

**PEST PANIC IN THE AMERICAN WEST: THE SAN JOSE SCALE AS CHANGE
AGENT IN AMERICAN AGRICULTURE, 1880-1900.**

by

**BARRIE RYNE BLATCHFORD
B.A. (Honours), The University of British Columbia, 2015**

**A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF**

MASTER OF ARTS

in

THE FACULTY OF GRADUATE AND POSTDOCTORAL STUDIES

(History)

THE UNIVERSITY OF BRITISH COLUMBIA

(Vancouver)

August 2017

© Barrie Ryne Blatchford, 2017

Abstract

The San Jose scale – a miniature, armoured, sap-sucking insect which preys promiscuously on all manner of deciduous fruit trees - became one of a host of accidentally-introduced bugs to plague American agriculture in the late nineteenth century, particularly in the West. However, despite its significant repercussions and contemporary prominence, scholars have relegated the scale to passing asides in studies of invasive species, American agriculture, and economic entomology. As such, it has little modern-day popular notoriety nor has it engendered the scholarly attention devoted to other contemporary pests like the boll weevil or gypsy moth. Yet the San Jose scale was a formidable change agent in Western agriculture, and also nationally. Its ravages stimulated the development and expansion of agricultural bureaucracies more than any other single insect, while also sparking numerous quarantine and inspection laws at both the state and national level. Meanwhile, the fecundity and tenacity of the scale forced technological innovation, driving entomologists, inspectors, and agriculturalists to pursue chemical solutions. Thus the scale played a key role in making pesticides hegemonic in American agriculture beginning in the 1890s, and also in the growth of government characteristic of the era.

That said, the efforts of officialdom to promote pesticides against the scale ran into opposition throughout the West. I explore this backlash to illuminate both the early history of systemic pesticide use as well as its discontents, subjects which remain understudied. Moreover, the turmoil the scale caused - costing Western farmers millions of dollars in ruined produce, dead trees, and the expense of spraying their orchards – and the apocalyptic, fear-mongering language in which contemporaries discussed it, offers a lens into contemporary mores about nature, suggesting that nineteenth-century Americans understood nature as vulnerable, not endlessly

bountiful. Finally, the scale's depredations pushed some to question the promise of the West as the "Garden of the World," and the system of industrial capitalism which opened up far-flung markets but also introduced exotic insects. In all this, the rhetoric about the scale serves as a vivid reminder of what Ann Stoler has called the "epistemic anxieties" at the heart of colonial enterprises.

Lay Summary

Biologists have been attuned to the ecological impacts – many of them devastating – of invasive species for decades now. However, historians have been less interested; therefore, historical studies of such organisms, which investigate an organism’s social and cultural meaning, are rare. Here, I explore the many ramifications – cultural, technological, legal, and bureaucratic – of the unintended arrival of the San Jose scale to America in 1870.

This tiny insect with a fondness for fruit trees bedeviled American agriculturalists for decades, particularly in the 1880s and 1890s, before being brought under a measure of control in the early twentieth century. Examining the tale of the scale offers insight into more than the crop damage it caused, of course. The crisis it provoked was central to the beginning of the era of mass pesticide use, the breakneck expansion of agricultural bureaucracy, and offers a lens into contemporary understandings of nature in the American West.

Preface

This thesis is entirely the original, unpublished, and independent work of the author,
Barrie Ryne Blatchford.

Table of Contents

Abstract.....	ii
Lay Summary.....	iv
Preface.....	v
Table of Contents.....	vi
List of Illustrations.....	vii
Acknowledgements.....	viii
I. Introduction.....	1
II. Adding a Sense of Scale: The Decades of Dramatic Deciduous Destruction, 1870-1910.....	13
III. The San Jose Scale as Technological and Regulatory Change Agent.....	19
IV. Fighting the “Spray Fiends”: Pesticide Pushback in the West.....	38
V. “Paradise” Lost? The San Jose Scale, the Settler-Colonial Ideal, and Apocalyptic Rhetoric..	53
VI. Conclusion.....	66
Bibliography.....	68

List of Illustrations

Illustration 1 – The San Jose Scale.....	3
--	---

Acknowledgements

The thanks I owe greatly exceeds the space I have here, but I will try. First of all, I want to thank my supervisor, Coll Thrush, for all the attention and inspiration he has given me over the years. His generosity, kindness, and insight have been invaluable to me. I also owe a special slice of thanks to Tina Loo, who so perceptively critiqued an earlier version of this paper. Finally, I must thank the other member of my committee, Jessica Wang, both for reading and for agreeing to come aboard at a late date!

More broadly, I have haunted UBC's History Department for some time now and must mention some of the many wonderful people I have encountered. Bradley Miller and Leslie Paris repeatedly employed me as a Research Assistant, and were constant sources of good company and great advice. I also benefitted enormously from the kindness and wisdom of Michel Ducharme, Courtney Booker, Arlene Sindelar, and William French. On the administrative end, special thanks to Jason Wu for making my life a lot easier on multiple occasions, and the same as well to Tuya Ochir. I was also blessed with highly talented peer group to learn from and laugh with. I am particularly grateful for the friendship of Luther Cenci, Aaron Molnar, David Adie, Vivien Chang, Devin Eeg, and Tryggvi Brynjarsson.

On a personal level, I must thank Conor and Victoria for being so much fun and such great friends, and for following me to New York City. I thank Evan, also, for everything he has meant to me and has done for me. I am truly blessed to have my wonderful parents, Nancy and Dennis, as well. Nothing I have done in academia would have been possible without them, and no one has done more for me.

Finally, this is for Alfie, my favourite corgi, who reminds me every day of the importance and agency of non-humans. I love you.

I. Introduction

Californian pioneer James Lick was a man of many legacies. The Pennsylvanian-born entrepreneur, born in 1796, amassed a fortune as a piano-maker and manufacturer, primarily in South America. But in mid-life he abruptly changed course, moving to California in 1848 and buying up vast tracts of land in the frontier state, thus cementing his fortune. A capricious, occasionally vindictive, and certainly eccentric man, Lick was also philanthropic.¹ His bequests upon his death in 1876 left a permanent mark on his adopted home state, ranging as they did from donations to orphanages and the local SPCA, to the building of public baths – free to all – for poor San Franciscans. Most notable of all, though, was Lick’s funding of the construction of a massive, state-of-the-art telescope on Mount Hamilton, near San Jose. Operated under the auspices of the University of California, the Lick Observatory opened in 1888 and remains active today. It is also surely a more functional and tasteful use of Lick’s fortune than two competing ideas he entertained but ultimately rejected: the erection of giant statutes of himself and his parents which could be seen from sea, and a proposed pyramid – larger than the ones at Giza – to be built in downtown San Francisco.²

As if that were not enough, James Lick appears to have another legacy, though not one remarked-upon by the custodian(s) of his Wikipedia page, nor by the authors of the very detailed biography of his life featured on the University of California’s Lick Observatory online historical archive.³ Indeed, Lick’s passion for horticulture seems to have led him to unleash accidentally the soon-to-be-dreaded San Jose scale on the United States, courtesy of imported fruit trees Lick

¹ Lick purportedly cut his son out of his will due to his offspring’s neglect of a pet parrot. That anecdote, plus all other information in this paragraph, derives from Anthony Misch and Remington Stone, “James Lick,” *University of California – Lick Observatory Historical Collections Project*, 1998. Found at: http://collections.ucolick.org/archives_on_line/James_Lick.html. Accessed on Aug. 14, 2017.

² Ibid. I have not determined where Lick planned to erect these statues, but I assume somewhere in San Francisco.

³ “James Lick,” *Wikipedia*, Oct. 10, 2016. Found at: https://en.wikipedia.org/wiki/James_Lick. Accessed on Aug. 14, 2017.

purchased in the early 1870s.⁴ This tiny armoured insect pest – which proliferates rapidly – sucks the sap from a wide array of deciduous fruit trees, causing the deformation of their fruit and often leading to the trees’ slow deaths.⁵ The San Jose scale would go on to a career of much more financial impact than Lick himself, causing damage to orchardists doubtless worth many, many times Lick’s bequests as it spread throughout the West Coast states in the 1880s and to the East by the early 1890s.⁶ Indeed, the scale was so deleterious and dreaded that it even provoked an international incident in 1898 with several countries, among them Germany and Canada, temporarily banishing American fruit imports.⁷

⁴ Entomologist C. L. Marlatt went to Asia in search of the origin of the scale in the early years of the twentieth century, and after many twists and turns, determined Lick brought it into the country from China courtesy of peach trees. Marlatt also thought the bug should be renamed the “Chinese scale”, but to no avail. Marlatt’s travails are recounted in brief in L. O. Howard, *A History of Applied Entomology (Somewhat Anecdotal)* (Washington: Smithsonian Institution, 1930), 120-124. They exist in full at C. L. Marlatt, *An Entomologist’s Quest* (Washington, D.C.: Monumental Print Co., 1953), 1-330.

⁵ Some basic biological facts on the San Jose scale might be helpful, though for my purposes, the biological facts matter much less than the scale’s social, cultural, and technological impact. In any event, these bugs are not born with scales; instead, they secrete them shortly after birth. There are also morphological differences between sexes. Males get wings in adulthood; females do not. Males also have eyes, which females do not. Those advantages may be made up for by the fact that males do not live very long in their adult phase even by insect standards (females live for a few months – males only hours). More generally, the scale feeds on a wide variety of fruit trees (over 200), which is part of what makes it so prevalent and so difficult to exterminate. Further to this, scale can inhabit all parts of a fruit tree, not merely the fruit or leaves. It is primarily transported through fruit tree cuttings shipped from place to place, but the wind and avian life can also transmit it. See “Diaspidiotus perniciosus (San Jose Scale),” *Invasive Species Compendium*, 2016. Found at: <http://www.cabi.org/isc/datasheet/46224>. Accessed on Jul. 30, 2017; “Pests - Quadraspidiotus perniciosus,” *Interactive Agricultural Ecological Atlas of Russia and Neighbouring Countries*, 2009. Found at: http://www.agroatlas.ru/en/content/pests/Quadraspidiotus_perniciosus/. Accessed on Aug. 10, 2017; Stanley C. Hoyt, “San Jose Scale,” *Orchard Pest Management Online – Washington State University*, 2017 [1993]. Found at: <http://jenny.tfrec.wsu.edu/opm/displaySpecies.php?pn=490>. Accessed on Aug. 10, 2017. As for the vast rate at which the scale can reproduce, contemporary experts concluded that females give birth to four or five generations per growing season of several hundred scale each – the females newly born then reach maturity within a month and also start breeding. Under perfect conditions, Leland Howard, chief of the U. S. Department of Agriculture’s Bureau of Entomology, concluded that three billion scale could be produced in one growing season. Effects of weather, predation, and the like meant that such expansion was nowhere close to possible in the field, but the take-away is simply that this was (and is) an enormously prolific organism. See A. B. Cordley, *The San Jose Scale* (Corvallis, Oregon: Oregon Agricultural Experiment Station, 1906), 7-8.

⁶ It is unlikely that one could arrive at the true cost of the San Jose scale overall, but suffice to say, it was a lot. For just one example, an 1891 article in the Oregon press claimed the scale had already cost California “millions of dollars” and that was before the insect had really even gotten started in its depredations on the rest of the West and in the Eastern states. See Untitled, *Corvallis Gazette*, May 8, 1891, 2.

⁷ The bans lasted from a few months to a few years. L.O. Howard, “Striking Entomological Events of the Last Decade of the Nineteenth Century,” *The Scientific Monthly* 31, 1 (1930), 8-9.

Illustration 1:



The San Jose Scale, by E. H. Zeck for the New South Wales Department of Primary Industries (date unknown). Pictured are the male scale (1), female juveniles (2, 3) and female adult scale (4, 5). The background is an approximately life-size rendering of a shrub infested by scale (6).

It is fitting that it was one of the American West's pre-eminent capitalists who unwittingly introduced the San Jose scale. Indeed, the accidental introduction of pestilential fauna was (and still is) an unpleasant symptom of increased global trade induced by the system of industrial capitalism that Anglo-American settlers brought to the American West. To borrow Carolyn Merchant's memorable phrase to describe the effects of European colonialism on the eastern seaboard, an "ecological revolution" occurred in the nineteenth-century West resulting from the arrival of white settlement and industrial capitalism to the West Coast.⁸ Settlers purposefully brought many organisms to the nineteenth-century West in order to effect what they thought of as improvement; these ranged from gamebirds and songbirds to plants.⁹ But many smaller fauna also came along, unknown and undesired, with the quotidian trading of goods and movement of people.

An awareness (and studious avoidance) of the movement of species through global trade and travel is commonplace today, in part because the high rate at which foreign, agriculturally-damaging insects – like the scale – bombarded the American West in the last decades of the nineteenth century caught contemporaries so unaware and unprepared, with such drastic consequences.¹⁰ Indeed, the unintentional introduction of unwanted species – often termed "invasives" or "exotics" – is now a well-worn fact of life in a global economy in which round-

⁸ Carolyn Merchant, *Ecological Revolutions: Nature, Gender, and Science in New England* (Chapel Hill and London: University of North Carolina Press, 1989), 1-29.

⁹ On plant introductions, see Philip J. Pauly, *Fruits and Plains: The Horticultural Transformation of America* (Cambridge, Mass., and London, England: Harvard University Press, 2007), 3. On bird introductions, see Thomas R. Dunlap, "Remaking the Land: The Acclimatization Movement and Anglo Ideas of Nature," *Journal of World History* 8, 2 (1997): 308.

¹⁰ Peter Coates noted that the rate of importation of economically-harmful species rocketed in the latter decades of the nineteenth century compared to what had come before. See Peter Coates, *American Perceptions of Immigrant and Invasive Species: Strangers on the Land* (Berkeley: University of California, 2006), 4. Although, I should note that the fact that global trade, and capitalism generally, were at the bottom of the spread of insects was not lost on some contemporaries, and some lamented this fact, as we shall see below.

the-world trade and travel is routine.¹¹ But familiarity has not made the effects of such invasives any less pernicious or undesirable in many cases, something to which governments and biologists are now well-attuned.¹² But while efforts to exclude or control invasive species are paramount concerns for modern-day authorities, historical studies of such organisms are few and far between.¹³ By concerning myself here with the San Jose scale's introduction, proliferation, and management, I illuminate a subject understudied by historians, while also unveiling how the impacts of some invasive organisms stretched well beyond the obvious economic damage they caused.

Indeed, while the tale of the San Jose scale might seem to offer only a narrow microhistory, the story of its spread and attempted control actually tells us much about the wide-ranging social, technological, and bureaucratic transformations provoked by the "bug boom" that

¹¹ There has been recent work which seeks to delegitimize the use of the term "invasive species." Such work argues that no ecosystem is pristine and untouched, so it is problematic to decide what *really* belongs there or not. Moreover, though a species may have been relatively recently introduced, it is not necessarily expendable to the ecosystem, even if humans perceive it as an interloper. Thus, eliminating an introduced species may have negative impacts as well. On the entrenched, yet newly-controversial, nature of the term "invasive species", see Mark A. Davis, *Invasion Biology* (Oxford: Oxford University Press, 2009), 3. Nevertheless, I use the term "invasive(s)" here because I do think it conveys something useful for my purposes – introduced species which caused demonstrable economic harm to ecosystems they had previously never inhabited.

¹² For instance, New Zealand has recently embarked upon an official campaign to exterminate all its invasive mammals. See Elizabeth Kolbert, "The Big Kill," *The New Yorker*, Dec. 22 & 29th Issue, 2014. Not Paginated. Found at: <http://www.newyorker.com/magazine/2014/12/22/big-kill>. Accessed on Aug. 10, 2017. For some context on the rise of invasive species as a major political-environmental issue in the United States, see Philip J. Pauly's discussion of American campaigns against the zebra mussel and the kudzu vine in the 1990s and 2000s. Pauly, *Fruits and Plains*, 243-258.

¹³ Some excellent examples do exist, though. Alfred Crosby's two seminal works of largescale species transfer from Europe to North America remain the canonical historiographical texts on invasive species, even though they seem a bit dated today. See Alfred W. Crosby, *Ecological Imperialism: The Biological Expansion of Europe 900-1900* (New York: Cambridge University Press: 1986) and Alfred W. Crosby, *The Columbian Exchange: Biological and Cultural Consequences of 1492* (Westport, Conn.: Greenwood Publishing Co., 1972). More recently, Peter Coates' study of American exotics and anti-immigrant rhetoric is a masterpiece. See Coates, *Strangers on the Land*. On a more targeted level, Glenn Sandiford's recent work on carp stands out as well. See Glenn Sandiford, "Transforming an Exotic Species: Nineteenth-Century Narratives about Introduction of Carp in America" (Ph.D. Dissertation, University of Illinois: *UMI Dissertations Publishing*, 2009). Non-historians have also made useful contributions. See Kim Todd, *Tinkering with Eden: A Natural History of Exotics in America* (New York and London: W. W. Norton and Company, 2001), and Christopher Lever, *They Dined on Eland* (London: Quiller, 1992).

plagued Western agriculture at the end of the nineteenth century.¹⁴ As such, this paper advances three main arguments. Firstly, that the scale was of singular importance in the development and enlargement of agricultural bureaucracies, inspection and quarantine laws, and pesticide use in this era – as such, it deserves more than the passing asides to which scholars have relegated it. In this, the crisis it created was highly influential in bringing about the transition to modern agriculture as we know it, with its elaborate bureaucratic, legal, and technological regimes. Secondly, I contend that the authorities’ heavy promotion of pesticides to combat the scale stirred up resistance to chemical methods and government authority in the 1890s West which has been only minimally covered, thus allowing some insight into the foggy early years of mass pesticide adoption. Thirdly, I believe that the rhetoric about the scale – with its heavy overtones of existential threat, apocalypse, and ambivalence toward the systems which brought the bug (railroads, trade) – reveals something profound about the mentalities of contemporary Americans to both nature and their own societies: namely, that they thought both were fragile. Implicit in this may also be one of the “psychopathologies” common to settler societies described by Lorenzo Veracini: the anxiety that “the land will ultimately turn against the settler project.”¹⁵

That the San Jose scale played a critical role in inciting lasting change to the way agriculture operated in the West (and nationally), helping to usher in an era of mass pesticide use and increased governmental oversight, was as clear to contemporaries as it has been obscure to historians. The scale was one of the prime targets of state- and county-level Boards of Horticulture and one of the main reasons for their creation. These Boards garnered powers of

¹⁴ I found the (very apt) term “bug boom” in a *Los Angeles Times* article from 1882, which describes the activities of the embryonic Los Angeles Horticultural Commission. See “Bug Boom – A Lively Meeting of the Fruit Growers Yesterday,” *Los Angeles Times*, Jan. 11, 1882, 3.

¹⁵ Lorenzo Veracini, *Settler Colonialism: A Theoretical Worldview* (England: Palgrave MacMillan, 2010), 77, 81.

seizure and sanction over agriculturalists that were previously unprecedented.¹⁶ These bodies, and their pest inspectors, also heavily promoted chemical insecticides – particularly to combat the scale – leading to the first massive adoption of pesticide use in the West, and in America more broadly.

The considerable impact of the scale in inducing these innovations will, I hope, become clear through consideration of the massive volume of media and legislative attention the scale generated, as well as by the fearful and panicky terms in which contemporaries – both professional and lay – discussed the San Jose scale peril. True, the San Jose scale was not the only problematic insect driving these changes.¹⁷ Yet, predominantly, both farmers and experts saw the scale as the era's pre-eminent threat to Western agriculture, and *the* key factor in galvanizing state-level and national regulatory and technological action, something which modern scholars seem to have overlooked.

So it is that the historian who has taken the most comprehensive look at nineteenth-century American agricultural pests, James E. McWilliams, refers to the San Jose scale only very briefly in his book-length study.¹⁸ Not surprisingly, then, McWilliams' sketch is minimalist; he acknowledges the great damage the scale did upon coming to America, but he does not link it to reform in agriculture practice, as I do.¹⁹ In addition, his reading seems a bit skewed in places.

¹⁶ California's board of horticulture began operating in 1881. Oregon and Washington's boards were formed around the end of the 1880s. These bodies were sometimes also known as Horticultural Commissions, as were many county-level bodies similarly dedicated to fruit and crop inspection. As we will see below, these boards, and their corresponding fruit inspectors, often exercised their prerogatives to seize infected trees and destroy them, to force farmers to spray their infested trees with pesticides, or to prosecute and fine resistant agriculturalists.

¹⁷ For instance, the codling moth was another loathed pest of the era which particularly vexed Western agriculturalists, which I will expand upon below.

¹⁸ McWilliams, *American Pests*, 67-70, 173-175, 182, 185, 207.

¹⁹ He does not see the scale as a catalyst for concern and conflict over pesticides, either. McWilliams, *American Pests*, 67-70.

Contrary to McWilliams, I do not think the scale “did not debut with a bang.”²⁰ Also, I do not think entomologists nor others thought the organism “lethargic”, even at first.²¹ George M. Cook’s journal article, on the other hand, does contend that the scale forced major changes in agriculture, but he focuses on its impact on Eastern Canada only.²² Other major works on agriculture, pesticides, invasive species, or economic entomologists subsume the story of the scale to brief anecdotes, minimizing its importance, if they address the organism at all.²³

Yet, the San Jose scale was much more than one troublesome insect amongst many, and it should not be merely a footnote in the larger pest predicament plaguing Western agriculture in this period, as scholars have seen it. It was a major change agent that permanently altered the complexion of American agricultural regulation and practice, and this is the first study to give the scale a sustained treatment. Thomas Dunlap, in his seminal study of DDT, nominated the boll weevil as “probably the most important pest to enter the United States in the last half of the

²⁰ James E. McWilliams, *American Pests: The Losing War on Insects from Colonial Times to DDT* (New York: Columbia University Press, 2008), 67-68.

