

# Demand Management, Climate Change, and the Livestock Grazing Crisis in the Great Basin

Hillary M. Hoffmann\*

Man is an interloper in that country, not merely because he maintains a toehold only on sufferance, depending on the precarious and sometimes disastrous flow of desert rivers, but because everything he sees is a prophecy of his inconsequent destiny.<sup>1</sup>

In March 2014, an armed conflict erupted over livestock grazing on nearly 600,000 acres of federal land near Bunkerville, Nevada, in the heart of the geographic area known as the Great Basin (“Great Basin” or “Basin”).<sup>2</sup> The national news media descended as soon as word spread that weapons and private militias were involved, in pursuit of a modern day Wild West story. The conflict involved a cattle rancher named Cliven Bundy, who was determined to fend off a federal government that sought to destroy his livelihood by taking his grazing “rights” and, eventually, his cattle.<sup>3</sup> Like-minded ranchers and militiamen poured in from other states, armed and determined to aid Bundy in his David and Goliath battle against the federal government.<sup>4</sup> “This is a lot bigger deal than just my cows,” Bundy told Fox News, “it’s a statement for liberty and freedom and the Constitution.”<sup>5</sup> And Bundy is right, in a sense; the conflict

over grazing *is* a bigger deal than just his cows, but for different reasons. These reasons call for a different solution to the “livestock versus wildlife” problem on public lands, which has been the focus of most of the scholarly analysis to date.<sup>6</sup> This Article proposes such a solution, in the form of demand management, which has been an effective resource management tool elsewhere in the United States and abroad since the 1970s.<sup>7</sup>

As the media circus unfolded, Bundy and his supporters argued that action by the U.S. Bureau of Land Management (“BLM”) to cancel his grazing rights on federal public lands violated his right to graze under Nevada law, which he claims is the true rule of law governing public lands grazing in the State of Nevada.<sup>8</sup> Bundy’s supporters shut down an interstate highway in both directions, issued death threats against the BLM, and called for a “range war.”<sup>9</sup> Bundy’s son attempted to attack a BLM officer and was tased, while other supporters “tweeted” the home address of a former U.S. Forest Service (“Forest Service”) employee who then worked for an environmental group working to protect environmentally sensitive areas of Bundy’s allotment, presumably as a threat to his physical safety.<sup>10</sup> Meanwhile, on the other side of the ideolog-

\* Hillary M. Hoffmann is a Professor of Law at Vermont Law School. The author thanks John D. Lesby for his invaluable input on an earlier version of this Article.

1. WALLACE STEGNER, *MORMON COUNTRY* 45 (2d ed. 2003).
2. Shawn Regan, Op-Ed, *A Peaceable Solution for the Range War Over Grazing Rights*, WALL ST. J., Apr. 23, 2014, at A15; Christopher Ketcham, *The Great Republican Land Heist: Cliven Bundy and the Politicians Who Are Plundering the West*, HARPER’S MAG., Feb. 2015, at 23.
3. Jacqueline Keeler, *On Cliven Bundy’s “Ancestral Rights,”* NATION (Apr. 29, 2014), <http://www.thenation.com/article/179561/cliven-bundys-ancestral-rights> (noting that despite Bundy’s claims that his forefathers had ranched in Nye County since the late 1800s, it was closer to 1948 when they moved into the area).
4. Shane Dixon Kavanaugh, *American Militias Emboldened by Victory at Bundy Ranch*, VOCATIV (Apr. 14, 2014), <http://www.vocativ.com/culture/society/american-militias-emboldened-victory-bundy-ranch/>.
5. Robert Gearty, *Feds Move in on Nevada Rancher’s Herd Over Illegal Grazing*, FOX NEWS (Apr. 7, 2014), <http://www.foxnews.com/politics/2014/04/07/feds-move-in-on-nevada-rancher-herd-over-illegal-grazing/>. Bundy has made

several other arguments in his multifaceted campaign against the Bureau of Land Management. See *id.* (joining states’ rights debate); Matt Ford, *The Irony of Cliven Bundy’s Unconstitutional Stand*, ATLANTIC (Apr. 14, 2014), <http://www.theatlantic.com/politics/archive/2014/04/the-irony-of-cliven-bundys-unconstitutional-stand/360587/> (asserting ancestral grazing rights trumped federal control); *The Western War: Last Remaining Rancher vs the Federal Gov’t* (FM News Talk 97.1 Apr. 10, 2014), available at <http://danaloeschradio.com/the-western-war-last-remaining-rancher-vs-the-federal-govt> (claiming to not recognize existence of federal government).

6. E.g., Harold S. Shepherd, *The Future of Livestock Grazing and the Endangered Species Act*, 21 J. ENVTL. L. & LITIG. 383 (2006).
7. See discussion *infra* Part V.
8. Ford, *supra* note 5; Kieran Suckling, *A Rancher’s Armed Battle Against the U.S. Government Is Standard Libertarian Fare*, GUARDIAN (Apr. 19, 2014), <http://www.theguardian.com/commentisfree/2014/apr/19/cliven-bundy-nevada-blm-libertarian>.
9. Ketcham, *supra* note 2, at 24.
10. See *id.*

ical spectrum were those who seized on Bundy's hyperbolic statements regarding the rule of law and race relations to portray him as a fringe lunatic intent on declaring war because of political sentiment and senseless right-wing ideology.<sup>11</sup> As is often the case, though, the dispute at the heart of this news story is not so cut-and-dried. It seemed true that Bundy had declared war on the federal government by continually violating the terms of his federal grazing permits and forcibly resisting the efforts of the BLM to enforce court orders requiring him to remove cattle from grazing allotments near Bunkerville.<sup>12</sup> It also seemed, for decades, that the rule of law had absolutely no impact on Bundy's actions—he was going to use the Bunkerville allotment for grazing whether or not he had a permit and regardless of court orders instructing him to cease grazing and remove his cattle.<sup>13</sup> In Bundy's view, he had a right to use the Bunkerville allotment for grazing, on his terms.

The intensity of the tension between Bundy and the BLM surprised those unfamiliar with the political, ecological, and social history of the Great Basin. Many people had a difficult time believing tensions over access to federal lands and the rule of law, western cultural values and resource scarcity, could really result in this level of conflict.<sup>14</sup> And yet, it did. The threats, militia presence, and other actions resulted in the BLM announcing it would not impound Bundy's livestock, due to "threats to public safety."<sup>15</sup>

To those who are familiar with the region, these types of conflicts are the norm, rather than the exception.<sup>16</sup> The cycle of resource use and resource scarcity are nothing new to natural resource managers, scholars, regional historians, or local residents.<sup>17</sup> Now the cycle includes a new variable: the uncertainties associated with climate change. These tensions and this cycle will continue, no doubt, unless there are significant changes in the way federal public lands are managed, and in the way that the regulated communities perceive and use the natural resources at stake. This statement is not a novel one, either, but to date, efforts at reforming the public lands grazing system have all failed, resulting in tens of thousands of acres of public lands grazing allotments deteriorating to the point where continued grazing is questionable.<sup>18</sup>

This problem is particularly acute in desert areas such as the Great Basin.<sup>19</sup>

This Article frames the age-old conflict between livestock grazing and other public lands uses in a new light, incorporating the modern "game-changer" of climate disturbance, using a new theory of reform that has succeeded in similarly delicate ecosystems involving scarce water resources. Part I describes the ecological region of the Great Basin, and its component ecosystems. Then, Part II presents a brief overview of the Great Basin's anthropological history and establishes the patterns of human use of this region for livestock grazing. Part III explains the legal regime governing livestock grazing on public lands, from the disposal era to the present. Part IV presents the historical climate trends in the Great Basin region, as well as the climate predictions for the next century, based on currently available data. Finally, Part V analyzes recent executive approaches for federal lands planning agencies in light of climate concerns, explaining how implementation of management measures will likely require agencies to promulgate new regulations, and presents the theory of demand management as an integral means of effecting the new livestock grazing use patterns that climate change will require.

## I. The Great Basin's Physical Characteristics

### A. Basin Topography

The Great Basin region is hydrologically and geographically unique. With respect to hydrology, the Basin is the largest area of endorheic watersheds in North America, which means that its water bodies have no outlet to any sea.<sup>20</sup> An endorheic basin is essentially a giant funnel, containing several smaller funnel-like basins.<sup>21</sup> The Great Basin is also one of the most mountainous regions of the country,<sup>22</sup> but due to its funnel shape, all of the precipitation that falls as snow or rain into the Basin's long, relatively narrow mountain ranges and valleys, or onto vast desert plains, either evaporates or seeps into the ground.<sup>23</sup>

The Great Basin stretches from southern Oregon eastward to southern Idaho, and southwestern Wyoming, through-

(noting that a conservative estimate of 29% of all BLM grazing allotments have failed to meet the Agency's own standards for rangeland health).

11. *See id.*

12. *Id.*; see also J.J. Macnab, *Context Matters: The Cliven Bundy Standoff—Part 1*, FORBES (Apr. 30, 2014), <http://www.forbes.com/sites/jjmacnab/2014/04/30/context-matters-the-cliven-bundy-standoff-part-1/>.

13. *E.g.*, United States v. Bundy, No. CV-S-98-531-JBR (RJJ), 1998 U.S. Dist. LEXIS 23835, at \*11 (D. Nev. Nov. 3, 1998).

14. Ketcham, *supra* note 2, at 25 (expressing surprise at Bundy's stance on grazing and his defiance of the federal government, which had been "so patient with his shenanigans" and had "subsidized ranchers like him with enormous largesse").

15. *Id.* at 24.

16. *Id.* at 25.

17. *Id.*

18. Public Employees for Environmental Responsibility, *Grazing Reform: About the BLM Grazing Data*, PEER.ORG, <http://www.peer.org/campaigns/public-lands/public-lands-grazing-reform/blm-grazing-data.html> (last visited Aug. 2, 2015).

19. *Id.*

20. *Great Basin and Central Valley, Western U.S.A.—September 17th, 2011*, EARTH SNAPSHOT (Sept. 17, 2011), <http://www.eosnap.com/image-of-the-day/great-basin-and-central-valley-western-usa-september-17th-2011/>.

21. JOHN MCPHEE, *BASIN AND RANGE* 27 (1981).

22. NAT'L PARKS CONSERVATION ASS'N, *GREAT BASIN NATIONAL PARK: A RESOURCE ASSESSMENT 1* (2009), available at [http://www.npsca.org/about-us/center-for-park-research/stateoftheparks/great\\_basin/GRBA-Web.pdf](http://www.npsca.org/about-us/center-for-park-research/stateoftheparks/great_basin/GRBA-Web.pdf).

