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Philip Garone, *The Fall and Rise of the Wetlands of California's Great Central Valley* (California, 2011). ISBN: 9780520266636

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Introduction by Jacob Darwin Hamblin, Oregon State University

The English language has not been kind to wetlands. We have swamps, bogs, quagmires, mires, and morasses. These are not words that call to mind productive landscapes. Such terms describe wet or inundated natural areas but they also double as metaphors for being stuck—being bogged down, swamped with work, in a tangled morass of problems, mired by responsibilities, or paralyzed in a political or military quagmire. If the dictionary is to be trusted, wetlands oppose everything that human beings hope to accomplish.

If we wish to find a story that casts human progress as a struggle against actual rather than metaphorical wetlands, California's history seems to fit. The reclamation of wetlands by draining them, redirecting the water, and converting the land to agricultural use, turned much of California's Great Central Valley into some of the most productive farmlands in the world by the mid-twentieth century.

Despite the apparent success story of agricultural transformation, today there is more interest than ever in restoring some of these lands to their wetlands status. Since the 1970s, hundreds of thousands of acres in the Central Valley have been either protected from drainage or turned back into wetlands.

What halted, and in some cases reversed, the transformation of wetlands in California?

In *The Fall and Rise of the Wetlands of California's Great Central Valley*, Philip Garone tells us about dramatic changes in views of wetlands, by taking on the "agricultural mystique" that offered agriculture as the optimal use of lands in the American West. In part, his book is a catalog of unforeseen ecological consequences stemming from reclamation, especially those connected to the dramatic reduction of wintering habitat for migratory birds. Yet it is also an analysis of those groups who argued for the return of wetlands. At the center of his discussion are the migratory waterfowl that relied on wetlands and the various groups that began to advocate on their behalf—including duck hunters, scientists, and others who had reasons to save the birds from disappearance.

Our first commentator is **Matthew Morse Booker**, Associate Professor of History at North Carolina State University. Booker has written extensively about land management and use in California, especially in the San Francisco Bay area. In his *Down by the Bay*, he explores the history of the largest estuary in the American West by showcasing how San Franciscans relied from the beginning "on making land from the sea." Like Garone, he highlights the story of draining wetlands to make way for

fertile farmlands. Booker reveals how later efforts at wetlands restoration were among the most ambitious and costly in American history.¹

Patrick Carroll, Associate Professor of Sociology at the University of California, Davis, has researched the politics of water as an aspect of state formation. He notes that over half a century, water became a “critical boundary object” between science and governance in California. Focusing on the latter part of the nineteenth century, Carroll shows how water became an object of government through the creation of bodies such as the State Water Commission. For Carroll, seeing how water was perceived as a technoscientific object allows us to identify a historical shift in discourse, from “problems that involved water” to a single “water problem.”²

Royal C. Gardner brings to this roundtable a legal and international perspective. He is Professor of Law and Director of the Institute for Biodiversity Law and Policy at Stetson University. He has served on the National Research Council’s Committee on Mitigating Wetlands Losses, and also has participated in Ramsar Convention conferences (the Convention on Wetlands of International Importance). In his book *Lawyers, Swamps, and Money*, he points out that it was only after society began to see wetlands as more than “worthless bogs” and assign economic value to them that laws governing their management evolved.³

Our final commentator, **Emily O’Gorman**, is a scholar with broad knowledge of wetlands beyond California. She is Lecturer in History at Macquarie University in Australia, and she is the author of *Flood Country*. In that book, she explores the tensions that marked land use in the Murray-Darling basin on eastern Australia. She notes that while floods are often treated as natural disasters, they have been critical sources of water in arid regions. O’Gorman is particularly interested in how changing ways of understanding floods influenced management strategies and the politicization of rivers and floodplains.⁴

Before turning to the first set of comments, I would like to pause here and thank all the roundtable participants for taking part. In addition, I would like to remind readers that as an open-access forum, *H-Environment Roundtable Reviews* is available to scholars and non-scholars alike, around the world, free of charge. Please circulate.

¹ Matthew Morse Booker, *Down by the Bay: San Francisco’s History between the Tides* (Berkeley: University of California Press, 2013). Quote on p. 3.

² Patrick Carroll, “Water and Technoscientific State Formation in California,” *Social Studies of Science* 42:4 (2012), 489-516.

³ Royal C. Gardner, *Lawyers, Swamps, and Money: U.S. Wetland Law, Policy, and Politics* (Island Press, 2011). Quote on p. 2.

⁴ Emily O’Gorman, *Flood Country: An Environmental History of the Murray-Darling Basin* (Collingwood, Vic: CSIRO Publishing, 2012).

Comments by Matthew Morse Booker, North Carolina State University

Philip Garone's book is an important contribution to Western history, to environmental history, and to the global literature on water history. That one book speaks to so many themes is a testament to the importance of the place he writes about. California's Central Valley is the most important and productive agricultural area in the United States, a space of global significance. The food and cotton grown in the Central Valley, however, is dependent on the remaking of a vast, seasonally-wet place into a well-drained, irrigated landscape. Why and how that happened is the stuff of power politics, and Garone joins some famed historians in telling that story.⁵

Garone, however, brings a new perspective. His acknowledgments describe what is new. On the way to his PhD in History, Garone first completed a master's degree in ecology. The University of California at Davis, where he wrote the dissertation that became this book, placed him at the intersection of great scholars from a range of fields. Among others were ecologists Peter Moyle and Michael Barbour and historian Louis Warren. Garone thanks economists, lawyers, water agency staff, refuge managers, sportsmen, environmental activists, even high school teachers. It is an impressively broad list, but Garone isn't showing off. To properly understand the complex history of the Central Valley's transformation, he not only had to study an impressive range of literatures but also to see firsthand the challenges of managing such an unwieldy organic machine. This breadth of knowledge is one reason his book has been reviewed in such a range of disciplinary journals.⁶

Garone provides a comprehensive history of the fate of California's vast wetlands and the rivers that fed them. The central point of his book, and the point I want to

⁵ Robert Kelley, *Gold versus Grain: The Hydraulic Mining Controversy in California's Sacramento Valley* (Glendale, Calif.: Arthur H. Clark, 1959) and *Battling the Inland Sea: American Political Culture, Public Policy, and the Sacramento Valley, 1850-1986* (Berkeley and Los Angeles: University of California Press, 1989); Donald Pisani, *From the Family Farm to Agribusiness: The Irrigation Crusade in California and the West, 1850-1931* (Berkeley and Los Angeles: University of California Press, 1984); Norris Hundley, *The Great Thirst: Californians and Water, 1770s-1990s* (Berkeley: University of California Press, 1992 and 2001); Ian Tyrrell, *True Gardens of the Gods: Californian-Australian Environmental Reform, 1860-1930* (Berkeley and Los Angeles: University of California Press, 1999); and Donald Worster, *Rivers of Empire: Water, Aridity, and the Growth of the American West* (New York: Pantheon Books, 1985).

⁶ For example, Robert Miller, *Journal of the West* 50:2 (Spring 2011), 92; Dan Airola, *Central Valley Bird Club Bulletin* 15:2 (2012), 48-49; Jeffrey K. Stine, *Western Historical Review* 43:1 (March 2012), 103; David Freeman, *Environmental History* 17:2 (April 2012), 426; Eric Steiger, *Agricultural History* 86:2 (Spring 2012), 113; Matthew Booker, *Journal of Interdisciplinary History* 43:1 (Summer 2012), 139-141; Walter G. Duffy, *The Quarterly Review of Biology* 88:1 (January 2013); Linda Nash, *Pacific Historical Review* 82:1 (February 2013), 120-121; Diane Rachels, *Historical Geography* Volume 40 (2012), 217; Matthew Booker, *Wetlands* 33:2 (April 2013), 379-380.

discuss in this conversation, is that California's Central Valley has hosted both the fall and the rise of wetlands. Where for a century land managers collaborated with farmers to "reclaim" dangerous wastelands into healthy, productive farmland, they now work to protect, preserve and create wetlands. Managing for more wetlands followed a slow but important cultural shift in understanding these odd spaces as productive rather than as wastelands. Now most people agree there are not enough wetlands. This is a sea change in attitude and in policy.⁷

This story of wetlands resurgent is what makes Garone's book so distinctive and important. It is hard to overstate the drama of this shift in attitude. In the nineteenth century United States, wetlands were enemy number one. In the federal Swamplands Acts of 1849, 1850 and 1860 and in a century of subsequent state legislation, governments subsidized the destruction of swamps, marshes and mires. They were so successful in California that by 1980 the state had lost approximately 91 percent of its original wetlands, almost twice the percentage for the nation as a whole (2). Wetlands are now widely seen as providing immense economic and ecological benefits, from storing carbon and buffering storm surges to purifying wastewater and slowing floodwaters.