²¹ Ibid.

²² George M. Cook, “‘Spray, Spray, Spray!’: Insecticides and the Making of Applied Entomology in Canada, 1871-1914,” *Scientia Canadensis: Canadian Journal of the History of Science, Technology and Medicine* 22, 51 (1998): 7-50.

²³ McWilliams, though his discussion is very limited, and Cook are the two scholars to give the scale the most attention. Next would be Pauly, though his discussion is confined to a few pages. See Pauly, *Fruits and Plains*, 137, 141-144. Other studies to reference the scale in passing include Coates, *Strangers*, 93-94, 97, 101; J. F. M. Clark, *Bugs and the Victorians* (New Haven and London: Yale University Press, 2009), 201; Steven Stoll, “Insects and Institutions: University Science and the Fruit Business in California,” *Agricultural History*, 69, 2 (1995): 222. Thomas Dunlap’s book on DDT – cited in full below – mentions the San Jose scale not at all, despite a whole chapter setting up the coming of insecticides. James Whorton’s study of insecticides before the DDT era is similarly silent on the San Jose scale, though he mentions as major pests the codling moth, chinch bug, Colorado Potato Beetle, and Western grasshopper, among others. See James C. Whorton, *Before Silent Spring: Pesticides and Public Health in Pre-DDT America* (New Jersey: Princeton University Press, 1974), 6. It is perhaps also worth noting that the rise of economic entomology and its leading lights like L. O. Howard have been the subject of scholarship far more than the organisms which made economic entomology necessary. McWilliams’ and Pauly’s work are archetypical of that. I may also add that work which has focused on economic entomology has often chronicled the growth of the Bureau of Entomology within the USDA and the discipline’s rise from derision to prominence, but such studies usually concentrate at the federal level, not the state-level. See Thomas R. Dunlap, *DDT: Scientists, Citizens, and Public Policy* (Princeton: Princeton University Press, 2014), 20-24, for one example. Perhaps, then, in my discussion that follows regarding resistance and feuding between horticulturalists and state- and county-level inspectors and boards of horticulture, I am also shedding a bit of light upon the experiences and actions of less-ballyhooed functionaries who were nevertheless carrying out the writ of economic entomology’s dictums.

nineteenth century,” while never mentioning the San Jose scale once.²⁴ While importance is difficult to quantify, in the passages that follow, I hope to show the discordance of the weight Dunlap assigns to each, at the very least.²⁵

My second central proposition, that the new normal of mass pesticide use and muscular government provoked by the scale’s spread caused a significant initial backlash, also seems little explored. Prominent scholars have admitted as much, especially concerning the 1890s when pesticides first emerged. For instance, Thomas Dunlap writes that “it is difficult to trace the early history of insecticide use,” and his subsequent discussion of farmers’ embrace of chemical answers seems to be shorn of nuance.²⁶ It appears to me that Western farmers resisted the expansion of state power to a greater degree than has been documented by scholars, a resistance often connected to officialdom’s promotion of pesticides.²⁷ As I will argue, in contrast to historians like Dunlap and McWilliams, the case study of the San Jose scale showcases significant early opposition to chemical pesticides from farmers, a conclusion that can help supplement the lean body of scholarship on the social acceptance of pesticides in the era of their

²⁴ Dunlap, *DDT*, 25.

²⁵ This is especially so when considering the West, my prime focus, where the boll weevil was irrelevant.

²⁶ For the quote, see Dunlap, *DDT*, 19. For Dunlap’s sketch of the American embrace of chemical methods, which omits almost all talk of grower opposition, and is in any case nearly entirely silent on the 1890s, see *Ibid.*, 29, 31, 35-38.

²⁷ Howard Seftel, writing about the Californian context only, does note that there was some farmer resistance to the state Board of Horticulture, pest inspectors, and their new powers, but he spends little time on the resisters and their reasons. In his short exposition on the subject, Seftel focuses on the hold of the ethos of individualism. However, as we shall see below, there were motives for resistance that Seftel did not cover, such as farmers who felt biological control (the use of predatory insects or other animals to control harmful insect populations) methods were superior to pesticides, or those who simply doubted the efficacy of the recommended pesticides. See Howard Seftel, “Government Regulation and the Rise of the California Fruit Industry: The Entrepreneurial Attack on Fruit Pests, 1880-1920,” *The Business History Review* 59, 3 (1985): 382-385. Steven Stoll, in his history of California’s fruit industry, is similarly only focused on California, and similarly perfunctory in his coverage of resistance to the emerging chemical and bureaucratic regimes, but he does delve into farmer reticence to some degree. More than that, though, his work is an excellent study of the activities of Californian entomological authorities. See Steven Stoll, “Insects and Institutions,” 216-239. Adelynn Hiller Whitaker, in her Ph.D. dissertation, also mentioned farmer resistance to pesticides, but very briefly and broadly in her larger discussion of the federal government’s early-twentieth century decision to regulate the insecticide industry. See Adelynn Hiller Whitaker, “A History of Federal Pesticide Regulations in the United States to 1947” (Ph.D. Dissertation, Emory University: Xerox University Microfilms, 1974), 80.

mass introduction. McWilliams proclaims that “farmers and field agents, for their part, demonstrated minimal overt opposition to the use of chemical insecticides, preferring as much as anyone a one-shot solution to the problem of infestations. Since the 1870s, these substances seem to have worked just well enough under the circumstances for American farmers to continue their spraying regimes without considerable concern or protest.”²⁸ The sources I will bring to bear here – through the prism of the San Jose scale’s assault on agriculture – challenge that interpretation.

My final core contention argues that the scale was meaningful on a less tangible plane as well, as the crisis it created infested the worldviews of contemporaries as much as their orchards. Popular and professional rhetoric about the scale displayed hegemonic social attitudes toward insect life which were usually deeply negative and alarmist. However, there was a small but meaningful counter-discourse here too, which looked to recast the scale as a silver lining to a dark cloud because it forced farmers to be more vigilant and industrious. On the whole, though, there is something striking about the prevalence of apocalyptic, doom-and-gloom rhetoric about the San Jose scale. It suggests, perhaps, that catastrophic environmental rhetoric is no brand-new feature of the climate change era but instead a trend with deeper roots.²⁹

²⁸ See McWilliams, *American Pests*, 186. To be fair, McWilliams does note that farmers were aware of the incomplete efficacy of insecticides in this era, and thus, they were not totally enamoured with them (See *Ibid.*). He also asserts elsewhere that elites at the USDA had grave reservations about pesticides in the 1880s and 1890s, but he does not square that well with the official promotion of insecticides the USDA gave during the era (he does not really address this fact), nor does he talk about how farmers received insecticides in the 1880s and ‘90s. See McWilliams, ““The Horizon Opened Up Very Greatly,”” 473-474, 478-479, 488. Finally, McWilliams also notes that the scholarly work done on the early years of the agricultural transition to insecticides is fragmentary and here I think he is right. As he puts it, “History has been relatively silent on the question of why” pesticides became hegemonic in American agriculture. See *Ibid.*, 469. One other scholar’s work should be briefly mentioned here, though I will expand on his contributions (and those of the others) below. James C. Whorton’s *Before Silent Spring* does touch on the popular reception of insecticides in the latter years of the nineteenth century, though only briefly. See pages 15-35.

²⁹ For one scholar who has discussed, and critiqued, the fear-based tone of modern environmentalist discourse, see Alex Gourevitch, “Environmentalism—Long Live the Politics of Fear,” *Public Culture* 22, 3 (2010): 411-424.

Such rhetoric also implies a level of awareness of the fragility of nature which historians have been reticent to ascribe to nineteenth-century Americans. The dominant view amongst scholars – though under attack from some quarters – is that the strands of what we now consider modern environmentalist consciousness did not exist in any deep or widespread sense in the nineteenth century.³⁰ But contemporary awareness of, and concern about, the ecological emergency engendered by the scale complicates that logic.

Lastly, there is an even more abstract level on which to analyze the rhetoric about the San Jose scale, with its apocalyptic tenor and notes of dissonance about facets of the industrial capitalist system – trade, railroads – which brought the bug; the fear, distress, and disappointment in these sources are redolent of the precariousness of the settler-colonial mindset, what Ann Laura Stoler has termed the “epistemic anxieties” at the heart of the colonial project.³¹ While colonial polities might be materially and militarily strong, they were often psychically

³⁰ According to this view, few Americans realized humans could seriously and irreparably damage nature, few were concerned about animal cruelty, few thought nature was worth preserving beyond the exigencies of resource maintenance. Some, like Thomas Dunlap, have even suggested nineteenth-century Americans thought about nature in ways totally foreign to us, remarking that modern American environmentalism would strike mid-nineteenth century Americans as being “as foreign as the philosophy of the ancient Chinese.” See Thomas R. Dunlap, *Saving America's Wildlife* (New Jersey: Princeton University Press, 1988), ix. Other scholarship perpetuates this viewpoint implicitly, by locating the “birth of environmentalism” later in time. See J. Brooks Flippen, *Conservative Conservationist: Russell E. Train and the Emergence of American Environmentalism* (Baton Rouge: Louisiana State University Press, 2006). As is fairly typical, Flippen acknowledges Progressive Era conservationism, but suggests that a real appreciation for the fragility of nature did not dawn on significant numbers of people until the 1960s. See *Ibid.*, 19. Similar examples of this perspective include Sarah L. Thomas, “A Call To Action: Silent Spring, Public Disclosure, and the Rise of Modern Environmentalism,” in Michael Egan and Jeff Crane eds., *Natural Protest: Essays on the History of American Environmentalism* (New York: Routledge, 2009): 185-204, and Adam Rome, *The Bulldozer in the Countryside: Suburban Sprawl and the Rise of American Environmentalism* (New York: Cambridge University Press, 2001). In line with some other scholars, like Richard Grove who locates the beginnings of environmentalism much earlier in time, I think this logic does not give nineteenth-century Americans quite enough credit. See Richard Grove, *Green Imperialism: Colonial Expansion, Tropical Island Edens, and the Origins of Environmentalism, 1600-1800* (USA: Cambridge University Press, 1995).

³¹ Stoler's book fixated on Dutch Indonesia, but I think her themes can be applied to other colonial spaces. The primary message that I get from her is that while colonial authorities appear powerful, and are powerful in some ways, a gnawing fear sits at the heart of colonial projects: fear that the oppressed will rise up, that the logic which justifies colonialism is faulty, that the entire edifice is meant to collapse. See Ann Laura Stoler, *Along the Archival Grain: Epistemic Anxieties and Colonial Common Sense* (Princeton: Princeton University Press, 2009), 2-6, 18, 20-22.

fragile, needing to justify their colonization and accompanying dispossession.³² Analyzing the reaction to the San Jose scale reveals considerable dissonance and disappointment about the promise versus the reality of the “garden paradise” ideal of the West, the founding mythos of Western settlement, as well as terror that the colonial project itself was threatened.³³ This is especially salient when one considers that whatever threatened agriculture in the nineteenth-century West, threatened society itself. Agriculture was simply that important in this era.³⁴

All in all, what unifies these disparate assertions is my contention that the San Jose scale was a major – if heretofore unappreciated – change agent, indelibly marking the society, culture, government, and industry of the fin-de-siècle American West. By analysing its history, we are offered a unique and insightful gaze into the complexity, and occasional discordance, of contemporary conceptions about insects, nature, technology, and their own society.

³² Veracini, *Settler Colonialism*, 75-86.

³³ The “Garden Paradise” trope was a regular feature of contemporary literature on the West. See Pierrette Hondagneu-Sotelo, *Paradise Transplanted: Migration and the Making of California Gardens* (USA: University of California Press, 2014), 13. See also Note 100 for a contemporary example of such literature. The idea of transforming the West into an Edenic garden of bountiful (and profitable) food crops was such a powerful, evocative, and popular idea amongst nineteenth-century Americans that historians of the epoch have also found it an irresistible metaphor to deploy, analyse, and repurpose. Indeed, Henry Nash Smith, in his classic 1950 study of the American West, entitles the entire final section of the book “Garden of the World.” In so doing, he tries to evaluate the impact of the famous cliché, the importance of agriculture to the West’s development, and the dissonance between expectation and reality fostered by the “Garden Paradise” imaginary. See Henry Nash Smith, *Virgin Land: The American West as Symbol and Myth* (Cambridge, Mass.: Harvard University Press, 1978 [1950]), 123-262.

³⁴ Henry Nash Smith uses contemporary booster literature to express the salience of agriculture to the dream of some to transform the West into a garden to support a flourishing American empire. To such thinking, progress in agriculture was essential to the realization of America’s strength. By extension, anything which threatened that progress, like the insect invasions of the 1880s and 1890s (though Smith does not mention these), threatened American strength itself. See Nash Smith, *Virgin Land*, 180-188.

II. Adding a Sense of Scale: The Decades of Dramatic Deciduous Destruction, 1870-1910

The scale, though long-forgotten today, was once the subject of great consternation and much spilled ink, as we shall see. Oddly, then, historians have had little interest in the insect, while lavishing attention on its “rivals”.³⁵ There exists no monograph dedicated to the San Jose scale, à la Robert J. Spear’s volume on the gypsy moth.³⁶ Nor is there the profusion of scholarly work which the boll weevil generated for its comparable rampage through the southern USA.³⁷ But the San Jose scale had a comparable impact on American agriculture, particularly that of the West, despite the impression one might get from the existing historiography.

James Lick’s unfortunate introduction passed basically unnoticed until the end of the 1870s, when John Henry Comstock – the esteemed naturalist – first observed a mystery bug infesting orchards in San Jose, California. He coined it *Aspidiotus perniciosus*, a new species to North America.³⁸ Scale insects were not unknown to the United States, but this one had never been catalogued until Comstock’s 1880 identification. Moreover, Comstock was so impressed by the ravages of the insect that his Latin moniker for the organism – *Aspidiotus perniciosus* – translated to the “pernicious scale”, as he deemed the insect “the most pernicious” of all the scale bugs.³⁹ Though that name would prove fitting and quite prescient, the appellation which stuck for

³⁵ Perhaps also lack of access to sources has played a role in the San Jose scale’s limited treatment by historians. I would have found this project very difficult without digitized historical newspaper archives. However, the scale also received plenty of publicity through the writings of professional entomologists like L. O. Howard, so perhaps source access is not the paramount reason historians have not been interested.

³⁶ Robert J. Spear, *The Great Gypsy Moth War: The History of the First Campaign in Massachusetts to Eradicate the Gypsy Moth, 1890-1901* (Amherst and Boston: University of Massachusetts Press, 2005).

³⁷ For example, see Dunlap, *DDT*, 25-30; James C. Giesen, “‘The Truth About the Boll Weevil’: The Nature of Planter Power in the Mississippi Delta,” *Environmental History* 14, 4 (2009): 683-704; Robert Higgs, “The Boll Weevil, The Cotton Economy, and Black Migration 1910-1930,” *Agricultural History* 50, 2 (1976): 335-350.

³⁸ The scale has acquired a slightly modified Latin binomial proper name – it is usually now known as *Quadraspidotus perniciosus*, but this is the same organism discovered by Comstock. The same goes for another variant, *Diaspidiotus perniciosus*. See “Pests - *Quadraspidotus perniciosus*,” *Interactive Agricultural Ecological Atlas of Russia and Neighbouring Countries*, 2009. On Comstock’s discovery, see Howard, *A History of Applied Entomology*, 120.

³⁹ Howard, “Striking Entomological Events,” 8-9.

the general public was place-based. The San Jose scale became inextricably associated with the city in which it was first identified, despite the chagrin of its residents and their later attempts to decouple the insect from their city.⁴⁰

The scale was only one of many newcomer insects to harass farmers in the years of the insect explosion of the late nineteenth century, but it was one of the most damaging, and one of the ones which elicited the most comment from contemporaries.⁴¹ While insect pests had harassed farmers in all parts of the world from time immemorial, the growth of world trade dramatically accelerated the number of new arrivals.⁴² Meanwhile, the robust expansion of Western agriculture in the second half of the nineteenth century combined with its emphasis on monoculture produced excellent conditions for new insects to thrive upon arrival.⁴³ Monoculture provided substantial clusters of food sources in close proximity. Given Western growers' focus on fruit, those insects – like the San Jose scale – who fed on a wide array of fruit-bearing deciduous trees had unique potential to cause havoc. That was particularly so because the scale, like many accidentally-introduced species, had no naturally-occurring predator in the United States, and there was not yet any sophisticated chemical method of destroying insects. All this meant conditions in the West were especially ripe for infestation during the second half of the nineteenth century.

⁴⁰ The residents of San Jose actually succeeded in getting assent from the California State Board of Horticulture in 1886 to strip the scale of the city's name, but the rebranding did not penetrate the popular imagination. See "Board of Horticulture – Report of Inspector Boggs on Fruit Pests," *San Francisco Chronicle*, Apr. 14, 1886, 5. Entomological authorities also most commonly used the popular name.

⁴¹ As I noted above, Peter Coates affirms that the rate with which foreign, economically-harmful species were reaching America increased drastically in the last half of the nineteenth century. See Coates, *Strangers*, 4. On the sheer volume of contemporary literature on the San Jose scale, Leland O. Howard attests to it. By the latter part of the 1890s, he writes that the "literature relating to this insect became enormous." See Howard, "Striking Entomological Events," 9. It may also be worth noting that I have even seen the San Jose scale mentioned metaphorically, as a term for an annoying person. See "Brevet Capitalists," *Dalles Daily Chronicle*, Sept. 20, 1897, 2. Finally, as we will see in the next chapter, digital searches of historical newspaper archives also demonstrate a massive amount of concern about the bug.

⁴² Dunlap, *DDT*, 18-20.

⁴³ Stoll, "Insects and Institutions," 216-217.

The impact the scale had was most severe from 1880 until around the time of the First World War. It became, as I asserted above, crucial in necessitating organizational and methodological changes in Western agriculture as it spread from California to Washington and Oregon by the late 1880s, and to the Eastern states by 1893. By the late 1880s and early 1890s, rising anxiety about the unchecked expansion of the scale (among other insects) had induced the creation of local- and state-level Boards of Horticulture in the first afflicted states of California, Oregon, and Washington. These were staffed by inspectors with the power to seize and destroy infected orchards, or to mandate agriculturalists to treat their trees with newfangled pesticides, the first ever to be utilised quite so systemically and ubiquitously.⁴⁴

Though prior to DDT insecticides were not as potent as farmers desired, sprays of lime, salt, and sulphur showed efficacy against the scale by the 1890s.⁴⁵ However, such sprays were at first only unevenly applied by recalcitrant farmers, if they were used at all.⁴⁶ This, in part, allowed the bug to spread from California to the rest of the American West by the late 1880s, and thence to the Eastern states beginning in 1893.⁴⁷ This rapid proliferation sparked fear and

⁴⁴ Indeed, it even became the law in many states that scale-infested orchards had to be sprayed with pesticides. For references to those laws see my discussion in the next chapter, or the 1898 summary produced by USDA Chief of the Entomology Bureau, L. O. Howard. See L. O. Howard, *Recent Laws Against Injurious Insects in North America, Together with the Laws Relative to Foul Brood* (Washington: USDA – Government Printing Office, 1898), 9-31. Of course, pesticide usage – or at least the use of chemicals to try to kill insects – long predated the 1890s, but it was very haphazard and uncoordinated (and often ineffective). See Whitaker, “A History of Federal Pesticide Regulation,” 4-15. My sense is that pesticide use after 1890 was also haphazard and uncoordinated in places and at times, but it was still organized and standardized to a degree which sets it apart from prior generations. This appears to be the dominant view of historians, too, as both McWilliams and Dunlap gesture at a new era of pesticide use coming into being around 1890. See McWilliams, “The Horizon Opened Up Very Greatly,” 469-470, and Dunlap, *DDT*, 17.

⁴⁵ DDT’s first use was during the Second World War to control an epidemic of typhus in Italy. It would then be introduced to civilian agriculture upon the war’s end in 1945. Its killing power was so fierce and indiscriminate that Thomas Dunlap describes it as the “atomic bomb of insecticides.” See *Ibid.*, 3.

⁴⁶ Even worse, while there was official promotion of pesticides, there were not always reliable sources to acquire them from. Unscrupulous makers of pesticide concoctions frequently lied about the actual contents, meaning often farmers were using insecticides that were ineffective. See Whitaker, “A History of Federal Pesticide Regulation,” 43.

⁴⁷ It might be slightly ungenerous to point this out, but McWilliams is way off-base on the scale’s eastern arrival. He writes that the scale “made its journey east as a stowaway on a shipment of pear trees to New Jersey in 1868.” That is not terribly likely given that the bug was not in the country until 1870 at the earliest. I think he may mean 1888,

provoked an international backlash – Germany, Canada, and other nations barred American fruit and fruit tree imports in 1898, citing concern over the San Jose scale.⁴⁸ Though my focus here will remain on the West Coast states where the San Jose scale hit first and seemingly hardest, it is worth noting that the bug became a national problem with international ramifications.