23. *See id.* at 2; E. Leif Reid, *Ripples From the Truckee: The Case for Congressional Apportionment of Disputed Interstate Water Rights*, 14 STAN. ENVTL. L.J. 145, 148 (1995).

out the western half of Utah (demarcated by the Wasatch mountain range).<sup>24</sup> Most of the Great Basin is occupied by the State of Nevada.<sup>25</sup> Topographically, the Basin is incredibly diverse, consisting of deserts, mountainous landscapes, alpine regions, lakes, and rivers.<sup>26</sup> In brief, though, it is one of the most hostile climates in the United States, and much of the Great Basin is virtually uninhabitable because “all of it is dry and all of it is hot.”<sup>27</sup> As Wallace Stegner explained in *Mormon Country*:

The mountains are treeless and sometimes waterless; the land is an endless succession of swinging sagebrush valleys hammocked between the ranges; the natives are jackrabbits, rattlesnakes, tarantulas, and horned toads . . . Three or four little puddles, an interminable string of crazy, warped, arid mountains with broad valleys swung between them; a few waterholes, a few springs, a few oasis towns and a few dry towns dependent for water on barrels and horsepower; a few little valleys where irrigation is possible and where the alfalfa looks incredibly green as you break down out of the pass; a desert more vegetationless, more indubitably hot and dry, and more terrible than any desert in North America except possibly Death Valley; an uncounted wealth of minerals—gold, silver, lead, zinc, copper, mercury, antimony—that about sums up the Great Basin.<sup>28</sup>

The tallest mountain in the Great Basin region is Mt. Whitney, which crests at approximately 14,000 feet, and the lowest point is Badwater in Death Valley at 282 feet below sea level.<sup>29</sup> As mentioned above, there are several endorheic basins within the Great Basin, such as the Salt Lake Valley, the Sevier Desert, and the Humboldt Sink.<sup>30</sup> Viewed from overhead, this region resembles long and narrow mountain ranges separated by long and deep valleys. Even today, the Basin is difficult terrain to traverse and access.<sup>31</sup>

## B. Ecology

The Great Basin is home to a surprisingly diverse number of plant and animal species. These include the world’s oldest known tree species, the bristlecone pine, with a life span numbering in the thousands of years.<sup>32</sup> Other native plants include sagebrush, aspen trees, pine trees, and various species

of short- to mid-length grasses.<sup>33</sup> However, multiple invasive species, such as cheatgrass, spotted knapweed, thistle, white top, and mullen, are also present.<sup>34</sup> These invasive plant species have caused serious problems in the Basin. For example, one study concludes cheatgrass has taken over approximately twenty-five million acres of BLM lands throughout the Basin, and one hundred million acres of land total.<sup>35</sup> Cheatgrass is a pernicious invader, rapidly taking over where livestock grazing and other surface disturbances occur due to its prolific ability to produce seeds and reproduce rapidly.<sup>36</sup>

The presence and availability of native grasses have depended largely on the climate. When seasonal weather patterns are wetter, grasses are widely present in the valley floors and semi-arid bottomlands.<sup>37</sup> During droughts, the number of grass species diminishes. For example, as a native shrub, sagebrush has been present throughout much of the Great Basin for about 11,000 years.<sup>38</sup> But sagebrush is particularly vulnerable to fire,<sup>39</sup> so the species has largely been replaced by cheatgrass and other invasive species as wildfires have increased in frequency and severity.<sup>40</sup> Cheatgrass and fire have formed a powerful feedback loop, rendering native species such as sagebrush powerless to reestablish themselves.<sup>41</sup> Together, cheatgrass and fire are a “symbiotic disaster.”<sup>42</sup>

Native animal species include coyotes, shrews, lizards, bats, minks, river otters, deer, antelope, porcupines, cougars, pelicans, cormorants, loons, gulls, pheasants, grouse, hawks, owls, and geese.<sup>43</sup> A number of the species of mammals, fish, reptiles, and amphibians that reside in the Great Basin are listed as endangered or threatened under the federal Endangered Species Act<sup>44</sup> or state wildlife protection statutes.<sup>45</sup> One species, the greater sage grouse, occupies almost the entire Basin, and narrowly missed an endangered species listing decision by

33. *Id.* at 14–16.

34. *Id.* at 8.

35. Tom Kenworthy, *How the “Black Fingers of Death” Can Help Defeat Climate Change*, THINKPROGRESS.ORG (Sept. 9, 2014), <http://thinkprogress.org/climate/2014/09/09/3478143/black-fingers-of-death-climate-change/>; see also Hilary Ann Parkinson, M.S. Thesis, *Impacts of Native Grasses and Cheatgrass on Great Basin for Development*, MONT. ST. U., Sept. 2008, at ix (stating that cheatgrass is present in more than one hundred million acres throughout the Basin).

36. Kenworthy, *supra* note 35.

37. U.S. FOREST SERV., U.S. DEP’T OF AGRIC., HUMBOLDT-TOIYABE NATIONAL FOREST CLIMATE CHANGE VULNERABILITY REPORT 2 (2011), available at [http://www.fs.usda.gov/Internet/FSE\\_DOCUMENTS/stelprdb5294901.pdf](http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5294901.pdf).

38. *See id.* at 1.

39. *See Effects of Fire in the Northern Great Plains*, U.S. GEOLOGICAL SURV., <http://www.npwrc.usgs.gov/resource/habitat/fire/shrubs.htm> (last updated Feb. 2, 2013).

40. *See* Brodie Farquhar, *Cheatgrass a Burning Problem*, CASPER STAR TRIB. (Feb. 25, 2003), [http://www.blm.gov/wy/st/en/programs/weeds\\_pests/Cheatgrass/news/2-25casperst.print.html](http://www.blm.gov/wy/st/en/programs/weeds_pests/Cheatgrass/news/2-25casperst.print.html).

41. Kenworthy, *supra* note 35.

42. *Id.*

43. McPHEE, *supra* note 21, at 45.

44. Endangered Species Act of 1973, Pub. L. No. 93-205, 87 Stat. 884 (codified as amended at 16 U.S.C. §§ 1531–1544 (2012)).

45. *See generally* U.S. NAT’L PARK SERV., GREAT BASIN NATIONAL PARK LISTING SENSITIVE AND EXTIRPATED SPECIES (2006), available at <http://www.nps.gov/grba/naturescience/upload/SENSIT-1.pdf>.

24. The Basin roughly resembles the shape of a shield, with the narrowest points at its southern end. *See The Great Basin*, U.S. NAT’L PARK SERV., <http://www.nps.gov/grba/planyourvisit/the-great-basin.htm> (last visited June 23, 2015).

25. *Id.*

26. *Id.*; McPHEE, *supra* note 21, at 18–19, 44 (describing region as: “Basin. Fault. Range. Fault. Range.”).

27. STEGNER, *supra* note 1, at 42.

28. *Id.* at 42, 44.

29. *Motivation for the Great Basin Paleoenvironmental Database*, DESERT RES. INST., <http://www.dri.edu/gbped-motivation> (last visited Mar. 23, 2015).

30. *E.g., System Description*, SEVIER RIVER WATER USERS ASS’N, <http://www.sevierriver.org/about/system-description/> (last visited Nov. 17, 2014); *The Great Basin*, *supra* note 24.

31. *Geology Provinces in the United States: Basin and Range Province*, U.S. GEOLOGICAL SURV., <http://geomaps.wr.usgs.gov/parks/province/basinrange.html> (last visited Mar. 23, 2015).

32. NAT’L PARKS CONSERVATION ASS’N, *supra* note 22, at 15.

the U.S. Fish and Wildlife Service in October 2015.<sup>46</sup> Federal officials noted that fire and invasive species have particularly threatened greater sage grouse habitat in the Basin.<sup>47</sup>

### C. Great Basin Geology and Hydrology

The Basin's rocky underbelly contains vast deposits of minerals and a surprising amount of groundwater. With respect to the former, the Basin holds some of the richest deposits of gold and silver in the world.<sup>48</sup> Its geologic features also hold platinum, copper, lead, zinc, and molybdenum.<sup>49</sup> Limestone caves hold vast displays of speleothems, or cave rock formations such as stalactites and stalagmites.<sup>50</sup>

Regarding the latter, there are several major river systems in the Basin: the Bear and the Jordan Rivers empty into the terminal Great Salt Lake<sup>51</sup>; the Provo River terminates in Utah Lake<sup>52</sup>; and the Sevier River sinks into the ground or evaporates, depending on the seasonal climate, before discharging into Lake Sevier.<sup>53</sup> In Nevada, river systems touching the Basin include the Truckee, Humboldt, Quinn, and Carson.<sup>54</sup> Two California river systems also connect to the Basin, the Amargosa and the Owens.<sup>55</sup> These rivers empty into terminal lakes—such as Pyramid Lake and Lake Tahoe in Nevada, and Mono Lake in California—where they evaporate, or seep into the ground.<sup>56</sup> As a result of their desert location and lack of hydrological connection to outside water bodies, many of the water sources in the Basin are highly saline.<sup>57</sup>

Much of the available water supply in the Great Basin is held in surface lakes, reservoirs, and underground aquifers.<sup>58</sup> Surface waters are largely appropriated or allocated, and all

of the Basin states are looking to aquifers to fulfill unmet water demands.<sup>59</sup> Aquifers recharge seasonally depending on rainfall and runoff, essentially absorbing any water that is not diverted or captured on the surface, whether by natural or anthropomorphic obstructions.<sup>60</sup> It cannot be overstated, the amount of water in the Great Basin is finite, and diminishes in direct proportion to human occupancy and use patterns.<sup>61</sup>

### D. Great Basin Weather

Given that the Great Basin technically includes part of the highest mountain in the lower forty-eight states, and the lowest, driest, and hottest desert, its climate varies tremendously. However, some discussion of weather patterns is useful in the context of analyzing available forage over the next fifty to one hundred years. With respect to precipitation, annual rain and snowfall in the Basin region is sparse. Although seasonal snowfall may reach up to 300 inches per season in some mountainous areas, some of the valley floors experience less than 5 inches of precipitation per year.<sup>62</sup> During spring runoff, much of the surface water flows too rapidly to soak into the arid ground, so it courses through canyons and gullies as flash floods and vanishes almost as quickly as it appeared.<sup>63</sup>

Temperatures in the Great Basin are extreme. The warmer parts of the Basin average greater than 85 degrees Fahrenheit in the summer<sup>64</sup> and the highest recorded temperature in U.S. history was in Death Valley, in the southwestern region of the Great Basin.<sup>65</sup> In the winter, temperatures can reach extreme lows in the mountainous regions, but the desert floors are not immune from the cold. Temperatures there can be in the low teens in the winter months.<sup>66</sup> In Great Basin National Park, in eastern Nevada, the average temperatures are above 80 degrees in the summer and below 20 degrees in the winter.<sup>67</sup>

The elevation differential between the basins and peaks of the ranges throughout the region can reach as much as 8000 feet, resulting in tumultuous wind and storm pat-

46. See 12-Month Finding on a Petition to List Greater Sage-Grouse (*Centrocercus urophasianus*) as an Endangered or Threatened Species, 80 Fed. Reg. 59,857, 59,858 (Oct. 2, 2015).

