public controversies? What other kinds of questions are buried when physical science is positioned as the only source of expertise?

This thesis has sought, most simply, to contribute to the public conversation about the effects of cloud seeding. Do we want to view the weather as merely an exploitable resource? How do we imagine and articulate an alternative relationship? How can a democratic politics of the weather be conceived of and enacted? This thesis is a critique of the processes that give rise to cloud seeding and of one set of efforts to stop it. And it is also an attempt to imagine another language around the politics of the weather.

As my first chapter makes clear, risk provides an impoverished language and imagination for debating and evaluating cloud seeding. Used by both proponents and opponents of cloud seeding, the language of risk, in many ways, validates the practice of cloud seeding. It takes cloud seeding as a given and asks that we tabulate and mitigate its risks, rather than reinventing the way we live in the world. Thinking about risks demands that we imagine the worst possible scenarios, rather than what we want the world to become. In a risky world, we wait for the answers that come from expert hands rather than taking action ourselves.

Understanding cloud seeding as a problem of corporate control opens up different ways of posing questions about its effects, but also has certain limitations. Cloud seeding is the appropriation of the weather for private profit. As such, it suggests implications for the ownership of the resulting water, the future and unregulated private use of the atmosphere, and alternative uses and logics of the water cycle. It turns humans' relationship to the weather into one mediated by the market and conceptions of

productive resources and private property, in place of other possible relationships to the weather. Cloud seeding, in effect, further entrenches capitalist relations in the landscape.

The notion of the commons is one way of posing an alternative to private ownership, and this idea is advanced by people in Mt. Shasta among other strategies. Yet opposition to cloud seeding as corporate control, at least in Mt. Shasta, appeals to conceptions of nature as pristine, original, and asocial in order to oppose cloud seeding. A strategy that appeals to a past, perfect nature, even around the democratically governed commons, is limited in terms of the alternatives it can pose.

What happens if we let go of certain conceptions of what natural is, and firm distinctions between nature and society? Can we adopt a politics that frees us up from any pre-existing notions about what the world is, and takes on the task of creating it? How can cloud seeding – and the weather – inform such a politics? A new language around the politics of the weather would address these concerns, and possibly open up new kinds of relations among humans and nonhumans.

In some respects, debates about cloud seeding are not unusual. Cloud seeding is one of many disagreements about how humans should use – or leave alone – certain manifestations of what we call nature. It brings up myriad and uncertain effects: floods, chemical contamination, ecological change. It is one of the many instances of private, for-profit appropriation of otherwise common resources, with the effects and alternatives that private control implies.

What is perhaps different about cloud seeding is the resource it taps into. As an object of environmental controversy, weather is not unique, but perhaps particularly obvious, in its transitory nature. Weather is a process, not a stable object. Property is what mediates many relationships between people, and between humans and the natural world. Traditional notions of property imagine a high degree of stability and continuity, of excludability and permanence. The weather exhibits none of these. No one can own it, no one can fix it in time or space. What cloud seeding and its opposition might offer is a way to imagine an environmental politics based on a wholly transient, diffuse entity. This politics would have to imagine something that is irreducible to conventions of property and demands other kinds of relations between humans and nonhumans. No one person or entity can, in any meaningful way, stabilize or fix the weather in time or space.

Weather is also obviously, but not uniquely, inextricably and undeniably social. With human-induced climate change, local weather patterns are changing, too. The claim that cloud seeding spoils something pristine isn't really accurate. So a politics of the weather could leave humans in the picture of the world it aspires to create. It could celebrate weather's movement and its rapid transformations.

But adopting this kind of politics requires a certain sense that a wealth of possibilities exists for what how the world could take shape. It requires a sense of leisure for imagining these possibilities. Standard paradigms of environmentalism stress the urgency and the obviousness of a single course of action. They urge action geared toward a single, predetermined outcome, relying on a view of the predictability and continuity of the world. The goal is to 'make nature present and render it eternal' (Hinchliffe 2007: 124-125). When that is strictly impossible, what opens up? The weather suggests the need for a flexible politics that attends to the kinds of processes that it seeks to engage. The question is still how to live kindly, wisely, and well in this world of transformations, the world evoked in this ancient poem by Heraclitus:

Air dies giving birth
to fire. Fire dies
giving birth to air. Water,
thus, is born dying
earth, and earth of water.

What was scattered
gathers.
What was gathered
blows apart.

The river
where you set
your foot just now
is gone –
those waters
giving way to this,
now this.

Just as the river where I step
is not the same, and is,
so I am as I am not.

HOPES: For those who are interested in knowing

What do I think about cloud seeding? It's probably evident from the way I wrote this thesis. But here, I briefly explain my underlying hopes. Know that, for all my over-thought skepticism, I care deeply about the kinds of issues cloud seeding brings up.

I think that cloud seeding shouldn't happen, along with all of the other things that undermine people's abilities to determine their future in creative, collective ways. I am disgusted by the sense of private entitlement to public resources that cloud seeding belies. For the depth of its implications, cloud seeding is shockingly unregulated. If it happens at all, I think it should be competently and closely watched – by an expert few *and* an interested many. Where it affects them – and they define where that is – people should have a say in whether or not cloud seeding takes place. Concerns about the way cloud seeding exerts a territorial claim on the resources it affects should be considered legitimate. And a new relationship to the weather should be forged. I want cloud seeding stopped, and I want the kind of processes and mindsets that enable it to be interrogated and radically changed.