The San Jose scale was never eradicated, though it was brought under a measure of control as the years rolled on. Despite significant initial resistance to the method, which I will profile in depth below, agriculturalists made progress in controlling the scale by the early years of the twentieth century through the assiduous application of the lime-salt-sulphur spray.⁴⁹ The scale could indeed be eliminated from orchards by this pesticide, though if spraying was not extremely rigorous, even very small remaining populations could rebound to large infestations in short order.⁵⁰ In addition, successful pesticide use also hinged on the willingness of neighbours to spray just as assiduously as well as on whether or not the San Jose scale had infested nearby shrubbery, woods, and forests.⁵¹ The ubiquity of the scale in uncultivated land, as well as the need for meticulous collective action for pesticide use to really work, meant the scale continued

which is plausible, given its discovery five years later. At any rate, I point this out just to underline the superficiality of the coverage the San Jose scale has received from scholars. See McWilliams, *American Pests*, 175.

⁴⁸ Howard, “Striking Entomological Events,” 9-10.

⁴⁹ Note, though, that this progress was never total, and always subject to reversal. As early as 1908, one entomologist noticed localized instances where lime-sulphur spray had apparently lost efficacy, as scale insects developed some partial immunity. McWilliams quoting A. L. Melander, *American Pests*, 185, 207. Moreover, the advent of the ultra-powerful DDT had to wait until WWII. See Ibid., 188-189. Scale control was also assisted by the 1910 passage of a federal law mandating regulatory standards for pesticides, something which had not previously existed. The old state of affairs permitted shady merchants to peddle adulterated, impotent insecticides, contributing to farmer mistrust of the technology, and to unsuccessful pest control. See Adelynne Hiller Whitaker’s discussion of the Insecticide Act of 1910 in “A History of Federal Pesticide Regulations,” ii.

⁵⁰ Oregonian fruit Inspector Emile Schanno opined in 1896 that only 1 in 5 orchardists sprayed carefully enough to actually eliminate the bug. He also pointed out how quickly the scale could revivify if only a handful of them survived spraying. See Emile Schanno, “Care of an Orchard,” *Hood River Glacier*, Apr. 24, 1896, 2.

⁵¹ Indeed, contemporaries were greatly agitated when they found San Jose scale on trees in the state capital, Salem, or in nearby forests. See respectively “State Park Infested,” *The Dalles Chronicle*, Jan. 31, 1900, 1; “Items in Brief,” *Dalles Times-Mountaineer*, Apr. 20, 1895, 3.

to be a problem for years after pesticides had been nearly-universally accepted around the time of the First World War.

But the damage the San Jose scale wreaked grew much less intense in the post-war period, causing it to fade from public prominence.⁵² No doubt, the mass conversion of growers to chemical solutions played a role, but it could also be that some sort of resistance to the bug built up amongst trees, which L. O. Howard, the most famous entomologist of the day, speculated about.⁵³ In any event, while the scale has remained extant all the way down to the present, it has receded as a major issue for farmers, though there have been sporadic flare-ups, as in 1938 when scale populations throughout the United States unexpectedly resurged.⁵⁴ It also remains a non-trivial concern at present in Western orchards, though quite a controllable one.⁵⁵

But the last 100 years are not what animates me here. Instead, it is the forty years prior, when the San Jose scale activated revolutions in agricultural management and pesticide deployment. While not all farmers met the horticultural boards, their functionaries, and their methods with open arms, as we shall see, the bureaucratic structures which emerged in the wake of the San Jose scale crisis eventually became essential to its attenuation, mostly due to their promotion of pesticides and sanctioning of uncooperative or derelict growers. One could certainly argue that those growers who opposed the boards, their inspectors, and their methods were mistaken, but that seems to me to miss the point. Instead, in my discussion below about agriculturalist resistance to the use of pesticides, or to expanded bureaucracy, I do not think it material whether horticulturalists were right or wrong to oppose these innovations – it is the

⁵² A search of the Google Books archive for mentions of the San Jose scale corroborates this, showing a precipitous drop in search term hits from 1920 onward. See Google Books NGram Viewer, “Untitled,” Google Inc., 2013. Found at: <http://tinyurl.com/ydxpw799>. Accessed Aug. 10, 2017.

⁵³ Howard thought the attenuation of the scale was mostly due to vigilant insecticide spraying, but he allowed for the possibility of trees acquiring some resistance to the scale. See Howard, “Striking Entomological Events,” 11.

⁵⁴ McWilliams, *American Pests*, 175.

⁵⁵ Hoyt, “San Jose scale.”

discourse of opposition itself that is significant. In this, the San Jose scale was both catalyst for organizational and technological change, as well as a source of social friction.⁵⁶ But before I turn to the resistance of agriculturalists to the new bureaucracies and their chemical ways, I think it first necessary to demonstrate the scale's foundational role in prompting this new agricultural order.

⁵⁶ The scale also ratcheted up inter-agency rivalry, too. Horticultural inspectors from Oregon and Washington occasionally embroiled themselves in disputes with each other, or with their counterparts in California, about who gave whom San Jose scale infested fruit. See "Fruit Inspector Calls the Bluff: Armstrong Furnished Proof that Oregon Peaches Bore No San Jose Scale," *Portland Oregonian*, Sept. 27, 1907; Untitled, *Corvallis Gazette*, Jul. 17, 1891, 2.

III. The San Jose Scale as Technological and Regulatory Change Agent

An increasing inability to cope with the “bug boom” – or “insect emergency” in James Whorton’s words – afflicting late nineteenth-century Western agriculturalists drove them, and their governments, to new frontiers of organization, regulation, and technology.⁵⁷ As I noted above, the San Jose scale was only one of many unintentionally introduced insects to plague the West in these years – in fact, it was not even the only scale insect to come from abroad to wreak havoc on crops.⁵⁸ But it was indeed, to harken back to Comstock’s words, the most “pernicious” of all the scale insects, and certainly the most tenacious as well, defying eradication and making even simple control difficult, especially at first. As such, it plagued the minds of contemporaries as much as their produce, becoming a constant presence in print media as well as in fruit trees – a fact which makes it odd that scholars and the general public alike have mostly forgotten it. My argument in this section, then, is that the scale had a profound impact on agricultural bureaucracy, practices, and laws, which can be detected in three main ways: the scale’s heavy media footprint in general, the intensity of agriculturalists’ and entomologists’ fears about the scale, and contemporary testimonials to the scale’s formative effect in bringing about new pesticide and inspection regimes.

Simply put, the San Jose scale worried contemporaries more than other economically-consequential insects, especially from 1880 to 1900. While it may be a bit of a crude instrument for detecting the social relevance of a subject, the sheer volume of contemporary media attention

⁵⁷ On the “bug boom” quote, see Note 14. For Whorton’s words, see *Before Silent Spring*, 3.

⁵⁸ The cottony-cushion scale also took a heavy toll on Californian agriculture as well, until it was effectively controlled by the vedalia beetle, imported from Australia in 1889. This was the one shining success of biological control efforts in the nineteenth century. All other attempts – including those aimed at the San Jose scale – would be met with much more mixed, and ultimately ineffective, results. On the cottony-cushion scale and its control, and the lack of results in other biological control efforts, see Whorton, *Before Silent Spring*, 13, and Cordley, *San Jose Scale*, 10-11.

bestowed on the scale is highly indicative of its importance, I think.⁵⁹ Indeed, while the codling moth also inspired terror amongst the afflicted, and drove organizational change as well, a Google Ngram search of the Google Books historical repository reveals that the San Jose scale was far more talked about by contemporaries during the most formative years for the new Western bureaucratic and pesticide regimes in the 1890s.⁶⁰ It is also worth noting that the scale remained much more mentioned than the famous – then and now – boll weevil until 1905. Thereafter, the weevil did not garner significantly more references until after the First World War. Indeed, the only newly-imported insect pest to be cited more often in contemporary books during the 1890s was the gypsy moth – and that was an Eastern phenomenon.⁶¹

It might be wondered how comprehensive a picture a Google NGram search can give; in truth, only a limited one, I think, as its reach does not encompass contemporary newspapers. However, newspaper-specific databases return similar results. For instance, searches through the Library of Congress' extensive digitized newspaper database of 2,248 newspapers from all over

⁵⁹ It is true that there is no 1:1 correlation between what gets profiled in newspapers and what the general public cares about, but I think a general relation exists. Newspapers do not sell unless they print things that interest people, so they tend to try to cover subjects which captivate large sectors of the population.

⁶⁰ All the data in this paragraph derives from a Google Books NGram search. The codling moth catches up in total mentions by 1904, after having held the lead over the scale in the 1880s. Thereafter, they remain about on par with each other until the 1920s, when scale references drop precipitously. One thing to keep in mind is that the codling moth was often spelled “codlin moth” in the nineteenth century, but adding that search term to my NGram search did not elevate the moth’s combined total of mentions above the scale during the 1890s. Further to this, the San Jose scale also went by the “pernicious scale” – an Anglicization of its Latin name – and there is a non-trivial amount of hits for that term which should be considered as part of the San Jose scale’s total, I think. See the data on these two insects, and several others which were prominent at the time, at Google Books NGram Viewer, Untitled, <http://tinyurl.com/ydxdpw799>. On the codling moth spurring organizational change too, it is worth noting that it was Public Enemy #1 of the Oregon Horticultural Board upon its 1889 founding. The Board deemed it “without question, the insect that needs to be looked after first as it is without doubt the worst insect pest ever introduced into the state.” See “The State Board of Horticulture,” *Albany State Rights Democrat*, May 3, 1889, 1. Other Oregon pest professionals felt otherwise, though. Colonel Varney – also known as General Varney – who was a chief inspector for the Board, deemed the scale worse than the codling moth in the sense that it could kill trees, and not merely destroy the fruit. See “Fruit Pests,” *Eugene City Guard*, Oct. 18, 1890, 1.

⁶¹ The gypsy moth is a wild tale unto itself. Essentially, an amateur entomologist with an interest in breeding silkworms – one Etienne Trouvelot – imported the gypsy moth to Medford, Massachusetts in 1867. Somehow, they escaped the confines of his house. Twenty years later, they were overrunning the town, and Massachusetts more broadly. This induced a sustained and not terrifically successful government action to suppress the moth, using the everything from arsenic to flame-throwers. Read more at Spear, *Gypsy Moth*, 7-40, 125-136.

the country demonstrates how talked-about the San Jose scale was in relation to its “rival” invasive insects. Indeed, a keyword search for the scale generates 2,128 hits in the years 1870 to 1900, and 8,410 with no time period filter.⁶² This is greater than the codling moth (1,557 and 5,702 hits, respectively), the gypsy moth (just under 4,500 hits with no time period filter, including the alternate “gipsy” spelling), and another great Western concern, the Colorado potato beetle (1,390 with no time filter applied).⁶³ The boll weevil, by contrast, dwarfs all of the above with 35,332 hits overall, but just 478 of those came from the period 1870 to 1900.⁶⁴

But one need not rely wholly on the admittedly blunt tool of digitized archival searches to discern how much the San Jose scale mattered in the late nineteenth century. The profusion of contemporary comment provoked by the San Jose scale is notable for more than its quantity; the tone in which farmers, inspectors, and entomologists alike discussed the scale’s menace reveals the depth of their concern with this organism. While I will delve deeper into the meanings I derive from the often-febrile commentary about the scale in Chapter Three, some representative examples require comment here to show that, for many, the San Jose scale was nothing less than

⁶² Chronicling America – Historic American Newspapers, “San Jose Scale,” *Library of Congress*. Found at: <http://chroniclingamerica.loc.gov/search/pages/results/?state=&date1=1789&date2=1924&proxtext=%22San+Jose+scale%22&x=0&y=0&dateFilterType=yearRange&rows=20&searchType=basic>. Accessed on Aug. 10, 2017.

⁶³ One caveat as to the codling moth’s totals: If one searches also for “codlin moth”, its total inflates by several hundred to become more like the number put up by the San Jose scale, at least in the period from 1870 to 1900. However, many of those sources are likely cross-listed (as in writers mentioning both variants in the same article for clarity), and one garners a few hits for “pernicious scale” as well, which refers to the San Jose scale, as mentioned in Note 46. For the individual search results, see Chronicling America – Historic American Newspapers, “Codling Moth,” *Library of Congress*. Found at:

<http://chroniclingamerica.loc.gov/search/pages/results/?state=&date1=1789&date2=1924&proxtext=%22codling+moth%22&x=0&y=0&dateFilterType=yearRange&rows=20&searchType=basic>. Accessed on Aug. 10, 2017;

Chronicling America – Historic American Newspapers, “Gypsy Moth,” *Library of Congress*. Found at: <http://chroniclingamerica.loc.gov/search/pages/results/?state=&date1=1789&date2=1924&proxtext=%22Boll+Weevil%22&x=0&y=0&dateFilterType=yearRange&rows=20&searchType=basic>. Accessed on Aug. 10, 2017;

Chronicling America – Historic American Newspapers, “Colorado Potato Beetle,” *Library of Congress*. Found at: http://chroniclingamerica.loc.gov/search/pages/results/?state=&date1=1789&date2=1924&proxtext=Colorado+Potato+beetle&x=0&y=0&dateFilterType=yearRange&rows=20&searchType=basic#tab=tab_newspapers. Accessed on Aug. 10, 2017.

⁶⁴ Chronicling America – Historic American Newspapers, “Boll Weevil,” *Library of Congress*. Found at: <http://chroniclingamerica.loc.gov/search/pages/results/?state=&date1=1870&date2=1900&proxtext=%22Boll+Weevil%22&x=0&y=0&dateFilterType=yearRange&rows=20&searchType=basic>. Accessed on Aug. 10, 2017.

an existential threat to Western agriculture, and to the fabled promise of the West as the “garden of the world.”

Californians were the first to be struck by the scale (or the first Americans, anyway), and their newspapers accordingly sounded the alarm throughout the 1880s and 1890s. An 1883 *Los Angeles Times* article stated that orchardists in the northern part of the state now “have learned to dread the San Jose scale as they dread no other insect.”⁶⁵ A *San Francisco Chronicle* piece from 1888 issued a similarly shrill warning to growers to “look out for scale and other pests before it is too late.” The same article went on to caution that unless the scale’s spread be checked, orchardists’ trees would be valuable “only for the wood they contain.”⁶⁶ The *Los Angeles Times* was as stark in 1894 as it had been in 1883, too; in that year, it announced that the scale was still “considered the most serious parasite with which California fruit-growers have to contend.”⁶⁷

Newspaper rhetoric was likeminded further north, too. In 1891, for example, Oregon’s *Dalles Times-Mountaineer* labelled the scale “sure death to all kinds of trees.”⁶⁸ Albany, Oregon’s *State Rights Democrat* rendered comparable verdict two years later. For it, the San Jose scale was the “most injurious” of all insect invaders, even more so than the codling moth, among others. On account of its fecundity and omnivorous appetite for deciduous trees, it was simply “the most pernicious insect known.”⁶⁹ Many other articles emanating from the Washington and Oregon press elaborate on the above, but one other piece seems especially striking.⁷⁰ In 1903, an

⁶⁵ “A Dangerous Fruit Pest,” *Los Angeles Times*, Aug. 7, 1883, 2.

⁶⁶ “Horticultural: Words of Warning,” *San Francisco Chronicle*, Dec. 19, 1888, 3.

⁶⁷ “San Jose Scale,” *Los Angeles Times*, Apr. 10, 1894, 1.

⁶⁸ “Items in Brief,” *Dalles Times-Mountaineer*, Nov. 14, 1891, 1.

⁶⁹ G. W. Kuthe, “Fruit Growing,” Dec. 15, 1893, 1.

⁷⁰ For a few other similarly-minded articles emanating from the West, see my chapter on apocalyptic rhetoric below. Though this does not fit with my geographic focus, I did also find a fascinating source compiled by the State Zoologist for Pennsylvania, one H. T. Fernald, who interviewed Maryland growers about the newly-arrived San Jose scale. Fernald proves that the scale was equally feared and loathed in the East. Some sample comments: “I very much fear that this pernicious insect will ruin the fruit industry of the state.” “I regard the San Jose scale as the most dangerous insect of which I have any knowledge.” “I have been a fruit grower all my life, and in my experience I

Oregonian article supporting agriculturally-based education in schools declared that “it is worth more for a child to know the appearance of San Jose scale than it is for him to be able to name the three ships that composed the fleet of Columbus.”⁷¹ As wounded as I feel when the value of historical knowledge is questioned, I think the remark gives a keen sense of the pressing importance contemporaries attached to the scale.

Lest one wonder whether the gloom-and-doom of the newspapers reflected more the hyperbolic style common to news media and less a sober appraisal of the dangers – or the broader concerns of the general public – it is worth noting that the scale roiled experts as much as laypeople.⁷² Indeed, the cultural penetration of the San Jose scale implied by its bulky media presence is also attested to by the most eminent entomologists of the day. Building on Comstock’s initial designation of the insect as the most damaging of the scale insects, many of the day’s leading entomological authorities chimed in to register their grave disquiet about the menace posed by the scale throughout the 1880s and 1890s.

For instance, entomologist Charles L. Marlatt, later chief of the USDA’s Bureau of Entomology from 1927 to 1933, was so agitated (and interested) by the San Jose scale that he self-financed a 1901-02 trip – credentialed by the USDA – to search for its origins in Asia.⁷³ This was because Marlatt felt the scale was “without doubt the most notable and destructive of all insect pests of deciduous fruits,” as he wrote in retrospect in his 1953 foreword to his diary of the

have never had to contend with such a persistent, deadly enemy as the San Jose scale.” See all that and more at H. T. Fernald, *The San Jose Scale, and Other Scale Insects* (Pennsylvania: Department of Agriculture, 1899), 6-7.

⁷¹ “Agriculture in the Schools,” *Portland Oregonian*, Oct. 14, 1903, 6.

⁷² Though as I will argue in a later section, some rhetoric about the San Jose scale *was* overheated. A real, serious, and costly threat was there, but it was sometimes overblown, as we shall see. At all events, the language of catastrophe so often employed to describe the scale suggests that perhaps that is simply the tropological register in which people pitch environmental crises. Perhaps it is also a manifestation of deeper colonial anxieties, as well.

⁷³ Marlatt, *An Entomologist’s Quest*, 9. Marlatt was also central in the eventual passing of 1912’s federal Plant Quarantine Act, which I will discuss below. See Pauly, *Fruits and Plains*, 146-153, for Marlatt’s persistence on the Quarantine Act. I have to think his fixation with the San Jose scale was a key motivator for him in his efforts to get the Act passed, though Pauly does not really say as much.

trip.⁷⁴ More contemporaneously, Marlatt commented in 1903 that there was then “perhaps no insect capable of causing greater damage to fruit interests in the United States than the San Jose or pernicious scale.”⁷⁵

Marlatt was not the only professional entomologist harried by the San Jose scale. W. H. Brown, Washington State Horticultural Inspector, remarked in 1897 that fruit growers had found the scale to be “the worst insect that they had ever come in contact with.”⁷⁶ Brown also noted that the scale’s spread had become “alarming,” before launching into an overblown rant which, while faintly (though perhaps unintentionally) comical, may also serve as a measure of the seriousness with which he took the scale:

I have battled with this pest from its native heath thence to Oregon, Idaho, Washington, and Utah ... Knowing what I do about the ruin this pest brings to the fruitgrowers’ best interest, I have this to say: Since I have been insect inspector, I have known no friends; I have shown no favors. My motto has been and now is, to show no quarter to this pest, no compromise; no flag of truce will be recognized by me. In mind, I have hoisted the black flag which means death to insect pests.⁷⁷

Others could not match Brown’s flair for the dramatic, but they nevertheless concurred with his concern. Leland O. Howard, chief of the USDA’s Bureau of Economic Entomology from 1894 to 1927, was a prolific producer of information about the scale from the early 1890s all the way to his 1930 memoirs. He was also the most famed and respected entomologist of the era. Alert to the severe damage the scale had already caused on the West Coast and its recent arrival in the East, Howard authored a 1893 USDA circular on the San Jose scale entitled *An Important Enemy to Fruit Trees*. Therein, he deemed the scale “the worst insect pest of

⁷⁴ Ibid., xi.

⁷⁵ Keep in mind he is not referencing two types of scale, but just two names for the San Jose scale. C. L. Marlatt, *The San Jose or Chinese Scale* (Washington: U.S. Department of Agriculture, Bulletin No. 62, 1906), 7.

⁷⁶ W. H. Brown, “Review of Fruit Pests,” *Ranche and Range*, Oct. 28, 1897, 3.