47. *Id.*

48. See Reid, *supra* note 23, at 154; *Western Region Gold Deposits*, U.S. GEOLOGICAL SURV., <http://minerals.usgs.gov/west/projects/nngd.htm> (last modified Dec. 13, 2012, 3:14 PM).

49. BILL FIERO, *GEOLOGY OF THE GREAT BASIN* 13 (1986).

50. *Park Geology*, U.S. NAT'L PARK SERV., <http://www.nature.nps.gov/GEOL-OGY/parks/grba/> (last updated Jan. 4, 2005).

51. Utah Div. of Water Res., *The Great Salt Lake*, UTAH.GOV, <http://www.water.utah.gov/GSL/GSLlake.htm> (last visited June 23, 2015).

52. ARTHUR C. BENKE & COLBERT E. CUSHING, *RIVERS OF NORTH AMERICA* 656 (2005).

53. *Id.* at 671; *Virtual River Basin: System Description*, SEVIER RIVER WATER USERS ASS'N, <http://www.sevierriver.org/about/system-description/> (last visited Aug. 2, 2015).

54. FIERO, *supra* note 49, at 192.

55. BENKE & CUSHING, *supra* note 52, at 657–58.

56. *Id.* at 656–58, 671; *Great Basin and Central Valley, Western U.S.A.—September 17th, 2011*, *supra* note 20.

57. See generally *Great Basin: Maps*, U.S. NAT'L PARK SERV., <http://www.nps.gov/grba/planyourvisit/maps.htm> (last visited June 23, 2015); NEV. DIV. OF WATER PLANNING, *HUMBOLDT RIVER CHRONOLOGY: AN OVERVIEW AND CHRONOLOGICAL HISTORY OF THE HUMBOLDT RIVER AND RELATED WATER ISSUES I-2* (2000), available at <http://water.nv.gov/mapping/chronologies/humboldt/hrc-pt1.pdf>; *About Mono Lake: Chemistry*, MONO LAKE COMMITTEE, <http://www.monolake.org/about/geolake> (last visited June 23, 2015).

58. See *Groundwater*, U.S. NAT'L PARK SERV., <http://www.nps.gov/grba/nature-science/groundwater.htm> (last visited June 23, 2015).

59. See, e.g., Mark Havnes, *Geologist: S. Utah Aquifer Could Be Developed*, SALT LAKE TRIB., June 14, 2009, at B2.

60. Glenn Thomas Malmberg, *Available Water Supply of the Las Vegas Ground-Water Basin Nevada*, U. NEV. LAS VEGAS, 1965, at 22, available at [http://digitalscholarship.unlv.edu/water\\_pubs/123/](http://digitalscholarship.unlv.edu/water_pubs/123/).

61. See *id.* at 84.

62. See *Great Basin: Weather*, U.S. NAT'L PARK SERV., <http://www.nps.gov/grba/planyourvisit/weather.htm> (last visited June 23, 2015); *Climate of Nevada*, W. REGIONAL CLIMATE CTR., <http://www.wrcc.dri.edu/narratives/NEVADA.htm> (last visited June 23, 2015). For a comparison, the city of Chicago, Illinois, receives about twice that amount. See *Compare Average Rainfall for U.S. Cities*, WEATHERDB, <http://average-rainfall.findthebest.com/> (last visited June 23, 2015).

63. MCPHEE, *supra* note 21, at 40.

64. *Great Basin: Weather*, *supra* note 62.

65. Andrea Thompson, *What's the Highest Temperature Ever Recorded in the U.S.?*, LIVE SCIENCE (July 8, 2011, 11:52 AM), <http://www.livescience.com/30582-highest-hottest-temperature-recorded-us-world.html>.

66. *Great Basin: Weather*, *supra* note 62.

67. *Id.*

terns.<sup>68</sup> The weather patterns in the Great Basin are regularly marked by flash floods, wind storms, and even sand storms.<sup>69</sup> In Great Basin National Park, visitors are advised to watch for weather-related dangers including rain, hail, and snow storms, and other hazards such as altitude sickness, sudden drops in temperature and visibility, and sun exposure.<sup>70</sup>

## II. Human Imprints on the Basin: Anthropological History

### A. Prehistoric Occupancy of the Great Basin

For the past 11,000 years, records indicate that the Great Basin has been plagued by drought.<sup>71</sup> The earliest occupants of the Great Basin settled near water, which is not surprising given the desert characteristics of the region.<sup>72</sup> As drought periodically settled on the Basin, records reflect “hiatuses” of human occupancy.<sup>73</sup> Recent studies of pollen, tree rings, and rat middens have allowed climatologists to determine that the region was perpetually plagued by droughts lasting around one hundred or more years, and that it has been gradually drying for the past 11,000 years.<sup>74</sup>

The records of human habitation in the Great Basin region date from approximately 12,000 B.C.<sup>75</sup> The earliest occupants, Paleo-Indians, were followed by civilizations of Archaic Peoples; the difference in their subsistence patterns and societal construction is attributed to climatological conditions and the types of food supplies those conditions could sustain.<sup>76</sup> The Paleo-Indians were primarily hunters, who moved with their prey, which included Pleistocene mammals like ground sloth, mammoth, and bison.<sup>77</sup> When climate conditions shifted and these large prey animals disappeared, Paleo-Indians disappeared from archaeological records and were replaced by Archaic Peoples.<sup>78</sup> The Archaic civilization was more omnivorous, supported by a wide variety of vegetation and supplemented by small mammals and fish.<sup>79</sup>

68. Paul W. Jewell & Kathleen Nicoll, *Wind Regimes and Aeolian Transport in the Great Basin, U.S.A.*, 129 *GEOMORPHOLOGY* 1, 1–3 (2011), available at [http://www.academia.edu/549920/Wind\\_Regimes\\_and\\_Aeolian\\_Transport\\_in\\_the\\_Great\\_Basin\\_U.S.A.](http://www.academia.edu/549920/Wind_Regimes_and_Aeolian_Transport_in_the_Great_Basin_U.S.A.)

69. STEGNER, *supra* note 1, at 49.

70. See *Current Conditions—Great Basin National Park*, U.S. NAT'L PARK SERV., <http://www.nps.gov/grba/planyourvisit/ccgrba.htm> (last updated June 19, 2015).

71. Scott Mensing et al., *Extended Drought in the Great Basin of Western North America in the Last Two Millennia Reconstructed From Pollen Records*, SCIENCE-DIRECT, 2007, at 1–2.

72. Stephanie D. Livingston, Presentation at the Spring-Fed Wetlands Conference: The Relevance of Old Dirt and Old Water to Location, Preservation, and Visibility of Prehistoric Archaeological Sites in the Great Basin, at 1, 3 (May 2002), available at [http://www.dri.edu/images/stories/conferences\\_and\\_workshops/spring-fed-wetlands/spring-fed-wetlands-livingston.pdf](http://www.dri.edu/images/stories/conferences_and_workshops/spring-fed-wetlands/spring-fed-wetlands-livingston.pdf).

73. *Id.* at 1.

74. Mensing et al., *supra* note 71.

75. NAT'L PARKS CONSERVATION ASS'N, *supra* note 22, at 10.

76. *Id.*

77. *Id.*

78. *Id.*

79. *Id.*

After these earliest inhabitants disappeared from the archaeological record, the Fremont arrived, around A.D. 500.<sup>80</sup> The Fremont were sedentary people who engaged in irrigated agricultural practices along with hunting both large and small game.<sup>81</sup> There is archaeological evidence that the Fremont grew corn, beans, and squash, and constructed permanent food storage structures in their villages, despite occupying the Basin during what has become known as the Holocene Drought.<sup>82</sup> The Holocene Drought lasted from roughly 486 B.C. until approximately A.D. 1500 and, initially, did not affect Fremont farming.<sup>83</sup> Between A.D. 1300 and 1500, the Fremont disappeared from the archaeological record of the Great Basin.<sup>84</sup> Recent studies have determined that their disappearance was largely due to the desertification of the Basin, which rendered their sedentary farming practices impossible.<sup>85</sup>

Around the time that the last traces of the Fremont civilization disappeared from the record, new indigenous civilizations moved into the area.<sup>86</sup> These were the ancestral relatives of modern native nations such as the Bannock, Chemehuevi, Kawaiisu, Mono, Paiute, Panamint, Shoshone, Goshute, Washoe, and Ute, and they were largely migratory societies.<sup>87</sup> They hunted large and small game, gathered nuts, berries, seeds, tubers and roots, and fished if they lived near one of the Basin's many lakes.<sup>88</sup> They did not engage in Fremont-style agricultural practices, except in very small, personal plots.<sup>89</sup> The descendants of these inhabitants still reside in the Great Basin today,<sup>90</sup> although their subsistence patterns have changed, especially with the introduction of domestic livestock by European settlers in the mid-1800s.<sup>91</sup> Many tribes, such as the Shoshone, engage in western-style cattle ranching today.<sup>92</sup>

### B. Historic Non-Native Settlers and Occupants of the Great Basin

Spanish conquistadors and missionaries began exploring the southernmost reaches of the Great Basin region in the mid-1500s, when records document their contact with members of the Zuni Nation in the present-day States of Arizona and

80. See *Historic Tribes of the Great Basin*, U.S. NAT'L PARK SERV., <http://www.nps.gov/grba/learn/historyculture/historic-tribes-of-the-great-basin.htm> (last visited June 23, 2015).

81. *Id.*

82. *Great Basin: Fremont Indians*, U.S. NAT'L PARK SERV., <http://www.nps.gov/grba/historyculture/fremont-indians.htm> (last visited June 23, 2015).

83. U.S. FOREST SERV., *supra* note 37.

84. See *Great Basin: Fremont Indians*, *supra* note 82.

85. *Id.*; Mensing et al., *supra* note 71.

86. See *Great Basin: Fremont Indians*, *supra* note 82 (“At the same time, new groups of hunter-gatherers appear to have migrated into the Fremont area from the southwestern Great Basin sometime after about 1,000 years ago.”).

87. *Historic Tribes of the Great Basin*, *supra* note 80.

88. *Id.*

89. *Id.*

90. *Id.*

91. John Ragsdale, *Individual Aboriginal Rights*, 9 MICH. J. RACE & L. 323, 331–32 (2004).

92. *Id.* at 342.