However, as much as I'd like to see cloud seeding outright prevented, I think it offers an opportunity to reconfigure the way we conduct environmental politics. In simply stopping it, we may reinforce existing modes of framing environmental issues that don't challenge our dealings with nature in fundamental ways. What if the tone of urgency in environmental politics were softened? In the case of the anti-cloud seeding work in Shasta, what if an ever-widening swath of people were addressed, rather than just a local few? What if we took cloud seeding as an opportunity, in its strangeness and invisibility, to make a sustained attempt to change the language of these debates?

Though the work in Shasta does not substantially shift the language around environmental issues, I hope those efforts are successful. I hope that these efforts fuel the community's commitment to questions about how to live responsibly in the world. And I hope that the organizing work in Shasta is successful in a way that doesn't erase cloud seeding from the consciousness of residents, and rather makes space for new kinds of discussions. Is it actually desirable to bring triumphant closure to the issue of cloud seeding in Shasta? The success of the ordinance could come at the expense of seeking

other ways to address cloud seeding. So I hope that cloud seeding isn't forgotten, while at the same time the community is encouraged by the results of its hard work.

I hope that the limitations of the ordinance are fully addressed. There are a number of ways cloud seeding could be stopped, but not all of them create new and valuable political imaginaries. Weighing imagination and pragmatism might be an interesting way to devise anti-cloud seeding strategies. Every strategy has its limits. And perhaps the limits of this strategy meet the community's goals. Yet I find myself wanting to see what else, what more, anti-cloud seeding politics could do.

Practically speaking, Mt. Shasta's ordinance is far from sufficient for stopping PG&E's cloud seeding project. The ordinance would ban cloud seeding above the city limits of Mt. Shasta, miles from where silver iodide generators are located and from the skies where cloud seeding would take place. The ordinance doesn't interfere, really, with PG&E's ability to control the weather. It makes provisions for chemical trespass – but what if silver iodide doesn't blow into the city? What then has the ordinance really accomplished?

I hope that something can successfully interfere with cloud seeding, both in northern California and beyond. And I hope it interferes with cloud seeding in innovative ways, trying on new languages. For some of the people that I talked to in Shasta, the ordinance is not a final measure for asserting different regimes of water use. What will follow? How could future efforts be more ambitious, both in stopping cloud seeding and in reforming our environmental imagination?

Though the ordinance addresses only a local few, the work in Shasta has brought cloud seeding to the attention of many, myself included. Residents of the Mt. Shasta area brought a lot of attention to cloud seeding, but don't seem to have found a way to engage non-local people who took notice. How can we travelers also participate meaningfully in the politics of cloud seeding? I hope that some local victory, as sweet as it may be, doesn't come at the expense of a sustained dissatisfaction with the process and language by which decisions about the environment are made. A strategy not geared toward such finality might be uncomfortable, but it might create different political opportunities that will radiate beyond Mt. Shasta. Thinking somehow more ambitiously, but also more loosely, about cloud seeding might lead to different kinds of successes.

For me, a successful anti-cloud seeding politics would disrupt old patterns of talking about environmental issues. If a language of risk is fully rejected, we might be able to talk about questions of ownership and our collective relationship to the natural world. And if familiar ideas of nature as external and vulnerable are abandoned, what ways of acting – rather than preventing – are made possible?

I'm curious to see how environmental politics could change, based on different premises. It is curiosity, not confidence, that leads me to these questions. I want to see how else environmental controversies could be worked out in different ways, but I'm not sure these ways would necessarily be any better. I write in the spirit of experiment. An alternative politics might entail undertaking a way of life that directly confronts practices like cloud seeding. As it stands, cloud seeding sets the agenda – our goal is only its absence. Instead, can we think about what we can contribute to creating, rather than mourn what we've done?

One set of practices that aims to create, rather than solely prevent, is the Winnemem Wintu's. I hope that they are successful in returning salmon to the McCloud River. Their efforts challenge a vast array of practices and technologies, and would radically reconfigure regional relationships with the river. I hope that, in their efforts, the Winnemem Wintu continually broaden the range of people who must also rethink the relationship with the river. I hope that PG&E's control of rivers is strongly challenged, the flow regimes of these rivers dedicated to other uses.

The Winnemem Wintu's vision is captivating. I, for one, am enthralled by Luisa Navejas' description of the salmon's life cycle in the Sacramento River system. Speaking in the present and future tenses, she invites us to bring to life a flourishing river system that supports healthy salmon. In conversation with Mark Miyoshi, Navejas emphasizes that bringing the salmon back will not just help humans survive, but will help humans and other living things *thrive*. In restoring the salmon, a certain way of seeing and relating to the world is also created. Navejas says,

And not just survival either. It's more thriving. We've been in a survival mode for so long that we seem to use that word a lot. And I do too. But if the salmon can thrive in the McCloud River, it means that all those other things are put in place. And that the water is pure and clear and running at a good level, and there's all these little plants and animals that feed the salmon, from the eggs being laid – it has to be in this highly oxygenated water. So the water is always mixing with the air and oxygenating itself.

So those eggs, if they're healthy, will be in that kind of health in the stream. And then once they hatch, the little fry that come out, the little eggs, still have their stomach outside their bodies, they're eating the food, and going down into that pool and it means that that pool has everything that that little baby salmon needs....And then they're gonna have enough water, there's gonna be enough water in the stream so that they'll make it all the way down to the ocean, where they'll smolt in the estuary.