⁷⁷ Ibid.

deciduous fruit trees on the Pacific coast” responsible for “great pecuniary loss. Many crops of fruit have been ruined, and thousands of trees have been killed.”⁷⁸

Though Howard recognized that by the time of his memoirs the scale had receded as a threat to agriculture owing to the salutary effects of the lime-salt-sulphur spray, he never lost sight of the fact that it seemed to pose an existential threat in the 1890s. Indeed, as he wrote, the tapering off of the scale as a major concern by 1930 did “not mean that the alarm excited among the fruit-growers by the entomologists was in the least unjustified.”⁷⁹ Instead, the dialing down of the threat owed exclusively to the vigilance of professionals of his ilk and their tireless advocacy of pesticides; as he noted, the scale was still out there (and still is), infesting untended roadside shrubbery and poorly maintained orchards, lying in wait.⁸⁰

To return to an appreciation of the magnitude of the threat the scale posed in the nineteenth century, it is also telling that Howard lumped the coming of the San Jose scale in with that of the gypsy moth, the boll weevil, and the discovery of mosquitoes’ malaria-bearing capability.⁸¹ For him, these were the four most “striking entomological events of the last decade of the nineteenth century,” as the title of his 1930 article in *The Scientific Monthly* put it.⁸² Such notorious company nicely places the scale in its contemporary context as one of the primary insects threats of the era. This is especially so when one takes into account the regional disparities; the gypsy moth was primarily a problem in the East, the boll weevil the South. Of the three, only the scale mattered in the West, and it apparently mattered above all other contenders for no less an authority than Howard.

⁷⁸ L. O. Howard, *An Important Enemy to Fruit Trees* (Washington: USDA Circular No. 3, 1893), 1.

⁷⁹ Howard, *A History of Applied Entomology*, 123.

⁸⁰ Ibid.

⁸¹ On the duration of Howard’s tenure, see McWilliams, ““The Horizon Opened Up Very Greatly,”” 470.

⁸² Howard, “Striking Entomological Events,” 5-18.

The profound worry the San Jose scale stimulated led to more than talk: it galvanized action. Agricultural regulation in the American West, and elsewhere in the country, was scant before the 1880s. No inspection regimes existed on imported produce or nursery stock, and there was little bureaucratic oversight of farming practices.⁸³ At the same time, economic entomology remained a fringe, little-respected science.⁸⁴ All that was to change by the dawn of the twentieth century, as the harm caused by insect pests – the San Jose scale looming large amongst them – produced a profusion of new laws, new pesticide regimes, and an expanded state role in agriculture.

The scale's critical role in these developments was not lost on contemporaries, however silent historians have been. C. L. Marlatt, he of the trip to Asia to find the scale's origins and thus one of the foremost experts of the period on the San Jose scale, wrote in 1906 that "no insect has been the subject of so much domestic and foreign legislation as has the San Jose scale."⁸⁵ Elsewhere, in his 1953 memoir of his investigations into the San Jose scale's Asian origins, Marlatt put the point even more vividly. Recounting the reams of legislation passed by foreign nations in the late 1890s against American fruit imports for fear of San Jose scale, Marlatt thundered:

⁸³ The U. S. Department of Agriculture had been founded under the Lincoln administration in 1862, but it remained a low-budget, minor facet of the federal government until the latter part of the 1880s. Its subsequent growth in staffing and budgetary terms owed in large part to the insect invasions of the era, of which the San Jose scale was prominent. For instance, at foundation in 1862, the Department had 9 employees. By 1891, it had 1,577. By 1912, 13,858. See Wayne D. Rasmussen, "The People's Department: Myth or Reality?" *Agricultural History* 64, 2 (1990): 291-292, 294. State-level agricultural departments would have to wait for California's establishment of a Horticultural Board in 1881 – more on that below.

⁸⁴ Scholars have talked about the role of prominent nineteenth-century entomologists like Howard or Marlatt in raising the profile of economic entomology from a minor profession to a beefy division of the Department of Agriculture with a robust budget. See McWilliams, "'The Horizon Opened Up Very Greatly,'" for example. But the invasive insect species which created the need for economic entomology often seem incidental to such analyses, as if they were not key actors, albeit ones without conscious intent.

⁸⁵ Marlatt, *The San Jose or Chinese Scale*, 80.

In fact, no insect had ever assumed the international importance of this scale, and the volume of legislation on account of it in our several States and in foreign countries soon became much greater than all similar legislation as to all other insect pests whatsoever!⁸⁶

Marlatt's outlook was echoed by Leland O. Howard. Howard made a point of tracking domestic and international legislation against the spread of the San Jose scale, enumerating these in detail in two USDA circulars in 1898 and 1900.⁸⁷ These laws tended to have some common features: they usually mandated inspections on all imported fruits and nursery stock, and the destruction or chemical treatment of afflicted fruit and trees.⁸⁸ As such, they increased the reach of oversight organs like state and county boards of horticulture and their pest inspectors.

More important than the individual particulars of each state law, or the laws of foreign nations, is Howard's general impression of the centrality of the San Jose scale in prodding governments to ratchet up agricultural regulations. As he put it in 1898:

Never in the history of economic entomology in the United States has a single species of insect excited so much interest as has the San Jose scale; and in view of the fact that it has aroused the whole fruit-growing population of the country to a sense of the value of entomological investigations, that it has brought about legislation against injurious insects in a number of States, and has *almost alone* [emphasis added] been responsible for an appeal for national legislation, participated in not only by the horticulturists of the country but by dealers in nursery stock, it may be said that its eastern advent has been far from an unmixed evil. Many individuals will have suffered, but the sum total of resulting good to the fruit-growing interests will eventually have placed the balance on the right side.⁸⁹

⁸⁶ C. L. Marlatt, *An Entomologist's Quest*, 4.

⁸⁷ By 1898, 15 states had legislated against the San Jose scale's spread with two more having compiled draft bills. The laws did not only have the San Jose scale in mind, of course, but Howard says the laws were designed "against injurious insects, especially the San Jose scale." See Howard, *Recent Laws Against Injurious Insects*, 7, 9-43. That number would increase subsequently. By 1900, Howard chronicled a total of 10 countries with laws on the books banning imported American fruit in large part due to the San Jose scale crisis. See L. O. Howard, *Regulations of Foreign Governments Regarding Importation of American Plants, Trees, and Fruits* (Washington: Government Printing Office, 1900), 1-4.

⁸⁸ Indeed, there was not a whole lot of variation in the texts of different laws, state-to-state. See Howard, *Recent Laws Against Injurious Insects*, 9-43.

⁸⁹ L. O. Howard, *The San Jose Scale in 1896-1897* (Washington: U. S. Department of Agriculture, Division of Entomology, 1898) 5.

Whether or not Howard was right about the bug eventually becoming a good thing on account of the new laws it inspired, the point is that there is no more clear and authoritative statement of the scale's singular impact in the regulatory and bureaucratic spheres.

The perspective granted by the passage of time did nothing to curb Howard's sense of the importance of the San Jose scale in bringing about a more robust state regulatory apparatus.

Indeed, in 1930, Howard drew a direct line between the state-level and foreign legislation of the 1890s designed to minimize the spread of the San Jose scale and the eventual passage of 1912's landmark federal law, the Plant Quarantine Act, which gave the USDA the power to inspect, seize, and banish agricultural products at America's borders.⁹⁰ As he wrote:

The San Jose scale not only was the cause of a very great arousing of interest in entomological matters in the United States, but also promoted international quarantines on a very large scale. From the action that foreign governments took at this time we may date the beginning of the agitation in this country to provide for our own protection against foreign importations, which ... was finally enacted into the federal horticultural law of 1912.⁹¹

Marlatt and Howard were two of the most illustrious and informed entomologists of their day, making their testimony to the San Jose scale's legislative consequences very weighty indeed. Of course, one might rightly point out that Marlatt and Howard speak mainly of the San Jose scale's seminal effect on agricultural regulation in America as a whole, particularly after the bug migrated east in 1893. Although national laws like the Plant Quarantine Act would have obvious impact on the Pacific Coast states as well, the quotes from Marlatt and Howard I cited above say little about how the San Jose scale specifically affected agricultural law and management in the American West. Luckily, there are numerous sources – including from

⁹⁰ On the Plant Quarantine Act of 1912, see U. S. Customs and Border Protection, "1912: Agricultural Safeguards Come to the Border," *U. S. Department of Homeland Security*, August 1, 2016. Found at: <https://www.cbp.gov/about/history/1912-agriculture-safeguards-come-border>. Accessed on Jul. 30, 2017.

⁹¹ Howard, "Striking Entomological Events," 10.

Marlatt – which put concern about the scale at the heart of agricultural regulation and bureaucratic establishment and expansion in the Western states of California, Oregon, and Washington.

California, Oregon, and Washington were the first states to be faced with, and thus the first to move against, the San Jose scale. At the beginning of the 1880s, California set up a new regime of horticultural inspectors tied to state- and county-level boards of horticulture, along with the nation's first plant inspection and quarantine law; Washington and Oregon followed suit around the end of the decade.⁹² These innovations were not solely due to the San Jose scale, but it is evident that the insect served as a prime motivator in the formative years of these organizations.

For example, California's statute of 1881, which created county-level boards of horticulture and inspectors, mentioned "scale bug" explicitly.⁹³ Only the codling moth and the "red spider" were also listed by name instead of under the catch-all category, "noxious insects."⁹⁴ Already the first state in the nation to set up a board of horticultural inspection, in 1883 the Golden State passed the nation's first Plant Quarantine Act.⁹⁵ This allowed state inspectors to investigate any incoming plant matter (trees, fruits, plants, seeds) for pests and to quarantine or

⁹² On California's pioneer status, see Howard, *History of Applied Entomology*, 134. The stories of Washington and Oregon I will explain in detail below.

⁹³ For the statute, see *The Statutes of California and Amendments to the Codes Passed at the Twenty-Fourth Session of the Legislature, 1881* (Sacramento: State Office: J.D. Young, Supt. State Printing, 1881), 86-87. It is worth noting that the reference to "scale bug" probably captures all insects of this type, not just the recently-coined San Jose scale.

⁹⁴ It would have been very interesting to see what the debate in the California legislature – and its Committee on Agriculture – looked like on this bill, but such things were not recorded for posterity until much later in time, as the source in the above note demonstrates. The same holds true for the legislative records of Washington and Oregon States. Instead, what does exist are simple records of what bills passed and when, which add little context. For Oregon, see "Legislative Research at Oregon State Archives," *Oregon Secretary of State – Oregon.gov*. Found at: <http://sos.oregon.gov/archives/Pages/records/legislative-research.aspx>. Accessed on Aug. 10, 2017. For what is (and is not) available from Washington State, see "Legislative History," *Washington State Legislature*. Found at: <http://leg.wa.gov/History/Legislative/Pages/factsandbilldata.aspx>. Accessed on Aug. 10, 2017.

⁹⁵ Marlatt, *An Entomologist's Quest*, 2.

destroy infected articles.⁹⁶ The San Jose scale was not the only “noxious insect” targeted by this legal and regulatory double whammy, but Marlatt strongly implies that it was the major threat growers and legislators had in mind. As he wrote, “both of these actions were stimulated by the San Jose scale, leading as it did to a demand by the aroused fruit growers of the State for protection from such introduced pests, and naming the San Jose scale at the head of the list.”⁹⁷

The scale was similarly influential in the other West Coast states. Though the first bulletin issued by the nascent Oregon State Board of Horticulture – created in 1889 – targeted the codling moth explicitly, not the scale, the latter bug quickly began forcing further regulations.⁹⁸ By 1891, a quarantine and inspection law on plant materials imported into the state had been passed by the legislature, in large part motivated by that “most dreaded pest,” the San Jose scale.⁹⁹ Similarly, by then a law was also in force allowing the state horticultural inspectors sweeping powers to seize, destroy, or compel growers to spray trees at their expense.¹⁰⁰ Once more, the law was largely aimed at curtailing the dread spread of the scale.

As in Oregon and California, the Washington State Board of Horticulture was much exercised by the San Jose scale upon its foundation in 1891. As with the other coastal states, board inspectors devoted much of their time to ferreting out and managing the scale.

Unsurprisingly, then, the San Jose scale provoked specific legislation as well. According to the 100th anniversary circular put out by the Washington State Department of Agriculture (the

⁹⁶ Ibid.

⁹⁷ Ibid. It might also be worth noting that the San Jose scale – and other scales – also sparked the creation of a “Scale Bug Commission” under the auspices of the California State Board of Horticulture in order to further study the problem. See “Brevities,” *Los Angeles Times*, Dec. 2, 1889, 7, and “Horticultural: Report of the Commission on Scale Bugs,” *Los Angeles Times*, Mar. 9, 1890, 10.

⁹⁸ “The State Board of Horticulture,” May 3, 1889, 1. It might be worth noting that the actual text of the legislation creating the state board did not mention any insect by name, instead referring only to “fruit pests.” See it reprinted in full at “The Horticultural Bill,” *Corvallis Gazette*, May 3, 1889, 4.

⁹⁹ “The San Jose Scale,” *The Dalles Daily Chronicle*, Jul 9, 1891, 2.

¹⁰⁰ Ibid.

successor to the Board of Horticulture), a specific penalty was introduced in 1895 against anyone importing plant matter infested with San Jose scale.¹⁰¹ This came in at the same time as a provision mandating that plant sellers and shippers be licensed.¹⁰² That example aside, the *Corvallis Gazette* reported in 1891 an earlier punitive regulation directed specifically at the original source of scale, California. This article claimed that the President of Washington State's Board of Horticulture threatened California growers exporting scale-y fruit to Washington with "arrest and a fine of \$25 to \$100."¹⁰³ Other evidence for the scale's crucial role in the establishment of horticultural inspection and bureaucratic regimes in Washington and other states comes from a 1901 *Yakima Herald* article; here the author sees the bright side of the "invasion of this pest" as it had "creat[ed] boards of horticulture, where none before existed, and establish[ed] careful inspection of trees and nursery stock in nearly all the states."¹⁰⁴ On the whole, then, it is clear that the spread of the San Jose scale was a vital spur to bureaucratic and regulatory multiplication in the West, much as it was nationally and internationally.

The San Jose scale's ravages did more than galvanize new bureaucratic, regulatory, and inspection measures, though – it was a critical agent in the new chemical-technological regime which slowly but steadily became hegemonic in the 1890s and beyond. The scale's repercussions here were two-fold: firstly, it popularized a specific insecticide, the lime-sulphur-salt spray, which was also beneficial against other pestiferous insects.¹⁰⁵ Perhaps more meaningfully, the scale also served as a major catalyst for the promotion of pesticides. Indeed, agricultural

¹⁰¹ "'Then and Now': A Look Back During Our Centennial Year at ... Nursery Inspection," Washington State Department of Agriculture, 2013, Not Paginated. Found at: <https://agr.wa.gov/PlantsInsects/PlantServicesProgram/docs/ThenNowPresentation.pdf>. Accessed on Jul. 30, 2017.

¹⁰² Ibid.

¹⁰³ Untitled. *Corvallis Gazette*, Jul. 17, 1891, 2.

¹⁰⁴ "The Scale Pest: How to Cope with the San Jose Enemy of Fruit Trees," *Yakima Herald*, Nov. 19, 1901, 3.

¹⁰⁵ A. B. Cordley attested to the lime-sulphur-salt spray's effectiveness against other insects, as well as some types of fungus. See Cordley, *The San Jose Scale*, 3.

authorities throughout the West (and in the rest of the country) were almost totally united in their calls to meet the challenge of the scale with pesticides, calls which quickly became backed up by the force of law.¹⁰⁶

But entomologists found it hard to advocate for pesticide use until they had arrived at the best remedy. Growers and entomologists experimented with a host of chemical potions to combat the San Jose scale soon after its 1880 discovery. The number of home remedies tried by desperate farmers before hitting upon the lime-sulphur-salt spray probably runs the gamut of every conceivable chemical mixture available to them, but the specifics are mostly lost to us. However, there are some hints in the newspaper archive of other sorts of control measures with which growers were willing to experiment in the early days of the outbreak. For instance, one paper reported in 1881 that a “steam using machine” employed in San Jose – ground zero for the outbreak – “did not seem to do much” except “hurt the trees.”¹⁰⁷

Professional entomologists also experimented widely, especially after 1887’s federal Hatch Act which provided for state-level agricultural experimentation stations.¹⁰⁸ Something of the desperation and ingenuity which must have infused the search for a successful insecticide against the scale comes through in a quote from Texas entomologist Albert F. Conradi, who reflected in 1906 that “almost any ingredient that appeared to have any insecticidal value has been experimented with in the hope of finding an effective method for controlling the scale.”¹⁰⁹

¹⁰⁶ There was some official experimentation (and some unofficial experimentation, as will become clear in the following chapter) with biological control methods, though. Notably, A. B. Cordley – head entomologist of the Oregon Agricultural Experiment Station – imported a lady bug to Oregon in 1903 to try to counteract the scale. See “Chinese Beetles,” *Corvallis Times*, Sep. 9, 1903, 2. However, Cordley’s efforts did not find much success. He would later lament the inadequacy of biological control methods, stating in 1906 that he could “offer no encouragement to those who desire to see the San Jose scale held in check by its natural enemies.” The problem, as Cordley concluded, was that the increase of the scale vastly outstripped that of their predator, making what control the predator offered marginal. Cordley, *The San Jose Scale*, 10-11.

¹⁰⁷ Untitled, *Albany Democrat*, Oct. 14, 1881, 1.

¹⁰⁸ On the Hatch Act and the founding of the experimental stations, see Dunlap, *DDT*, 20.

¹⁰⁹ Albert F. Conradi, *Bulletin No. 87: The San Jose Scale* (Houston, Texas: State Printing Company, 1906), 8.

Among other potential panaceas, entomologists tried out concoctions based in kerosene, whale-oil soap, and caustic soda, and even fumigation using hydrocyanic gas.¹¹⁰ These various measures had limited, but non-trivial, success, with whale-oil most popular in the Eastern states.¹¹¹ However, one spraying formula in particular emerged into wide use by the early 1890s, and became dominant around mid-decade owing to its high rate of efficacy: this was the lime-sulphur-salt spray, which became the official weapon of choice against the scale, particularly in the Western states.

The exact circumstances involved in the origination of the lime-sulphur-salt spray remain somewhat murky, but it appears to have been first developed in California in 1886 as a direct response to the San Jose scale.¹¹² It took a few years to gain mass popularity, and as I will explore in the next chapter, official promotion of the spray ran into significant resistance, particularly in the early 1890s. But by then, the lime-sulphur-salt spray had begun to emerge as a perennially popular remedy for San Jose scale infestation. A. B. Cordley of the Oregon Agricultural Experimental Station reported in 1906 that it had been the “standard spray” for hampering the San Jose scale since 1891.¹¹³ And indeed, that is the date at which calls from pest inspectors, prominent growers, and entomologists alike to spray orchards with the lime-sulphur-salt spray became a chorus.

For instance, in March 1891, C. C. Thompson, future head of the Southern California Pomological Society and regional fruit grower of some esteem, pronounced his faith in the lime-

¹¹⁰ Howard, *An Important Enemy to Fruit Pests*, 6-9; Cordley, *The San Jose Scale*, 12-15.

¹¹¹ John B. Smith, *The Pernicious or San Jose Scale* (New Brunswick, NJ: New Jersey Agricultural Experiment Stations, 1896), 11.

¹¹² Arnold L. Aspelin, “Pesticide Usage in the United States: Trends During the Twentieth Century: Part Two” (Raleigh, N.C.: Center for Integrated Pest Management, North Carolina State University, 2003) 5. Found at: http://www.pestmanagement.info/pesticide_history/Two.pdf. Accessed on Jul. 30, 2017.

¹¹³ Additionally, according to Cordley, Oregon’s Pest Inspector Emile Schanno, in 1896, devised a precise mixture of lime, salt, and sulphur which had become known as the “Oregon formula,” and was preferred to all others in that state, at least. I am unaware if it gained popularity elsewhere. See Cordley, *The San Jose Scale*, 9.

sulphur-salt spray, which was also presented as a sort of novelty, suggesting the emulsion was not widely-known at that moment.¹¹⁴ Similar sentiments prevailed further north; a December 1891 article cited one Professor Washburn – Oregon state entomologist – as authority to exhort farmers to spray their crops with lime, sulphur, and salt that year.¹¹⁵ Thereafter, entreaties to spray become a constant and perennial theme across the Western states, endorsed by national luminaries like Howard all the way down to state entomologists like Cordley and county-level pest inspectors like Oregon’s Emile Schanno.¹¹⁶

There are numerous other examples I could draw upon, but suffice to say that I believe officialdom by and large became very partial to chemical solutions starting in the early 1890s, at least in the case of the lime-sulphur-salt spray. This also runs against James McWilliams’ view that the USDA and its economic entomologists in particular harboured serious reservations about insecticides until after World War I.¹¹⁷ I simply do not see that when it came to the lime-sulphur-salt spray, at least.

In any event, as I mentioned above, these exhortations to spray for the scale were accompanied by legal sanction, which endowed horticultural board inspectors with powers to compel spraying, or to assess the stubborn with penalties of seizure, destruction, or fines. In the next chapter, I will profile the not-insignificant resistance these edicts induced, but for current purposes, it is perhaps just worth noting that the rise of mass pesticide use was not entirely due to

¹¹⁴ On Thompson’s promotion of the spray, see “San Jose Scale – Mr. Thompson Gives a Recipe for An Effective Wash,” *Los Angeles Times*, Mar. 19, 1891, 7. On Thompson’s association with the Pomological Society and his reputation as a grower of some note, see “Fruit Growers,” *Los Angeles Herald*, Oct. 2, 1891, 4, and “The Fruit Growers,” *Los Angeles Herald*, May 7, 1897, 8.

¹¹⁵ Untitled. *Corvallis Daily Gazette*, Oct. 2, 1891, 3. Reprinted from the *Oregonian*.