Garone begins by detailing the creation of what he calls the "agricultural mystique" in the American West—the centuries-old assumption that remaking both wet and dry lands into farms was the highest and best use. Garone shows that converting California's interior wetlands to fields was costly and in many cases shortsighted. During the late nineteenth and early twentieth century, Central Valley wetlands were rapidly and brutally transformed through large capital investment and governmental subsidies. Yet within decades, much of this new farmland would be threatened by scarce water supplies and, paradoxically, by the residues of irrigated agriculture itself. And the ecological consequences of wholesale destruction of California's interior wetlands—extinction of races of salmon, decimation of wildfowl populations, loss of entire habitat types—contributed to a societal shift that by the 1970s led to efforts to preserve and restore wetlands in California.

Why the change? In part it is because, as both Garone and Bob Wilson have pointed out, refuges were not primarily created to benefit wildlife. In most cases, the Central Valley wildlife refuges were carved out of already-altered landscapes. They were created spaces designed to help farmers and other users. Farmers needed places to put their wastewater, and the low-down places of the Central Valley became the sumps for their irrigation ditches. Only later did shifting ideas of ecological function and a powerful alliance of hunters and other lovers of wildlife promote refuges as natural spaces. Now the refuges are for both nature and economic users, leading to a surprising and remarkable (if fragile) coalition of rice growers and conservationists in the Central Valley today. In this story, when it comes to public lands, the original

⁷ Ann Vileisis, *Discovering the Unknown Landscape: A History of America's Wetlands* (Covelo, Calif.: Island Press, 1997); Linda Nash, *Inescapable Ecologies: A History of Environment, Disease, and Knowledge* (Berkeley and Los Angeles: University of California Press, 2006).

intent was often as complicated as the present uses. People fought about these spaces from the beginning. It doesn't get simpler as you go back in time.⁸

The great surprise in the history of California's wetlands is not that so many were destroyed. The surprise is that so many have been created or recreated. And that story is not a simple triumph of public ownership over private greed, or wildlife over agriculture. Instead both the devastation and the restoration are due to public-private partnerships. Americans typically think of public lands, especially designated refuges, as the basis for wildlife habitat. This is because private ownership has historically been devastating for wildlife. Farmers in California's Central Valley were responsible for some of the greatest destruction of wetlands in the nation's history. Yet in recent decades rice growers have begun managing their fields as wetlands. Flooding rice fields after harvest has more than doubled the available seasonal wetland habitat in California, helping to reverse the collapse of duck populations and boosting Pacific waterfowl populations to levels not seen since the 1970s. Garone provides an incredible statistic: since 2003, "the extent of flooded rice fields exceeded the combined total acreage of all public refuges and private wetlands in the Central Valley." (250)

We can and should begin our modern environmental histories with loss. Much biological diversity has been destroyed and can never be recovered. Yet this book, like many of our best works, refuses to celebrate transformation or to tell a simple declensionist story. Instead Philip Garone has given us a complicated, messy and maybe even hopeful story. That is a useful past.

⁸ Robert Wilson, *Seeking Refuge: An Environmental History of the Pacific Flyway* (Seattle: University of Washington Press, 2010).

Comments by Patrick Carroll, University of California, Davis

Philip Garone's book, *The Fall and Rise of the Wetlands of California's Central Valley*, is an exactingly researched work. It is packed with details and is extremely well sourced. In addition it is, as far as I know, the most comprehensive history of California's wetlands to date. It traces the many forces that led to the virtual disappearance of California's wetlands, and also the modest restorations through government refuges, private duck clubs, and even rice fields. It begins with something of a natural history and topography of the "Great Central Valley" and its place in the Pacific Flyway. It concludes with a sober but hopeful discussion of restoration efforts and challenges like climate change. The bulk of the book consists of two parts with four chapters each, one focusing on "the fall," and the other on "the rise" of California's wetlands.

Part two, "the fall," begins with a chapter on the destruction of the American Indians of the central valley. The chapter sets up the implicit image of "good Indians" in harmony with "nature" or "the environment" soon to be displaced by "the white man" ready to destroy it. For the Indians the valley was a land of plenty, but for the settlers it was a "wasteland" in need of "reclamation" (which originally meant to win back from waste or immoral condition). The chapter discusses early contacts with Indians prior to the founding of the state, and their subsequent decimation by malaria. This is followed by something of a digression into period texts that held up irrigation as a menace to health. The chapter ends with a short account of how the federal swampland reclamation act of 1850 provided the first boost to the drainage of California's wetlands. The core of part two, however, consists of a chapter each on the San Joaquin and Sacramento Valley's, and one on the Sacramento-San Joaquin Delta.

I felt the discussion of the Indians would have flowed more effectively had it not concluded with the founding of the state, but with their early history in relation to reclamation. As Carey McWilliams documented, California's central valley Indian population were finally driven out (if not killed) in the first two decades of the state. California was the site of the first Indian reservations (originally "military reservations"), by a law passed in 1853. Prior to that, in 1851, treaties were negotiated with (some of) the Indians in which they gave up all claim to the lands of California in exchange for about eight and half million acres, much of it riparian wetlands. Indeed of eighteen tracts of land set aside for the Indians, thirteen were strung down the center of the Sacramento and San Joaquin Valleys. The government of California was nothing if not fast (no state transitioned from a territory to a state in such a short time), so rather than spend time negotiating over titles and rights with Indian agents and congressional committees, the state's delegation to the US Senate made sure, in 1852, that not one of the eighteen treaties was ratified. Within a decade the Indians (by various means) had been overrun by miners and agricultural settlers and effectively eradicated from the valley. In addition to the

treaty lands, they would lose another seventy-five million acres previously recognized as belonging to them. What remained of California's Indians mostly ended up scattered in the mountains or in desert areas, or removed to the newly created reservations, most of which were not in the valley, and all of which were eventually overrun by settlers or basically stolen by corrupt government agents. As Williams pointed out, this rapid "solution" of the "Indian problem" in California helps explain the speed with which Central Valley agriculture, and thus the Californian economy, was developed. I mention this partly because it would have served as a more effective link to the introductory discussion of reclamation, drainage, and irrigation, but more substantively because it is the part of the Indian story that is most relevant to the agricultural settlement of the valley.

Part two provides an exacting account of reclamation, flood control, and irrigation in the Central Valley. It is particularly helpful to have a discussion of the Sacramento and San Joaquin Valleys, and the Delta, in separate chapters, but integrated into a single narrative. However I must admit I was a bit puzzled by the organization of the discussion, beginning as it does with the San Joaquin Valley. Almost all the early state efforts at reclamation (and thereby drainage of wetlands) were focused on the Sacramento Valley, from the Swampland Commissioners (1860s) to the beginning (c.1910) of the Sacramento Flood Control Project (revolutionary for the time as at its heart were huge flood bypasses in the Sacramento Valley, a design at odds with the "levees only" doctrine of the USACE, and only adopted on the Mississippi after a devastating flood in the late 1920s). Indeed, as the author notes, the bold idea of a bypass system in the Sacramento Valley was first articulated in the 1860s. Thus it seemed to me that the chapter on the Sacramento Valley would have better followed the discussion of the early reclamation efforts. Then the transition to the chapter on the San Joaquin Valley would flow more smoothly via the extension of the Sacramento Flood Control Project to that valley through the creation, in 1913, of the Sacramento and San Joaquin Drainage District. Also, though there was indeed seasonal flooding in the San Joaquin, that valley was more in need of irrigation (neglected by state government during the nineteenth century, much to the chagrin of the first State Engineer), both through conveyance systems and groundwater pumping, strategies that while attempted by landowners in the nineteenth century, only really got going seriously in the early twentieth century. In general, the icon of reclamation in the Sacramento Valley is the levees, whereas in the San Joaquin it is the canals.

Having said that, the chapters on the two valleys, along with that on the delta, together provide one of the best overall accounts of the early agricultural and water infrastructure development across the entire Central Valley. It concludes with a discussion of the formulation of California's first great water plan for storage and conveyance (and flood control), which eventually becomes the federal Central Valley Project (CVP). The author is pointedly correct in his observation that the project would tie the two great valleys, the delta, and Tulare Basin together "both physically and symbolically." Before that the idea of a single Great Central Valley was something of an abstraction, with life in Yolo County in the north being a world a

way from that around the Tulare Basin in the south. Yolo was the home of the University of California, Davis, significant towns like Woodland and Davis, and many wealthy farming families with fine country homes. Tulare was barren of towns or community, the land monopolized by a small number of growers who, as Williams put it, “mined” rather than farmed the land. The author also notes, when discussing the Pacific Flyway, that the delta was the “hydrological lynchpin of California.” The construction of the CVP began the process whereby the delta, similarly, became the symbolic and material heart of the entire water infrastructure of the state, and thus “ground zero” of water politics in California.