And in the Delta ...the salmon have to go there, and they change their systems from freshwater into the anadromous fish, and now they can live in salt water. Then they go all the way up the Coast...They're out there for 4 or 5 years, and they're gonna come back, and there's gonna be no barriers in the stream, and enough pure water that they can make their way all the way up without eating the fat off their bodies. And then the female goes to the exactly the same place, and lays her thousands of eggs into that nest, and starts the cycle all over again. For those cycles to happen, everything around has to be in this thriving mode.

And the salmon are just these huge things. I laugh when I see these signs, food not salmon. Have you ever looked at a healthy salmon? How many people do you think a healthy salmon could feed?...

Yeah, I'm thinking the salmon is to us such an indicator of the quality of the water, the purity of the water. They help in so many ways in the stream.

When we went to New Zealand...you could pick out where the salmon are because they have these nests that are called redds. They have these huge redds, maybe half the size of this part of the kitchen here. You can tell because all the rocks have been overturned. And all that stuff in the water, they overturn it, their big bodies, moving sideways, they're overturning these rocks, and all of this stuff is going downstream. And so you can tell, where there's clean gravel, that's where the eggs are.

So that's the importance of the salmon for us.

Who would not want to live in the world she describes? I want to see this world come about. And so it is my hope that anything – including cloud seeding – that interferes with this vision and this way of relating to the world will be seriously questioned. And I hope that ways of questioning these kinds of practices are imagined and chosen with great care, attentive to the world that words partially bring into being.

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- Ric Costales, Natural Resource Specialist, Siskiyou County Government
- Mark Franco, Winnemem Wintu Tribe Headman
- Gary Freeman, PG&E Hydrologist
- Ed Gardiner, Mount Shasta Activist
- Rene Henery, Mount Shasta Activist
- Arlen Huggins, Researcher, Desert Research Institute (Reno, Nevada)
- Mark Miyoshi, Winnemem Wintu Tribe
- Luisa Navejas, Winnemem Wintu Tribe

Greg Plucker, Planning Department, Siskiyou County Government
Maury Roos, California Department of Water Resources (Sacramento)
Matt Ryan, Rainmaker, Siskiyou County
Caleen Sisk-Franco, Winnemem Wintu Tribe Spiritual Leader
Tom Stokely, Retired, Trinity County Planning Department; Water Policy Coordinator,
California Water Impact Network
Barbara Vlamis, Director, AquAlliance (Chico, California)

Laws

California Water Code, Weather Resources Management Act of 1984, and California Environmental Quality Act. Available at <http://www.leginfo.ca.gov/calaw.html>

Events

Mt. Shasta City Council Meeting, April 26, 2010, viewed online
Mt. Shasta City Council Meeting, May 24, 2010, viewed online
People's Movement Assembly: (Re)Claiming the Commons. U.S. Social Forum, Detroit, Michigan. June 24, 2010.

Appendix 1: Mount Shasta Community Water Rights and Self-Government Ordinance

Initiative Measure to be Submitted Directly to the Voters

The people of the City of Mt Shasta do ordain as follows:

AN ORDINANCE

City of Mt. Shasta, California

An Ordinance to assert and secure the right of the people of the City of Mt. Shasta to natural water systems and cycles through the exercise of community self-government by enumerating certain rights held by the people and natural community and prohibiting activities that would deny those rights; by protecting the health, safety, and general welfare of the citizens and environment of the City of Mt. Shasta; by not allowing corporations to engage in weather manipulation; by establishing strict liability and burden of proof standards for chemical trespass; by not allowing corporations to engage in water withdrawal for export and resale beyond the City of Mt. Shasta; by removing claims to legal rights and protections from corporations that would allow a few people hiding behind the corporate shield to subordinate the people and environment of the City of Mt. Shasta to them; and by recognizing and enforcing the rights of residents to defend the rights of natural communities and ecosystems.

Section 1.Preamble, Name and Purpose

Section 1.1: Preamble

WHEREAS Mount Shasta serves headwaters to the critical Sacramento River, a primary source of Northern California's water; and

WHEREAS pristine spring water is one of Mount Shasta's most valuable natural assets, continually ranking among the top three in state and national water quality contests; and

WHEREAS two multinational corporations currently extract and export undisclosed amounts of Shasta water from their respective basins; and

WHEREAS the water bottling industry increases reliance upon fossil fuels, creating excessive non-biodegradable waste and carbon emissions; and

WHEREAS Cloud seeding is poorly understood, with unknown implications for the hydrologic cycle in the regions where it is applied; and, per findings from the National Academy of Sciences, has not been proven to increase precipitation; yet the State of

California allows private corporations to cloud seed without regulation or adequate environmental review; and

WHEREAS Mount Shasta's decrease in average annual snow pack and precipitation leads to surface and groundwater depletion, thereby increasing risk of toxicity, forest fires, drought, species extinction, desertification and reduced property values; and

WHEREAS conservative natural resource policies have been proven to stimulate innovative, resilient, sustainable, local commerce; while existing regulatory policies function to permit environmentally harmful practices;

THEREFORE be it ordained that the people of the City of Mt. Shasta do hereby declare our rights and responsibility to preserve watershed integrity as the foundation for environmental and economic security, by enacting the Mount Shasta Community Water Rights & Self-Government Ordinance.

Section 1.2: Name

This Ordinance shall be known and may be cited as the "City of Mt. Shasta Community Water Rights and Self-Government Ordinance."

Section 1.3: Purpose

One purpose of this Ordinance is to recognize and protect the inalienable rights of residents of the City of Mt. Shasta, including but not limited to those enumerated in this Ordinance, particularly the Right to Natural Water Systems and Cycles, to Self Government in the place of residence, to Self, to a Healthy Environment, to Home and Livelihood, and to Cultural Heritage.

