From ‘dismal swamp’ to ‘smiling farms’: Socio-ecological change and making food in the Holland Marsh

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Abstract

In the early 1920s a three thousand hectare area of the Holland River lowlands, 60 kilometers north of Toronto, Ontario, was canalized, drained and transformed into fields. In the contemporary period, wetlands are places to protect – not dredge, drain and farm. Yet in the 1920s support for the conversion of the Holland Marsh was virtually unanimous. Indeed in 1920 *not* converting the wetland to farmland would have been considered reckless. The pages that follow excavate the complex social, political, biophysical, and cultural processes that account for this significant divergence in ideas about, and uses of, land. Through a chronological environmental history of the area, important historical conjunctures and constellations of institutions, ideologies and technologies responsible for driving landscape change and the production of nature in the Holland Marsh are highlighted.

Conceptually, I problematize the idea that the agricultural landscape is 'natural' by drawing on Neil Smith's (2008 [1984]) provocative production of nature thesis. I combine this with more traditional political economic and political ecological approaches to the study of food agriculture in order to elaborate and extend Smith's work. I demonstrate that the context of nature's production – the actors, institutions, locale, history and politics – both facilitate and impinge upon the production of nature.

Dedication

For Serena, Emry and Sue.

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Sue – You've been the best kind of distraction a dog can be.

Emry – When you arrived in our lives, you instantly made everything far more hectic, busy and chaotic. But also far more meaningful and manageable.

Serena – That's it. No more school. Literally couldn't have done it without you.

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1.0 Origin and introductory overview