Before turning to the part on “the rise,” the author points out that protection of fish and wildlife was “conspicuously absent” from the CVP plan. This was because it was not until the turn of the twentieth century that state government began, haltingly, to take notice of protecting birds. In 1913 fish and game districts were created, the wardens given enforcement powers, and the department given jurisdiction over birds. But the effectiveness of the department was limited. The CVP plan was largely complete by 1931, just before government action on waterfowl really gets going. As Garone documents, the history of federal refuges in the valley begins in 1937 with the Sacramento Migratory Waterfowl Refuge. 150 CCC workers were mobilized to completely re-engineer the Glenn-Colusa Irrigation District as a feeding ground for birds. The author does not naively represent this as an act of “environmental protection,” but shows how it was largely motivated by efforts to prevent crop depredations by migrating birds. Two more refuges were established in the Sacramento Valley in 1945. Further action followed with the Lea Act of 1947, a break with the past in that it provided for the federal government to directly purchase lands in cooperation with the state. Garone notes that it is ironic that agricultural development was responsible both for the destruction and the reestablishment of wetlands in California. The book documents further developments along these lines in the 1950s, when scientific research into bird biology became more significant (the first biological survey was conducted by the federal government in 1901). In the San Joaquin Valley, Garone shows how hunters were particularly important to restoration of wetlands, especially the Grass Lands Water Association. After a long struggle the association was reorganized as a public water “district,” allowing it to contract with the Bureau of Reclamation for CVP water. In addition, the Grasslands Development Authorization Act of 1954 also reauthorized the CVP and for the first time explicitly stated that project water be used for fish and wildlife purposes.

In contrast with the original Central Valley Project authorization, California’s second great storage and conveyance plan, the State Water Project (1957), noted the “necessity” for the protection and enhancement of “wildlife resources” and the development of the recreational potential of the project. It might have been noted in this context that the reference to “resources”, and the link drawn with “recreation,” indicated that this again was not motivated by “environmental” concerns in the contemporary sense of that term. Garone recognizes this elsewhere, showing how early attempts at providing habitat areas were driven by other interests. For

instance, rice farmers became supporters in the context of crop depredations caused by migrating waterfowl. Hunters and duck clubs, who wanted to preserve waterfowl for recreational hunting, became supporters in that context.

Garone does us a great service in bringing out the way that apparently fixed interests completely at odds with each other could in fact be reconfigured by specific circumstances. It is an important lesson for those who speak of monolithic and fundamentally opposed “agricultural, municipal, and environmental interests.” When framed like this co-operation seems impossible. That framing drives the “water wars” narrative, which is great for selling newspapers. Garone’s more nuanced research reveals that interests are not at all monolithic, and they are subject to change. His discussion of the alliances built around waterfowl habitat restoration is particularly insightful. Without neglecting the conflicts at work, he shows how rice growers, hunters and duck clubs, and state, national, and international actors forged, slowly but surely, solutions to the loss of waterfowl habitat in the Central Valley and the Pacific Flyway more generally. Most people no doubt assume that it is only on official government “refuges” that the provision or restoration of habitat has occurred. Environmentally conscious people are often suspect and disapproving of what they see as too cozy a relationship between the fish and game wardens and hunters, sometimes construing it as little more than a funding mechanism for the agency (through permits). But Garone shows that this ignores the critical role that hunters have played in the protection and restoration of wetlands.

While early efforts at restoration were not driven by any sense that birds had certain rights independent of human purposes, that changed dramatically with what the author terms the “tragedy of Kesterson Reservoir.” Failure to develop an effective drainage system for agricultural runoff in the San Joaquin Valley led the Bureau of Reclamation, in 1978, to deliver subsurface drainage to Kesterson Reservoir. The drainage water was contaminated with selenium and as soon as 1983 researchers found hundreds of dead and deformed birds. Garone skillfully shows the conflicts over the claims that selenium was the cause, and how various government agencies were at odds with each other, especially the Bureau and Fish and Wildlife Service within the Department of the Interior. In stark contrast to the Bureau, the Service began sounding the alarm. But they could achieve little as they were “trampled on” by the Bureau at the behest of their “powerful western political constituency.” Another highly respected agency within Interior, the United States Geological Survey, attacked the findings of the Bureau’s studies on scientific grounds, and most importantly, the story was picked up by the press. As the author points out, this led, in the context of a new world of “environmental” awareness, to public outrage. The story went national in 1985 through a *60 Minutes* report. The issue of wetlands protection and restoration became animated by a new sensitivity toward “nature” and what was constructed as the inherent value of “biodiversity.” The new environmental movement that emerged from the 1960s not only constructed an equivalence between *the* environment and nature, but joined together scientific and moral/ethical arguments for environmental protection writ large. Garone

documents this in the final chapter, showing the role of environmental groups in driving a wetlands resurgence in the valley. The Central Valley Project Improvement Act of 1992 mandated protection of the Delta and adjacent Suisun Marsh, a critical part of the Pacific Flyway. The Bay-Delta Accord (1994), signed by federal and state agencies as well water agencies and environmental groups, inaugurated CalFed, an intergovernmental organization which added “ecosystem restoration” as a co-equal goal of water supply reliability and levee restoration. Garone rightly points out that CalFed has fallen far short of expectations, and that efforts at restoration have had varying results. He provides a level-headed assessment of what has been achieved and of the prospects for the future, but is no doubt correct that a corner has been turned in attitudes toward wildlife protection in the Central Valley.

Garone’s book provides an important corrective to the environmental history of the state, which is often framed within a “desert narrative” that pays little attention to California’s wetlands or waterfowl. California’s water history has often been folded into the broader southwestern desert narrative that papers over the significant differences in the landscape of California, for instance between the Sacramento Valley, the San Joaquin Valley, the Tulare Valley, southern California (south of the Tehachapi’s), the coastal areas, and the many small valleys across the state, not to mention significant differences with other southwestern states. The desert narrative was popularized by Reisner’s *Cadillac Desert*, but even in more scholarly work, such as Worster’s famous *Rivers of Empire*, one finds it. Indeed the word “swamp” only appears once in Worster’s book, and this is the context of a critique of environmental damage caused by over-irrigation. While much of California is a desert landscape, Garone’s book makes clear that there were significant differences between, for instance, the Sacramento Valley and the San Joaquin Valley. In respect to the former he brings out that difference in relation to rice culture, which became an important feeding ground for birds, and which today still grows almost all of California’s rice crop, with about half a million acres under culture. He points out, as many authors fail to do, that reclamation was not merely another word for irrigation, despite the Bureau of Reclamation’s equation of the two. Reclamation often meant the draining of land, of getting water off the land rather than onto it. The focus on wetlands, or what until the mid-twentieth century was called swampland (tule) and tidal or fresh water marsh, helps put the rise of desert irrigation in proper historical context. In 1852 the governor claimed there were ten million acres of “swamp and overflowed lands” that could be claimed for the state from the federal government. In the end the state got about 2.2 million acres, most coming from what we today designate wetlands, estimated at about four million acres before reclamation.

Thus by focusing attention on the wetlands and waterfowl, Garone provides a much more balanced view of the state’s landscape than one finds in the desert narrative. In addition, while the history of irrigation in the state has been well documented (e.g. Pisani), and also the history of floods, flood control, and levee based reclamation (e.g. Kelley), this is the first book I have encountered that treats both, in such detail, simultaneously. It is also the first book that addresses all three of the

state's great water projects in a single narrative: the Sacramento Flood Control Project, and the CVP and SWP. This provides a much better integrated and complete picture of how the landscape of California has, as Garone points out, been so thoroughly transformed. We can see that the loss of feeding grounds to birds and waterfowl in the Sacramento Valley and Tulare valley/basin/lake area, though both happening for the purpose of expanding agriculture, happened very differently.

The only major criticism I have of the book is its lack of a theoretical framing. There is no engagement with the literature; for instance, Karen O'Neill's work on flood control in the Sacramento Valley, which draws on the work of Timothy Mitchell to explore how the distinction between state and society/economy is constructed; or the work of Linda Nash, which situates bodies and public health in the history of the Central Valley. Granted these works have different empirical foci, but they raise theoretical issues that are relevant to Garone's work, such as the relationship between the private and the public, and the opposition between humans and the environment. Garone documents and acknowledges how the Central Valley has been completely transformed by reclamation, irrigation, and agriculture, but he still frames his story as though nature can be viewed as separate from humanity; at one point he speaks of the "choices made by humanity," an abstraction at odds with his detailed narrative of who precisely we are talking about. Scholars have been problematizing the human/nature dualism for sometime now, some questioning if we can even speak of nature without scare quotes, others deploying terms like "socio-natures," "techno-natures," "cyborg landscapes," "techno-territoriales" and so on.