Another purpose of this Ordinance is to recognize and protect the inalienable rights of the natural environment of the City of Mt. Shasta, including the right to exist and flourish, free from damage caused by alteration of natural water systems and cycles or introduction of toxic and potentially toxic substances. Disturbing natural water cycles, including rainfall, the recharging of aquifers, and interfering with access to water by human and natural communities are explicit prohibitions imposed by this Ordinance, to protect Rights.

A further purpose of this Ordinance is to recognize that it is an inviolate, fundamental, and inalienable right of each person residing within the City of Mt. Shasta to be free from involuntary invasions of their bodies by the application of corporate chemicals into the environment as a result of the violation of the provisions of this Ordinance.

The people of the City of Mt. Shasta understand that certain activities controlled by large corporations have and continue to cause damage to climate, weather, water systems, the soil and air, and that it is the people's responsibility to prohibit behavior that they deem to be destructive of the natural and human environment within the jurisdictions where they enjoy self-governing rights.

The people of the City of Mt. Shasta understand that responsibility for remedying or simply enduring harmful effects brought about by modifications to weather, the introduction of toxins into the environment, and the privatization of water, is borne predominantly by the public. State and federal authorities regularly sanction damaging industrial and corporate behavior, and state and federal lawmakers and courts exercise preemptive authority over community attempts to prohibit harmful corporate behavior locally. The people of the City of Mt. Shasta recognize that they are forced to endure or attempt to repair the harm to their environment that they have no commensurate authority to prevent, under current state and federal law. The people of the City of Mt. Shasta adopt this Ordinance to correct that error.

While the State of California and the federal government have bestowed legal protections and immunities upon corporations and those who benefit from them, they have concurrently disallowed the people from making those persons reaping financial benefits from harmful corporate activities bear responsibility for damage inflicted. In light of this fundamental denial of the right of the people to self-determination, the interference with ecosystems' right to exist and flourish, the denial of peoples' freedom from chemical trespass, the denial of peoples' right to natural water cycles, and the denial of the right to demand restitution for harms, the City of Mt. Shasta, under authority of the people, subordinates corporations to the rights and self governance of the people, prohibits corporations from violating rights, and to achieve the purposes herein outlined, enacts this Ordinance.

Section 2: Statements of Law

The rights of people and natural communities and the limitations on the privileges of corporations delineated in this Ordinance, beyond the scope of pre-existing law, are specifically enforceable only when the ordinance's prohibitions on water withdrawal, cloud seeding and weather modification are violated.

Section 2.1: The Right of the People and Ecosystem to Natural Water Cycles

Section 2.1.1: Right to Water. All residents, natural communities and ecosystems in the City of Mt. Shasta possess a fundamental and inalienable right to sustainably access, use, consume, and preserve water drawn from natural water cycles that provide water necessary to sustain life within the City.

Section 2.1.1.1: It shall be unlawful for any corporation to engage in cloud seeding or weather modification within the City of Mt. Shasta. It shall be unlawful for any person to assist a corporation to engage in cloud seeding or weather modification within the City of Mt. Shasta.

Section 2.1.1.2: It shall be unlawful for any director, officer, owner, or manager of a corporation to use a corporation to engage in cloud seeding or weather modification within the City of Mt. Shasta.

Section 2.1.1.3: Corporations and persons using corporations to engage in activities prohibited by this Ordinance in a neighboring municipality, county or state shall be strictly liable for all violations of the rights of residents, ecosystems and natural communities; for all harms caused to ecosystems and natural communities, and for all harms caused to the health, safety, and welfare of the residents of the City of Mt. Shasta from those activities.

Section 2.1.1.4: The deposition of toxic substances or potentially toxic substances within the body of any resident of the City of Mt. Shasta, or into any natural community or ecosystem, which results from corporate cloud seeding or weather modification, whether engaged in, within or beyond the City of Mt. Shasta, is declared a form of trespass and is hereby prohibited.

Section 2.1.1.5: It shall be unlawful for any corporation to engage in water withdrawal for export in the City of Mt. Shasta. It shall be unlawful for any person to assist a corporation to engage in water withdrawal for export in the City of Mt. Shasta.

Section 2.1.1.6: It shall be unlawful for any director, officer, owner, or manager of a corporation to use a corporation to engage in water withdrawal for export within the City of Mt. Shasta.

Section 2.1.1.6.1: Exceptions. The people of the City of Mt. Shasta hereby allow the following exceptions to the Statements of Law contained within Section 2.1.1.5, or 2.1.1.6 of this Ordinance:

(1) Municipal authorities established under the laws of the State of California engaged in water withdrawals providing water only to residential and commercial users within the City of Mt. Shasta;

(2) Nonprofit educational and charitable corporations organized under state non-profit corporation law, qualified under §501(c)(3) of the federal Tax Code, which do not sell water withdrawn within the City of Mt. Shasta outside of the City of Mt. Shasta;

(3) Utility corporations operating under valid and express contractual provisions in agreements entered into between the City of Mt. Shasta and those utility corporations, for the provision of service within the City of Mt. Shasta;

(4) Corporations operating under valid and express contractual provisions in agreements entered into between persons in the City of Mt. Shasta and those corporations, when the withdrawn water is used solely for on-site residential, household, agricultural, or commercial use within the City of Mt. Shasta, provided that such commercial use does not involve the withdrawal of water for sale outside of the City of Mt. Shasta, or involve the purchase of water withdrawn from the City of Mt. Shasta for sale outside of the City.