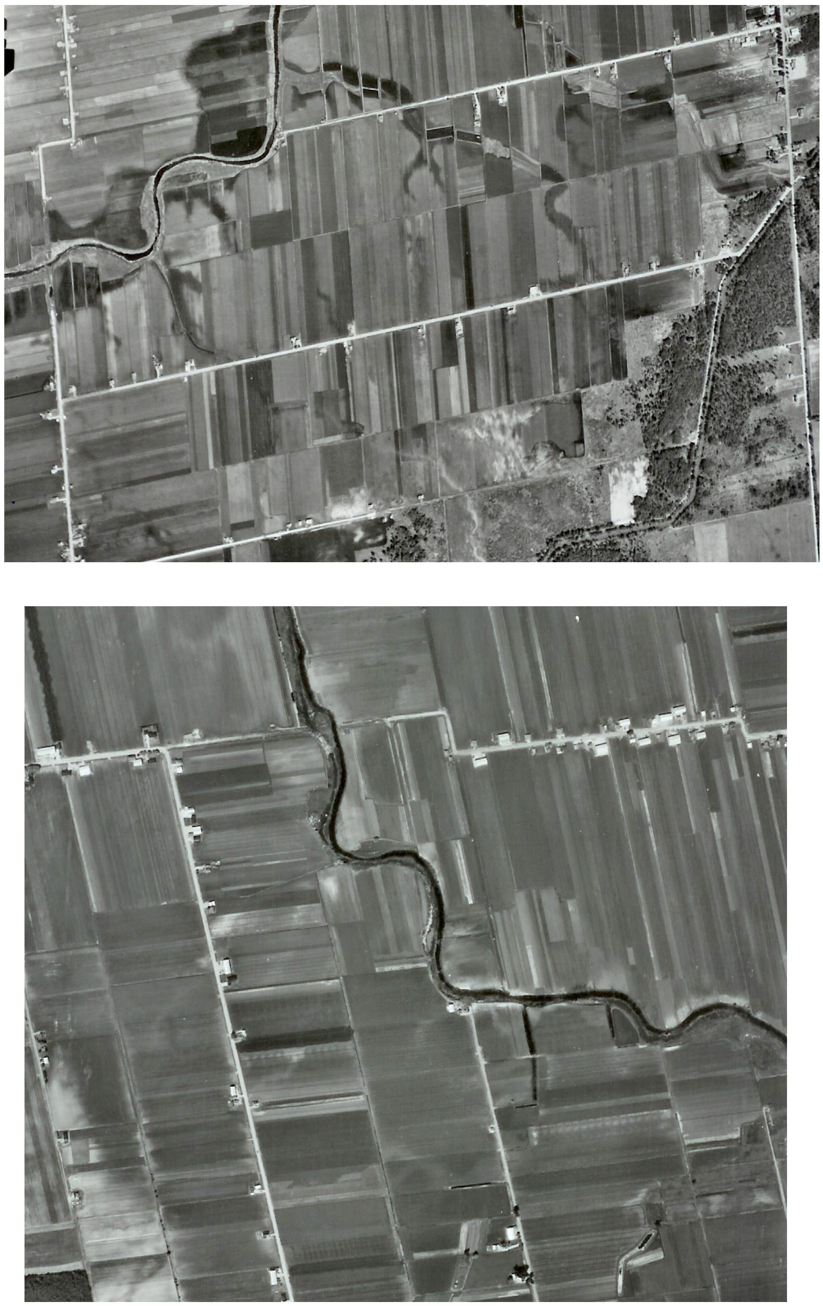

Figure 1. Orderly fields of the Holland Marsh. Images courtesy of the Holland Marsh Drainage Commission, no date.

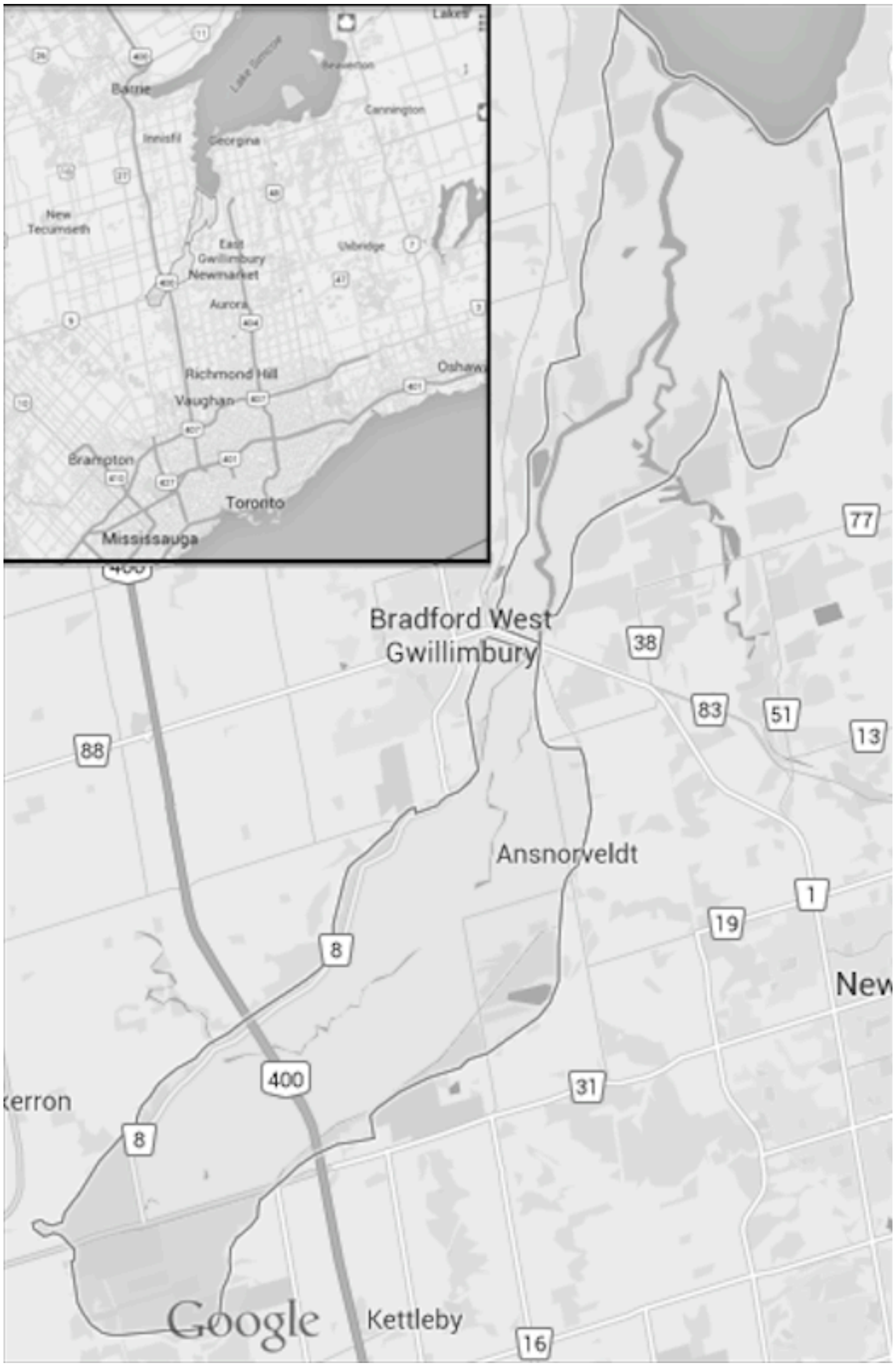

Figure 2. Map of the Holland Marsh. Created with Google Maps.