The lack of theory leads to other problems. It's not clear what the *explanans* is. The author states that the book argues that "changes in how we perceive wetlands have allowed us to appreciate their intrinsic values." But who is the "we" here? Many are completely unaware of the wetlands, others quite happy to sacrifice them to agriculture, and many others view them from a resource point of view rather than in terms of intrinsic value. Also, if it is a change in "perception" that is doing the explanatory work, how do we explain the change in perception? If it is just perception itself that is driving change we end up with a very idealist, and dated, view of history. Also, without theory the story seems oddly teleological, despite the details revealing all the contingencies of the history. For instance, Garone will often cite a particular report as necessarily leading to a particular course of action, or will use the term "it was clear" that such and such had to be done, which left me wondering "clear to whom?" The narrative sometimes seems naively realist: various actors see the world for how it really is and accordingly do the correct thing. Finally, the lack of a critical analysis leads to an ahistorical treatment of "the environment," and the "nature-environment" synonym. For instance, "environmental" awareness is granted to actors in the mid-nineteenth century, when the notion of environment as nature would have been entirely alien to them. The ahistorical approach to "the environment" and the naïve realism upon which it rests, can, I suppose, be forgiven. It is all too frequent in environment history (not to mention sociology), where scholars are actually part of, or at least fellow travellers

with, the environmental movement, the very movement which constructed the nature-environment synonym as a timeless reality “out there” apart humans.

Having said that, one great value of documentary history lies in the vast amount of detail it is capable of capturing about so many variables: in this case reclamation, irrigation, flood control, railways, dredging technologies, settlement patterns, water rights law, major court decisions, epic legal battles, massive water projects, duck clubs, hunting laws, development of government agencies, unlikely alliances, matters of health and disease, pollution, mismanagement, animal species, law enforcement, the role of various sciences, different forms of vegetation, pumping technologies and so on, all told through the lens of particular individuals and organizations, their struggles and alliances. In this respect the book will be an invaluable source for anyone interested in almost any aspect of the environmental history of California’s great valleys. Critiquing overly detailed documentary/empiricist history E.H. Carr, in his classic *What is History*, famously stated that history was like a half-tone picture: if you look at it too closely it becomes a series of meaningless dots. Though this book lacks any theoretical or historiographical ambition it is by no means a mere bunch of facts lacking coherent meaning. On the contrary, the consistent focus on the wetlands allows Garone to draw in a huge range of heterogeneous empirical detail without losing his highly coherent account of the complexity of forces that shaped the modern history of those wetlands.

I would like to finish by noting that it was a pleasure to read a book dealing with water in California that does not embody what I term “historiographic cynicism,” a historiography that emerged from the 1960s and 1970s as a counter to Whig historiography, which while rightly rejecting the teleology of progress at the heart of the latter, replaced it with a cynicism that sees variously nefarious, corrupt, pretentious and incompetent actors everywhere. The narrative of heroic progress is replaced by that of corruption, greed, and decline. This is what one so often gets in the literature hung on clichés of “water wars.” No one doubts that in the case of water in California there was plenty of corruption, land-grabs, empire building and so forth, but much of the water wars literature makes it appear as though such was unique to water rather than characteristic of the history of American capitalism generally. Garone’s book does not neglect the powerful forces at work in the transformation of California’s Central Valley, but such is revealed as more ordinary than extraordinary. His more neutral (though still normative in relation to “nature”) approach reveals how quite unlikely alliances were possible. These alliances importantly made possible the reversal of wetland loss, creating the prospect that a more hopeful future, from the point of view of protecting migrating waterfowl habitat, is not only possible but completely within grasp.

Comments by Royal C. Gardner, Stetson University College of Law

In meticulously documenting the history of the wetlands of California's Great Central Valley, Philip Garone emphasizes two broad themes that have resonance far beyond the region. The first is society's growing appreciation of wetlands.

Although Native Americans viewed them as "sources of subsistence," early U.S. settlers considered the wetlands to be miasmatic repositories of malaria that needed to be drained for agricultural purposes (48). After much damage was inflicted (including the desiccation of Tulare Lake), the initial call for protecting the area's aquatic resources came from duck hunters. Of course, they were not advocating wetland conservation from a biocentric perspective; instead, their concern was anthropocentric or utilitarian based. They understood that the area's wetlands provided critical habitat for migratory waterfowl and that, without these wetlands, the duck clubs would have little reason to exist. Today we recognize that wetlands provide an array of ecosystem services—benefits to people—such as flood control, storm abatement, water purification, and aquifer recharge. This swing in public perception largely tracks what has occurred at the international level. For example, the Ramsar Convention, a multilateral environmental agreement concluded in 1971, is devoted to wetland conservation. At its inception, the Ramsar Convention had migratory waterfowl as its focus (indeed, the treaty's formal title is the "Convention on Wetlands of International Importance especially as Waterfowl Habitat"). Now, however, the Ramsar Convention and its 168 parties, including the United States, emphasize the full range of ecosystem services that wetlands provide.

The second dominant theme in the book is the importance of broad (and sometimes unusual) alliances to effect changes in public policy and practices. It is difficult for environmental advocates to make gains alone, and Garone chronicles the importance of the duck hunting community in saving and restoring wetlands. More broadly, the "hook and bullet" crowd should not be overlooked as environmental stakeholders. Nor should we neglect opportunities to work with sectors typically considered antagonistic to environmental concerns. As Garone points out, rice farmers have adopted "a waterfowl-friendly flooding approach to straw management": after the harvest, the fields are flooded, providing benefits to both birds (habitat and food) and farmers (avoidance of burning, assistance in decomposition process, and reduction of weeds) (250). Examples of such non-obvious partnerships can be found throughout the country. In Florida, sugar production, propped up by federal price supports, has long contributed to degraded water quality in the Everglades. A coalition of environmentalists, libertarians, and candy manufacturers continue to criticize the program, all with different motivations. Often one must augment the traditional base to make a difference.

Much of book recounts (rightly so) federal and state actions spurred on by strange bedfellows. The next stage of the resurgence of the Central Valley's wetlands may rely more on the private sector, through ecosystem markets.

The federal “no net loss” of wetlands policy, mentioned in passing, has spurred the creation of wetland mitigation banks. The “banking” concept depends on the existence of a regulatory program, such as the Clean Water Act section 404 program. If a developer wants to fill in a wetland, it must first obtain a permit from the U.S. Army Corps of Engineers. To be sure, there can be disagreement about whether a particular area meets the regulatory definition of a wetland or, if so, whether there is a sufficient nexus to a navigable water to justify federal jurisdiction. (Interestingly, Garone notes that wetland delineations have prompted controversies going back to the Swamp and Overflowed Lands Act in the 1850s and 1860s when states were “claiming greater acreage than federal authorities would concede” (59). If the Corps grants a Clean Water Act section 404 permit, it will generally require as a condition of the permit that the developer offset the adverse environmental impacts of its project. Accordingly, if the developer filled in ten acres of riparian marshes, the Corps might require ten acres (or more) of restored habitat as an offset. In theory, this results in “no net loss” of wetland area and/or function. In practice, this “permittee-responsible” mitigation often failed, resulting in a net loss.

Accordingly, the Corps and the U.S. Environmental Protection Agency have endorsed a different approach to wetland offsets, seeking to move away from permittee-responsible mitigation. They have encouraged private companies to engage in wetland restoration projects, thereby generating wetland credits, which are “banked” for future use. With the permission of the agencies, these credits are then sold to developers, which use them to satisfy the offset requirements of their permits. Garone characterizes wetland mitigation banks as “one of the more promising avenues for wetland mitigation,” and many such entrepreneurial operations have sprouted in the Central Valley (349). According to the Corps’ on-line database RIBITS (an acronym for Regulatory In lieu fee and Bank Information Tracking System), there are fourteen wetland mitigation banks established in the Central Valley, with another nine pending approval.⁹

Closely related to mitigation banking is conservation banking, which applies to endangered and threatened species habitat. Federal and state laws require offsets for permitted impacts to protected species, and private companies are restoring and preserving vernal pool habitat to create fairy shrimp and California tiger salamander credits, among others. The state of California and the U.S. Fish and Wildlife Service’s Sacramento field office have been leading advocates of this approach, and the majority of conservation banks are located in California, with twenty in the Central Valley. Some sites produce both wetland and species credits. For instance, in Solano County, the 1815-acre Elsie Gridley Mitigation Bank sells marsh and vernal pool credits, as well as credits for the burrowing owl, California tiger salamander (riparian and upland), fairy shrimp, tadpole shrimp, and Swainson’s hawk. The site, which was once slated for development, is now to be managed and preserved for ecological purposes in perpetuity.

⁹ <http://geo.usace.army.mil/ribits/index.html>

Despite the advantages that mitigation and conservation banking offer over traditional permittee-responsible mitigation, it is important to remember that they function as part of an offset program. Wetland and species losses are exchanged for wetland and species gains. Yet there is one offset program that has the potential to result in a dramatic net increase in Central Valley wetlands: carbon offsets. Ironically, climate change, one of the primary threats to the Central Valley as discussed in the epilogue, may lead to a mechanism to finance large-scale restoration.