(5) Corporations operating under valid and express contractual provisions in agreements entered into between persons in the City of Mt. Shasta and those corporations, when the

withdrawn water is used for the manufacture of beverages within the City of Mt. Shasta, provided that such commercial use does not involve the withdrawal of water for sale, either in bulk or packaged, outside of the City of Mt. Shasta.

Section 2.2: The Right of the People to Self-Government

Section 2.2.1: Right to Community Self-Government. All residents of the City of Mt. Shasta possess the fundamental and inalienable right to participate in a form of government in the community where they live which guarantees them authority to use, assert and enforce plenary governing power over questions of law that affect their lives, families, environment, quality of life, health, safety and welfare. That right includes the right to exercise un-preempted legislative authority through the government closest to them. All governing authority is and shall remain inherent in the people affected by governing decisions, and all legitimate governments are founded on the people's authority and consent. The recognition, protection and enforcement of the rights enumerated in this Ordinance are rooted in the foundation of valid government; law gains its legitimacy when it serves this purpose.

Section 2.2.1.2: The foundation for the making and adoption of this law is the people's fundamental and inalienable right to govern themselves in the community where they live, and thereby secure their rights to life, liberty, and the pursuit of happiness. Any attempts to use other units and levels of government to preempt, amend, alter, or overturn this Ordinance, or parts of this Ordinance, shall require the City Council to hold public meetings that explore the adoption of measures to overcome the usurpation and protect the ability of residents to exercise their fundamental and inalienable right to self-government.

Section 2.2.1.3: To ensure that the rights of the people to make self-governing decisions are never subordinated to the privileges of a few, within the City of Mt. Shasta corporate entities and their directors and managers shall not enjoy special powers or protections under the law, nor shall any class of people enjoy such privileges, protections or powers. Corporations and other business entities shall not be deemed to possess any legal rights, privileges, powers, or protections which would enable those entities to avoid the enforcement of, nullify provisions of, or violate the rights enumerated in this Ordinance.

Section 2.2.1.3.1 Corporate Privilege: Within the City of Mt. Shasta, corporations that violate the provisions of this Ordinance shall not be "persons" under the United States or California Constitutions, or under the laws of the United States, California, or the City of Mt. Shasta, and so shall not have the rights of persons under those constitutions and laws. Nor shall they be afforded the protections of the Contracts Clause or Commerce Clause of the United States Constitution, or similar provisions from the California Constitution, within the City of Mt. Shasta, nor shall those corporations possess the authority to enforce State or federal preemptive law against the people of the City of Mt. Shasta. Corporations shall not be afforded the protections of any international agreement or treaty

which would enable the corporation to nullify local laws adopted by the City of Mt. Shasta or the people of the City of Mt. Shasta.

Section 2.2.1.3.2 Corporations as State Actors: Corporations chartered by government acquire their being, their authority, and their ability to act from the State. Within the City of Mt. Shasta, corporations shall be prohibited from denying the rights of residents and natural communities and shall be civilly and criminally liable for any such deprivation or denial of rights.

Section 2.2.1.3.3 Future Profits Not Property: Within the City of Mt. Shasta, corporate claims to “future lost profits” as a result of the enactment, implementation or enforcement of this Ordinance shall not be considered property interests under the law and thus shall not be recoverable by corporations seeking those damages as a result of the enforcement of this Ordinance within the City.

Section 2.2.1.4: Any permit, license, privilege or charter issued to any person or any corporation, the use of which would violate the prohibitions and provisions of this Ordinance or deprive any City resident, natural community, or ecosystem of any rights, privileges, or immunities secured by this Ordinance, the California Constitution, the United States Constitution, or other laws, shall be deemed invalid within the City of Mt. Shasta. Additionally, any employee, agent or representative of government who issues a permit, license, privilege or charter which results in the violation of the provisions of this Ordinance or deprives any City resident, natural community, or ecosystem of any rights, privileges, or immunities secured by this Ordinance, the California Constitution, the United States Constitution, or other laws, shall be liable to the party injured and shall be responsible for payment of compensatory and punitive damages and all costs of litigation, including, without limitation, expert and attorney’s fees. Compensatory and punitive damages paid to remedy the violation of the rights of natural communities and ecosystems shall be paid to the City of Mt. Shasta for restoration of those natural communities and ecosystems.

Section 2.2.2: People as Sovereign. The City of Mt. Shasta shall be the governing authority responsible to, and governed by, the residents of the City. Use of the “City of Mt. Shasta” municipal corporation by the sovereign people of the City to make law shall not be construed to limit or surrender the sovereign authority or immunities of the people to a municipal corporation, or to the State, which are subordinate to them in all respects at all times. The people at all times enjoy and retain an inalienable and indefeasible right to self-governance in the community where they reside.

Section 2.2.2.1: Nullification of Official Rights Denial. The authority of the State of California to enforce any State law that removes authority from the people of the City of Mt. Shasta to decide the future of their community, and to protect the health, safety, welfare, environment and quality of life of City residents, natural communities, and ecosystems, shall be deemed null within the City of Mt. Shasta.