¹¹⁶ Howard recommends the use of lime, sulphur, and salt as early as 1893. See Howard, *An Important Enemy to Fruit Trees*, 7. On Schanno, see “Spray Your Trees,” *Dalles Daily Chronicle*, Feb. 10, 1898, 4. For Cordley’s recommendation of the lime-sulphur-salt spray, see “Winter Sprays,” *Corvallis Gazette*, Jan. 8, 1897, 2. He also strongly endorses the spray as the “one remedy yet discovered which need be considered in this state” in his 1906 treatise on the scale. See Cordley, *San Jose Scale*, 9.

¹¹⁷ See McWilliams, ““The Horizon Opened Up Very Greatly,”” 474, 478, 483, 488.

persuasion and demonstrable results. Coercion, or at least the threat of coercion, was required to bring a critical mass of growers into line, but thus was the magnitude of the threat the San Jose scale seemed to pose that – for officialdom – backing pesticide promotion with punitive measures for disobedience seemed necessary.

There were other successful insecticides for other types of organisms developed in this period which also contributed to the developing hegemony of chemicals in agriculture. Arsenic-based compounds – with misleadingly innocuous names like “Paris green” – became widely used in the 1890s as well.¹¹⁸ Kerosene-based potions became popular, too; their effectiveness against the scale might have been limited, but they worked better against other organisms.¹¹⁹ Yet the widespread introduction of the lime-sulphur-salt spray was every bit as important as the above-mentioned concoctions, not least because it worked against a host of other insect pests like the woolly aphis, green aphis, pear-leaf blister mite, the bud-moth, and certain fungi.¹²⁰

Because of its indiscriminate killing powers, Cordley proclaimed the lime-sulphur-salt spray a great “general” spray, from which “beneficial results are almost certain to follow whether the scale be present or not.”¹²¹ Thus, the lime-sulphur-salt spray had become “the standard spray used in commercial orchards” by the middle of the first decade of the twentieth century.¹²² And in the years since, it has remained a viable remedy; in fact, it is still used.¹²³ In sum, then, I think it fair to call the San Jose scale the mother of the invention of the lime-sulphur-salt spray, one of

¹¹⁸ Dunlap, *DDT*, 20.

¹¹⁹ *Ibid.*

¹²⁰ Cordley, *The San Jose Scale*, 3.

¹²¹ *Ibid.*, 4.

¹²² Conradi, *Bulletin No. 87*, 8. Conradi also asserted that the lime-sulphur wash (with or without salt) was the most cost-effective option, and the safest, as it did not injure trees (in his estimation). See *Ibid.*

¹²³ A Google, Amazon, or E-Bay search would reveal this, but it is perhaps worth noting that United Agri Products, the North American agricultural products giant, still sells lime-sulphur-based products. See “Products – Insecticides,” *United Agri Products Canada Inc.*, 2010. Found at: http://uap.ca/products/products_insect.htm. Accessed Aug. 10, 2017.

the most important and widely-used insecticides of the era. It was the necessity which gave birth to this particular invention, and thus – in part – the scale was what prompted mass pesticide use.¹²⁴ Indeed, as Cordley put it in 1906: “We shall, perhaps, be ready to exclaim with J. H. Hale, the veteran peach grower of Connecticut and Georgia, ‘Blessed be the San Jose scale.’ It has compelled us to spray with the lime, sulphur, and salt.”¹²⁵

Ultimately, a rather direct line can be drawn from the fear the scale struck in the heart of farmers, and the dent it put in their orchards and pocketbooks, to the new organizational, regulatory, and technological regimes deployed in the West and beyond in the 1880s and 1890s. It was deeply consequential by so many metrics; on these grounds, it deserves more than the passing scholarly asides it has received. But yes, it is true, the San Jose scale was not the only insect pest which drove the bureaucratic, administrative, and chemical revolution in American agriculture, Western or otherwise. Quarrelsome minds might even ask – given the undoubtedly heavy contemporary toll taken by other bugs like the codling moth, and the many others still to come – could Western agriculture have long stayed in a state of loose central authority, only sporadically and individually employing pesticides, even in a world in which the San Jose scale did not exist?

There is no indisputable answer to that hypothetical, like all counter-factual scenarios, but I think it is a bit like asking if there would have been a computer industry without Microsoft. Clearly there would have been, but its contours would have looked markedly different. The point is that the scale was pivotal in causing enduring organizational and technological change in Western agriculture, and in American agriculture more generally. But as we shall see in the next

¹²⁴ Pauly credits the gypsy moth with the impetus for the 1892 development of lead-arsenate, one of the most widely-used insecticides of the era. I would aver that the San Jose scale is to lime-sulphur what the gypsy moth is to lead-arsenate. See Pauly, *Fruits and Plains*, 137.

¹²⁵ Cordley, *The San Jose Scale*, 3.

section, while an engorged and empowered regulatory apparatus, along with the systemic use of pesticides, would become normative, the rise of these twin innovations was not without discord.

IV. Fighting the “Spray Fiends”¹²⁶: Pesticide Pushback in the West

One commonly thinks of opposition to pesticides as a twentieth-century movement, sparked by the 1962 publication of Rachel Carson’s *Silent Spring*, which remains vigorous and current today.¹²⁷ However, significant opposition appears to have existed earlier, before DDT’s deleterious effects – so memorably articulated by Carson – became widely-known. As we have seen, the first widespread application of pesticides to agriculture came in reaction to the late nineteenth-century wave of invasive insects of which the San Jose scale was a major part.¹²⁸ While pesticides evolved from a relative novelty to a nearly-mandatory measure from 1880 to the First World War, mostly lost in the tale of their ascension are the many farmers who harboured suspicions about the new chemicals and who tried to avoid using them.

The crisis of the San Jose scale reveals many local tales of resistance to pesticides which have never been profiled before. Indeed, historiographical work on the nineteenth-century reception of insecticides is remarkably scant. While Howard Seftel mentioned initial resistance amongst farmers to Californian state and local Boards of Horticulture in their early years in the 1880s, he did not mention that much of that resistance was predicated on objections to pesticides.¹²⁹ Further to this, Seftel’s portrayal of the formation of California’s state Board of Horticulture as a fairly smooth process largely endorsed by fruit growers themselves unfairly minimizes the turbulence involved.¹³⁰

¹²⁶ F. O. Cass, “In Re Bugs: A Furious Ruction Over Spraying vs. Parasites,” *Los Angeles Times*, Apr. 27, 1890, 12.

¹²⁷ Rachel Carson, *Silent Spring* (Boston: Houghton Mifflin, 2002 [1962]).

¹²⁸ The operative word is “widespread.” Fighting agricultural pests with kitchen concoctions of one substance or another is probably something quite old, as James Whorton argues. See Whorton, *Before Silent Spring*, 15.

¹²⁹ Seftel, “Entrepreneurial Attack,” 382-385.

¹³⁰ Though Seftel did note that there was resistance to bureaucratic intrusions on the part of individualist farmers, which continued at least on a small scale for decades, he spoke only of California, not of the larger West. Secondly, his discussion of resistance was brief, and focused on the ethos of individualism (not opposition to pesticides or promotion of biological control). Plus, I have unearthed sources he did not use. See *Ibid.*, 382-385. Steven Stoll’s treatment of pesticide resistance in California I have made reference to in Note 25, but it is worth noting that his book, *The Fruits of Natural Advantage*, has little more to say on the subject. His earlier journal article, “Insects and

Moreover, James Whorton's comprehensive study of arsenic poisoning in the Victorian Age curiously nearly totally omits mention of pesticide use (often composed of arsenicals before WWII), and any dissonance toward it.¹³¹ His stellar book on early pesticide use, *Before Silent Spring*, the only dedicated treatment of the subject I have found, does mention that "the road to popularity was not smooth for any of the early insecticides," noting that some farmers had safety reservations about the most popular pesticides of the era, arsenic-based compounds.¹³² However, he does not devote much space to describing popular resistance to pesticides, nor does he mention the lime-salt-sulphur sprays which were used predominantly on the San Jose scale. Instead, much as with his other book, he preferred to focus on arsenicals and the medical-agricultural-entomological establishment.¹³³

Thomas Dunlap's study of the introduction and impact of DDT does discuss the early years of mass pesticide use beginning in the 1890s, but he ignores that many growers were apprehensive of, or opposed to, the new technologies. This is partially understandable given that his focus is elsewhere, but Dunlap does devote an entire chapter to the fifty years of mass pesticide use prior to DDT's commercial introduction in 1945. In it, he portrays farmers as overwhelmingly pesticide positive, dubbing chemicals "the favoured method" of most, and asserting that farmer reliance on them was "deep [sic] rooted."¹³⁴ Certainly in some places and at some times during the fifty-year span in question that was true, but as a summary statement, it

Institutions," is essentially just reproduced in his book-length study as the fourth chapter. See Steven Stoll, *The Fruits of Natural Advantage: Making the Industrial Countryside in California* (Berkeley and Los Angeles: University of California Press, 1998), 94-123.

¹³¹ James Whorton's *The Arsenic Century* had a whole chapter on farming, but it rarely mentioned arsenic as an insecticide, instead focusing on its use on sheep. See James C. Whorton, *The Arsenic Century: How Victorian Britain was Poisoned at Home, Work & Play* (Oxford: Oxford University Press, 2010), 294-323.

¹³² See Whorton, *Before Silent Spring*, 24.

¹³³ Ibid., 15-35.

¹³⁴ Dunlap, *DDT*, 29.

lacks texture and depth.¹³⁵ American farmers had a more reluctant and ambivalent relationship with the new chemicals than Dunlap contends, at least in the 1880s and 1890s.

Finally, James E. McWilliams' work on the American switch to chemical insecticides from 1894 to 1927 is a worthy contribution to understanding the dynamics behind the mass introduction of pesticides. Like myself, McWilliams noticed that the origins of the rise of pesticides remain "elusive" with "little known about the precise historical developments that fostered their emergence."¹³⁶ However, his work focuses mainly on professional entomological elites like Leland O. Howard and their promotion of pesticide use ahead of remedies like biological or cultural control.¹³⁷ Meanwhile, in McWilliams' book-length study of introduced agricultural pests, he skates over farmer uncertainties and objections toward the new chemical pesticides. As I noted above, he states that in the period from 1870-1938, chemical insecticides had worked "just well enough" to avert "considerable concern or protest" from American farmers.¹³⁸ In this section, I take a different view.

Instead of McWilliams' concentration on elite prime movers, I seek in this section a more popular, socio-cultural examination of the history of pesticide introduction. By examining instances of popular opposition to pesticide use, I suggest two conclusions might be drawn: One, there existed a substantial amount of initial distrust – manifested by both open defiance and large-scale apathy – toward these chemical solutions, something which has been underexplored by scholars. Indeed, it is one thing to gesture in passing at a phenomenon, quite another to explore it in detail, as I intend to do in this section. Secondly, such opposition underscored the

¹³⁵ I would also argue that Dunlap's statement that "it is difficult to trace the early history of insecticide use" reflects the somewhat one-dimensional and hurried feel of his discussion of this issue. See *Ibid.*, 19.

¹³⁶ James E. McWilliams, "'The Horizon Opened Up Very Greatly,'" 469-470.

¹³⁷ *Ibid.*, 470-486.

¹³⁸ See McWilliams, *American Pests*, 186, and my own Note 11 in this essay for some expansion.

limits to the authority of state fruit inspectors and boards of horticulture in the 1880s and 1890s, as their recommendations to douse trees with insecticides frequently fell upon deaf ears.

Officialdom was enlarged and empowered in these years, its technological imperatives would become hegemonic, and its authority would become widely accepted. But at first, the powers-that-were encountered minority, but serious, opposition, showing that the scale created social, as well as economic, turmoil. In all, what follows offers a snapshot into the murky early history of mass pesticide use.

A prime example of how concerns about overweening bureaucracy could intertwine with reservations about technology is the case of California farmer F. O. Cass. The infestation of his farm with San Jose scale in the late 1880s brought down upon him the unfavourable attention of the local Los Angeles County pest inspectors, which Cass himself railed against in the press.¹³⁹ Cass, displeased with the results of pesticide spraying that he was ordered to undertake – he argued that the spray damaged the trees it was meant to relieve – imported a lady bug to his property which he claimed killed the scale, a method of insect management known as biological control. However, the County Horticultural Commission rubbished Cass’ claims to have discovered a scale predator, and ordered him to spray his orchard with pesticides anew. When Cass refused, citing potential injury to his trees and to the lady bug, the Commission tried to enforce its writ through the courts, though it was ultimately unsuccessful. Undaunted, the Commission then cited Cass for public nuisance (having scale-infested trees). Unfortunately for the Commission, a jury acquitted Cass of this charge as well, suggesting that more than a few people thought the Horticultural Commission was overstepping its bounds.

¹³⁹ F. O. Cass, “In Re Bugs: A Furious Ruction Over Spraying vs. Parasites,” *Los Angeles Times*, Apr. 27, 1890, 12; “The Cass Bug: A Subject of Much Horticultural Dispute,” *Los Angeles Times*, Feb. 23, 1890, 3. All subsequent footnotes in this passage derive from the latter article.

Cass had choice words for the most zealous of the Commission's "spray fiends" in response penned in April, 1890, where he also alleged very heavy-handed behaviour on the part of the powers-that-were.¹⁴⁰ Cass asserted that one C. M. Heintz – "mouthpiece" of the "spray men" on the County Horticultural Commission – attempted to wheedle him into "indorsing" certain insecticides.¹⁴¹ When Cass refused, Heintz – whom Cass mockingly described as a "gentleman [?]" – resorted to threats to "make it hot" for Cass, and to "do him up."¹⁴² It seems to me that if this story can be believed, which seems reasonable given the legal lengths to which the authorities were willing to go, such a heated and sustained confrontation indicates the depth of the resistance to the authorities. It is not just Cass' intransigence that indicates this – the very need to bring him to court implies that the Commission needed to make an example out of him, a stance which implies defensiveness and insecurity.

Cass' resistance seems not uncommon – other Californian sources allude to similar situations. A certain J. C. Sherer authored two letters-to-the-editor of the *LA Times* bemoaning the climate of opposition to the work of horticultural inspectors. On March 3, 1890, Sherer penned a "plea for the 'bug commission,'" in defense of the "much-abused 'bug commissioners'" of Los Angeles County.¹⁴³ He denounced the "ignorant condemning" of these officials by those "who should know better."¹⁴⁴ He then recounted the ravages of the San Jose scale, pointing out that no proven biological control had yet emerged (and none ever would), and that until such time as one did, pesticides were the only control. Otherwise, "the prolific and

¹⁴⁰ "Furious Ruction," 12.

¹⁴¹ Ibid.

¹⁴² Ibid.

¹⁴³ J. C. Sherer, "Letters to the Times: A Plea for the 'Bug Commission,'" *Los Angeles Times*, Mar. 3, 1890, 6.

¹⁴⁴ Ibid.

pernicious *aspidiotus* will put a quietus on raising fruits in Los Angeles County just as sure as fate!”¹⁴⁵

Sherer then makes his case for why the “bug commissioners” are needed: Because some people need the prodding of the law to do right by their neighbours, and because some people are simply too ignorant about pest control to do the sensible thing.¹⁴⁶ Here, of course, Sherer is speaking to the deeply-ingrained Western ethos of individualism, but also strongly implying that other notions of pest control (like biological control) had a hold on farmers’ mentalities. Most importantly of all, his letter signals the existence of widespread antipathy to the pest inspectors – otherwise, he would not suggest they were “much-abused,” nor would he likely feel the need to write in to the newspaper to defend them. This antipathy is furthered by Sherer’s remark that some farmers would have the horticultural commission “dispensed with.”¹⁴⁷

This was not Sherer’s only intervention on the issue. Thirteen days later Sherer wrote a second opinion piece for the *Times*. Here, Sherer disclosed that he credited spraying with a lime-salt-sulphur solution with saving his trees – both through his own use of it and that of most of his neighbours – though only after significant damage caused by lack of spraying.¹⁴⁸ Sherer felt official inspection was the catalyst for increased pesticide use in his area, though he noted not everyone he knew was on board.¹⁴⁹ More significantly, Sherer referred to his displeasure with a campaign to abolish the local horticultural commission, thus proving such a campaign existed.¹⁵⁰ Though I have not found documents which elaborate on the views of those who wanted the commission eradicated, Sherer’s commentary would not exist unless in response to an anti-

¹⁴⁵ Ibid.

¹⁴⁶ Ibid.

¹⁴⁷ Ibid.

¹⁴⁸ J. C. Sherer, “Letters to the Times: Complaint of the Fruit Grower,” *Los Angeles Times*, Mar. 16, 1890, 9.

¹⁴⁹ Ibid.

¹⁵⁰ Ibid.

pesticide, anti-horticultural commission movement. Thus, Sherer's letters can be used to triangulate the contours of the opposition he declaims against.

The same reading can be safely applied to other pro-pesticide, pro-bureaucracy articles from this period. For instance, a *Los Angeles Times* article from February 1891 notes Pest Inspector Richardson's frustration with the inaction of local farmers in spraying their trees with pesticides, Richardson's prescribed remedy.¹⁵¹ The article also clearly notes that the farmers had been "forewarned", so ignorance could not be at the heart of their failure to take the recommended steps.¹⁵² Passive resistance or mere apathy was not the only way farmers fobbed off the newly-founded botanical bureaucracy, though. Indeed, it seems like Cass was not the only one willing to obdurately reject bureaucratic edicts, as in the case of a Pasadena man referred to by the aforementioned *Times* article who wanted "to fight the Horticultural Commission."¹⁵³ Sadly, neither his reasons for his opposition to the Commission, nor his identity, are given.

Days later, another *Los Angeles Times* piece featured the chiding commentary of one C. Thompson, apparently "Pasadena's most extensive grower of deciduous fruits."¹⁵⁴ Here, Thompson lambasted the reluctance of Pasadena farmers to spray for the San Jose scale, in spite of their orchards' infestation with it. He said "very little attention" was paid to efforts by the Pest Inspector to encourage spraying the previous fall, and the same calls were meeting with deaf ears in the spring.¹⁵⁵ Thompson also critiqued those "easy and unconcerned" enough to prefer

¹⁵¹ "Tuesday's Budget: What Happened in Pasadena Yesterday – The San Jose Scale Here," *Los Angeles Times*, Feb. 18, 1891, 7. On the basis of context, I assume Richardson was either Inspector for Los Angeles County or for California State as a whole, but I do not know for sure.

¹⁵² *Ibid.*

¹⁵³ *Ibid.*

¹⁵⁴ "Pasadena: A Note of Warning – Mr. Thompson Speaks About the San Jose Scale," *Los Angeles Times*, Mar. 13, 1891, 7.

¹⁵⁵ *Ibid.* A short blurb around the same time from the *Los Angeles Times* drives home the same message. Baldly stating that the scale was flourishing, it wryly asserted that it was a good thing that Inspector Richardson cared about combatting the insect, since fruit growers did not seem to. See "Brevities," *Los Angeles Times*, Feb. 27, 1891, 7.

biological control over pesticides, proclaiming that they were sure to be “disappointed” with that measure.¹⁵⁶ Yet again, though, Thompson’s piece communicates more than just his disapproval – one can easily extrapolate significant farmer ambivalence toward pesticides at the time. There is probably something ideological underlying such passive resistance or apathy in most cases, as in the case of Cass, though quotidian concerns like the expense of pesticides, or the investment of time cannot be dismissed.

All of those examples derive from California, but the story is similar elsewhere in the West. By the late 1880s and early 1890s, the San Jose scale had become a serious problem for Oregonian orchardists as well. When, in 1889, Oregon had seen fit to copy California’s example with the foundation of a state Board of Horticulture complete with a Pest Inspector, the first man to fill that last position was a certain General Varney, and the role made him quite unpopular in many circles. Oregonians frequently attacked Varney’s competence, integrity, and zeal for pesticides which lays bare a strong undercurrent of defiance toward both chemicals and officialdom.

Salem’s *Capital Journal* hurled invective at Varney in an 1890 column inveighing against his public statements that Salem’s fruit trees had a serious pest infestation.¹⁵⁷ To it, the “bungling” Varney must have “aphis on the brain”, especially as his talk of San Jose scale in Oregon nurseries could only be “calculated to injure a great and growing Oregon industry in the eyes of other states.”¹⁵⁸ Instead, *The Capital Journal* called for Varney to be dismissed and his post eliminated, as there was no value in keeping a “travelling fruit inspector on the rounds, alarming the public.”¹⁵⁹ The *Journal* did not deny that pests existed in Oregon, but it clearly felt

¹⁵⁶ Ibid.

¹⁵⁷ “General Varney and Fruit Pests,” *The Capital Journal*, Nov. 4, 1890, (page unknown).

¹⁵⁸ Ibid.

¹⁵⁹ Ibid.

the bad press generated by the bug bureaucrats was more pernicious than the insects, a perspective which nicely captures both the rejection of bureaucracy as well as the denial of officialdom's framing of the dangers that existed.

The *Salem Capital Journal* was not a lone voice in the storm – or at the very least, it lent its pages to the voices of others who might run down Varney. Varney and a farmer by the name of Sam Clark engaged in an amusing war of words in the *Journal* in 1891. First, Clark cast aspersions on Varney's ability to recognize the San Jose scale, reporting that it had been found in Varney's own nurseries, and that Varney had wriggled out of a boast he made to pay \$10 for any of his trees found to have scale.¹⁶⁰ This was made doubly ironic to Clark since he claimed that Varney had ordered Clark to eliminate the San Jose scale from his property a year prior – but a subsequent inspection found none. Clark also stated in the article that he thought lady bugs could offer an effective control for the scale, facetiously hoping they would come to Varney's aid at one point.