In December 2013, Ecosystem Marketplace reported that “[c]arbon finance could soon play a critical role in the restoration of California’s wetlands, with a coalition of stakeholders developing a methodology that would allow wetlands restoration projects in the state to generate credits for both the voluntary carbon market and California’s cap-and-trade program.”¹⁰ The American Carbon Registry has approved a methodology to measure reduced greenhouse gas emissions from restored wetlands along the Mississippi Delta. Should a similar methodology be approved for California:

[s]takeholders see abundant opportunities to restore wetlands in the Sacramento-San Joaquin Delta, Suisun Marsh, and California coastal areas. In the San Francisco Bay Area, more than 95% of crucial habitat has disappeared since the 1800s, according to the US Geological Survey. More than 2.5 billion cubic meters of organic soils have disappeared since delta islands were first diked and drained for agriculture in the late 1800s, resulting in land subsidence up to 25 feet below sea level. Drained and cultivated organic soils continue to oxidize, subside and emit an estimated 1.5 to 2 million metric tons of carbon dioxide equivalent annually.

The carbon markets—and the odd coalitions that they entail—may provide the next chapter for the recovery of the Central Valley wetlands.

And it is well worth the effort to find innovative ways to protect and restore this globally important resource. The federal government has recognized the value of California’s largest remaining contiguous tract of freshwater wetlands, a collection of public and private lands in Merced County, by designating the Grasslands Ecological Area as a Wetland of International Importance under the Ramsar Convention. With this highest of recognition come certain international obligations, including the duty to conserve the area and report any ecological changes to the Ramsar Secretariat in Switzerland. The United States must also periodically update

¹⁰http://www.ecosystemmarketplace.com/pages/dynamic/article.page.php?page_id=10109§ion=biodiversity_market&eod=1

the site's Ramsar Information Sheet, which provides background data to the public. When next doing so, it should be sure to list "The Fall and Rise of the Wetlands of California's Great Central Valley" in the bibliographical references.

Comments by Emily O’Gorman, Macquarie University

Philip Garone’s book, *The Fall and Rise of the Wetlands of California’s Great Central Valley*, is a fascinating account of the changing waterscapes of this region. It is in fact gripping reading, as Garone takes us through some of the downs and ups of the Central Valley’s environmental history. ‘Downs and ups’ is in keeping with the overarching narrative of the book, which Garone has structured as a ‘fall and rise’ of the wetlands, in contrast to previous narratives of environmental decline in the Valley. Garone explains: ‘although the sheer volume of wetlands losses has been enormous, this book suggests reasons for a cautious optimism about the future of wetlands in California’s Central Valley and across the nation as a whole’ as conservationists try to remake some of the lost wetlands (1-2). The total area of California’s wetlands shrank by a staggering 91 per cent between the 1850s and 1980s (2), largely due to the expansion of irrigation and increasing numbers of large dams, driven by land speculators and supported by governments, both geared towards radically altering the water regimes of the Valley to create an agricultural utopia. It is this dual history of agriculture and wetlands that Garone ultimately seeks to tell, with a strong focus on the consequences for migratory water birds of the Pacific Flyway. Conservation efforts, albeit at times compromised, are threaded through his story, as some farmers and waterfowl hunters, and later scientists, sought to protect shrinking areas of sloughs, swamps, and lakes. The shifting nomenclature of what we so often refer to now rather homogeneously as ‘wetlands’ is evident in this story and I wondered at times about the geographies, politics, and histories behind these changing naming practices. For example, ‘slough’ is not a common term in Australia (but we do have ‘billabongs’ which are often bends in a river that no longer connect to the main channel that fill during floods).

The book is divided into three main sections. The first, ‘Part One. Wetlands and Waterfowl’ (chapter 1) is dedicated to examining the wetlands ecology of the Central Valley, in particular the ‘three natural communities’ of the valley – grassland, woodland, and marshland – and the past and current reliance of waterfowl on them. The following section, ‘Part 2. The Fall’ (chapters 2-5) analyses the processes of reclamation, agricultural expansion, flood control, and land speculation that combined to gradually reduce the area of wetlands in the Central Valley. This section includes many insights and stories that reveal the cultural and environmental complexity of these processes. I will highlight just two here. Garone begins the section with a brief but fascinating account of Native American uses and burning of wetlands, especially for food and materials. In the early 1800s, Native Americans who had escaped from Spanish missions also used the long grasses of wetlands to evade the officials sent to find them. This worked well, however a malaria epidemic in the 1830s had devastating consequences, killing at least 20,000 Native Americans and weakening many others. In the mid-nineteenth century in California (then under the control of the USA), malaria, likely introduced by European sailors or traders and trappers from the east, became one of a range of

reasons behind reclamation efforts by private landowners and state and federal governments. The money each of these groups, and certain individuals, could make from increased cultivation and density of settlement through reclamation was, however, the central motivating factor. These efforts were at times undermined by the legal difficulties in classifying swampland for drainage and indeed the flood regimes of the river, which defied engineers' early attempts at control.

Garone's account of the disappearance of Tulare Lake is also intriguing. In the second half of the 1800s, fishermen and hunters were taking increasing amounts of fish and waterfowl from the lake to supply San Francisco markets. At the same time, a flood in 1862 changed the courses of waterways that fed the lake and this, combined with irrigation diversions, slowly reduced water flows to the lake until it disappeared. As the lake shrank, so too did populations of wetland-dependent birds, who, with reduced habitat, suffered greater instances of diseases such as botulism. Indeed, as Garone notes, many animals and plants suffered because of reclamation by agriculturalists along the lake shore, reductions in water flow, over-fishing and hunting, and eventually the lake's disappearance. For example, numbers of tule elk plummeted, the last remaining herd being protected by Henry Miller (one of the partners of the mega pastoralists Miller and Lux). Garone ends the section with an examination of increasing government investment in flood control and irrigation infrastructure from the turn of the century, to increase agricultural productivity still further and protect civil centres. Throughout the chapters in this section Garone explores the negative effects of habitat reduction, and sport and commercial hunting, on waterfowl, as well as farmers' views of these birds as pests to wheat (and later rice) crops.

In the final section, 'Part 3. The Rise' (chapters 6-10) Garone largely examines efforts to conserve wetlands, mostly by hunters, hunting groups, and private land owners who could benefit financially by charging hunters for access to wetlands. Together they sought to preserve the wintering grounds of waterfowl and ultimately populations of ducks. The role of politicians like Franklin D. Roosevelt, figures like Aldo Leopold, and organizations like More Game Birds in America (the forerunner to Ducks Unlimited), as well as their connections, is fascinating. Garone deftly examines the rationales, and cultures of conservation for hunting, that underpinned the creation of refuges (including the so-called 'duck factory' of the prairie potholes in north America) by Ducks Unlimited as well as its efforts to conserve migratory waterfowl habitat across the northern national border by establishing Ducks Unlimited Canada. In the 1990s Ducks Unlimited was also a key player (in partnership with the Rice Industry) in the creation of wetland refuges for waterfowl by flooding rice paddies in the north of the valley during the winter months.

In some ways I see Garone's account of the disaster at Kesterson Reservoir as the climax of the final section. In the 1980s toxic agricultural drainage water slowly poisoned the refuge, leading to birth defects in birds and causing problems for other animals, including killing most of the fish species. Through this story we can see a

wider interest in wetlands conservation by a range of people, particularly scientists. Garone examines scientists' involvement in wetlands conservation for biodiversity (not just waterfowl) further in the final chapter, titled 'Wetlands Resurgent'.

As I was reading Garone's book, particularly the final section, I wanted to know more about what was happening to the wetlands species that were not birds. More specifically, what were (and are) the consequences for other species of intensive management of wetlands for birds? 'The rise' of wetlands in California seems to be foremost a rise for birds. This has also been the case in Australia and in international efforts, as demonstrated in the centrality of water bird conservation in the Ramsar Convention on Wetlands. I think it is important that environmental historians consider the consequences of the politics that are at work here. That is, to borrow a question often asked in a particular strand of science and technology studies: who wins and loses in this kind of wetland conservation? Who lives and who dies?¹¹ Garone examines some of the important class issues around privatizing hunting on wetlands; could environmental historians also consider the consequences of managers and organizations privileging particular species?¹² This points towards a wider consideration in environmental history. Perhaps we need to tell more complex stories that are neither rises nor falls, declensionist nor ascensionist, but that illuminate the mixed outcomes for different groups and species. These are not criticisms of Garone's book as such, rather I think these as conversations that are worth having in roundtable forums like this. That is, to reflect on the stories we tell.¹³ Indeed, these are things I am considering as I begin researching histories of wetlands in the Murray-Darling Basin in Australia. Overall, this a well researched and written book that is interesting on its own terms and draws attention to important histories as well as contemporary problems.

¹¹ Donna Haraway, *When Species Meet*. Minneapolis: University of Minnesota Press, 2008; Michael Flower, 'Technoscientific Politics: Cui Bono?', *Theory & Event* 1:3, 1997.

¹² This is something anthropologist Eben Kirksey has considered in relation to wetland management for ducks in Costa Rica. See, Eben Kirksey, 'Living With Parasites in Palo Verde National Park', *Environmental Humanities*, 1, 2012, pp.23-55:

<http://environmentalhumanities.org/archives/vol1/>

On overlooked species see: Deborah Rose and Thomas van Dooren, 'Introduction', *Unloved Others: Death of the Disregarded in the Time of Extinctions*, special issue of *Australian Humanities Review*, 50, 2011: <http://www.australianhumanitiesreview.org/archive/Issue-May-2011/home.html>.