New Mexico.<sup>93</sup> By the mid-1600s, the Spanish established permanent settlements in the area.<sup>94</sup> In 1821, Mexico succeeded in gaining independence from Spain and claimed the Great Basin as its sovereign territory.<sup>95</sup> However, Spanish and Mexican nationals found the Basin region largely uninhabitable and did not settle as ranchers or farmers beyond the present-day States of Arizona and New Mexico.<sup>96</sup> They introduced cattle to the region, laying the foundation in southern Arizona and New Mexico for the type of ranching that would eventually spread northward into the Great Basin.<sup>97</sup> This style of large-scale, open-range ranching, would ultimately transform the region in less than 200 years.<sup>98</sup>

After the Mexican-American War, Mexico ceded almost the entirety of the Great Basin region to the United States in the Treaty of Guadalupe Hidalgo.<sup>99</sup> Thereafter, in the latter part of the nineteenth century, European-American settlers began arriving, intent on farming and ranching in the same manner they had learned in the east.<sup>100</sup> Most settlement occurred around water sources that would provide adequate sustenance for large herds of sheep and cattle, such as Pruess Lake in Snake Valley, along the Utah and Nevada border.<sup>101</sup>

Some of the first large groups to settle in the Basin were members of the Mormon Church.<sup>102</sup> They staked their claims on “an immense area,” with “farms and villages, [and] outposts that worked outward from Salt Lake City” shortly after the United States signed the Treaty of Guadalupe Hidalgo.<sup>103</sup> Unlike later farmers and ranchers, these early farms were generally small, around 20 acres, and utilized both wet and dry farming techniques.<sup>104</sup> From fairly early on, however, it was clear that the Mormon settlers had taken on more than they bargained for because the land in the Great Basin was so arid and the water supplies so scarce.<sup>105</sup> In essence, as Wallace Stegner put it, “[W]ater was always a problem.”<sup>106</sup> As these settlers soon found, the Great Basin was largely “a dead land,” where human destiny was “plain on its face.”<sup>107</sup> In brief, “its distances were terrifying, its cloudbursts cata-

strophic, its beauty flamboyant and bizarre and allied with death. Its droughts and its heat were withering.”<sup>108</sup>

As early as 1878, the explorer John Wesley Powell cautioned that the high desert climate in the Great Basin was “ill suited” for traditional agricultural practices.<sup>109</sup> Continuously, settlers discovered that the Great Basin proved “wholly inadequate” to support the type of agricultural practice of the size and scope contemplated by the federal disposition laws enacted by Congress at the time.<sup>110</sup> By the 1860s, livestock grazing had changed the landscape significantly, depleting native forage to the point that invasive species like sagebrush quickly took over as the dominant groundcover.<sup>111</sup> Cheatgrass, medusahead, and red brome were all introduced as replacement forage, but these grasses only increased the desertification which their introduction was designed to stem.<sup>112</sup>

### III. Legislating on the Brink of Ecological Disaster: The Federal Statutes Regulating Livestock Grazing in the Great Basin

#### A. Incentivizing Disaster: The Disposal Statutes of 1800–1934

The grazing “rights” that Cliven Bundy once lawfully possessed, derive from disposal-era policies that the federal government adopted when it first tried to establish control over the vast territory it had acquired west of the Mississippi River in the mid to late 1800s. To encourage rapid settlement and population dispersal over what are now the eleven western States of California, Oregon, Washington, Idaho, Montana, Wyoming, Colorado, Utah, Nevada, Arizona, and New Mexico, Congress passed a series of statutes designed to vest ownership in new settlers, so they would stay and cultivate the arable bottomland.<sup>113</sup> In reality, the statutes ended up accommodating a small number of large enterprises and consolidated control over large mineral estates, land, and water, at the expense of small farmers and individual miners.<sup>114</sup>

In the beginning, to encourage small ranching operations, Congress passed several statutes allowing early twentieth century settlers to patent up to 640 acres of federal land if

93. *Zuni Tribe of N.M. v. United States*, 12 Cl. Ct. 607, 618 (1987).

94. *Id.* at 620.

95. *Id.* at 627.

96. Eric B. Kunkel, *The Spanish Law of Waters in the United States: From Alfonso the Wise to the Present Day*, 32 McGEORGE L. REV. 341, 351 (2001).

97. George Cameron Coggins & Margaret Lindeberg-Johnson, *The Law of Public Rangeland Management II: The Commons and the Taylor Act*, 13 ENVTL. L. 1, 22 (1982–1983).

98. *See id.*; Pub. Lands Council v. Babbitt, 529 U.S. 728, 732–33 (2000).

99. Frederico M. Cheever, *A New Approach to Spanish and Mexican Land Grants and the Public Trust Doctrine: Defining the Property Interest Protected by the Treaty of Guadalupe Hidalgo*, 33 UCLA L. REV. 1364, 1369 (1986).

100. *Grazing the Great Basin*, U.S. NAT'L PARK SERV. (Apr. 2000), <http://www.nps.gov/grba/historyculture/grazing-the-great-basin.htm>.

101. EDWARD LEO LYMAN & LINDA KING NEWELL, *A HISTORY OF MILLARD COUNTY* 167 (1999).

102. John E. Thorson et al., *Dividing Western Waters: A Century of Adjudicating Rivers and Streams*, 8 U. DENV. WATER L. REV. 355, 400–01 (2005).

103. STEGNER, *supra* note 1, at 34.

104. *See id.* at 38.

105. *Id.* at 34, 40.

106. *Id.* at 40.

107. *Id.* at 51.

108. *Id.*

109. Robert B. Keiter, *Public Lands and Law Reform: Putting Theory, Policy, and Practice Into Perspective*, 2005 UTAH L. REV. 1127, 1133 (2005).

110. Coggins & Lindeberg-Johnson, *supra* note 97, at 20.

111. MULE DEER WORKING GRP., W. ASS'N OF FISH & WILDLIFE AGENCIES, *MULE DEER IN THE WEST—CHANGING LANDSCAPES, CHANGING PERSPECTIVES* 3 (2003), available at <http://www.wafwa.org/Documents%20and%20Settings/37/Site%20Documents/Working%20Groups/Mule%20Deer/Publications2/Mule%20Deer%20Changes.pdf>.

112. Lecture by Karen Launchbaugh & Eva Strand, Professor & Assistant Professor respectively, Univ. of Idaho, on *Grazing, Fuels, and Fire—Interactions in Sagebrush Ecosystems* (n.d.), available at [http://www.gbfiresci.org/storage/docs/Webinars/2013-04\\_GrazingFuels.pdf](http://www.gbfiresci.org/storage/docs/Webinars/2013-04_GrazingFuels.pdf).

113. Coggins & Lindeberg-Johnson, *supra* note 97, at 19–20.

114. *Id.* at 19.

they satisfied certain requirements.<sup>115</sup> The problem with these statutes was that profitable ranching in an arid or semi-arid environment required thousands, not hundreds, of acres,<sup>116</sup> so it was never possible to ranch in an economically viable way with 640 acres or less. It was also impossible to patent more land because large swaths had no access to water and it was impractical to erect structures (required by the homesteading laws for a patent to issue) on multiple 640 acre parcels.<sup>117</sup> It was much easier to patent a 340 acre parcel, and run large herds of cattle on the public range, with no attendant statutory obligations.<sup>118</sup>

Starting with the railroad land grant statutes of the mid-1800s, the federal government disposed of over a billion acres of land between 1789 and 1934.<sup>119</sup> The disposals can be categorized roughly by category of grantee. Beginning in 1862, Congress gave away over ninety million acres of federal land to private railroad corporations.<sup>120</sup> In 1862, Congress passed perhaps the most well-known disposal statute, the Homestead Act,<sup>121</sup> which opened federal public land to anyone who settled and cultivated it.<sup>122</sup> This was followed by the General Mining Law in 1872,<sup>123</sup> which opened all “unreserved” federal lands to those willing to prospect hard rock minerals.<sup>124</sup> Lesser known homesteading statutes succeeded them, such as the Timber Culture Act of 1873,<sup>125</sup> the Desert Lands Act of 1877,<sup>126</sup> the Graduation Act of 1854,<sup>127</sup> and the Timber and Stone Act of 1878.<sup>128</sup> Along with the settlement statutes, Congress passed other disposal laws intended to encourage the westward moving populace to settle and “tame” the vast federal estate.<sup>129</sup> Thus, the west was essentially “won” by the early 1900s, at least as far as ranching was concerned, and a use pattern and an expectation of privilege were established, both of which still exist today.<sup>130</sup>

## B. Federal Land Laws to the Rescue: Conservation-Driven Legal Reform

As settlers poured into the western states to take advantage of open access to federal grazing lands, violent conflicts over

resources began erupting, particularly in areas like the Great Basin.<sup>131</sup> By 1867, large ranching operations were conducting cattle drives, bringing herds thousands of miles to access newly constructed railheads.<sup>132</sup> These first drives brought great profits, encouraging others to enter the cattle business and graze their livestock on the public domain.<sup>133</sup> In the 1870s, large-scale sheep ranching began, and different grazing patterns between sheep and cattle sparked tension and even more competition for scarce common resources.<sup>134</sup> The tension erupted into open hostility at points, resulting in the “range wars” of the 1880s and 1890s.<sup>135</sup> Much of the conflict early on, especially in arid regions like the Great Basin, arose out of attempts to monopolize access to the limited surface water sources.<sup>136</sup>

One of the first congressional attempts to curb this conflict was the Unlawful Inclosures Act of 1885,<sup>137</sup> which provided that “[t]he assertion of a right to the exclusive use and occupancy of any part of the public lands of the United States . . . without claim, color of title, or asserted right . . . is likewise declared unlawful, and prohibited.”<sup>138</sup> This statute criminalized actions that ranchers had been taking to protect their water sources, like fencing off sections of public land to keep competing livestock at bay.<sup>139</sup> While Congress was deliberating further action, conservationists like Aldo Leopold were already predicting that continued grazing in the Great Basin region would lead to an environmental crisis because of the impacts grazing had on fire patterns and other causes of desertification.<sup>140</sup>

The Unlawful Inclosures Act did little to address the root of the problem: too many cattle and sheep on the open range, and too little water and forage to go around.<sup>141</sup> Yet, it took another four decades of unregulated grazing on the public commons and the environmental catastrophe now known as “the Dust Bowl” to spur further congressional action.<sup>142</sup> That action was the Taylor Grazing Act,<sup>143</sup> which Congress passed in 1934.<sup>144</sup> Much has been written about the reasons for this statute, and what it was intended to accomplish, but it was one of the strongest indicators of congressional intent to avert ecological disaster, although those charged with implement-

115. *Id.* at 20.

116. *See id.* at 6.

117. *See id.* at 21 (“[P]rivate lands are randomly interspersed among the federal tracts and checkerboarded with railroad sections.”).

118. *Cf.* *Buford v. Houtz*, 133 U.S. 320, 328, 332 (1890) (explaining that running cattle on public range was a necessity for western ranchers).

119. *Coggins & Lindeberg-Johnson*, *supra* note 97, at 4.

120. *Id.* at 11–12.

121. Homestead Act, ch. 75, 37 Stat. 392 (1862) (repealed 1976).

122. *Id.* at 392.

123. General Mining Law, ch. 152, 17 Stat. 91 (1872) (codified as amended at 30 U.S.C. §§ 21–54 (2012)).

124. *Id.* at 91.