The Capital Journal was fair enough to publish a reply on behalf of Varney seven days later, which claimed that the scale had not been found in Varney's nurseries proper, but on trees just outside it, but nevertheless on his property.¹⁶¹ It also claimed Varney paid up.¹⁶² But the truth of the matter is less important than the dispute itself, which evidently entertained contemporaries.¹⁶³ It shows that Varney had a difficult time imposing his authority – while that might be due to his personal characteristics or failings, Richardson had similar trouble in

¹⁶⁰ Sam Clark, "Sam Clark – Pays His Compliments to the Lady Bird Bug and General Varney," *Salem Capital Journal*, Oct. 23, 1891, Page Unknown.

¹⁶¹ "General Varney's Scale," *Salem Capital Journal*, Oct. 31, 1891, 1.

¹⁶² A more expanded exculpation of Varney was published elsewhere, too, and it also rejected Clark's claims that lady bugs in The Dalles would be sufficient to see off the San Jose scale. See George R. Snipes and W. H. Taylor, "About the San Jose Scale," *Dalles Daily Chronicle*, Oct. 27, 1891, 3. This article also implies that Clark's original letter was published in the *Portland Oregonian*, indicating it would have been widely circulated around the state.

¹⁶³ The Clark-Varney dispute got some light-hearted coverage in other sectors of the Oregonian press. See "Local Brevities," *Dalles Daily Chronicle*, Nov. 6, 1891, 3.

California it seems, pointing to a more general problem. Moreover, Clark's commentary also indicates he was no devotee of insecticides, either. His needling remark about Varney's need for lady bugs came only after leading off his article with serious comment on the effectiveness of lady bugs in The Dalles, Oregon, against the scale.¹⁶⁴ No doubt his parting shot at Varney was also an indictment of what Clark would have seen as Varney's failed methods – pesticides.

A slew of other documents also demonstrate that many Oregonian farmers spurned the newfangled horticultural bureaucracy and its chemical methods. An 1891 blurb reported that a "Captain Babcock" discovered some scale-y trees in his orchard, whereupon he ordered them burnt.¹⁶⁵ Before he could effect this order, though, neighbouring farmers arrived asking about taking the trees for themselves. They were not dissuaded even after learning of the reason for the trees' disposal, and reportedly became "quite indignant" when they were finally refused. The writer chalked up this attitude to a "stubborn determination to ignore facts and experience," though it also might imply that some were more blasé about the risks San Jose scale posed, even in the face of the sustained warnings from the state horticultural authorities.

Such stories are not rare. The *Corvallis Daily Gazette* reprinted an article in the *Oregonian* chastising farmers for not spraying efficiently and often enough, thus failing to derive the benefit from insecticides.¹⁶⁶ The article noted that some farmers were even telling newspapermen that "spraying was a humbug", which evidently meant it did not work. Other anecdotes display the high contempt many Oregonians felt for the horticultural authorities and their methods. One C. W. Denton ran afoul of Varney for selling fruit "infected" with San Jose

¹⁶⁴ Clark, "Pays His Compliments," Page Unknown. Clearly, Clark's ladybugs were not a long-term solution, though. No biological control method ever gained lasting traction, as I have mentioned.

¹⁶⁵ "Farm and Home," 1891. From the PDF, it is not evident which newspaper this is actually from (though it was an *Oregonian* paper), nor is the exact date visible.

¹⁶⁶ Untitled, *Corvallis Daily Gazette*, Oct. 2, 1891, 3. Reprinted from the *Oregonian*.

scale in 1891, long after there could have been any question of the propriety of that.¹⁶⁷ Another 1892 article blasts the State Board of Horticulture for its “ignorance of facts and the equity of trade,” in the Board’s decision to publish concerns about insects which the writer felt could lead to the closure of Eastern markets to Oregonian trees and fruit.¹⁶⁸ One might also perceive indirect criticism of the horticultural inspectors’ performance from an 1892 article which proclaimed it “needless to spray orchards and fight the devilish San Jose scale” if shipments infested with scale were going to continue to stream in to Oregon from California.¹⁶⁹ Numerous other articles from these years which promote spraying necessarily also imply an unconverted segment of agriculturalists.¹⁷⁰

Other critics are less direct, but no less contrarian. A striking article from September 1892 praises the annual report of Oregon’s Board of Horticulture as “the best report so far published by the board” and full of “a vast amount of valuable information.”¹⁷¹ Yet it also pointedly dissents from the board’s oft-touted chemical remedies, saying that the chapter on insect pests is “marred only by the pernicious fruit pest laws and quarantine regulations.”¹⁷² The article goes further, exploding the board’s pesticide advocacy by saying that “spraying is against the judgment of experienced orchardists as it could harm the scale but little at the time and would destroy the insect enemies of the pest.”¹⁷³ Regardless of the validity of the opinion expressed, the

¹⁶⁷ Denton was fined \$25 plus costs, a not-insignificant amount. See Untitled, *Dalles Daily Chronicle*, Jul. 8, 1891, 3.

¹⁶⁸ D. B. Weir, “Poisoned Fruit: The Second of a Series of Interesting Papers,” *Heppner Gazette*, Mar. 8, 1892, 4.

¹⁶⁹ This, of course, could function as an indictment of the competence of both Oregonian and Californian inspectors. See “Local and Personal,” *Dalles Daily Chronicle*, Sep. 9, 1892, 3.

¹⁷⁰ See urgings to spray in pieces like “Items in Brief,” *Dalles Times-Mountaineer*, Jul. 23, 1892, 1; “The Fruit Pests – Secretary Tolleson Gives Valuable Information,” *The Hillsboro Argus*, Dec. 26, 1895, 1; “Let Us Spray,” Publication Unknown, Mar. 1895; “San Jose Scale – Causing Much Damage to Fruit Orchards in This State,” *Daily Morning Astorian*, Mar. 12, 1896, 1; “Enforce Spraying – Inspector Evans Will War on San Jose Scale,” *Daily East Oregonian*, Oct. 10, 1906, 8; “Scale Bugs on Fruit,” *Seattle Post-Intelligencer*, Jul. 4, 1891, 7.

¹⁷¹ “A Valuable Book – The Annual Report of the State Board of Horticulture,” *Heppner Gazette*, Sep. 9, 1892, 1.

¹⁷² Ibid.

¹⁷³ Ibid.

point is clear: substantial and sustained dissent was rife, and it often focused on suspicion of chemical insecticides, which were nothing more than “poppycock” to some.¹⁷⁴

Washington State saw a similar public discourse, replete with challenges to the state board of horticulture and its chemical doctrines. By 1893-4, the scale’s rapid spread meant that control was oft-debated in the state press. As with Oregon and California, pro-spray literature paints a vivid picture of the opposition. By February 1894, secretary of the state Board of Horticulture – one Tolleson – was exhorting members of local horticultural societies to give “the names of parties who have infested trees, but who will not begin the work of spraying.”¹⁷⁵ That Tolleson would attempt to use informants to ferret out the recalcitrant is telling. It suggests strongly that resistance to spraying was more widespread than the authorities could handle on their own.

That impression is undergirded by other articles. The following month, Yakima Horticultural Commissioner Maxey used a local periodical to publish the names of 17 local farmers with scale on their trees.¹⁷⁶ He then concluded with a warning that “the law must be enforced” should these men not take “urgent” action (meaning the use of pesticides).¹⁷⁷ Such an article operated as a name-and-shame tactic to enforce compliance. One has the distinct impression it would not at all be necessary if the authorities had much faith that their wishes would be carried out otherwise. Similarly, State Fruit Inspector D. M. Jessee inveighed against orchardists “indifferent” to persuasion or threat, noting that he planned to initiate legal action against one particularly prickly farmer as a test case.¹⁷⁸

¹⁷⁴ “Big Money in Fruit,” *Polk County Observer*, Oct. 23, 1903, 1.

¹⁷⁵ “Orchard and Garden Notes,” *The Ranch*, Feb. 10, 1894, 7.

¹⁷⁶ “San Jose Scale in Yakima – He Has Them On the List,” *The Ranch*, Mar. 17, 1894, 9.

¹⁷⁷ *Ibid.*

¹⁷⁸ “The Interviewer,” *The Ranch*, Apr. 4, 1894, 4.

The passage of time (and legislation mandating spraying) does not seem to have dented the will of some Washington farmers to avoid the use of pesticides, though much evidence suggests mass compliance by the turn of the century. In 1906, *The Evening Statesman* out of Walla Walla published a withering critique from State Commissioner of Horticulture F. A. Huntley directed at those farmers who, for “various reasons”, had failed to spray their trees against the scale.¹⁷⁹ Announcing that it was either “spray or dig up the trees”, Huntley scolded those “deluded” enough to believe that the recent frost had killed the scale. However, Huntley may not have really believed that farmers neglected spraying on account of the frost (at least not all of them), otherwise he would not have referred to their reasons as “various” elsewhere. Instead, the tone of the article makes it appear as if Huntley is ridiculing a convenient excuse made by farmers seeking to evade penalty for not spraying. He also praises the activity of the local pest inspector in trying to “impress on valley fruit growers the absolute necessity of raising cleaner fruit” – the unstated corollary being that that necessity was not accepted everywhere, at least not if it meant using the chemical methods advocated by the Commissioner.

All of the above further illustrates that officialdom met with considerable dissent in Washington as well. The reasons Westerners were wary of chemical solutions were various; aversion to government authority, conviction that the pesticides did not work, or dedication to alternate means of control. Interestingly, though, some may have had suspicions that the pesticide sprays were harmful to human health, something usually thought of as a mid-twentieth century concern. Indeed, even advocates of pesticides acknowledged some potential harms. Albany, Oregon’s *State Rights Democrat* published a blurb describing a variant sulphur concoction for treatment of the San Jose scale, but it warned users not to “breathe the vapour

¹⁷⁹ “Spray or Dig Up the Trees: Imperative Order Issued By Commissioner Huntley,” *The Evening Statesman*, Mar. 31, 1906, 5. All other quotations in this paragraph derive from this same source.

from the can.”¹⁸⁰ Meanwhile, the self-proclaimed “official organ of the Northwest Fruit Growers’ Association,” *Ranche and Range*, pushed the use of cyanide gas to eliminate San Jose scale in greenhouses, though it cautioned that no one should be around to breathe it in.¹⁸¹ Finally, Oregon Inspector Emile Schanno, while vigorously recommending the lime, salt, and sulphur spray for the scale, also advised farmers to wear goggles and keep their hands and faces protected when spraying.¹⁸²

Ultimately, it is very difficult to assess how much fears of pesticide safety mattered to contemporary farmers who opposed pesticide use.¹⁸³ In the first place, chronic poisoning was not well-understood at the time, though it was something which people incurred from pesticides, as James Whorton pointed out.¹⁸⁴ Nor is it a concern which arose often in the sources I have seen, examples above notwithstanding.¹⁸⁵ That said, Schanno’s above-mentioned advice to spray also noted that he thought farmers feared getting the spray on their clothes.¹⁸⁶ Also, there is one possibly telling anecdote in Oregon’s *Daily Capital Journal* dating from 1897. This reported a certain Pap Richardson’s demand that the local horticultural inspector order the spraying of a nearby orchard infested with scale.¹⁸⁷ The paper then noted that Richardson’s zeal for spraying dried up when he learned that there was an infestation of scale on his property. Of course, the issue there could have been financial, not medical: we simply do not know. Nevertheless, despite

¹⁸⁰ “Sure Death,” *State Rights Democrat*, Apr. 3, 1896, 1.

¹⁸¹ It did not say when, or if, it would be safe to return. See “The San Jose Scale: The San Jose Scale as a Permanent Factor in Fruit-Growing,” *Ranche and Range*, Nov. 15, 1900, 9.

¹⁸² Schanno, “Care of an Orchard,” 2.

¹⁸³ At least, fears about safety to *human* health. Many, like Cass above, voiced concerns about the impact on trees. But my reading of the discourse in general is that the key worry for those farmers who were worried was about pesticide efficiency, not danger.

¹⁸⁴ Whorton, *The Arsenic Century*, x-xii, 320-322.

¹⁸⁵ Only D. B. Weir’s above-cited treatise takes specific aim at the issue, and he rubbishes British concerns about poisonous pesticide residue on American apples. Weir, “Poisoned Fruit,” 4.

¹⁸⁶ Schanno, “Care of an Orchard,” 2.

¹⁸⁷ “Journal ‘X-Rays,’” *Daily Capital Journal*, Sept. 6, 1897, Page Unknown.

the paucity of evidence, it seems plausible to me that some of the reticence of farmers to use chemical methods might have stemmed from a common-sense concern for their health, despite the lack of medical validation available at that time for the harms of chronic insecticide poisoning.

All told, it does appear that more and more farmers accepted the prevailing wisdom of the authorities as time went on: Pesticide spraying was the best way to eviscerate the San Jose scale – beneficial insects, while perhaps helpful in some instances, could not be generally relied upon. But one should not allow eventual consensus to obscure the fractious state of affairs which predominated during the 1880s and 1890s. All in all, throughout the West, the inchoate horticultural bureaucracy's authority seemed hardly all-encompassing, and trust in pesticides limited, at least until the mid-1890s (and sometimes even beyond).

V. “Paradise” Lost? The San Jose Scale, the Settler-Colonial Ideal, and Apocalyptic Rhetoric

Beyond the tangible measures taken to stop the scale’s spread and the opposition they provoked, popular discourse about the San Jose scale also offers insight into contemporary mentalities about nature, place, and Western society. The nineteenth-century American West was a newly-colonized space, of course, and like all such spaces, settlers required a *raison d’être* for their society, and implicitly, for their dispossession of indigenous peoples.¹⁸⁸ This usually took the form of ideas of “progress” – that Europeans would bring civilizational and environmental improvements, thus justifying their colonization. Indeed, Thomas Dunlap has pointed out that the belief that Europeans intrinsically brought progress to the spaces they conquered animated so much environmental change in nineteenth-century settler societies.¹⁸⁹ At the same time, the progressivist narrative functioned as an excuse for the marginalization of indigenous peoples, plants, and fauna – they were doomed to give way before a superior civilization by virtue of their supposed inferiority.¹⁹⁰

But this identity was always unstable and insecure, even neurotic. Settler-colonial polities tend to be hyper-sensitive to their own potential usurpation and destruction, something reflected in dialogue about vexing situations. As we shall see, the San Jose scale seemed to activate an archetypal settler fear, according to Veracini, that the land itself was scorning the settlers.¹⁹¹ As such, it became the cause of soul-searching about the drawbacks of settler-society; these were the trappings of modernity, like industrial capitalism, railroads, and trade. In addition, the scale was a locus of sheer terror – to many, it seemed an existential threat to Western agriculture, which,

¹⁸⁸ Veracini, *Settler Colonialism*, 75-81.

¹⁸⁹ Dunlap, “Remaking the Land,” 318.

¹⁹⁰ Ibid.

¹⁹¹ Veracini, *Settler Colonialism*, 81.

given agriculture's centrality, was tantamount to a threat to the West itself.¹⁹² Finally, though, as the smoke cleared, the pesticides worked, and the danger receded, the bug became rhetorically transformed into a challenge overcome, which only reiterated and redounded to settler virtue. As such, the scale crisis – once existential – could be enfolded back into affirmational settler narratives, much like those which grew up over episodes of foundational violence.¹⁹³

As I remarked earlier, it is apt that it was one of the early American West's most notable capitalists, James Lick, who accidentally introduced the San Jose scale. Some sources pertaining to the scale strongly indicate that contemporaries linked pestilential insect species to the larger processes of change incited by the settlement of the West. Furthermore, they seemed to have some misgivings about innovations that stemmed from the prevailing system of industrial capitalism, like railroads, that "progress" had brought. Though contemporary awareness of such macro-scale processes (pun intended) might have been only partial, there are notes of ambivalence with the world wrought by settler-colonialism.

Key to this interpretation are sources like a 1904 article featured in the *Portland Oregonian* entitled "Pests Weren't Always Here."¹⁹⁴ This article is set up as a dialogue between the "old settler" and a "dealer" of apples using paraphrase rather than direct quote, and not identifying either speaker by proper name. Here, the old pioneer lamented the now-routine presence of insects in fruit, and the damage they cause.¹⁹⁵ He spoke of the days, not so long past,

¹⁹² Rasmussen claims that in 1862, 50% of the American population was involved in farming. I would think the figure for the West was at least that high during the remainder of the century, given how much less urbanized it was. Rasmussen, "The People's Department," 291.

¹⁹³ Veracini makes much of the importance of overcoming indigenous inhabitants by violence to settler society self-image. Often these episodes are retranslated as noble and necessary, underscoring the most virtuous elements of settler society, usually its industriousness and all-around clean-living. Veracini, *Settler Colonialism*, 75-79. The scale tempest did something similar – first serving as a grave peril, activating the always-latent settler fear of destruction, a talisman, perhaps, of divine disfavor with the community. Then, once overcome, it became a tale which could be quickly enrolled in the service of those who would extol settler society.

¹⁹⁴ "Pests Weren't Always Here," *Portland Oregonian*, Jan. 29, 1904, 9.

¹⁹⁵ Ibid.

when the ravages of the codling moth and San Jose scale were simply unknown in Oregon.¹⁹⁶

The dealer responded with an involved history of how the two insects reached Oregon: the railroad was to blame for the codling moth, plant-importing vacationers to San Jose from Portland for the scale. The dealer also noted that the scale had come originally from China, prompting him to lament that “it would scarcely be imagined that such tiny pests could travel so far as Oregon, or do as much damage as they have since arriving here.”¹⁹⁷

In such a document, one can detect dissonance with the wider system of industrial capitalism, wherein ever-increasing global trade, transport, and travel had elevated the rate of exchange of capital, yes, but also of insect pests as well. Not, of course, that such was necessarily the intent of the speakers (though it might have been), but such sentiments possibly express something beyond the consciousness of the speakers. What is certain is that both the old settler and the dealer knew the world they were used to had changed – a new reality had imposed itself, with some unwelcome side effects. It also seems reasonable to hear in this piece disappointment with the promise of the “Garden of the World” rhetoric so often used to sell the West.¹⁹⁸

Witness also the 1886 complaint of one G. F. W., an entomologist, who bemoans the ravages of both the San Jose scale and the codling moth which were “unknown” a mere “six or eight years ago.”¹⁹⁹ Now, though, Western fruit-growers were beset by “about as many stumbling blocks as that of [their] eastern brother[s],” their “pathway[s] ... by no means strewn

¹⁹⁶ Ibid.

¹⁹⁷ Ibid.

¹⁹⁸ As I expressed earlier, building up the West as a paradisiacal place where agriculture would be bountiful and easy was perhaps the central trope of American booster literature. For one example, see C. W. Dana, *The Garden of the World, or, the Great West: Its History, Its Wealth, Its Natural Advantages, and Its Future* (Boston: Wentworth and Company, 1856), particularly pages 278-334.

¹⁹⁹ G. F. W., “The Entomologist: Insect Pests in California,” *The Cultivator and Country Gentleman*, 51, 1766 (Dec. 2, 1886): 913.

with roses.”²⁰⁰ Seemingly, the dream of agricultural plenty and profits galore had been seriously clouded for some.

That conclusion seems confirmed by a 1902 article in the *Oregonian*, written by one William M. Holmes. Though Holmes presented the path of Oregon horticulture as one in which adversity was overcome to the stabilization and prosperity of the fruit industry, it is hard not to read ambivalence into his words. He wrote that, “every old pioneer in the state knew what the soil and the climate were capable of before the codling moth and the San Jose scale followed close upon the advent of the overland railroad.” But the rail-riding bugs subsequently drove an entire generation of growers into retirement, according to Holmes: “With the coming of the scale and the gradual decay of the earlier orchards, the early day orchardists concluded the difficulties in the way of future success were insurmountable.” Afterwards, it was left to a newer generation to pick up the pieces, learn to fight the insects chemically, and “wrest victory from defeat.” Though things end optimistically, it seems that the writer pines for the era before the railroad, an era in which the “local fruit exhibits ... have never been excelled.”²⁰¹

Most explicitly of all, an 1890 Salem *Capital Journal* article acknowledged the source of the bugs battering Oregon as side effects of settler technology and economy:

It is a fact that fruit pests have come into Oregon the last five years. The railroad and commerce have brought them. But these same agencies have brought a market for fruit, and with all the pests other states have, Oregon people are getting more money out of fruit, than when the pests were unknown and fruit lay rotting on the ground by thousands of bushels. Oregon people must learn to guard their fruit crops as other states do, and can then best the world at raising them.²⁰²

²⁰⁰ Ibid.

²⁰¹ All information in this paragraph derives from William B. Holmes, “Oregon Apple Talk,” Jan. 21, 1902, 11.

²⁰² “General Varney and Fruit Pests,” *Capital Journal*, Nov. 4, 1890.