¹³ William Cronon, 'A Place For Stories: Nature, History, and Narrative', *The Journal of American History*, March 1992, pp.1347-1376.

Response by Philip Garone, California State University, Stanislaus

One of the rewards of being invited to participate in these Roundtable Reviews is the opportunity to see how scholars in a range of disciplines receive one's work. In this case, I am grateful for the distinct perspectives and expertise offered not only by fellow environmental historians (Matt Booker and Emily O'Gorman), but also a sociologist (Patrick Carroll), and a law professor (Royal Gardner). I am also thankful for the tireless work of Jake Hamblin, not simply on this review but all others that have come before.

In this response, in general, I will first address some of my goals for the book and the reviewers' comments about its themes and contributions, then their criticisms, and finally those comments that point to interesting further directions for research. As my book title illustrates, and as Booker emphasizes, my primary goal was to account not only for the decline ("fall") of California's Central Valley wetlands, but also for their more recent recovery ("rise"). In doing so, I wanted to be able to explain the myriad causes for the societal shifts that made such a reversal of fortune possible.

As my research progressed, several daunting challenges became apparent.

First, because so much of the early efforts to preserve wetlands revolved around waterfowl—whether to protect farmers from them, or to provide spaces for hunters to shoot them, or to conserve the bird populations themselves—I would need to master a good deal of both wetland and waterfowl ecology. Only then would I be able to tell this story from a distinctly ecological perspective and be able to situate wildlife in the forefront of the story. Doing so would advance two of my other goals: to bring ecology more explicitly into environmental history and to contribute in hopefully original ways to the burgeoning environmental historiography of animals.¹⁴ One of the unexpected pleasures of this line of research is that I became a reasonably competent birder (at least for waterfowl and other waterbirds), as I spent many hours on the Central Valley's numerous refuges, almost always in winter, and often in the cold dusk, when millions of migratory birds were present and were taking flight or approaching, *en masse*, for a landing.

Second, because the majority of the valley's wetlands were reclaimed for agricultural use, I would need to engage fully the reclamation and irrigation historiography for California and write, as O'Gorman notes, "a dual history of agriculture and wetlands." And I would need to do so for each of the distinct, yet related, regions of the valley (the Sacramento Valley, the Sacramento-San Joaquin Delta, the San Joaquin Basin, and the Tulare Basin), as several of the reviewers point

¹⁴ See, for example, the Forum on "Wildlife in America," organized by Peter S. Alagona, in *Environmental History* 16:3 (2011): 391–97, 400–55. Of course, much of the historiography of animals, far too voluminous to cite here, extends beyond wildlife to domesticated animals as well.

out. In the end, the book did end up becoming as much about California agriculture and the hydraulic infrastructure that sustains it as about wetlands *per se*. On this point, I appreciated Carroll's observation that the way I framed reclamation in the Central Valley—as *both* removing water from the landscape and delivering it somewhere else—differs markedly from reclamation in most of the rest of the arid West. To acknowledge the centrality of reclamation in this history, for a time I contemplated the more denotative but ultimately too unwieldy title, "From Reclamation to Conservation: The Rise and Fall of the Wetlands of California's Great Central Valley." Ultimately, with its emphases not only on agriculture and wetlands, but also ecology, geography, hydrology, and science and policy, the book became even more interdisciplinary than I had at first envisioned it; I thank Booker for kindly presenting a list of journal reviews from a wide range of fields.

A third challenge was that, as I pieced together the disparate parts of this narrative, I realized that the story would be both far more complicated than I had imagined and far less tidy. While "the fall and rise" indeed serves as a useful narrative frame for the overarching history, neither process was linear or uninterrupted, as I explain in the Introduction and which is evident throughout the book. I am forever grateful to the numerous people who guided me through parts of the complex terrain (literal and metaphorical) of this story, but especially to the scientists who not only lived, but also made, this history. Their involvement went beyond granting interviews, providing primary sources, and reading drafts of the manuscript, all of which was already more than I could have hoped for. But they also offered their time to spend days with me driving up and down the Central Valley, explaining key hydrological features as well as their roles in this history. Without their contributions, this book would have been a drier history and a less insightful one. Among other things, they made it apparent that the motives of many of the historical actors in the story defied easy categorization. One consequence of such complicated motives was the creation of unlikely alliances and public-private partnerships that frequently effected changes in public policy, a point noted by Gardner and the other reviewers.

Although I attempted as comprehensive a history as realistically possible, I could not include everything that may have been desirable or that I would have wished. While O'Gorman highlights my treatment of Native Americans, Carroll would have liked more extensive coverage of them, particularly in regard to their removal from the Central Valley in the first couple of decades after California statehood. This is a reasonable point. My primary goal in discussing California Indians was to show the ways in which they utilized and viewed wetlands, ultimately to provide a counterpoint to the views of the settlers who descended on the Central Valley during and after the Gold Rush. This involved researching all of the tribal groups of the Central Valley and searching for hunting techniques (especially for waterfowl), ways in which they made use of wetland plants, and any rituals they may have had in association with wetlands. I decided not to attempt to write a comprehensive history of California Indians and their precipitous decline—other than to explain the great malaria epidemic of the early 1830s and how the introduction of malaria to previously disease-free wetlands diminished the Indians' ability to survive there,

and opened up the Central Valley floor to future agricultural settlement. My decision to frame my coverage of California Indians in this way was influenced by two factors, one historiographical and the other purely pragmatic. In addition to the work of Carey McWilliams, to which Carroll refers, excellent and more recent work (which I cite in the book) has already been done on the fate of California Indians in the years after the Gold Rush, including their assignment to reservations, usually outside of the valley, conveniently removing them from the most promising agricultural lands.¹⁵ I saw here an opportunity to present the essential information about Native Americans most germane to the wetlands lens through which I tell this story, while still adhering to the practical limitations of the book's word limit, which itself merits a comment. I am grateful that the University of California Press, after listening to my arguments that the ambitions of this book could not be achieved in a shorter work, graciously agreed to nearly double the word count first offered to me. At the same time, I tried to be mindful of writing a book that would not be so lengthy as to be of limited practical use in a graduate seminar or upper division course, and would be one that resource managers and wildlife enthusiasts would actually wish to read.

Regarding the organization of the book's chapters, Carroll wonders about my choice, in Part II, "The Fall," to place my chapter on the San Joaquin Valley before that on the Sacramento Valley, and offers several arguments for a reversed order. However, I based my decision on different factors than those that Carroll mentions. While it is true that most of the early *government* efforts at reclamation were focused on the Sacramento Valley, *private* efforts to reclaim the San Joaquin Valley began earlier, by the mid-1850s. Despite some modestly successful efforts to reclaim small parts of the lower Sacramento Valley during the 1860s, the valley was not radically altered until the completion of the Sacramento Flood Control Project in the early twentieth century. But by then, in the Tulare Basin (the southern half of the San Joaquin Valley) enormous Tulare Lake had long since all but disappeared, largely because of irrigation diversions of the rivers that fed it, and the entire basin had been radically altered for agriculture. It was in the Tulare Basin that California water law regarding irrigation and reclamation was established in the late nineteenth century, decades before any serious statewide reclamation planning involving the Sacramento Valley would come to fruition. And it was in the San Joaquin Basin (the northern half of the San Joaquin Valley) that landownership and land use patterns, which would determine the fate of the basin's wetlands to this day, were established well before the end of the nineteenth century, even while the Sacramento Valley continued to suffer from devastating floods that would inhibit reclamation and sustained land use patterns for decades more. So, from any perspective other than where the state first focused its reclamation efforts (even while making little material progress for half a century), the earliest significant changes to the physical and legal landscape took place in the San Joaquin Valley.

¹⁵ Robert F. Heizer, ed., *The Destruction of the California Indians* (Santa Barbara and Salt Lake City: Peregrine Smith, Inc., 1974); Albert L. Hurtado, *Indian Survival on the California Frontier* (New Haven, Connecticut: Yale University Press, 1988).

Carroll, while applauding numerous contributions and insights of the book, also offers the most serious criticisms of the four reviewers, particularly his statement that “this book lacks any theoretical or historiographical ambition.” Although I heartily disagree with his contentions on this point, they merit a detailed response. I’ll begin with the book’s historiographical ambitions, which I lay out in detail in the Introduction. First, the book aims to incorporate a much greater degree of ecology and natural history into the extant environmental historiography of wetlands (more on this point below, in reference to theoretical framework).¹⁶ Second, it seeks to offer explanations for changing public and private attitudes towards wetlands, and such an analysis requires a reevaluation of the “agricultural mystique” of the American West, the view that irrigation was almost always the optimal use of Western lands. Third, it unites the historiography of irrigation and reclamation, flood control, and California’s great water projects in a single work, a point that Carroll himself acknowledges, in novel ways that point to their intersections and at times unexpected outcomes. Fourth, while providing detailed histories of each of the four regions of the Central Valley, it offers the first overarching narrative of the entire valley, and does so in a particular way that ties the whole valley together as a geographical entity rather than simply as the sum of its parts.