Section 2.2.3: Authority to Enact This Ordinance. The residents of the City of Mt. Shasta have legitimate power and authority to use the municipality known as the “City of Mt. Shasta” as their convenient instrument for asserting their right to community self-government, and in accord with that authority and right they enact this Ordinance. Section 2.2.3.1: Authority: This Ordinance is also enacted pursuant to the authority of the City of Mt. Shasta, as recognized by all relevant Federal and State laws and their corresponding regulations, and by the inherent right of the citizens of the City of Mt. Shasta to self-government, including, without limitation, the following:

The Declaration of Independence, which declares that people are born with “certain inalienable rights” and that governments are instituted among people to secure those rights; The Tenth Amendment of the U.S. Constitution, which declares that “The powers not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the States respectively, or to the people;”

The California Constitution, Article 1, Section 1, which declares that “All people are by nature free and independent and have inalienable rights. Among these are enjoying and defending life and liberty, acquiring, possessing, and protecting property, and pursuing and obtaining safety, happiness, and privacy;”

The California Constitution, Article 1, Section 24, which declares that “Rights guaranteed by this Constitution are not dependent on those guaranteed by the United States Constitution;”

The California Constitution, Article I, Section 24, which further provides that “This declaration of rights may not be construed to impair or deny others retained by the people;”

The California Constitution, Article II, Section 1, which asserts that “All political power is inherent in the people. Government is instituted for their protection, security, and benefit, and they have the right to alter or reform it when the public good may require;”

The California Constitution, Article XI, Section 5 (a), which declares that “City charters adopted pursuant to this Constitution shall supersede any existing charter, and with respect to municipal affairs shall supersede all laws inconsistent therewith;”

The California Constitution, Article XI, Section 7, which declares that “A county or city may make and enforce within its limits all local, police, sanitary, and other ordinances and regulations not in conflict with general laws;”

The California Constitution, Article XI, Section 11(a), which declares that “The Legislature may not delegate to a private person or body power to make, control, appropriate, supervise, or interfere with county or municipal corporation improvements, money, or property, or to levy taxes or assessments, or perform municipal functions.”

Section 2.2.3.2 Interpretation: Anyone interpreting, implementing, or applying this Ordinance shall give priority to the findings and purposes stated in Section 1 over such considerations as economy, eminent domain, efficiency, national security and scheduling factors.

Section 2.2.3.3: Administration: This Ordinance shall be administered by the City of Mt. Shasta.

Section 2.3: Enumerated Rights of the People within this Community

Section 2.3.2: Right to a Healthy Environment. All residents and persons within the City of Mt. Shasta possess a fundamental and inalienable right to a healthy environment, which includes the right to unpolluted air, water, soils, flora, and fauna, the right to a natural environmental climate unaltered by human intervention, and the right to protect the rights of natural communities and ecosystems, of which each resident is both intrinsically a part and upon which all are dependent.

Section 2.3.3: Right to Self. All residents and persons living within the City of Mt. Shasta possess a fundamental and inalienable right to the integrity of their bodies, and to be free from unwanted invasions of their bodies by manufactured chemicals and toxins, including but not limited to, toxic substances and potentially toxic substances.

Section 2.3.3.1: The deposition, by corporations in violation of the provisions of this ordinance, of toxic substances or potentially toxic substances within the body of any resident of the City of Mt. Shasta, or into any natural community or ecosystem, is declared a form of trespass and is hereby prohibited.

Section 2.3.3.2: Persons owning or managing corporations which manufacture, generate, sell, transport, apply, or dispose of, toxic or potentially toxic substances, which are detected within the body of any resident of the City of Mt. Shasta or within any natural community or ecosystem within the City, having violated the provisions of this Ordinance, shall be deemed culpable parties, along with the corporation itself, for the recovery of trespass damages, compensatory damages, punitive damages, and the instatement of permanent injunctive relief. If more than one corporation manufactured or generated the detected substance, persons owning and managing those corporations, along with the corporations themselves, shall be held jointly and severally liable for those damages, in addition to being subject to injunctive relief.

Section 2.3.3.3: Corporations manufacturing, using, selling or generating toxic or potentially toxic substances in violation of the provisions of this Ordinance that are detected within the body of a City resident shall provide information about the manufacture or generation of those substances to the municipality sufficient for a determination by the municipality of the culpability of that particular corporation for the manufacturing or generation of a particular toxic or potentially toxic substance.

Section 2.3.3.4: It shall be the duty of the City to protect the right of City residents, natural communities and ecosystems to be free from trespass under the provisions of this Ordinance, and to obtain damages for any violation of that right. If the presence of toxic and/or potentially toxic substance is detected within the body of any City resident, or within a natural community or ecosystem within the City, the municipality shall initiate litigation to recover trespass, compensatory, and punitive damages – and permanent injunctive relief - from all culpable parties. If a significant number of City residents have been similarly trespassed against, the municipality shall select representative plaintiffs and file a class action lawsuit on behalf of all City residents to recover trespass, compensatory, and punitive damages – and permanent injunctive relief - from all culpable parties. City residents retain all individual legal rights to pursue damages and relief.

Section 2.3.3.5: Persons or corporations engaged in activities prohibited by this Ordinance shall be strictly liable for the deposition of toxic substances and potentially toxic substances into the bodies of residents of the City and within natural communities and ecosystems within the City. Culpable parties shall be deemed strictly liable if one of their toxic or potentially toxic substances or chemical compounds is discovered within the body of a City resident or into any natural community or ecosystem within the City. The municipality's showing of the existence of that substance or chemical compound within the body of a resident living in the City or within a natural community or ecosystems within the City, and the municipality's showing that the Defendant(s) are responsible for the manufacture, generation, sale, or deposition of that substance within the City, shall constitute a prime facie showing of causation under a strict liability standard. Current and future damages resulting from the culpable parties' trespass shall be assumed, and the burden of proof shall shift to the culpable parties for a showing that the substance or chemical compound could not cause harm or contribute to causing harm, either alone or in combination with other factors, or that the culpable parties are not responsible for the trespass of that particular substance into the body of residents of the City or within a natural community or ecosystems within the City.