Like many kids who grew up in southern Ontario, I sometimes went north in the summer for family vacations. As we drove north along Highway 400, leaving Toronto behind us, I always looked forward to passing Canada's Wonderland. The theme park – a sprawling spectacle of games, bright lights and roller coasters in Vaughan, Ontario – always seemed like an urban capstone. It was a carnivalesque punctuation point to the urban agglomeration of Toronto and its ancillary suburbs. Beyond Canada's Wonderland was Canada's hinterland – a bucolic landscape of rolling hills, mighty forests and pristine lakes.

From Canada's Wonderland to the south canal of the Holland Marsh – a 3,000 hectare agricultural preserve – is about twenty kilometers, or roughly a ten-minute drive north on Highway 400. Despite the short distance, the two places could not be more different, or so I used to think. The low-lying, verdant fields of the Holland Marsh *are* a stunning aesthetic counterpoint to the towering infrastructure of the roller coasters. The twenty kilometers between the two seemed to me to be a transition zone – a liminal space between the city and *not* the city, between nature and society. The Holland Marsh, to me, was where society ended and nature started.

I have driven down the two-and-a-half kilometer stretch of Highway 400 that bisects the Marsh dozens of times over the years. However, until the first year of my doctoral studies I had never ventured more than a couple hundred meters into the Marsh, to shop at the Canal Road Farmers Market. I was keen, then, to join a day long tour of local food infrastructure, organized by FoodShare Toronto, a local food advocacy nonprofit, that included two planned stops in the Marsh – at a carrot processing plant and the Holland Marsh Wineries.

It was not long into the tour when I realized what I should have understood for years: the Holland Marsh is not the nature I imagined it to be. Crisscrossed with roads, teeming with tractors, and speckled with houses, barns, storage and packing facilities, and various other *unnatural* accoutrements, the Marsh was revealed to me as a bustling area of peri-urban agricultural production. The Marsh was not the sacred space where nature started, but instead was part of the 'consumption countryside' (Marsden, 1999) – a rural area, yes, but also somehow not *only* rural as a result of the ongoing agricultural activities. The tour also revealed that the Holland Marsh name is no coincidence – that previous to the mid-1920s, the fields we were standing in were covered in water, part of the Holland River wetlands. The abridged version of the transformation – elaborated on significantly throughout these pages – is that a canal was dug around the wetland, the water drained off, and a 3,000 hectare polder emerged for the production of 'market garden' crops, including carrots, onions and celery. This dissertation is animated, in part, by an ironic undercurrent of the tour that day: A bus load of environmentally minded food activists, students and teachers were, in one sense, celebrating the destruction of a large wetland.

Today, we think of wetlands as places to protect, not dredge, drain and farm, yet in the 1920s support for the conversion of the Holland Marsh was nearly unanimous. Indeed in 1920 *not* converting the wetland to farmland would have been unthinkable. But what accounts for this significant divergence in perspectives regarding peri-urban land use? How do we make sense of the vastly different ways in which this landscape has been understood, utilized and manipulated over time? What collection of forces are responsible for driving both the material change of the landscape, as well as socio-cultural normative conceptions of how landscapes and 'nature' ought to be used? And most importantly, what role have food and agriculture played in the transformation of the Holland River lowlands?

As I demonstrate in the pages to follow, exploring the transformation of the Holland Marsh reveals a significant, and heretofore largely overlooked piece of Ontario's agricultural history. On one level, the following pages provide an account of the rise, and (potential) demise, of intensive agricultural production in the Holland Marsh – an important story which has not yet been told. We neglect agricultural histories at our own peril – the countless untold stories of different agricultures (in plural) across the province hold important insights for feeding a growing population in more just and sustainable ways. Providing an account of one such history thus stands as a central feature of the pages to follow.

Importantly, I argue that there was nothing inevitable about the about the emergence of the Marsh as a site of agricultural production. Rather, the initial transformation, and the ongoing presence of farming in the area is the result of specific and historically contingent, social, natural and political configurations. Capitalist agriculture – in its various iterations – has propelled agriculture and landscape change in the Holland Marsh. However as I attempt to emphasize throughout, this is not to suggest that a one dimensional, instrumental pursuit of profit alone animates the process of change in the Marsh. Instead I point to ways in which culture and history, technology and faith have also sculpted the fields.