125. Timber Culture Act of 1873, ch. 277, 17 Stat. 605 (repealed 1891).

126. Desert Lands Act of 1877, ch. 102, 19 Stat. 315 (codified as amended at 43 U.S.C. §§ 321–323 (2012)).

127. Graduation Act, ch. 244, 10 Stat. 574 (1854) (repealed 1862).

128. Timber and Stone Act, ch. 151, 20 Stat. 89 (1878) (repealed 1955).

129. *See Coggins & Lindeberg-Johnson*, *supra* note 97, at 11.

130. *See, e.g.*, *United States v. Fuller*, 409 U.S. 488, 493 (1973) (holding the Fifth Amendment requires no compensation for value added to fee lands and that permits do not create property rights).

131. *Coggins & Lindeberg-Johnson*, *supra* note 97, at 22–23.

132. *Pub. Lands Council v. Babbitt*, 529 U.S. 728, 731 (2000).

133. *Id.* at 731–32.

134. *Id.* at 732.

135. *Id.*

136. *See Coggins & Lindeberg-Johnson*, *supra* note 97, at 21–22.

137. Unlawful Inclosures Act, ch. 149, 23 Stat. 321 (1885) (codified as amended at 43 U.S.C. §§ 1061–1066 (2012)).

138. 43 U.S.C. § 1061.

139. *Id.*

140. CTR. FOR BIOLOGICAL DIVERSITY, LIVESTOCK GRAZING, FIRE REGIMES, AND TREE DENSITIES: APPENDIX C 1–4 (n.d.), available at <http://www.biological-diversity.org/publications/papers/FIRE.PDF>.

141. *See* George Cameron Coggins et al., *The Law of Public Rangeland Management I: The Extent and Distribution of Federal Power*, 12 ENVTL. L. 535, 549 (1981–1982).

142. Sandra Zellmer, *Boom and Bust on the Great Plains: Déjà Vu All Over Again*, 41 CREIGHTON L. REV. 385, 393–94 (2008).

143. Taylor Grazing Act, ch. 865, 48 Stat. 1269 (1934) (codified as amended at 43 U.S.C. §§ 315–315r (2012)).

144. *Id.* at 1269.

ing the statute “organized” grazing in such a way that perpetuated it.<sup>145</sup>

Throughout the western half of the nation, overgrazing in the late 1800s and early 1900s on the public domain led to dramatic alterations of the landscape to the point where homesteaders struggled to survive.<sup>146</sup> By the 1930s, the Dust Bowl descended and created a mass exodus to the west, where states like Nevada, Colorado, New Mexico, Kansas, and Oklahoma were experiencing a drought unlike any seen in decades.<sup>147</sup> The droughts of the 1930s hit the Great Basin particularly hard,<sup>148</sup> as it is a region that reached its domestic livestock carrying capacity far sooner than others.<sup>149</sup> In response to this environmental and social crisis, Congress passed a number of statutes as part of The New Deal, in an effort to revitalize and stabilize the agricultural economy and the greater national economy dependent upon it.<sup>150</sup>

These statutes included measures granting mortgage relief to bankrupt farmers, agricultural subsidies, and, as mentioned above, so did the Taylor Grazing Act.<sup>151</sup> The Taylor Grazing Act was intended to organize a grazing system on the federal lands, to “regulate their occupancy and use,” and to preserve the land from “destruction or unnecessary injury.”<sup>152</sup> A salient theme throughout the statute is “the need for improvement of range conditions.”<sup>153</sup>

What Congress did not know in 1930, but has become apparent with the evolution of climate science, is that the grazing and agricultural practices of the late 1800s and early 1900s actually changed the ecological backdrop in the Great Basin region, rendering it drier and less able to support large-scale domestic livestock operations than other areas of the west, and they continue to do so today.<sup>154</sup> With the gradual

increase in human population since that time, resources such as water have become even scarcer,<sup>155</sup> which has prevented the Basin’s rangelands from regenerating. Moreover, as the land dries, it becomes more susceptible to dust and windstorms, causing increasing dust loads to form on the mountainous regions downwind of the desertified valleys.<sup>156</sup> The increasing dust loads cause snow to melt more quickly, which results in less retained moisture at higher elevations and greater levels of spring runoff.<sup>157</sup>

After Congress passed the Taylor Grazing Act, it took the federal government until the early 1960s to formally adjudicate the grazing rights to all of the federal lands—that is, to apportion grazing allotments to the nearby landowners and water rights holders in the manner that the statute required.<sup>158</sup> Simultaneously, the Grazing Service, and later the BLM, organized thousands of grazing allotments into various districts and selected regional ranchers to oversee them.<sup>159</sup> In the interim, the condition of federal grazing allotments continued to decline, prompting Congress to act again in the 1970s and 1980s through the passage of the Federal Land Policy and Management Act of 1976 (“FLPMA”),<sup>160</sup> the National Environmental Policy Act of 1969 (“NEPA”),<sup>161</sup> and the Public Rangelands Improvement Act of 1978 (“PRIA”).<sup>162</sup>

In PRIA, Congress declared that “vast segments of the public rangelands are . . . in an unsatisfactory condition,” and that this “unsatisfactory condition” presented a “high risk of soil loss, desertification . . . and contribute[d] to unacceptable levels of siltation and salinity in major western watersheds . . . .”<sup>163</sup> In addition, Congress found that overgrazing had “increase[d] surface runoff and flood danger . . . and may ultimately lead to unpredictable and undesirable long-term local and regional climatic and economic changes.”<sup>164</sup> To carry out the management changes authorized by PRIA, Congress authorized the appropriation of funds for new management policies aimed specifically at

145. See 43 U.S.C. § 315a; Coggins et al., *supra* note 141, at 550 (characterizing the Taylor Grazing Act as a step backwards, rather than forwards, in terms of the overall health of the public rangeland).

146. John D. Leshy & Molly S. McUsic, *Where’s the Beef: Facilitating Voluntary Retirement of Public Lands From Livestock Grazing*, 17 N.Y.U. ENVTL. L.J. 368, 373–74 (2008).

147. JOHN STEINBECK, *THE GRAPES OF WRATH* 233 (Steinbeck Centennial ed., Penguin Books 2002) (1939) (“And then the dispossessed were drawn west—from Kansas Oklahoma, Texas, New Mexico; from Nevada and Arkansas families, tribes, dusted out, tracted out. Carloads, caravans, homeless and hungry; twenty thousand and fifty thousand and a hundred thousand and two hundred thousand. They streamed over the mountains, hungry and restless—restless as ants, scurrying to find work to do—to lift, to push, to pull, to pick to cut—anything, any burden to bear, for food. The kids are hungry. We got no place to live. Like ants scurrying for work, for food, and most of all for land.”).

148. LeRoy W. Hooten, Jr., *Thirties Drought Still Utah’s Worst*, SALT LAKE CITY PUB. WORKS (Aug. 14, 2013), <http://www.slcdocs.com/utilities/NewsEvents/policy2003/news8142003.htm>.

149. *Id.*

150. Arthur F. McEvoy, *Environmental Law and the Collapse of New Deal Constitutionalism*, 46 AKRON L. REV. 881, 881–82 (2013).

151. Kurt T. Lash, *The Constitutional Convention of 1937: The Original Meaning of the New Jurisprudential Deal*, 70 FORDHAM L. REV. 459, 476 (2001); see also Coggins & Lindeberg-Johnson, *supra* note 97, at 47.

152. 43 U.S.C. § 315a (2012).

153. Coggins & Lindeberg-Johnson, *supra* note 97, at 51.

154. Cf. Colorado Plateau—Land Use History of North America, *Cattle and Sheep Grazing: History*, CPLUHNA, <http://cpluhna.nau.edu/Change/grazing.htm> (last visited June 24, 2015); see also Debra L. Donahue, *Federal Rangeland Policy: Perverting Law and Jeopardizing Ecosystem Services*, 22 J. LAND USE & ENVTL. L. 299, 304 (2007).

155. See Colorado Plateau—Land Use History of North America, *Population Growth*, CPLUHNA, <http://cpluhna.nau.edu/Change/populationgrowth.htm> (last visited June 24, 2015).

156. Tom Kenworthy, *How Dust on Colorado’s Snow Could Ruin Your Salad*, CLIMATE PROGRESS (June 19, 2014, 9:54 AM), <http://thinkprogress.org/climate/2014/06/19/3447621/dust-on-snow-colorado/>; C. Rhoades et al., *The Influence of an Extensive Dust Event on Snow Chemistry in the Southern Rocky Mountains*, 42 ARCTIC ANTARCTIC & ALPINE RES. 98, 98 (2010), available at [http://www.fs.fed.us/rm/boise/AWAE/scientists/profiles/Rhoades/rmrs\\_2010\\_rhoades003.pdf](http://www.fs.fed.us/rm/boise/AWAE/scientists/profiles/Rhoades/rmrs_2010_rhoades003.pdf) (discussing livestock grazing’s role in increasing ambient dust in the western United States).

157. See Kenworthy, *supra* note 156.

158. See Hillary M. Hoffmann, *A Changing of the Cattle Guard: BLM’s New Approach to Grazing Regulations*, 24 J. ENVTL. L. & LITIG. 243, 253–66 (2009).

159. See Bruce Pendery, *Reforming Livestock Grazing on the Public Domain: Ecosystem Management-Based Standards and Guidelines Blaze a New Path for Range Management*, 27 ENVTL. L. 513, 519 (1997).

160. Federal Land Policy and Management Act of 1976, Pub. L. No. 94-579, 90 Stat. 2743 (codified as amended at 43 U.S.C. §§ 1701–1787 (2012)).

161. National Environmental Policy Act of 1969, Pub. L. No. 91-190, 83 Stat. 852 (1970) (codified as amended at 42 U.S.C. §§ 4321–4347 (2012)).

162. Public Rangelands Improvement Act of 1978, Pub. L. No. 95-514, 92 Stat. 1803 (codified as amended at 43 U.S.C. §§ 1901–1908 (2012)).

163. 43 U.S.C. § 1901(a)(1), (3).