Section 2.3.3.6: The City of Mt. Shasta shall select a laboratory with expertise in the testing for toxic substances and potentially toxic substances and chemical compounds associated with weather modification, and other substances including, but not limited to, those listed in the Definitions Section of this Ordinance. The City shall provide financial resources for the first ten residents, determined by postage mark, who request in writing to be tested for the presence of toxic substances and potentially toxic substances and chemical compounds within their bodies, and make all reasonable efforts to provide financial resources for the testing of additional residents.

Section 2.4: The Rights of Natural Communities and Ecosystems

Section 2.4.1: Rights of Natural Communities. Natural communities and ecosystems, including, but not limited to, wetlands, streams, rivers, aquifers, clouds, and other water systems, possess inalienable and fundamental rights to exist, flourish and naturally evolve within the City of Mt. Shasta. Consequently, no private claim to ownership of natural

communities, whole ecosystems or the genetic material of any organism shall be recognized within the City of Mt. Shasta.

Section 2.4.1.1: It shall be unlawful for any corporation or its directors, officers, owners, or managers to interfere with the existence and flourishing of natural communities or ecosystems, or to cause damage to those natural communities and ecosystems. Such interference shall include, but not be limited to, the deposition of toxic substances and potentially toxic substances into natural communities and ecosystems in the City, the extraction of “resources” and the manipulation of elements of the environment that affect the ability of natural communities to exist, flourish and evolve. The City of Mt. Shasta, along with any resident of the City, shall have standing to seek declaratory, injunctive, and compensatory relief for damages caused to natural communities and ecosystems within the City, regardless of the relation of those natural communities and ecosystems to City residents or the City itself. City residents, natural communities, and ecosystems shall be considered to be “persons” for purposes of the enforcement of the civil rights of those residents, natural communities, and ecosystems.

Section 2.4.1.2: Corporations and persons using corporations to engage in activities prohibited by this Ordinance in a neighboring municipality, county or state shall be strictly liable for all harms caused to the health, safety, and welfare of the residents of the City of Mt. Shasta from those activities, and for all harms caused to ecosystems and natural communities within the City of Mt. Shasta.

Section 3: Definitions

The following terms shall have the meanings defined in this section wherever they are used in this Ordinance.

Cause damage to natural communities and ecosystems: This term and equivalent terms shall include but not be limited to alteration, removal, destruction, eradication, or other actions inflicted upon natural communities and ecosystems, in whole or in part, that bring about the cessation of the ability of natural communities and ecosystems to exist and flourish independent of human intervention.

City: The City of Mt. Shasta in Siskiyou County, California, its City Council, or its representatives or agents.

City resident: A natural person who maintains a primary residence within the City of Mt. Shasta.

Cloud Seeding: The spraying, spreading, injection, incorporation, introduction or deposition by any means, of substances by a corporation or an agent of a corporation, into the atmosphere, onto a land surface, body of water, air space, residential area, structure, fixture, public space, or natural feature within the City which would have the effect of inducing or suppressing precipitation from clouds or the atmosphere.

Corporation: Any corporation organized under the laws of any state of the United States or under the laws of any country. The term shall also include any limited partnership, limited liability partnership, business trust, or limited liability company organized under the laws of any state of the United States or under the laws of any country, and any other business entity that possesses State-conferred limited liability attributes for its owners, directors, officers, and/or managers. The term shall also include any business entity in which one or more owners or partners is a corporation or other entity in which owners, directors, officers and/or managers possess limited liability attributes. The term does not include the municipality of the City of Mt. Shasta.

Culpable Parties: Persons owning or managing corporations which manufacture, generate, transport, sell, dispose of, or by any means apply toxic or potentially toxic substances detected within the body of any resident of the City of Mt. Shasta or within any natural community or ecosystem within the City, as a result of the violation of the prohibitions of this ordinance. This term shall also refer to government agencies, agents, and other entities that permit, license or empower a corporation to violate the provisions of this Ordinance.

Deposition: The placement of a toxic chemical or potentially toxic chemical within the body of a person. The act of deposition shall be assumed if a toxic chemical or potentially toxic chemical is detected within the body of a person.

Ecosystem: The term shall include but not be limited to, wetlands, streams, rivers, aquifers, and other water systems, as well as all naturally occurring habitats that sustain wildlife, flora and fauna, soil-dwelling or aquatic organisms.

Engage in Water Withdrawal: The term shall include, but not be limited to, the physical extraction of water from subsurface aquifers or surface bodies of water and the buying and/or selling of water that has been extracted within the City of Mt. Shasta outside the City.

Exist and flourish: The term shall include but not be limited to, the ability of natural communities and ecosystems to sustain and continue to exercise natural tendencies to promote life, reproduction, non-synthetic interactions and interdependencies among proliferating and diverse organisms; the term shall also include the ability of natural communities and ecosystems to establish and sustain indefinitely the natural processes and evolutionary tendencies that promote well-being among flora, fauna, aquatic life, and the ecosystems upon which their mutual benefit depends.

Natural Communities: Wildlife, flora, fauna, soil-dwelling, aerial, and aquatic organisms, as well as humans and human communities that have established sustainable interdependencies within a proliferating and diverse matrix of organisms, within a natural ecosystem.

Natural Water System: The term shall include but not be limited to the natural and unmanaged circulation of water between atmosphere, land, and sea by evaporation, precipitation, and percolation through soils and rocks.

Ordinance: City of Mt. Shasta Community Water Rights and Self-Government Ordinance.