To make this last point more concrete, consider that irrigation diversion for rice fields in the Sacramento Valley during the second decade of the twentieth century led to decreased freshwater flows through the Delta, which precipitated local resistance and led to more than a decade of state water planning that resulted, by the 1930s, in the Central Valley Project. The project, in turn, delivered Sacramento Valley water through the Delta to the San Joaquin and Tulare basins, thus physically tying the regions—with their quite distinct histories—together and, not inconsequentially, creating a hydraulic infrastructure that to this day is at the center of California’s most intense controversies over the allocation and distribution of water. None of this was preordained or teleological, and was the result of actions of individuals, organizations, and governments at multiple levels, the motivations of which the book explores and interprets in detail. These historiographical goals point to the book’s contributions to environmental history, Western history, and water history, a point noted by Booker as well.

Regarding Carroll’s claim that the book lacks a theoretical framework, it is true that on the spectrum from synthesis to theory-driven history, I consciously shaped this book more toward synthesis. But it is far from lacking in theory. It seems to me that environmental historians—in general—tend to background, rather than forefront,

¹⁶ For some of the important historiography of wetlands (largely in the U.S.), see Nancy Langston, *Where Land and Water Meet: A Western Landscape Transformed* (Seattle: University of Washington Press, 2003); Ann Vileisis, *Discovering the Unknown Landscape: A History of America’s Wetlands* (Washington, D.C.: Island Press, 1997); Robert M. Wilson, *Seeking Refuge: An Environmental History of the Pacific Flyway* (Seattle: University of Washington Press, 2010).

our theoretical approaches, unlike a number of other disciplines in the social sciences, as we attempt to tell compelling stories. Indeed, the critique that historical writing lacks theory dates back to the cultural turn of the 1970s. That said, this book does indeed have a theoretical framework, just not the one that Carroll would have liked to see. The book is grounded in ecological theory, including lessons from plant community ecology, island biogeography, population dynamics, and community and systems ecology. One of my theoretical and methodological goals was to incorporate ecology in a substantive way into this narrative, to engage with non-human nature in a way that makes explicitly clear the consequences to wildlife populations of human manipulations of the environment. Certainly, mine is not the only book to attempt this— Joseph Taylor’s *Making Salmon*, Andrew Isenberg’s *The Destruction of the Bison*, and Jon Coleman’s *Vicious* are just a few of many excellent works that come readily to mind.¹⁷ My premise is that an understanding of how certain ecosystems actually function is an essential lens through which to gauge human actions that affect those systems. It is largely for this reason that the entire first chapter of the book, “The Nature of the Great Central Valley and the Pacific Flyway,” is devoted to the ecology of the Central Valley and the larger Pacific Flyway in which it lies. Carroll mentions this opening chapter in passing, but does not acknowledge its theoretical underpinnings.

Carroll’s research interests lie largely in theories of state formation, and it is this theoretical framework that he finds lacking. I did not set out to write specifically about state formation, but there is a good deal of attention given to the concentration of California state power and federal power in the book. For example, in the chapter on “The Sacramento-San Joaquin Delta and the Central Valley Project’s Origins,” I discuss at considerable length the interplay between private, state, and federal attempts at reclamation and the “legitimation of federal reclamation” that led to the Reclamation Act of 1902 and, ultimately, to the Central Valley Project. Along the way, I discuss in detail the rise of coordinated state water planning in California and the expansion of state power that was necessary before California could develop its own State Water Plan, which became the federal Central Valley Project only after California was unable to finance the plan during the Depression. Still, I appreciate Carroll’s mention of sociologist Karen O’Neill’s fine work on flood control in the Mississippi and Sacramento valleys.¹⁸ Had I encountered this book earlier—and no doubt there are others that I missed among all the historiographies that my book engages—I’m sure I could have benefited from her insights.

¹⁷ Jon T. Coleman, *Vicious: Wolves and Men in America* (New Haven, CT: Yale University Press, 2004); Andrew C. Isenberg, *The Destruction of the Bison* (New York: Cambridge University Press, 2000); Joseph E. Taylor III, *Making Salmon: An Environmental History of the Northwest Fisheries Crisis* (Seattle: University of Washington Press, 1999).

¹⁸ Karen O’Neill, *Rivers by Design: State Power and the Origins of U.S. Flood Control* (Durham, NC: Duke University Press, 2006).

More difficult to understand is Carroll's claim that I do not engage with the work of Linda Nash on bodies and public health in the Central Valley. Not only do I cite her work in the very first footnote in the book, but, more substantively, in Chapter Two, "From Lands of Plenty to 'Waste Lands,'" I explicitly discuss settler perception of the disease environment and human bodies in the valley, citing the work of Nash, and Conevery Valencius as well, on this topic.¹⁹ I also discuss a range of early views toward irrigation, including the caution toward it advised by no less a figure than George Perkins Marsh. I considered the presentation of various nineteenth-century views toward irrigation and health not to be a digression, as Carroll perceives it, but rather as intrinsic to the discourse of bodies, disease, and environment.

On a related point, I'm not sure what Carroll means when he claims that I frame the story "as though nature can be viewed as separate from humanity." The entire book presumes that humans are a part of the natural world; this is no less true because the book discusses human choices about altering the environment. Perhaps I could have stated this more explicitly, but it did not seem necessary. Although there has indeed been much productive scholarly problematizing of the human/nature dualism, environmental historians have recognized for some time now that humans are not separate from the rest of the natural world, and that human-built environments are part of nature.²⁰

There are other problems that Carroll claims arise from the lack of theory. I'm not quite clear on how my approach to the environment is in any way ahistorical or, for that matter, how this supposedly ahistorical view is based on naïve realism, which he defines as historical actors seeing the world for how it really is and then doing the correct thing. Throughout the book, I stressed that motivations were rarely simplistic, were often conflicted, and resulted in compromises, some beneficial to wildlife, some harmful, a point which appears repeatedly in the reviewers' comments, Carroll's included. The waterfowl hunters of the Grasslands (in the San Joaquin Basin), for example, while ardently and successfully challenging the imminent destruction by the Central Valley Project of the private wetlands they had maintained for decades—and hence doing what they viewed as the correct thing—are also described as resisting (for a time) the creation of public refuges in their vicinity, in part because such protected spaces would diminish the hunting prospects on their own lands. Or perhaps Carroll is referring to my portrayal of the scientists who worked for the Fish and Wildlife Service and who—at tremendous costs to their careers—publicly revealed the death and destruction of waterfowl at Kesterson Reservoir, the result of the inflow of toxic subsurface agricultural

¹⁹ Linda Nash, *Inescapable Ecologies: A History of Environment, Disease, and Knowledge* (Berkeley and Los Angeles: University of California Press, 2006); Conevery Bolton Valencius, *The Health of the Country: How American Settlers Understood Themselves and Their Land* (New York: Basic Books, 2002).

²⁰ See, perhaps most notably, William Cronon, "The Trouble with Wilderness; or, Getting Back to the Wrong Nature," in *Uncommon Ground: Rethinking the Human Place in Nature*, ed. William Cronon (New York: W. W. Norton, 1996).

drainwater from a Bureau of Reclamation project (the San Luis Project, an extension of the Central Valley Project). These individual whistleblowers can well be described as valuing scientific fact above political considerations as they called attention to an environmental catastrophe. Carroll's critique leaves me wondering how it is possible to portray such highly qualified professionals as seeing things (the science, the political implications, etc.) as they really were, and then choosing to act on their beliefs of what is right, without running aground on charges of naïve realism.

As Carroll does not offer specific examples, it is also not clear how I grant environmental awareness to nineteenth-century actors who could not have possessed such awareness. When I do discuss such "environmental" actors as John Muir or Marsh, or, for that matter, those who possessed visions of transforming the Central Valley for diversified horticulture, such as John Bidwell, I quote directly from their writings and do not ascribe to them an environmental worldview that they themselves did not elucidate. Carroll seems to associate this supposed ahistorical problem with the fact that many environmental historians are participants in, or are at least sympathetic to, contemporary environmentalism. But it's not that simple, and his claim raises a larger issue. The question of environmental advocacy has been seriously debated in environmental history, most recently in a roundtable organized by Paul Sutter for *The Journal of American History*.²¹ Certainly not all practitioners of environmental history are environmentalists, and some contemporary histories that attempt to make environmental stories more complex and nuanced have been questioned for the lack of advocacy that they may foster. This particular debate is likely to be with us for a while, but the claim that having environmentalist leanings somehow leads scholars to ahistorical attributions of environmental sensibilities seems a bit reductionist.