164. *Id.* § 1901(a)(3).



addressing overgrazing.<sup>165</sup> Unfortunately, as the condition of the western range continued to change, the system of allocating public lands for existing permittees at historical grazing levels did not,<sup>166</sup> and, as one might predict, the federal range continued to decline. Numerous scholars have commented on the failure of PRIA and other 1970s-era legislation, such as the FLPMA, National Forest Management Act (“NFMA”),<sup>167</sup> and NEPA, to effectuate real change on federal grazing allotments, in terms of lowering stock levels, improving range monitoring, and raising grazing fees to reflect the actual cost of grazing on federal lands.<sup>168</sup> Those scholars attribute this failure, at least in part, to strong, and sometimes violent, resistance by the regulated community of federal lands ranchers, combined with a lack of recognition by land management agencies of the true ecological impacts of grazing by land.<sup>169</sup>

### C. Cultural Backlash Against the Grazing Statutes

When Cliven Bundy was in his twenties, a national movement to disrupt federal control over livestock grazing, and indeed, over federal ownership of public land as a whole, started in his home state of Nevada. Disgruntled local residents succeeded in convincing their state and local representatives to enact ordinances and legislation demanding that the federal government cede public lands within Nevada to the State.<sup>170</sup> Residents also took up arms in defense of their cause, which was to eliminate federal ownership and control over public lands.<sup>171</sup> This movement is now known as the Sagebrush Rebellion.<sup>172</sup> In certain places, “Sagebrush Rebels,” as the activists became known, threatened or actually initiated violence over livestock grazing on federal lands, and spawned the social movement that continues in the Great Basin today.<sup>173</sup>

Although its legal strategies failed, the Sagebrush Rebellion never really died, and it persists in federal and state discussions of policy choices involving federal lands.<sup>174</sup> The Rebels’ resentment results, at least in part, from their frustration that the federal government owns vast tracts of lands in the western states (particularly in the Great Basin states) and that federal management over the past several decades has included steps to protect endangered species, biological diversity, and the sharing of public lands amongst mul-

multiple interest groups, as opposed to representing purely local interests.<sup>175</sup> Instead, the Rebels (and their progeny) want to reinstate federal disposal policies and concurrently disrupt federal policy choices over how public lands are managed.<sup>176</sup> The fulcrum of the dispute is ownership of federal lands, because ownership carries the rights to determine use patterns.<sup>177</sup> Despite the violence and active support for the movement, the Sagebrush Rebels have historically failed to effect any change in either the legislative scheme or administrative policy choices governing livestock grazing in any of the western states.<sup>178</sup>

In the 1980s and 1990s, the Sagebrush Rebellion was repackaged and reinvigorated as the “County Supremacy,” or “County Home Rule,” Movement.<sup>179</sup> Although it originated outside the Great Basin, in Catron County, New Mexico, this movement quickly resonated with holdover Sagebrush Rebels as a new hope for less federal control over livestock grazing.<sup>180</sup> Similar to the Sagebrush Rebellion, the County Supremacy Movement was disruptive, threatening, and violent.<sup>181</sup> It was different, however, in that its scope was broader than just grazing on federal lands.<sup>182</sup> This time, county governments more actively sought to divest the federal government of its property by passing local ordinances purporting to claim rights to federal land within county borders.<sup>183</sup> Like the Sagebrush Rebellion, these ordinances were uniformly rejected in federal court challenges, and by many State Attorneys General and other officials, and federal lands remained under federal ownership.<sup>184</sup>

The recent resurgence in violent, disruptive tactics by Cliven Bundy, E. Wayne Hage, and their fellow activists follows the pattern established by the Sagebrush Rebellion and the County Supremacy Movement.<sup>185</sup> Bundy’s view, as reflected in the various legal proceedings he has been involved in since the early 1990s, is that the federal government has no authority to regulate his use of federal lands for grazing.<sup>186</sup> In 1993, Bundy decided to test that view by declining to apply for a grazing permit and not paying

165. *Id.* § 1901(b)–(c).

166. See Hoffman, *supra* note 158, at 246.

167. National Forest Management Act of 1976, Pub. L. No. 94-588, 90 Stat. 2949 (codified as amended at 16 U.S.C. §§ 1600–1614 (2012)).

168. See, e.g., Debra L. Donahue, *Western Grazing: The Capture of Grass, Ground, and Government*, 35 ENVTL. L.J. 721, 772 (2005); Leshy & McUsic, *supra* note 146, at 376–77.

169. See Coggins & Lindeberg-Johnson, *supra* note 97, at 23–24; Joseph M. Feller & David Brown, *From Old-Growth Forests to Old-Growth Grasslands: Managing Rangelands for Structure and Function*, 42 ARIZ. L. REV. 319, 333 (2000).

170. Robert L. Glicksman, *Fear and Loathing on the Federal Lands*, 45 U. KAN. L. REV. 647, 647–52 (1997).

171. *Id.*

172. *Id.*

173. See *id.*

174. *Id.*

175. See *id.*; see also 43 U.S.C. §§ 1751–1753 (2012).

176. See Glicksman, *supra* note 170, at 652–54.

177. *Id.*

178. A. Dan Tarlock, *Can Cowboys Become Indians? Protecting Western Communities as Endangered Cultural Remnants*, 31 ARIZ. ST. L.J. 539, 563 (1999).

179. Scott W. Reed, *The County Supremacy Movement: Mendacious Myth Marketing*, 30 IDAHO L. REV. 525, 527 (1994); Tom Gede, *Anti-Government Movements in the West*, 11 NAT’L ENVTL. ENFORCEMENT J., No. 4, 1996, at 3.

180. Gede, *supra* note 179; Reed, *supra* note 179.

181. Gede, *supra* note 179.

182. *Id.*

183. Reed, *supra* note 179, at 529.

184. Gede, *supra* note 179, at 5.

185. E. Wayne Hage was another Nye County rancher who shared Cliven Bundy’s beliefs regarding grazing rights on federal lands. He died in 2006, after waging a decades-long war in court and on the ground over access to grazing allotments and water sources located on federal lands. Steve Tetreault, *Nevada Rancher Details Long Fight for Property Rights*, LAS VEGAS REV. J. (Oct. 29, 2013, 9:29 PM), <http://www.reviewjournal.com/news/nevada-rancher-details-long-fight-property-rights>.

186. United States v. Bundy, No. CV-S-98-531-JBR (RJJ), 1998 U.S. Dist. LEXIS 23835, at \*\*2–3 (D. Nev. Nov. 3, 1998).

the grazing fees required by the Taylor Grazing Act<sup>187</sup> and BLM regulations,<sup>188</sup> and sending various letters to the BLM informing the Agency that it had no jurisdiction to regulate his grazing activities because he had “vested grazing rights” on the Bunkerville Allotment.<sup>189</sup>

Due to decades of threats and documented fears by federal land managers that any attempts to enforce federal grazing laws against Bundy would result in violent conflict, the BLM allowed Bundy to continue trespassing on federal lands for over twenty years.<sup>190</sup> Finally, in 2014, after decades of legal proceedings and orders authorizing impoundment, the Agency attempted to impound his trespassing livestock.<sup>191</sup> The resulting violence made national news, and the Agency returned Bundy’s animals out of fear of a militia-style retaliation.<sup>192</sup>

#### IV. Historical Climatic Data and Climate Projections for the Great Basin Region From 1900–2100

##### A. The Climatological Foundation: Great Basin Climate Change From 1900–2014

Understanding how and why the Bundy saga developed into an all-out war is impossible without considering the history of climate change in the Great Basin. The current battles over grazing, suitable land, water, and forage are a result of climatological changes that altered the availability of those very resources. From 1900 to 2000, the Great Basin region warmed by between 0.6 and 1.1 degrees Fahrenheit (depending on elevation and location) and experienced increased intermittent precipitation events (especially during the winter and spring), a declining snowpack during winter, increased tree mortality, and an earlier onset of spring due to changes in runoff patterns.<sup>193</sup> Much of the region is currently experiencing the most severe drought conditions since recordkeeping started.<sup>194</sup> While some changes, like increased precipitation events, seem advantageous in light of the warming trends, these changes may actually accelerate desertification by reducing the overall nutrient load available in the soil.<sup>195</sup> This will

lead to marked decreases in available grasses for domestic livestock grazing on federal lands in the Basin and, simultaneously, increase the viability of plants like sagebrush, which livestock do not readily consume.<sup>196</sup>

As the region has desertified, continued grazing has accelerated the process and made it more difficult to mitigate the changes in climate and ecology.<sup>197</sup> The statistics related to the carrying capacity of the land indicate that the number of supportable livestock grazing on federal lands has fallen from a peak of thirty-five million animal unit months (“AUMs”) in 1900 to slightly less than fifteen million AUMs in 2000.<sup>198</sup> This reduction has occurred because there is simply less available forage, and, in places, grasses have disappeared altogether and been replaced with species like sagebrush, which thrive in high aridity.<sup>199</sup> In short, range managers have attempted to mitigate climate change in the Basin through reductions in AUMs, which has produced unsatisfactory results.

##### B. Great Basin Climate Change From 2014–2100

For the next several decades, scientists agree that the Great Basin region will continue to warm, dry, and produce additional desertification. The U.S. Bureau of Reclamation estimates that water demand in the Basin will exceed water supply on a consistent basis throughout that period, and that temperatures across the Basin will rise by as much as 6 degrees Celsius by 2100.<sup>200</sup> The region’s rivers will experience earlier peak flows and an earlier spring runoff caused by increased dust loads on winter snowpack, resulting in less available consistent water flow during the hot summer months.<sup>201</sup> The United Nations Intergovernmental Panel on Climate Change predicts the region will experience less precipitation in the spring and summer through 2060, although increased water vapor in cloud cover will cause more dramatic precipitation events when rain does fall.<sup>202</sup> These effects will influence other wild card phenomena, such as pine and spruce beetle infestations.<sup>203</sup> The overall warming, changes in groundcover plant species, and decreased summer precipitation will result in increased fire incidents across the Great Basin region.<sup>204</sup> More specifically, the Great Basin is expected to experience more fires, more acreage burned, longer lasting fires, and longer fire seasons, all of which will tax the reduced water flow even more, as fire management agencies use water reserves to combat the fires.<sup>205</sup>

187. 43 U.S.C. § 315b (2012).

188. 43 C.F.R. § 4130.8-1 (1993).

189. *Bundy*, 1998 U.S. Dist. LEXIS 23835, at \*\*2–3.

190. *See id.* at \*\*4–5.

191. Jaime Fuller, *Everything You Need to Know About the Long Fight Between Cliven Bundy and the Federal Government*, WASH. POST (Apr. 15, 2014), <http://www.washingtonpost.com/blogs/the-fix/wp/2014/04/15/everything-you-need-to-know-about-the-long-fight-between-cliven-bundy-and-the-federal-government/>.

192. *E.g.*, Bleakly et al., *BLM Releases Cattle to Bundy*, 8 NEWS NOW (Apr. 12, 2014), <http://www.8newsnow.com/story/25231502/breaking-news-protesters-gather-on-i15-causing-traffic-delays-cliven-bundy-blm>.

193. JEANNE C. CHAMBERS, U.S. DEP’T OF AGRIC., CLIMATE CHANGE AND THE GREAT BASIN 29 (2008); *see* Bradley Udall, Presentation at the 16th Annual Conference for Environmental Law Teachers: The Future of Water Supply and Demand in the Colorado River Basin, at 3 (2013).

194. Udall, *supra* note 193.

195. RICHARD F. MILLER ET AL., OR. AGRIC. EXPERIMENT STATION, SPECIAL REPORT NO. 880, DRY-WET CYCLES AND SAGEBRUSH IN THE GREAT BASIN 12–13

(1991).

196. *Id.* at 13–14.