Person: A natural person, or an association of natural persons that does not qualify as a corporation under this Ordinance.

Self Government: The inalienable and legitimate authority of the people of the City of Mt. Shasta to decide as a community the future of their community, and to protect the health, safety, welfare, environment and quality of life of City residents, natural communities, and ecosystems, free from preemptive usurpations and constrained only by the rights of natural persons, natural communities and ecosystems.

Substantially Owned or Controlled: A person, corporation, or other entity substantially owns or controls another person, corporation, or other entity if it has the ability to evade the intent of Section 4.6 of this Ordinance by using that person, corporation, or other entity to violate the provisions of this Ordinance in the City of Mt. Shasta.

Sustainable Interdependencies: Co-existence of human and non-human organisms and communities, where human health and survival can be maintained and where human activities do not cause damage to natural communities and ecosystems.

Toxic substances and potentially toxic substances: The phrase shall include all substances that have been found to cause or are suspected of causing adverse effects to animals, humans, or ecosystems, including those chemicals, chemical compounds, sources of radiation, and all other substances deemed to be mutagenic, neurotoxic, carcinogenic, teratogenic, reproductive or developmental toxicants, or any other toxic chemical or hazardous substance identified by the City of Mt. Shasta by resolution as subject to this Ordinance. The phrase shall specifically include, but shall not be limited to, silver iodide.

Trespass: As used within this Ordinance, the deposition of toxic or potentially toxic substances, as defined in this Ordinance, which are detected within a human body, natural community or ecosystem.

Weather Modification/Weather Manipulation: These terms shall include any activity which intentionally changes natural weather and climate conditions that would affect the quality and character of the atmosphere, precipitation, temperature, available water supplies or related aspects of the natural environment, and shall include but not be limited to cloud seeding.

Section 4: Enforcement

Section 4.1: The City of Mt. Shasta shall enforce this Ordinance by an action brought before a court of competent jurisdiction.

Section 4.2: Any person, corporation, or other entity that violates any provision of this Ordinance shall be guilty of a summary offense and, upon conviction thereof by a court of competent jurisdiction, shall be sentenced to pay the maximum allowable fine for first-time and for each subsequent violation, and shall be imprisoned to the extent allowed by law.

Section 4.3: A separate offense shall arise for each day or portion thereof in which a violation occurs and for each section of this Ordinance that is found to be violated.

Section 4.4: The City of Mt. Shasta may also enforce this Ordinance through an action in equity brought in a court of competent jurisdiction. In such an action, the City of Mt. Shasta shall be entitled to recover all costs of litigation, including, without limitation, expert and attorney's fees and all related costs.

Section 4.5: All monies collected for violation of this Ordinance shall be paid to the Treasurer of the City of Mt. Shasta.

Section 4.6: Any person, corporation, or other entity chartered, permitted or licensed by the State, or acting under authority of the State or any government agency, that violates, or is convicted of violating this Ordinance, two or more times shall be permanently prohibited from business activities in the City of Mt. Shasta. This prohibition applies to that person's, corporation's, or other entity's parent, sister, and successor companies, subsidiaries, and alter egos, and to any person, corporation, or other entity substantially owned or controlled by the person, corporation, or other entity (including its officers, directors, or owners) that twice violates this Ordinance, and to any person, corporation, or other entity that substantially owns or controls the person, corporation, or other entity that twice violates this Ordinance.

Section 4.7: Any City resident shall have the authority to enforce this Ordinance through an action in equity brought in a court of competent jurisdiction. In such an action, the resident shall be entitled to recover all costs of litigation, including, without limitation, expert and attorney's fees, as well as any damages, compensatory or punitive.

Section 5: Civil Rights Enforcement

Section 5.1: Any person acting under the authority of a permit issued by a government agency, any corporation operating under a state charter, any person acting on behalf of the State or any government agency, or acting under the authority of the state, or any director, officer, owner, or manager of a corporation operating under a state charter, who deprives any City resident, natural community, or ecosystem of any rights, privileges, or immunities secured by this Ordinance, the California Constitution, the United States Constitution, or other laws, shall be liable to the party injured and shall be responsible for payment of compensatory and punitive damages and all costs of litigation, including,

without limitation, expert and attorney's fees. Compensatory and punitive damages paid to remedy the violation of the rights of natural communities and ecosystems shall be paid to the City of Mt. Shasta for restoration of those natural communities and ecosystems.

Section 5.2: Any City resident shall have standing and authority to bring an action under this Ordinance's civil rights provisions, or under state and federal civil rights laws, for violations of the rights of natural communities, ecosystems, and City residents, as recognized by this Ordinance.

Section 6: Enactment

Pursuant to California Election Code, Section 9214, the City Council, is advised and requested to submit this Ordinance immediately to a vote of the people at a special election.

Section 7: Effective Date

This Ordinance shall be effective immediately upon its enactment.

Section 8: Severability

The provisions of this Ordinance are severable. If any court of competent jurisdiction decides that any section, clause, sentence, part, or provision of this Ordinance is illegal, invalid, or unconstitutional, such decision shall not affect, impair, or invalidate any of the remaining sections, clauses, sentences, parts, or provisions of the Ordinance. The City Council of the City of Mt. Shasta hereby declares that in the event of such a decision, and the determination that the court's ruling is legitimate, it would have enacted this Ordinance even without the section, clause, sentence, part, or provision that the court decides is illegal, invalid, or unconstitutional.

Section 9: Repealer

All inconsistent provisions of prior Ordinances adopted by the City of Mt. Shasta are hereby repealed, but only to the extent necessary to remedy the inconsistency.