Unlike the sources above, this was hardly a lament, though it did finger the same macro processes as culprits. While this article attempts to reorient the debate around accepting pests as an unfortunate but inevitable by-product of the benevolent force of trade, one can easily imagine not everyone was so sanguine about the necessity and ease of learning to “guard their fruit crops.” Indeed, many Westerners thought the San Jose scale represented an existential threat to their livelihoods (and perhaps to their civilization), especially in 1886 when G. F. W. was writing, and 1890 when the *Capital Journal* urged Oregonians to stop complaining and simply deal with the problem. It is to the modes of expression these fears of catastrophe took – and the deeper meanings possibly underlying this rhetoric – to which I now turn.

It should surprise no one that martial metaphors and war-like language were commonplace in descriptions of the San Jose scale’s destruction and control.²⁰³ Historians have thoroughly documented how martial rhetoric predominates in discourse about insect pests. Most notably amongst them, perhaps, is the esteemed environmental historian Edmund Russell, who noticed the disturbing rhetorical and methodological overlap between war against insects and war against humans.²⁰⁴ That is to say, groups of people have often been rhetorically reduced to the level of insects – once that dehumanization is accomplished, then it is possible to treat them as we often treat insects: with ruthless, exterminatory violence. More than that, Russell also highlights that methods of killing insects became methods of killing people awfully quickly.²⁰⁵

²⁰³ There are too many examples to list, but here are some highlights: A brief note in the *Los Angeles Times* declared that “scalebug inspectors are on the warpath.” See “Brevities,” *Los Angeles Times*, Nov. 21, 1889. An 1894 blurb about the Yakima Horticultural Society’s efforts to exterminate the San Jose scale and other insects reports that the Society’s “general disposition [was] to make vigorous war on the invaders.” See “Ranch Small Talk,” *The Ranch*, Mar. 24, 1894, 8.

²⁰⁴ Edmund Russell, *War and Nature: Fighting Humans and Insects with Chemicals from World War I to Silent Spring* (Cambridge: Cambridge University Press, 2001), 1-52.

²⁰⁵ *Ibid.*, 42-43.

Chemical poisoning rapidly became not merely a technique to be used against the arthropods, as World War I and World War II proved.

That intellectual terrain has been well-tilled, so I do not wish to say more about it here, other than to point out that my sources further buttress that well-established thesis. Yet there is a discursive analysis I do want to undertake. Popular and professional literature on the San Jose scale often drifted into feverish, apocalyptic language. Though catastrophic environmentalist rhetoric is a frequent feature of our age, with rampant pollution, startling rates of species loss, and the looming reality of global warming with all its attendant horrors, it is striking to note the similar tone of much comment on the San Jose scale. Perhaps some of this alarmism was self-serving – it may have helped some interested parties promote pesticides.²⁰⁶ Also, such talk may have assisted legislators around the world who wanted to push protectionism.²⁰⁷ Finally, alarmism may also have helped horticultural authorities justify their existence. It also may be encoded into the DNA of the mass media to embellish threats – that is not to say that these threats are often without validity, just that modern media tend to run to extremes in their portrayals. Nonetheless, I think the prevalence of apocalyptic rhetoric about the San Jose scale – and other insect dangers in this period – also suggests a contemporary appreciation for the vulnerability of nature, and how humans can dramatically impact it.

Fear practically seeps from the ink of some contemporary columns. For instance, in 1901, the *Ranche and Range* could not resist the temptation to wax Biblical:

No insect, except perhaps the Biblical locust, more generally represents the universal combat between man and his insect enemies than the San Jose scale. Practically every

²⁰⁶ Russell alleges entomologists had a vested interest in talking up the pest threat since they profited from it via increased government funding, though that does seem a bit too cynical to me. See *Ibid.*, 47.

²⁰⁷ Leland O. Howard thought that was the real reason behind Germany's ban of American horticultural products in 1898. See Howard, *History of Applied Entomology*, 121.

deciduous tree ... is liable to its attack. Its rapid spread from state to state has been a terror.²⁰⁸

Also par for the course are phrases like *The Dalles Times-Mountaineer*'s 1891 breathless warning that the scale is "sure death to trees," which I touched on above.²⁰⁹ Of course, while the scale certainly could and did kill trees, it usually took quite a while. However, the fruit produced by badly infested trees would usually be distorted, spotted, and often shrunken, even though the tree could often remain living for a few years. Years later, in 1897, *The Plain Dealer* of Roseburg, Oregon, was even more strident in its warning:

Every effort should be made by the fruit growers to stop the ravages of this dread disease [the scale] by employing proper methods immediately. The best and safest way of doing this would be to grab them up and burn them. It looks as if it was a great sacrifice to destroy valuable fruit trees, but it is cheaper to do this than to let the scale spread and finally destroy an entire orchard and possibly all the orchards in the South Umpqua valley.²¹⁰

Such drastic measures after the recent discovery of an early scale infestation hardly seem appropriate at that point, though such was the dread the bug inspired, and such was the language habitually employed.

Another example might bring the point to crystal-clarity. The *Corvallis Gazette*, also of Oregon, ran an article in which it declared "the life of our trees and shrubs threatened." While that was a reasonable statement, if melodramatically phrased, the article goes on to suggest that Portland's reputation as the "Rose City" was in imminent danger from the scale. This outlandish idea was bolstered by the local horticultural inspector who forecast that unless spraying became the norm in Portland, "it is only a matter of time when there will not be a rose in this city fit to be

²⁰⁸ "Scientific Investigation of the San Jose Scale," *Ranche and Range*, Oct. 3, 1901, 4.

²⁰⁹ "Items in Brief," *Dalles Times-Mountaineer*, Nov. 14, 1891, 1.

²¹⁰ "San Jose Scale," *Plain Dealer*, Mar. 25, 1897, 1.

called by the name.” Furthermore, the inspector declared that – were it not for spraying and pruning – there would not be “a single apple or cherry in Western Oregon fit to eat.”²¹¹

That agriculturalists faced perhaps a mortal peril in the scale was a recurring discursive theme. Reflecting on the situation from the vantage point of 1901, the *Oregonian* concluded that, indeed, the scale (and other bugs) “threatened the very existence of the industry.”²¹² Writing in 1903, the *Corvallis Times* was even less sanguine, putting the peril of the scale in the present tense. It wondered aloud at that point whether Benton County, Oregon’s orchards were destined to perish on account of a recent assault of scale. Unless growers sprayed immediately, the paper concluded that “orchards in this vicinity will soon be in the throes of a violent disease, and that in the course of a few years all the trees will die.”²¹³

Of course, I am not trying to suggest that the San Jose scale was not a serious peril, or even an existential threat in some places at some times. Obviously, it was. The fears raised above were real, if a bit overblown (Portland remains the Rose City). What is striking, though, is that such a public discourse does not suggest the hubris towards nature with which humans of the era are often associated. Instead, many contemporaries appear to be deeply worried that there are natural forces well beyond their control, though perhaps exacerbated by the bad behaviour of humankind. Furthermore, while it may be inferential, I do not think it unreasonable to see in such documents sub-textual signs of pervading settler-colonial anxiety that nature itself would thwart their ill-gotten gains, dispossessing them much as they had dispossessed others.

All that said, there is the question of how many people were really agitated by such alarmism. As an entire section of this paper has argued, many farmers were obtuse to the pleas of

²¹¹ All material in this paragraph derives from “San Jose Scale – The Life of Our Trees and Shrubs Threatened,” *Corvallis Gazette*, Dec. 12, 1905, 1.

²¹² “Horticulture – Fruit Crop \$2,000,000,” *Portland Oregonian*, Jan. 1, 1901, 12.

²¹³ “Will Benton’s Orchards Die?” *Corvallis Times*, Sept. 9, 1903, 3.

inspectors to spray, at least at first. Moreover, apocalyptic rhetoric also co-existed with intermittent assurances from some quarters that the scale could be easily subdued by pesticides.²¹⁴ Perhaps, then, much like the multifarious present-day social and intellectual reception of global warming, the prominence of doom-mongering rhetoric does not uniformly reflect mass opinion. Notwithstanding, I think the deep concern routinely expressed about this organism was much more genuine than self-serving, and I think it was widespread. Perhaps it was not universal, but it was likely the sentiments of the majority.

While most contemporary comment on the San Jose scale was ferociously negative, replete with fear and loathing, there was also a discursive cross-current which constructed the scale in quite different terms, even describing it positively. This discursive strand was quantitatively weak compared to the conventional rhetoric, but it is still notable as it allows for deeper investigation into human-insect relations in this era. In this, I want to delve into what anthropologist Brian Morris has termed “cultural entomology” – that is, the cultural impact of insects upon human societies.

As Morris says, there is a “deeply pervasive cultural bias in Western societies” priming Westerners to view insects with “revulsion and hostility.”²¹⁵ The sources I highlighted above plainly indicate the truth of Morris’ statement. Nonetheless, insects were not uniformly dreaded in this era, not even the San Jose scale. In the first place, one conclusion that can be drawn from my prior discussion of farmer resistance to pesticides is that many farmers were not particularly

²¹⁴ The degree to which it could be controlled was often overstated too, but as I noted earlier, lime-salt-sulphur spray did have a salutary effect. For an example of the type of soothing, yet exaggerated, language some employed to dampen concern about the scale – and to promote spraying – see Untitled, *Ranch and Range*, Oct. 28, 1897, 8, the author of which mocked the “hysteria” then spreading in the East in the wake of the scale, calmly declaring their faith in pesticides. However, such sources may mislead. Pauly notes that some experts, like John B. Smith, intentionally dampened their concerns publically in order to try to quell fears. See Pauly, *Fruits and Plains*, 144.

²¹⁵ Brian Morris, *Insects and Human Life* (Oxford and New York: Berg Publishers, 2004), 184.

revolted by insect life, certainly not reflexively. Otherwise, there would have been no experimentation with biological control using other insects.

Moreover, although rare, there are a handful of sources which seem to express a grudging admiration for the qualities of the San Jose scale, even though it was so destructive to human interests. Witness, for instance, a *Times-Mountaineer* article from 1893 stating that in light of the near-total spraying of the area's trees now underway, "if the San Jose scale still predominates [afterwards] their tenacity of life must be wonderful."²¹⁶ The note of respect, even of awe, is quite compelling. Though I do not know if the scale did survive in that area after that round of spraying, I think it likely that the comment was occasioned by the bug's pre-existing record of rebounding from even sustained chemical assault.

Other forms of praise cropped up elsewhere. The weekly *Ranche and Range* opined in 1898 that insect pests, the San Jose scale foremost among them, were actually a blessing to farmers:

The farm papers of the eastern and middle states are terrorizing the owners of orchards with terrible tales of what the San Jose scale is going to do to their fruit trees. On the Pacific coast, where the San Jose scale is now common, the people are beginning to look upon it as a pretty good missionary, for it is causing growers to exercise vigilance in caring for their orchards. They must prune vigorously and spray regularly ... [t]his spraying and additional care is improving the standard of the fruit we produce. The insect pests are to the orchard what the weeds are to the garden—our best friends.²¹⁷

Of course, there is a self-interested subtext to these words. *Ranche and Range* was certainly an outlet with a pro-spraying agenda, and also one which wanted to minimize the threat posed by the San Jose scale as it clearly worried that the brouhaha over the bug in the Eastern states at the

²¹⁶ "Items in Brief," *Dalles Times-Mountaineer*, Mar. 25, 1893, 3.

²¹⁷ "Editorial Notes," *Ranche and Range*, Jul. 8, 1897, 8.

time was bad for business in the Pacific Northwest.²¹⁸ Nevertheless, its metamorphosis of the conventional discourse on the scale is noteworthy. Here, the scale was a close friend, because it forced horticulturalists to redouble their efforts and refine their craft. It was even described in religious terms as a “missionary”, seemingly because it would improve the character and industriousness of those it touched.

The idea of the scale as a “blessing in disguise,” or at least a deserved punishment for lax agricultural practices, is evident elsewhere.²¹⁹ An 1898 article from *Pacific Farmer*, reprinted in the *Hood River Glacier*, provided a stern riposte to those members of the American press complaining about Germany’s ban of American fruit on account of the San Jose scale. Titled “Some Plain Truths”, the article “did not blame the Germans in the least” for the ban, because the “American people as a rule are entirely too careless and dishonest in many matters for their own good.”²²⁰ The unnamed author concluded by stating that Americans can expect better treatment from other countries when they “pack and ship clean fruit instead of pest and fungous covered fruit,” among other things. Here there is no admiration for the scale, but much like in the *Ranche and Range* article, the author renders the bug a positive thing in that it will provoke a necessary correction in behaviour.

Other settlers also learned how to stop worrying and love the San Jose scale. The same 1901 *Ranche and Range* article, quoted above, which used the Biblical “plague of locusts” comparison to describe the severity of the conflict between humankind and the scale also shifted

²¹⁸ That conclusion is attested to by the frequent efforts of the publication to tamp down Eastern frenzy over the scale. Remember, it was the official fruit-grower publication of the Northwest. See Untitled, *Ranche and Range*, Mar. 26, 1898, 8, and “The San Jose Scale,” *Ranche and Range*, Mar. 19, 1898, 6, for two representative examples.

²¹⁹ In fact, the phrase “blessing in disguise” was actually applied to the scale by an Oregonian Horticultural Commissioner excited by the extra vigilance employed by regional growers after a scale outbreak. See “Orchards Getting Better Care,” *Portland Oregonian*, Mar. 13, 1902, 4.

²²⁰ “Some Plain Truths,” *Hood River Glacier*, reprinted from *Pacific Farmer*, March 25, 1898, 2. All quotations in this paragraph derive from this source.

tack into the bug-as-blessing rhetoric. Noting that the scale's "invasion" has produced "some good effects," the author recounted that it was owing to the scale's challenge to agriculture that horticultural inspectors were created, fruit inspection laws were passed, and knowledge of insects in general greatly increased.²²¹ On account of this, the writer concluded that it was "very possible" that the "horticultural interests of the country will, in the long run, have been actually benefitted [by the scale]."²²² An article of the same year running in the *Yakima Herald* – which I mentioned above in my discussion of the scale's effect on agricultural bureaucracy in Washington State – echoed those thoughts; while lamenting the scale as a "gigantic pest" the author also said its "invasion" had had a "good effect" in creating novel horticultural boards and inspection regimes.²²³ Apart from other instances of positive comment about the scale, it is especially salient to note, perhaps, that these sources also bolster my earlier claim for the importance of the San Jose scale in inciting bureaucratic change.

Ultimately, it is not shocking that so many sources express terror, revulsion, hatred, and fear for the San Jose scale. Such attitudes are, as Morris contended, deeply hard-wired into Western consciousness. What is surprising, though, is the degree of concern expressed, suggesting that apocalyptic language about environmental concerns is a tropology with a long, and as yet basically unexplored, history.²²⁴ I aver that the prevalence of panic in the discourse about the scale is even less surprising given the element of colonial anxiety at play here.

In addition, it is striking to see rhetoric about the scale that is neither fear-mongering nor pejorative. In the first place, perhaps there is also some measure of respect hidden beneath the

²²¹ "Scientific Investigation of the San Jose Scale," *Ranche and Range*, 4.

²²² *Ibid.*

²²³ "The Scale Pest: How to Cope with the San Jose Enemy of Fruit Trees," *Yakima Herald*, 3.

²²⁴ My efforts to turn up scholarship addressing the historical confluence between apocalyptic rhetoric and the environment has turned up nothing terribly relevant, though it is a connection which I believe deserves further study to be sure.

rhetoric of fear, loathing, and catastrophe profiled above – maybe a certain amount of respect for the adversary is often intrinsic to anything which provokes such unbridled fear. Secondly, it seems some eventually interpreted the scale as less a foreign invader and more a necessary correction to bad practices. In that sense, for some, the San Jose scale was a good thing; a needed challenge which could be dutifully overcome by returning to the (supposed) essence of settler virtues: industriousness and self-reliance. Thus, the organism became something to cheerfully accept, as it allowed some settlers to re-inscribe and reiterate the virtues with which they believed nature had imbued their culture. Furthermore, the measures instituted to mitigate the ravages of the scale, along with the entomological knowledge acquired *en route*, reinforced the progressivist narrative at the heart of settler justifications for colonization.

VI. Conclusion

Insects matter. They really do. The Earth may indeed truly belong to them and not us, to recycle the old bromide. They may be small, but they are greater in terms of biomass than any other type of creature.²²⁵ Yet despite their importance, little work exists on cultural entomology and historians interested in animals have generally sought larger game.²²⁶ Indeed, despite promising ventures like the work of Morris, or that of environmental historian John Robert McNeill on mosquitoes, most scholarly work on animalia focuses on mammals, birds, and fish.²²⁷

But of course, there's nothing terribly surprising in that focus. Larger animals are more visible to us in terms of their literal size as well as in their impacts upon us, and more like us physiologically. It is even less of a surprise that an insect with no benefits to humanity like the scale should attract even less attention than much more prominent ones like bees, spiders, or ants.²²⁸ Indeed, there is nothing charismatic or romantic about the San Jose scale – nobody loves it, finds it beautiful, nor keeps it as a pet; nobody eats it for subsistence, nor as a delicacy. It is anti-charismatic micro-fauna. Yet such organisms can also be profoundly meaningful for human societies, as I hope the preceding has demonstrated. The present study, then, can also be viewed as one small effort at remedying the general bias of scholarship toward charismatic megafauna, and even toward the more prominent insects.

²²⁵ "Numbers of Insects," *BugInfo - Smithsonian Institution*. Not Dated. Found at: http://www.si.edu/Encyclopedia_SI/nmnh/buginfo/bugnos.htm. Accessed on Jul 30, 2017.

²²⁶ Morris, *Insects and Human Life*, 185.

²²⁷ John Robert McNeill, *Mosquito Empires: Ecology and War in the Greater Caribbean, 1620-1914* (Cambridge: Cambridge University Press, 2010). Another notable work is Tammy Horn's *Bees in America* (Lexington: University of Kentucky Press, 2005).

²²⁸ For some examples, see Horn's book about bees in the above note, Katarzyna Michalski and Sergiusz Michalski, *Spider* (London: Reaktion Books, 2010), and Charlotte Sleight, *Ant* (London: Reaktion Books, 2003).

I also think my study functions also as one small piece of the larger understanding of settler-colonialism in the American West. Ultimately, the resettlement of the American West is about more than just people. It is just as much about the animals, plants, fungi, protists, and microbes which came along with Anglophone settlement, or thereafter due to accelerating global travel and trade. Any truly comprehensive history of the settler-colonial transformation of the West must not only deal with the realm of humans – and the war, politics, eviction, and resettlement which occurred – but also the “ecological revolution” which followed along with settler-colonialism and in its wake. Historians have not been entirely obtuse to this notion – seminal works like Crosby’s *Ecological Imperialism* are a case in point – but on the whole, the discipline rarely concentrates on non-human alterations beyond infamous instances like the spread of horrendous diseases like smallpox.²²⁹

Moreover, as little as scholars have looked at the West’s transformation from a holistic ecological point of view, still less have scholars commented on how environmental change, intentional or otherwise, has provoked change in human societies, a linkage I have attempted to underscore here. Without veering to extravagance (I hope), I have tried to show how pivotal the San Jose scale was in enacting bureaucratic, legal, and technological change, and yes, catalysing the creation of modern agricultural as we know it. Even though humans were the architects (wittingly or unwittingly) of many of the changes to the ecological world, historians must also try to account for the boomerang effects of such ecological impacts upon human societies. This essay has been one such contribution, seeing the spread of the San Jose scale as both a multi-faceted change agent in agriculture, a function of a wider settler-colonial capitalist system, and a lens into the larger society into which it sprang.

²²⁹ McNeill’s book on mosquitoes would be an example of this. Clearly, it is the disease link to malaria and yellow fever which attracts him. See McNeill, *Mosquito Empires*, 63-194.

Bibliography

Primary Sources:

- “A Dangerous Fruit Pest.” *Los Angeles Times*, Aug. 7, 1883, 2.
- “A Valuable Book – The Annual Report of the State Board of Horticulture.” *Heppner Gazette*, Sep. 9, 1892, 1.
- “Agriculture in the Schools.” *Portland Oregonian*, Oct. 14, 1903, 6.
- “Board of Horticulture – Report of Inspector Boggs on Fruit Pests.” *San Francisco Chronicle*, Apr. 14, 1886, 5.
- “Big Money in Fruit.” *Polk County Observer*, Oct. 23, 1903, 1.
- “Brevet Capitalists.” *Dalles Daily Chronicle*, Sept. 20, 1897, 2.
- “Brevities.” *Los Angeles Times*, Nov. 21, 1889, 7.
- “Brevities.” *Los Angeles Times*, Dec. 2, 1889, 7.
- “Brevities.” *Los Angeles Times*, Feb. 27, 1891, 7.
- Brown, W. H. “Review of Fruit Pests.” *Ranche and Range*, Oct. 28, 1897, 3.
- “Bug Boom – A Lively Meeting of the Fruit Growers Yesterday.” *Los Angeles Times*, Jan. 11, 1882, 3.
- Cass, F. O. “In Re Bugs: A Furious Ruction Over Spraying vs. Parasites.” *Los Angeles Times*, Apr. 27, 1890, 12.
- “Chinese Beetles.” *Corvallis Times*, Sep. 9, 1903, 2.
- Clark, Sam. “Sam Clark – Pays His Compliments to the Lady Bird Bug and General Varney.” *Salem Capital Journal*, Oct. 23, 1891. Page Unknown.
- Conradi, Albert F. *Bulletin No. 87: The San Jose Scale*. Houston, Texas: State Printing Company, 1906.
- Cordley, A. B. *The San Jose Scale*. Corvallis, Oregon: Oregon Agricultural Experiment Station, 1906.