197. Feller & Brown, *supra* note 169, at 339.

198. Launchbaugh & Strand, *supra* note 112.

199. MILLER ET AL., *supra* note 195, at 14.

200. *See* Udall, *supra* note 193, at 8.

201. *Id.* at 15.

202. *See id.* at 8; Andrew Freeman, *Climate Projections More Confident, Dire From IPCC*, CLIMATE CENTRAL (Sept. 27, 2013), <http://www.climatecentral.org/news/ipcc-report-shows-climate-scientists-more-confident-dire-in-projections-16528>.

203. Udall, *supra* note 193, at 20.

204. *Id.* at 22.

205. *Id.*

Experts agree climate change is “water change,”<sup>206</sup> but it will also create “forage change” for those using the federal lands to graze domestic livestock. Where there is less water, increased fire, and continued grazing, there will be less forage. Ranchers will increasingly have to bring forage and water to their cattle grazing on federal allotments to supplement the naturally occurring grasses.<sup>207</sup> The carrying capacity of federal allotments will decrease, in many places, to the point where grazing will have to cease altogether.<sup>208</sup>

Climate change in the Great Basin has, and will continue to, dramatically impact native species. Two-thirds of the Basin’s native fish are either on the endangered species list, designated for listing, or targeted as species of concern.<sup>209</sup> One species, the pika, has demonstrated what could potentially happen to other species—it disappears from the periphery of the warmest parts of its range at a demonstrable rate and does not return.<sup>210</sup> That is to say, as pika habitat warms by just a few degrees, the pika leave, seeking cooler temperatures at higher elevations.<sup>211</sup> They do not adapt and they do not return.<sup>212</sup> Alarmingly, the State of Nevada alone has identified over one hundred biodiversity “hot spots” in the Basin, which are areas where the number of rare or endangered species is considered critical to maintain.<sup>213</sup>

In brief, the climate projections indicate that grazing will have to be curtailed, at a minimum, to the degree it has already been over the past fifty years. What is currently unknown is the degree to which the effects of climate change will impact livestock grazing given all of the other variables, such as increased fire, increased dust loads on snowpack, pest outbreaks, decreased and unpredictable water supplies, and perhaps others, in various combinations and at unpredictable intervals. Yet, all of these predictions result in a future climate that does not support livestock grazing at current levels, or possibly at all, depending on how rapidly the region warms. Ideally, such dramatic change warrants a wholesale restructuring of the statutory regime governing natural resource management, but the pace of current climate change demands a faster solution than Congress can deliver.

## V. Demand Management: A New Social, Scientific, and Legal Regime for a New Series of Resource Management Problems

### A. Grazing Management and Climate Change

The topic of, and the need for, range reform is nothing new to those who study and manage livestock grazing on public lands, but it was historically undertaken only in response to overgrazing crises or threats to endangered species or their habitat. As noted above, the statutory authority to manage grazing stems primarily from the Taylor Grazing Act,<sup>214</sup> as modified slightly by the Granger-Thye Act,<sup>215</sup> the FLPMA, the NFMA, NEPA, and to some degree, PRIA. Yet none of these statutes contemplate, let alone require, the Forest Service or the BLM to regulate grazing activity in light of climate change science.<sup>216</sup> Indeed, the concept of climate change did not enter into the dialogue of public lands managers until 2010, when the Council on Environmental Quality (“CEQ”) sent draft guidance to federal lands agencies regarding potential measures they could take into account for climate change when making individual adjudicatory decisions.<sup>217</sup> Yet, even the CEQ acknowledged that it did not have specific guidance for land use planners, such as Forest Service and BLM rangeland specialists responsible for advising on grazing policy and making adjudicatory decisions.<sup>218</sup>

In June 2013, the White House issued a *Climate Action Plan* that surveyed the impact of climate change on public lands.<sup>219</sup> Although this represents an encouraging step in the right direction for those concerned about climate impacts on public lands, the anticipated completion date for any resulting studies is, at earliest, the summer of 2015 and the focus of these early documents is on the key action items involving greenhouse gases, energy production, and protection of vulnerable communities from storms and other disasters associated with sea level rise.<sup>220</sup> Impacts to public lands are barely mentioned.<sup>221</sup>

In November 2013, President Obama issued an executive order entitled “Preparing the United States for the Impacts of Climate Change,” which notes many of the climate impacts that regions like the Great Basin have and will suffer as a

206. *Climate Change and Water*, U.S. ENVTL. PROTECTION AGENCY, <http://water.epa.gov/scitech/climatechange/> (last visited June 25, 2015).

207. Thomas M. Power, *Taking Stock of Public Lands Grazing: An Economic Analysis*, PUBLICLANDSRANCHING.ORG, [http://www.publiclandsranching.org/htmlres/wr\\_taking\\_stock.htm](http://www.publiclandsranching.org/htmlres/wr_taking_stock.htm) (last visited June 25, 2015) (noting that, in 1997, only 4% of the feed for domestic livestock in the eleven public lands ranching states came from public lands).

208. See Pendery, *supra* note 159, at 583–87.

209. Holly Doremus, *Water, Population Growth, and Endangered Species in the West*, 72 U. COLO. L. REV. 361, 367 (2001).

210. *Global Warming and the American Pika*, NAT’L WILDLIFE FED’N, <https://www.nwf.org/Wildlife/Threats-to-Wildlife/Global-Warming/Effects-on-Wildlife-and-Habitat/Pika.aspx> (last visited June 25, 2015).

211. See John Kostyack & Dan Rohlf, *Conserving Endangered Species in an Era of Global Warming*, 38 ELR 10203, 10204 (Apr. 2008).

212. *Id.*

213. See PETER F. BRUSSARD ET AL., U.S. GEOLOGICAL SURV., STATUS AND TRENDS OF THE NATION’S BIOLOGICAL RESOURCES 514 (1998).

214. 43 U.S.C. § 315(b) (2012).

215. Granger-Thye Act, Pub. L. No. 81-478, 64 Stat. 82 (1950); see also Federal Land Policy and Management Act of 1976, Pub. L. No. 94-579, § 701(j), 90 Stat. 2743, 2787 (clarifying that nothing in the Act was intended to affect livestock grazing revenues under section 12 of the Granger-Thye Act, codified at 16 U.S.C. § 580h (2012)).

216. Marya Torrez, *Cows, Congress, and Climate Change: Authority and Responsibility for Federal Agencies to End Grazing on Public Lands*, 14 VT. J. ENVTL. L. 1, 30–31 (2012).

217. Mark Squillace & Alexander Hood, *NEPA, Climate Change, and Public Lands Decisionmaking*, 42 ENVTL. L. 469, 469 (2012).

218. *Id.* at 473.

219. EXEC. OFFICE OF THE PRESIDENT, CLIMATE ACTION PLAN 14 (2013).

220. See *id.* at 5, 12.

221. See *id.* at 7, 14, 15 (discussing public lands but only in the context of other issues such as water usage and energy concerns).

result of climate change, but focuses largely on building community resilience and infrastructure that can adapt to the changing climate and the challenges that it will bring to urban population centers.<sup>222</sup> The order speaks of “safeguarding natural resources” and contains one section requiring the heads of the Department of the Interior and Department of Agriculture, among others, to inventory and assess proposed changes to “their land- and water-related policies, programs, and regulations necessary to make the Nation’s watersheds, natural resources, and ecosystems, and the communities and economies that depend on them, more resilient in the face of a changing climate.”<sup>223</sup> In addition, the order requires agencies, “where possible, [to] focus on program and policy adjustments that promote the dual goals of greater climate resilience and carbon sequestration, or other reductions to the sources of climate change.”<sup>224</sup> The executive order required that the assessment and inventory be completed within nine months of its issuance.<sup>225</sup>

The agencies’ individual climate action plans are still bound by the statutory mandates in the Taylor Grazing Act, which, together with the grazing regulations, guarantee that existing ten-year grazing permits shall be renewed as long as the permittee has not violated the terms of the prior permit.<sup>226</sup> The BLM and Forest Service can reduce grazing levels in response to permit violations (such as grazing too many or too few livestock on an allotment, or grazing outside the permissible season), and to protect the ecological health of an allotment; however, these authorities were promulgated before the CEQ recommendation in 2010 and the subsequent executive order mentioned above.<sup>227</sup> Therefore, existing grazing laws and regulations do not expressly authorize the Forest Service or the BLM to reduce grazing levels or cancel grazing on allotments in response to climate change concerns.

### B. Demand Management: An Unorthodox Solution to the Grazing Problem

Although the existing statutory and regulatory structures governing livestock grazing on public lands would, theoretically, allow for land management agencies to incorporate climate change impacts into planning and decisionmaking efforts,<sup>228</sup> it is likely that a full execution of the 2013 executive order will require the promulgation of new regulations. When agencies take this inevitable step, they will have several models to follow from governmental entities that have already begun the work of planning for climate change, both within the United States and in the Mediterranean region.<sup>229</sup>

One theory that has proven successful in planning for climate-related impacts on regional water resources is called “Water Demand Management.”

Demand management is a concept that developed from the field of economics, involving the study of market forces operating on a given product or service.<sup>230</sup> As economists have known for centuries, factors of supply and demand will drive price, while governmental manipulation on either side of the supply or demand curves will alter market price and product consumption.<sup>231</sup> Since the early 1970s, governments and the United Nations have been managing and studying water use patterns in the Mediterranean region using the Water Demand Management theory.<sup>232</sup> Climate science is one of the factual bases used in the application of this theory to determine future water availability and, if data indicate a lessening of the total amount of the resource, to provide the factual support for governmental entities to curb societal demand for, and use of, that resource.<sup>233</sup> As implemented in the Mediterranean, Water Demand Management is a holistic approach, involving more than just “command and control” techniques.<sup>234</sup> The reason for this is that Mediterranean countries have recognized that a social component must form part of a successful demand management strategy to achieve the desired result in the most efficient way.<sup>235</sup>

The theoretical assumption underpinning demand management is that, whether water is privately owned or communally held, it is a resource that is subject to government regulation.<sup>236</sup> The authority for either national or local governments to condition water usage must, and does, exist in all nations and regions that have incorporated demand management measures.<sup>237</sup> This is because demand management is an integrated approach to resource management, involving top-down, or command and control style regulation, with a bottom-up, social and educational component.<sup>238</sup> Specific demand management techniques with respect to water management have included: cost-reflective pricing, metering, loss detection measures, communications campaigns to educate consumers about efficient resource

222. See Exec. Order No. 13,653, 78 Fed. Reg. 66,817 (Nov. 6, 2013).

223. *Id.* at 66,820.

224. *Id.*

225. *Id.*

226. 42 U.S.C. § 315(b) (2012).

227. See 43 C.F.R. § 4180.1 (2015).

228. See Hillary M. Hoffmann, *Climate Change and the Decline of the Federal Range: Is Adaptive Management the Solution?*, 15 Vt. J. ENVTL. L. 265, 287–89 (2014).