The last of Carroll's points concerning theory that I will address revolves around changing perceptions of wetlands over time. Perhaps I should not have written sentences that included wording such as "...changes in how 'we' perceive wetlands..." By "we" I meant the preponderance of those in society who are involved in wetlands protection and restoration as well as those in the general public who support wetlands in some way. Clearly, not everyone shares these views, as Carroll correctly points out, but my point was that *enough* elements of society have adopted a more favorable view of wetlands such that change has been effected. But going beyond semantics, Carroll also is critical of what he sees as a lack of explanation for the changes in general perceptions of wetlands and for how such perceptions themselves drove historical change. Accounting precisely for attitudinal changes and then explaining directly how those changes translate into action is perhaps a historian's most difficult task. I make no claim to have done this perfectly, but I cannot agree that this book does not attempt such explanations; in fact, it offers several tangible causal explanations for both changing attitudes and changing policies. To cite just a few examples, in the "Wetlands Resurgent" chapter, I discuss

²¹ Paul Sutter, et al., "State of the Field: American Environmental History," *The Journal of American History* 100:1 (2013): 94-148.

how ecologists wrote a number of books during the 1950s and 1960s that specifically aimed to increase public awareness and appreciation of wetlands.²² I also discuss advances in the field of wetland ecology at this time, and how those advances included the beginnings of the quantification of nonmarket values of wetlands and thus built up a scientific basis for protecting them. I discuss how growing public and scientific support for wetlands then translated in national and international policy. From a different perspective, I discuss public and political backlash to environmental nightmares, such as that at Kesterson, and how that incident led directly to increased scientific funding, in government agencies and in universities across the country, to solve toxicity issues that were decimating wetlands.

Gardner directly addresses the issues of how society's growing appreciation of wetlands and the broad alliances that resulted from this sentiment translated into changes in public policy and practices. Drawing on his expertise in international environmental law, he discusses the importance of the Ramsar Convention, and how its focus has expanded from migratory waterfowl to wetland ecosystem services more broadly. The Convention is especially relevant for Central Valley wetlands because, as I note in the book, the Grasslands Ecological Area (in the San Joaquin Basin) is now designated as a "Wetland of International Importance" under Ramsar. Gardner also details the federal "no net loss" policy for wetlands, which, while it has not been entirely successful, has fostered the creation of wetland mitigation banks, themselves dependent on the regulatory framework that includes Section 404 of the Clean Water Act. He notes that the book does include these topics, but as the manuscript neared completion I was torn about how much detail to provide. In the end, I relegated much of this discussion to several lengthy expository footnotes, not because any of these topics are of minor importance, but rather because of the rapid flux in the regulatory framework itself, and hence in its implications and outcomes. As with any work of history that continues right up to the present, there is always a balancing act involved: how close to the current moment can one extend the narrative without undue risk that regulations and policies will quickly change, rendering that part of the text too quickly obsolete? From my research on Section 404, the recent Supreme Court decisions that have repeatedly reinterpreted its scope, and even from a Continuing Legal Education (CLE) course on it that I attended in Sacramento, it was clear that I was dealing with a rapidly shifting landscape.²³ But Gardner's commentary is valuable not only for calling attention to these policies—and conservation banking (for threatened and endangered species habitat) too—but also for his insights about how carbon markets may be poised to create new coalitions and further the recovery of Central Valley wetlands. As the

²² See Paul L. Errington, *Of Men and Marshes* (New York: Macmillan, 1957); William A. Niering, *The Life of the Marsh: The North American Wetlands* (New York: McGraw-Hill, Inc., 1966); John M. Teal and Mildred Teal, *Life and Death of the Salt Marsh* (Boston: Little, Brown, 1969).

²³ See, for example, *Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers*; 531 U.S. 159 (2001); *Rapanos v. United States*, 547 U.S. 715 (2006).

challenges of global climate change, which I discuss in the book's Epilogue, become ever more pressing, the politics and economics of carbon markets vis-à-vis wetland protection offer a terrific new avenue for research.

O'Gorman also raises an excellent question for further research as she asks about the consequences of managers and organizations privileging particular species. My book offers a number of inroads into this query. For example, it recounts how, although the first refuges in the Central Valley were concerned almost exclusively with waterfowl, refuge managers soon began to pay attention to other waterbirds and to raptors and riparian songbirds. The Central Valley Joint Venture, a public-private partnership formed to carry out the objectives of the North American Waterfowl Management Plan, expanded its original focus in a similar way. At the same time, concerns about endangered and threatened species have drawn greater attention to an increasing variety of species from non-avian taxa; refuge managers now also manage for mammals such as the San Joaquin kit fox and several species of kangaroo rat, reptiles such as the blunt-nosed leopard lizard and giant garter snake, and invertebrates such as the valley elderberry longhorn beetle, to name just a few. This expansion of species protections relates also to O'Gorman's point about changing naming practices. While the term "wetlands" came to replace a variety of earlier names for watery landscapes, the names of wetland refuges themselves evolved over the course of the twentieth century from "waterfowl refuges" to "wildlife refuges."

As humans occupy an ever greater percentage of the planet's habitat and consume an ever greater percentage of its resources, the question of which species we attempt to save—and for what reasons—becomes all the more pressing. In the United States, much of this debate has of course revolved around the goals and limitations of the Endangered Species Act, itself the subject of a recent roundtable, and is reflected in the global shift from conserving individual species to protecting entire ecosystems.²⁴ But even more broadly, there is the question of how to protect species the decline of which we do not yet fully understand, as in the case of amphibians, for example. O'Gorman's work on Australia's Murray-Darling Basin will hopefully yield further insight into these questions, as I trust will be the case for a number of scholars who will continue to investigate the conservation of global biodiversity.

I'll conclude by narrowing the focus back to wetlands and suggesting what I think is another very promising area for future research, that of comparative studies of wetland protection under different governmental regimes, and perhaps most interestingly in the context of comparative federalism. Numerous studies—mostly in political science—have examined the question of the relationship between federalism and environmental protection broadly, but little work has been

²⁴ See "Roundtable on Peter S. Alagona, *After the Grizzly: Endangered Species and the Politics of Place in California*," *H-Environment Roundtable Reviews*, Vol. 4, No. 4 (2014).

conducted in this context specifically about wetland protection.²⁵ Australia and the United States together provide a compelling example of such an opportunity, with their similar but far from identical federal systems. Significantly, both nations contain a wide variety of permanent and seasonal inland freshwater wetlands as well as coastal wetlands, ranging from tropical or subtropical to temperate, and both nations have experienced substantial wetland loss. Parallels between the two nations' ideologies about managing the environment date back to shared notions of horticulture, forestry, irrigation, and biological control developed during the second half of the nineteenth century.²⁶ Protection of public lands on a large scale in the United States and Australia dates to 1872 and 1879, respectively, with the creation of the world's first two national parks. But the two countries have moved at different paces concerning wetland management; the U.S. created the National Wildlife Refuge System in 1966, for example, but Australia did not develop a national system of protected lands that included wetlands until the National Reserve System was created in 1992.

In an essay written for the very recent Forum on "Climate Change and Environmental History" that Mark Carey and I organized for the journal *Environmental History*, I delved into questions of the relationship between the federal and state (and local and tribal) governments in the United States in terms of their abilities and limitations in protecting natural resources in the context of the American federal system.²⁷ In an Australian context, one might ask how have states—which historically have been less enthusiastic than the commonwealth government about environmental protection laws that might threaten development—responded to the shifting balance of power first from state domination over resources, then to expanding commonwealth control during the 1970s and 1980s, and finally to the current model of coordinate federalism, in which cooperative approaches appear more appropriate than conflicts over jurisdictional turf.²⁸ How has the internationalization of environmental issues (both in terms of binding international conventions and global concerns such as climate change) influenced the continuing evolution of the federal system? The various manifestations of federalism in Australia invite a critical comparison with the

²⁵ See Jeanne Nienaber Clarke and Daniel C. McCool, *Staking out the Terrain: Power and Performance among Natural Resource Agencies*, Second ed. (Albany: State University of New York Press, 1996); Barry G. Rabe, ed., *Greenhouse Governance: Addressing Climate Change in America* (Washington, D.C.: Brookings Institution Press, 2010); Edella C. Schlager, Kirsten H. Engel, and Sally Rider, eds., *Navigating Climate Change Policy: The Opportunities of Federalism* (Tucson: University of Arizona Press, 2011).

²⁶ Ian Tyrrell, *True Gardens of the Gods: Californian-Australian Environmental Reform, 1860–1930* (Berkeley and Los Angeles: University of California Press, 1999).

²⁷ Philip Garone, "Mission Convergence?: Climate Change and the Management of U.S. Public Lands," in Mark Carey, Philip Garone, et al., "Forum: Climate Change and Environmental History," *Environmental History* 19, no. 2 (2014): 281–364.

²⁸ Meredith A. Newman and Aynsley Kellow, "Environmental Policy and Administration in Australia," in *Handbook of Global Environmental Policy and Administration*, ed. Dennis L. Soden and Brent S. Steel (New York: Marcel Dekker, Inc., 1999).

evolution of multilevel governmental control over the environment in the United States. While I offer Australia as an example, clearly there is a nearly unlimited range of possibilities for these kinds of inquiries, about wetlands in particular and about natural resource management more generally.

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