- Dana, C. W. *The Garden of the World, or, the Great West: Its History, Its Wealth, Its Natural Advantages, and Its Future*. Boston: Wentworth and Company, 1856.
- “Disease of the San Jose Scale.” *Lincoln County Leader*, May 19, 1899, 1.
- “Editorial Notes.” *Ranche and Range*, Jul. 8, 1897, 8.
- “Enemy of San Jose Scale: A Ladybird Beetle Imported from China.” *The Globe & Mail*, Aug. 15, 1904, 4.
- “Enforce Spraying – Inspector Evans Will War on San Jose Scale.” *Daily East Oregonian*, Oct. 10, 1906, 8.
- “Farm and Home.” Oregon, 1891.
- Fernald, H. T. *The San Jose Scale, and Other Scale Insects*. Pennsylvania: Department of Agriculture, 1899.
- “Fruit Growers.” *Los Angeles Herald*, Oct. 2, 1891, 4.
- “Fruit Inspector Calls the Bluff: Armstrong Furnished Proof that Oregon Peaches Bore No San Jose Scale.” *Portland Oregonian*, Sept. 27, 1907.
- “Fruit Pests.” *Eugene City Guard*, Oct. 18, 1890, 1.
- G. F. W. “The Entomologist: Insect Pests in California.” *The Cultivator and Country Gentleman*, 51, 1766 (Dec. 2, 1886): 913.
- “General Varney’s Scale.” *Salem Capital Journal*, Oct. 31, 1891, 1.
- “General Varney and Fruit Pests.” *Capital Journal*, Nov. 4, 1890, Page Unknown.
- Holmes, William B. “Oregon Apple Talk.” Jan. 21, 1902, 11.
- Howard, L. O. *A History of Applied Entomology (Somewhat Anecdotal)*. Washington: Smithsonian Institution, 1930.
- Howard, L. O. *An Important Enemy to Fruit Trees*. Washington: USDA Circular No. 3, 1893.
- Howard, L. O. *Recent Laws Against Injurious Insects in North America, Together with the Laws Relative to Foul Brood*. Washington: USDA – Government Printing Office, 1898.
- Howard, L. O. *Regulations of Foreign Governments Regarding Importation of American Plants, Trees, and Fruits*. Washington: USDA – Government Printing Office, 1900.
- Howard, L.O. “Striking Entomological Events of the Last Decade of the Nineteenth Century.” *The Scientific Monthly* 31, 1 (1930): 5-18.

Howard, L. O. *The San Jose Scale in 1896-1897*. Washington: U. S. Department of Agriculture, Division of Entomology, 1898.

“Horticulture – Fruit Crop \$2,000,000.” *Portland Oregonian*, Jan. 1, 1901, 12.

“Horticultural: Report of the Commission on Scale Bugs.” *Los Angeles Times*, Mar. 9, 1890, 10.

“Horticultural: Words of Warning.” *San Francisco Chronicle*, Dec. 19, 1888, 3.

“Importing Bugs: Insects to Destroy Orchard Pests.” *San Francisco Chronicle*, Jan. 11, 1891, 3.

“Items in Brief.” *Dalles Times-Mountaineer*, Nov. 14, 1891, 1.

“Items in Brief.” *Dalles Times-Mountaineer*, Jul. 23, 1892, 1.

“Items in Brief.” *Dalles Times-Mountaineer*, Mar. 25, 1893, 3.

“Items in Brief.” *Dalles Times-Mountaineer*, Apr. 20, 1895, 3.

“Journal ‘X-Rays.’” *Daily Capital Journal*, Sept. 6, 1897, Page Unknown.

Kuthe, G. W. “Fruit Growing.” Dec. 15, 1893, 1.

“Let Us Spray.” Publication Unknown, Mar. 1895.

“Local Brevities.” *Dalles Daily Chronicle*, Nov. 6, 1891, 3.

“Local and Personal.” *Dalles Daily Chronicle*, Sep. 9, 1892, 3.

Marlatt, C. L. *An Entomologist’s Quest*. Washington, D.C.: Monumental Print Co., 1953.

Marlatt, C. L. *The San Jose or Chinese Scale*. Washington: U.S. Department of Agriculture, Bulletin No. 62, 1906.

“Orchard and Garden Notes.” *The Ranch*, Feb. 10, 1894, 7.

“Orchards Getting Better Care.” *Portland Oregonian*, Mar. 13, 1902, 4.

“Pasadena: A Note of Warning – Mr. Thompson Speaks About the San Jose Scale.” *Los Angeles Times*, Mar. 13, 1891, 7.

“Pests Weren’t Always Here.” *Portland Oregonian*, Jan. 29, 1904, 9.

“Ranch Small Talk.” *The Ranch*, Mar. 24, 1894, 8.

“San Jose Scale.” *Los Angeles Times*, Apr. 10, 1894, 1.

- “San Jose Scale.” *Plain Dealer*, Mar. 25, 1897, 1.
- “San Jose Scale – Causing Much Damage to Fruit Orchards in This State.” *Daily Morning Astorian*, Mar. 12, 1896, 1.
- “San Jose Scale – Mr. Thompson Gives a Recipe for An Effective Wash.” *Los Angeles Times*, Mar. 19, 1891, 7.
- “San Jose Scale – The Life of Our Trees and Shrubs Threatened.” *Corvallis Gazette*, Dec. 12, 1905, 1.
- “San Jose Scale in Yakima – He Has Them On the List.” *The Ranch*, Mar. 17, 1894, 9.
- “Scale Bugs on Fruit.” *Seattle Post-Intelligencer*, Jul. 4, 1891, 7.
- “Scale Insects.” *San Francisco Examiner*, Jun. 17, 1888, 6.
- Schanno, Emile. “Care of an Orchard.” *Hood River Glacier*, Apr. 24, 1896, 2.
- Schanno, Emile. “Spray Your Trees.” *Dalles Daily Chronicle*, Feb. 10, 1898, 4.
- “Scientific Investigation of the San Jose Scale.” *Ranche and Range*, Oct. 3, 1901, 4.
- Sherer, J. C. “Letters to the Times: A Plea for the ‘Bug Commission.’” *Los Angeles Times*, Mar. 3, 1890, 6.
- Sherer, J. C. “Letters to the Times: Plaint of the Fruit Grower.” *Los Angeles Times*, Mar. 16, 1890, 9.
- Smith, John B. *The Pernicious or San Jose Scale*. New Brunswick, NJ: New Jersey Agricultural Experiment Stations, 1896.
- Snipes, George R. and W. H. Taylor. “About the San Jose Scale.” *Dalles Daily Chronicle*, Oct. 27, 1891, 3.
- “Some Plain Truths.” *Hood River Glacier*, reprinted from *Pacific Farmer*, March 25, 1898, 2.
- “Spray or Dig Up the Trees: Imperative Order Issued By Commissioner Huntley.” *The Evening Statesman*, Mar. 31, 1906, 5.
- “State News.” *Washington Standard*, Mar. 23, 1894, 2.
- “State Park Infested.” *The Dalles Chronicle*, Jan. 31, 1900, 1.
- “The Cass Bug: A Subject of Much Horticultural Dispute.” *Los Angeles Times*, Feb. 23, 1890, 3.
- “The Horticultural Bill.” *Corvallis Gazette*, May 3, 1889, 4.

- “The Fruit Growers.” *Los Angeles Herald*, May 7, 1897, 8.
- “The Fruit Pests – Secretary Tolleson Gives Valuable Information.” *The Hillsboro Argus*, Dec. 26, 1895, 1.
- “The Interviewer.” *The Ranch*, Apr. 4, 1894, 4.
- “The San Jose Scale.” *The Dalles Daily Chronicle*, Jul 9, 1891, 2.
- “The San Jose Scale.” *Ranche and Range*, Mar. 19, 1898, 6.
- “The San Jose Scale: The San Jose Scale as a Permanent Factor in Fruit-Growing.” *Ranche and Range*, Nov. 15, 1900, 8-9.
- “The Scale Pest: How to Cope with the San Jose Enemy of Fruit Trees.” *Yakima Herald*, Nov. 19, 1901, 3.
- “The State Board of Horticulture.” *Albany State Rights Democrat*, May 3, 1889, 1.
- The Statutes of California and Amendments to the Codes Passed at the Twenty-Fourth Session of the Legislature, 1881*. Sacramento: State Office: J.D. Young, Supt. State Printing, 1881.
- “Tuesday’s Budget: What Happened in Pasadena Yesterday – The San Jose Scale Here.” *Los Angeles Times*, Feb. 18, 1891, 7.
- Untitled. *Albany Democrat*, Oct. 14, 1881, 1.
- Untitled. *Corvallis Gazette*, May 8, 1891, 2.
- Untitled. *Dalles Daily Chronicle*, Jul. 8, 1891, 3.
- Untitled. *Corvallis Gazette*, Jul. 17, 1891, 2.
- Untitled. *Corvallis Daily Gazette*, Oct. 2, 1891, 3. Reprinted from the *Oregonian*.
- Untitled. *Ranch and Range*, Oct. 28, 1897, 8.
- Untitled. *Ranche and Range*, Mar. 26, 1898, 8.
- Weir, D. B. “Poisoned Fruit: The Second of a Series of Interesting Papers.” *Heppner Gazette*, Mar. 8, 1892, 4.
- “Will Benton’s Orchards Die?” *Corvallis Times*, Sept. 9, 1903, 3.
- “Winter Sprays.” *Corvallis Gazette*, Jan. 8, 1897, 2.

Secondary Sources:

Aspelin, Arnold L. "Pesticide Usage in the United States: Trends During the Twentieth Century: Part Two." Raleigh, N.C.: Center for Integrated Pest Management, North Carolina State University, 2003. Found at: http://www.pestmanagement.info/pesticide_history/Two.pdf. Accessed on Jul. 30, 2017.

Carson, Rachel. *Silent Spring*. Boston: Houghton Mifflin, 2002 [1962].

Chronicling America – Historic American Newspapers. "Boll Weevil." *Library of Congress*.

Found at:

<http://chroniclingamerica.loc.gov/search/pages/results/?state=&date1=1870&date2=1900&proxtext=%22Boll+Weevil%22&x=0&y=0&dateFilterType=yearRange&rows=20&searchType=basic>. Accessed on Aug. 10, 2017.

Chronicling America – Historic American Newspapers. "Codling Moth." *Library of Congress*.

Found at:

<http://chroniclingamerica.loc.gov/search/pages/results/?state=&date1=1789&date2=1924&proxtext=%22codling+moth%22&x=0&y=0&dateFilterType=yearRange&rows=20&searchType=basic>. Accessed on Aug. 10, 2017.

Chronicling America – Historic American Newspapers. "Colorado Potato Beetle." *Library of Congress*. Found at:

http://chroniclingamerica.loc.gov/search/pages/results/?state=&date1=1789&date2=1924&proxtext=Colorado+Potato+beetle&x=0&y=0&dateFilterType=yearRange&rows=20&searchType=basic#tab=tab_newspapers. Accessed on Aug. 10, 2017.

Chronicling America – Historic American Newspapers. "Gypsy Moth." *Library of Congress*.

Found at:

<http://chroniclingamerica.loc.gov/search/pages/results/?state=&date1=1789&date2=1924&proxtext=%22Boll+Weevil%22&x=0&y=0&dateFilterType=yearRange&rows=20&searchType=basic>. Accessed on Aug. 10, 2017.

Chronicling America – Historic American Newspapers. "San Jose Scale." *Library of Congress*.

Found at:

<http://chroniclingamerica.loc.gov/search/pages/results/?state=&date1=1789&date2=1924&proxtext=%22San+Jose+scale%22&x=0&y=0&dateFilterType=yearRange&rows=20&searchType=basic>. Accessed on Aug. 10, 2017.

Clark, J. F. M. *Bugs and the Victorians*. New Haven and London: Yale University Press, 2009.

- Coates, Peter. *American Perspectives on Immigrant and Invasive Species: Strangers on the Land*. Berkeley: University of California, 2006.
- Cook, George M. “‘Spray, Spray, Spray!’: Insecticides and the Making of Applied Entomology in Canada, 1871-1914.” *Scientia Canadensis: Canadian Journal of the History of Science, Technology and Medicine* 22, 51 (1998): 7-50.
- Crosby, Alfred W. *The Columbian Exchange: Biological and Cultural Consequences of 1492*. Westport, Conn.: Greenwood Publishing Co., 1972.
- Crosby, Alfred W. *Ecological Imperialism: The Biological Expansion of Europe, 900-1900*. New York: Cambridge University Press, 1986.
- Davis, Mark A. *Invasion Biology*. Oxford: Oxford University Press, 2009.
- “Diaspidiotus perniciosus (San Jose Scale).” *Invasive Species Compendium*, 2016. Found at: <http://www.cabi.org/isc/datasheet/46224>. Accessed on Jul. 30, 2017.
- Dunlap, Thomas R. *DDT: Scientists, Citizens, and Public Policy*. Princeton: Princeton University Press, 2014 [1983].
- Dunlap, Thomas R. *Saving America's Wildlife*. New Jersey: Princeton University Press, 1988.
- Dunlap, Thomas R. “Remaking the Land: The Acclimatization Movement and Anglo Ideas of Nature.” *Journal of World History* 8, 2 (1997): 303-319.
- Flippen, J. Brooks. *Conservative Conservationist: Russell E. Train and the Emergence of American Environmentalism*. Baton Rouge: Louisiana State University Press, 2006.
- Giesen, James C. “‘The Truth About the Boll Weevil’: The Nature of Planter Power in the Mississippi Delta.” *Environmental History* 14, 4 (2009): 683-704.
- Google Books NGram Viewer. “Untitled.” Google Inc., 2013. Found at: <http://tinyurl.com/ydxpw799>. Accessed on Aug. 10, 2017.
- Gourevitch, Alex. “Environmentalism—Long Live the Politics of Fear.” *Public Culture* 22, 3 (2010): 411-424.
- Grove, Richard. *Green Imperialism: Colonial Expansion, Tropical Island Edens, and the Origins of Environmentalism, 1600-1800*. USA: Cambridge University Press, 1995.
- Higgs, Robert. “The Boll Weevil, The Cotton Economy, and Black Migration 1910-1930.” *Agricultural History* 50, 2 (1976): 335-350.
- Hondagneu-Sotelu, Pierrette. *Paradise Transplanted: Migration and the Making of California Gardens*. USA: University of California Press, 2014.

- Horn, Tammy. *Bees in America*. Lexington: University of Kentucky Press, 2005.
- Hoyt, Stanley C. "San Jose Scale." *Orchard Pest Management Online – Washington State University*, 2017 [1993]. Found at: <http://jenny.tfrec.wsu.edu/opm/displaySpecies.php?pn=490>. Accessed on Aug. 10, 2017.
- "James Lick." *Wikipedia*, Oct. 10, 2016. Found at: https://en.wikipedia.org/wiki/James_Lick. Accessed on Aug. 14, 2017.
- Kolbert, Elizabeth. "The Big Kill." *The New Yorker*, Dec. 22 & 29th Issue, 2014. Not Paginated. Found at: <http://www.newyorker.com/magazine/2014/12/22/big-kill>. Accessed on Aug. 10, 2017.
- "Legislative History." *Washington State Legislature*. Found at: <http://leg.wa.gov/History/Legislative/Pages/factsandbilldata.aspx>. Accessed on Aug. 10, 2017.
- "Legislative Research at Oregon State Archives." *Oregon Secretary of State – Oregon.gov*. Found at: <http://sos.oregon.gov/archives/Pages/records/legislative-research.aspx>. Accessed on Aug. 10, 2017.
- Lever, Christopher. *They Dined on Eland*. London: Quiller, 1992.
- McNeill, John Robert. *Mosquito Empires: Ecology and War in the Greater Caribbean, 1620-1914*. Cambridge: Cambridge University Press, 2010.
- McWilliams, James E. *American Pests: The Losing War on Insects from Colonial Times to DDT*. New York: Columbia University Press, 2008.
- McWilliams, James E. "'The Horizon Opened Up Very Greatly': Leland O. Howard and the Transition to Chemical Insecticides in the United States, 1894-1927." *Agricultural History* 82, 4 (2008): 468-495.
- Merchant, Carolyn. *Ecological Revolutions: Nature, Gender, and Science in New England*. Chapel Hill and London: University of North Carolina Press, 1989.
- Michalski, Katarzyna and Sergiusz Michalski. *Spider*. London: Reaktion Books, 2010.
- Misch, Anthony, and Remington Stone. "James Lick." *University of California – Lick Observatory Historical Collections Project*. 1998. Found at: http://collections.ucolick.org/archives_on_line/James_Lick.html. Accessed on Aug. 14, 2017.

- Morris, Brian. *Insects and Human Life*. Oxford and New York: Berg Publishers, 2004.
- “Numbers of Insects.” *BugInfo - Smithsonian Institution*. Not Dated. Found at: http://www.si.edu/Encyclopedia_SI/nmnh/buginfo/bugnos.htm. Accessed on Jul. 30, 2017.
- Pauly, Philip J. *Fruits and Plains: The Horticultural Transformation of America*. Cambridge, Mass., and London, England: Harvard University Press, 2007.
- “Pests - *Quadrapiidiotus perniciosus*.” *Interactive Agricultural Ecological Atlas of Russia and Neighbouring Countries*, 2009. Found at: http://www.agroatlas.ru/en/content/pests/Quadrapiidiotus_perniciosus/. Accessed on Aug. 10, 2017.
- “Products – Insecticides.” *United Agri Products Canada Inc.*, 2010. Found at: http://uap.ca/products/products_insect.htm. Accessed Aug. 10, 2017.
- Rasmussen, Wayne D. “The People’s Department: Myth or Reality?” *Agricultural History* 64, 2 (1990): 291-299.
- Rome, Adam. *The Bulldozer in the Countryside: Suburban Sprawl and the Rise of American Environmentalism*. New York: Cambridge University Press, 2001.
- Russell, Edmund. *War and Nature: Fighting Humans and Insects with Chemicals from World War I to Silent Spring*. Cambridge: Cambridge University Press, 2001.
- Sandiford, Glenn. “Transforming an Exotic Species: Nineteenth-Century Narratives about Introduction of Carp in America.” Ph.D. Dissertation, University of Illinois: *UMI Dissertations Publishing*, 2009: 1-319.
- Seftel, Howard. “Government Regulation and the Rise of the California Fruit Industry: The Entrepreneurial Attack on Fruit Pests, 1880-1920.” *The Business History Review* 59, 3 (1985): 369-402.
- Sleigh, Charlotte. *Ant*. London: Reaktion Books, 2003.
- Smith, Henry Nash. *Virgin Land: The American West as Symbol and Myth*. Cambridge, Mass.: Harvard University Press, 1978 [1950].
- Spear, Robert J. *The Great Gypsy Moth War: The History of the First Campaign in Massachusetts to Eradicate the Gypsy Moth, 1890-1901*. Amherst and Boston: University of Massachusetts Press, 2005.
- Stoler, Ann Laura. *Along the Archival Grain: Epistemic Anxieties and Colonial Common Sense*. Princeton: Princeton University Press, 2009.

- Stoll, Steven. "Insects and Institutions: University Science and the Fruit Business in California." *Agricultural History*, 69, 2 (1995): 216-239.
- Stoll, Steven. *The Fruits of Natural Advantage: Making the Industrial Countryside in California*. Berkeley and Los Angeles: University of California Press, 1998.
- "'Then and Now': A Look Back During Our Centennial Year at ... Nursery Inspection." Washington State Department of Agriculture, 2013. Not Paginated. Found at: <https://agr.wa.gov/PlantsInsects/PlantServicesProgram/docs/ThenNowPresentation.pdf>. Accessed on Jul. 30, 2017.
- Thomas, Sarah L. "A Call To Action: Silent Spring, Public Disclosure, and the Rise of Modern Environmentalism." In Michael Egan and Jeff Crane eds., *Natural Protest: Essays on the History of American Environmentalism*. New York: Routledge, 2009: 185-204.
- Todd, Kim. *Tinkering with Eden: A Natural History of Exotics in America*. New York and London: W. W. Norton and Company, 2001.
- U. S. Customs and Border Protection. "1912: Agricultural Safeguards Come to the Border." *U. S. Department of Homeland Security*. August 1, 2016. Found at: <https://www.cbp.gov/about/history/1912-agriculture-safeguards-come-border>. Accessed on Jul. 30, 2017.
- Veracini, Lorenzo. *Settler Colonialism: A Theoretical Worldview*. England: Palgrave MacMillan, 2010.
- Whitaker, Adelynn Hiller. "A History of Federal Pesticide Regulations in the United States to 1947." Ph.D. Dissertation, Emory University: Xerox University Microfilms, 1974: 1-451.
- Whorton, James C. *Before Silent Spring: Pesticides and Public Health in Pre-DDT America*. Princeton, N. J.: Princeton University Press, 1974.
- Whorton, James C. *The Arsenic Century: How Victorian Britain was Poisoned at Home, Work, & Play*. Oxford: Oxford University Press, 2010.

Illustrations:

- Zeck, E. H. "The San Jose Scale." New South Wales Department of Primary Industries (date unknown).