229. See GLOBAL WATER P'SHIP, WATER DEMAND MANAGEMENT: THE MEDITERRANEAN EXPERIENCE 7–8 (2012), available at <http://www.gwp.org/Global/Tool>

Box/Publications/Technical%20Focus%20Papers/01%20Water%20Demand%20Management%20-%20The%20Mediterranean%20Experience%20(2012)%20English.pdf.

230. See Asmita Barve, *Lessons in Demand Management*, N.C. ST. UNIV. SUPPLY CHAIN RESOURCE COOPERATIVE (Sept. 24, 2002), <http://scm.ncsu.edu/scm-articles/article/lessons-in-demand-management>.

231. See generally Amy Sinden, *The Tragedy of the Commons and the Myth of a Private Property Solution*, 78 U. COLO. L. REV. 533, 535 (2007).

232. See GLOBAL WATER P'SHIP, *supra* note 229.

233. See *id.* at 4; see also David Stephenson, *Demand Management Theory*, 25 WATER S. AFR. 115, 117 (1999).

234. See GLOBAL WATER P'SHIP, *supra* note 229, at 4.

235. See *id.* at 37; Stephenson, *supra* note 233, at 118.

236. In Turkey, for example, water rights can be publically held, but they are subject to privatization by the government, for use in hydroelectric dams. See Mine Islar, *Privatized Hydropower Development in Turkey: A Case of Water Grabbing?*, 5 WATER ALTERNATIVES 376, 382 (2012). In the United States, water is owned by the public but subject to state-specific apportionment laws and federal navigational servitudes.

237. See *id.*; Gregory S. Weber, *A New Water Accounting*, 40 ECOLOGY L.Q. 795, 810 (2013).

238. Weber, *supra* note 237.

use, incentives for retrofitting outdated equipment, and mandated reduction of resource use on either a temporary or permanent basis.<sup>239</sup> The specific measures used depend on the nature of the resource, its relative scarcity, and the social context surrounding its use.<sup>240</sup>

Water Demand Management has been applied in some regions of the United States, although its use has thus far been a matter of local or state choice, rather than a federal mandate.<sup>241</sup> In California, for example, the state legislature passed a water conservation statute in 2009, requiring municipal governments to reduce overall water usage in the State by 20% in eleven years.<sup>242</sup> The statute requires these authorities to implement demand management principles into water planning and environmental review of new development practices.<sup>243</sup> Demand management techniques will also likely play a part in reapportioning upper and lower Colorado River basin allocations under the Colorado River Compact.<sup>244</sup>

As for grazing in the Great Basin, principles of demand management should be incorporated into the federal natural resource management scheme, given that climate science demonstrates an impending ecological disaster if grazing continues at current, or slightly less than current, rates.<sup>245</sup> Moreover, like water, the regulated community in the Great Basin and federal land statutes regard the federal range as a quasi-public resource.<sup>246</sup> That is, ranchers like Cliven Bundy admit that the federal government currently owns the Bunkerville Allotment, but they believe, ardently, that they possess a private, independent right to the forage contained thereon.<sup>247</sup> Many have debated the nature of what these ranchers consider to be a grazing right and the federal definition of the corresponding legal term, a “grazing preference,” has evolved over time, but there is no debate over the fact that federal land management agencies and the regulated community of ranchers consider there to be at least some component of a private right in the forage located on the federal range, whatever form or label it actually may take.<sup>248</sup>

239. See PacificWater SOPAC, *What Is Water Demand Management*, SOPAC, <http://www.pacificwater.org/pages.cfm/water-services/water-demand-management/what-water-demand-management/> (last visited Mar. 21, 2015).

240. *Id.*

241. Jamey Volker, *Water Supplies Finally Take Center Stage in the Land Use Planning Arena*, 35 *ECOLOGY L.Q.* 573, 604–08 (2008).

242. Andrew P. Tauriainen et al., *New Attention for Urban Water Management Plans: Urban Water Planning in California After the Water Conservation Act of 2009*, 13 *A.B.A. WATER RESOURCES COMMITTEE NEWSL.* 14, 14 (2010).

243. *Id.* at 17–18.

244. Greg Hobbs, *Upper Colorado River Basin Compact: Sharing the Shortage*, 32 *WYO. LAW.* 20, 23 (2009).

245. See Torrez, *supra* note 216, at 2–8.

246. *Nevada Governor Calls Federal Cattle Roundup “Intimidation,”* CBS LAS VEGAS (Apr. 9, 2014, 11:09 AM), <http://lasvegas.cbslocal.com/2014/04/09/nevada-governor-calls-federal-cattle-roundup-intimidation/> (“Bundy, a descendant of Mormons who settled in Bunkerville more than 140 years ago, claims an inherent right to graze the area and casts the conflict as a states’ rights issue. He said he doesn’t recognize federal authority on land that he insists belongs to Nevada.”).

247. *Id.*

248. Donahue, *supra* note 154, at 323.

There are several reasons why demand management is needed and could succeed in ways that prior attempts to reduce or eliminate grazing failed. To begin, it is a theory of natural resource management that contemplates large-scale prospective planning, which is exactly what natural resource management agencies will have to do as they attempt to plan for climate change impacts, both direct and indirect, some of which are unknown.<sup>249</sup> It is also malleable and can be developed during the planning process required by the FLPMA, during the renewal process for individual grazing allotments, or during the review process for annual operating instructions (“AOI”) by the BLM.<sup>250</sup>

For example, the BLM could promulgate regulatory amendments that require federal land use plans to consider region-specific climate change impacts. Various aspects of demand management could be incorporated into those regulations, or folded into the Agency’s implementation of the new regulations. These amendments, and the notice and comment process, would alert the regulated community that the Agency acknowledges climate change is occurring and notify them that the direct and indirect impacts of climate change will alter their grazing patterns. The regulations themselves could be fairly general to allow for district- and allotment-level planning decisions that require specific actions, but they could require the Agency to consider climate change as it moves ahead with grazing management decisions. Simultaneously, the Agency could enable district and regional range managers to make adjustments to forage levels based on the present climate science.

Alternatively, the BLM could promulgate climate change regulations that incorporate demand management principles more directly, and require the Agency to manage grazing accordingly. This approach could include a multifaceted, holistic directive to range managers to set up a forage monitoring system, determine a means of evaluating compliance with AUM levels, and establish a system for determining rates of forage and water loss. They could also be directed to adjust grazing fees to reflect the true cost to the Agency of administering the grazing program (as well as including the cost of scientific research into climate impacts), include incentives for ranchers who comply with their permit terms, mandate across the board AUM reductions in regions like the Great Basin where the climate will dry and warm at a predictable rate, and set up a training program for range managers to educate ranchers about climate change. The latter component will be particularly critical given the existing tensions between ranchers like Cliven Bundy and the BLM.<sup>251</sup> It may not be easy to determine a way to communicate the facts of climate change to this community but any new regulatory scheme should include this element if there is any hope of success. Without it, public lands ranchers will continue to resist federal management of grazing on federal lands.

249. See Torrez, *supra* note 216, at 27.

250. See 43 U.S.C. §§ 1751–1753 (2012).

251. See *Nevada Governor Calls Federal Cattle Roundup “Intimidation,”* *supra* note 246.

Moreover, as demonstrated by the Mediterranean region's experiences, a successful demand management paradigm must incorporate an educational component about the impacts of use or climate on natural resources and the projections regarding the availability of that resource in the future.<sup>252</sup> So, it is necessary not only to tell ranchers that climate change is happening and that it will impact their forage levels, but also to show them the scientific proof of these eventualities. This educational and social element could be incorporated into BLM and Forest Service grazing management at one or all of the following levels: during long-term NFMA and FLPMA planning processes, at allotment-specific ten-year renewals, and annually with the issuance of AOIs.

## VI. Conclusion

For decades, Cliven Bundy has grazed his livestock on federal lands in Nevada without applying for a permit or paying grazing fees—essentially operating completely outside the legal system that was intended to regulate his activity.<sup>253</sup> He has flouted numerous district and appellate court orders requiring him to remove his cattle from those federal lands, and when the BLM recently attempted to impound his cattle for these violations, Bundy and his supporters used violence and armed intimidation to thwart the agency.<sup>254</sup> The result?

Bundy prevailed over the federal government and the rule of law.<sup>255</sup> And he is not alone.<sup>256</sup>

When citizens can thumb their noses at the rule of law for decades, and the law fails to change their behavior, it is clear that a change in the rule of law is required. In the Great Basin, on federal lands where livestock grazing is authorized, this change needs to happen sooner rather than later, based on the climate predictions discussed earlier.<sup>257</sup>

According to the agencies that manage federal lands in the Great Basin, livestock grazing is the single greatest cause of vegetation loss.<sup>258</sup> It is also the single greatest surface use of the federal lands in the Basin.<sup>259</sup> Climate scientists have warned of impending changes such as warming temperatures, desertification, and fire patterns that will impact this region in a way that is not conducive to maintaining current grazing levels.<sup>260</sup> To address these eventualities, livestock grazing patterns must change.

Moreover, to avoid more showdowns between ranchers and federal land managers, federal agencies must take a new approach.<sup>261</sup> Demand management is a theory that has been proven to alter resource use patterns successfully, and it can be used to implement changes that will improve both the health of ecosystems like the Great Basin and the relationship between its federal stewards and all ranchers, including Cliven Bundy.

252. See GLOBAL WATER P'SHIP, *supra* note 229, at 57, tbl. 8 ("Public awareness and education.").

253. Brief for Appellee at 7–10, *United States v. Bundy*, 178 F.3d 1301 (9th Cir. 1999) (No. 98-17293).

254. See *United States v. Bundy*, No. 02:98-CV-00531-LRH-VCF, slip op. at 1–2 (D. Nev. Oct. 8, 2013).

255. Valerie Richardson, *Cliven Bundy Taunts Feds by Enjoying the "Freedoms" to Graze His Cattle on Disputed Land*, WASH. TIMES (Dec. 29, 2014), <http://www.washingtontimes.com/news/2014/dec/29/rancher-cliven-bundy-still-grazing-his-cattle-on-d/?page=all>.

256. *Id.* ("Mr. Bundy may be getting some stronger local political support, with Republicans capturing both houses of the state legislature in the midterm elections, while GOP Gov. Brian Sandoval easily won re-election. The incoming state Assembly majority leader, Las Vegas Republican Michele Fiore, was a strong supporter of Mr. Bundy and outspoken critic of the BLM's land management programs in April's showdown.").

257. See *supra* Part IV.A–B.

258. Coggins et al., *supra* note 141, at 538–39.

259. Donahue, *supra* note 154, at 322.

260. See Torrez, *supra* note 216, at 2.

261. Zellmer, *supra* note 142, at 386–87; Bruce Babbitt, *Federalism and the Environment: An Intergovernmental Perspective of the Sagebrush Rebellion*, 12 ENVTL. L. 847, 848 (1982) (predicting that a confusing land management structure will lead to more problems).