Emphasizing that food and agriculture in the Holland Marsh are distinctly – however partially – *capitalist* in character puts a fine point on one of the main foci of this dissertation. While I spend a great deal of time discussing the specifics of food and agriculture in the Holland Marsh, I do so at times in an illustrative register, as a way of bringing into focus the intermingling of industrial agriculture, commercial food, and ecological transformation. The Marsh serves in this respect as an exemplar of, but importantly at times a foil to, much of the recent literature concerned with the state of the contemporary agro-food complex. For over a century critical agricultural scholars have questioned the extent to which agriculture is capitalist (Akram-Lodhi & Kay, 2010, 2010a; Brenner, 1976, 1982; Kautsky, 1988[1899]). While no clear consensus has emerged in seeking to determine the degree to which this is actually the case, scholars have convincingly demonstrated that agriculture is significantly shaped by the constraints and opportunities to capital in the ongoing process of capital's attempt to fully rationalize agriculture (see for example Mann, 1980; Mann & Dickinson, 1978; Kloppenburg, 2004). Exploring how capitalism has shaped the fields and farming in the Holland Marsh, and untangling the implications, contribute texture and specificity to debates about the relationship between agriculture and capitalism.

I argue throughout that the complex dynamics of nature's production are at the centre of the introduction and continued presence of agriculture in the Holland Marsh. I draw on the insights of Neil Smith (2008 [1984]) and others to demonstrate that the fields of the Holland Marsh are, in part, an expression of an ideology of nature. The material changes within the Holland Marsh have been enabled within a broader context of state regulation and planning which have shifted over time to privilege particular kinds of 'nature'. As the tour revealed to me, the Holland Marsh landscape, despite resembling what we typically conceive of as 'natural', has been built in much the same way Canada's

Wonderland was built. In the pages that follow I excavate the complex social, political, biophysical, ecological and cultural process involved in the social and material transformation of the Holland Marsh. Through a chronological telling of this story, I attempt to highlight important historical conjunctures and constellations of institutions, ideologies, and technologies responsible for driving landscape change and the production of nature in the Holland Marsh.

While I consider this dissertation to be an examination of the myriad processes involved in the production of ‘local’ food, I attempt to reveal that the food grown in the Holland Marsh is constituted by, but also more than simply, its locality – my way of avoiding the local trap, as Born and Purcell (2006) put it (see also Purcell, 2006). My aim is to uncover the vast tangle of social and natural relations that adhere in the carrots, onions and celery stalks grown in the Marsh, and which go far beyond the specific location where they were grown. When I buy a carrot from the Holland Marsh, it is so much more than just a local carrot grown 60 kilometers away. An almost unimaginable complexity of history, multi-jurisdictional policies and protocols, international trade agreements, and global trends in the political economy of agriculture, complicate, enable and ultimately co-produce the carrots and other crops of the Holland Marsh.

At the same time, however, the Holland Marsh as a *place* matters on at least two fronts. First, the specific physical materialities of place – the organic/muck soil[1], climatic conditions, weather patterns, hydrological cycle, and geological features – have all impacted the character of agricultural production in the Marsh. It is true that agriculture is endlessly entangled with scale-jumping policies and processes, and funneled through the logic of capitalism that makes equivalencies out of carrots from China, California and the

Marsh. Yet the biophysical materialities of the Holland Marsh matter profoundly to the production of Holland Marsh food and agriculture and differentiate it substantially from other areas of agricultural production.

Second, there is a collection of *social* materialities attached to the physical landscape of the Holland Marsh. Here I mean to signal the constellation of institutions, practices, property rights, and the like that have similarly been instrumental in shaping the Holland Marsh, and that are unique to it. As I discuss in greater detail below, place matters profoundly to the continual reproduction of the Holland Marsh landscape, and the agricultural activity therein. Place dominantly persists, even within the radically homogenizing milieu of contemporary industrialized agriculture, in part, due to the unique social and physical materialities of the Marsh.

Bringing place into focus is more than simply a stylistic choice. Instead, situated within the broader context of Canadian scholarship concerned with food and agriculture, teasing out the specificity of place becomes a conceptual and methodological intervention. Owing in part to the intellectual force of the paragons behind the staples thesis, much of the social scientific scholarship related to agriculture in Canada has tended to focus on macroeconomic trends, countrywide aggregate data, and commodity or sector-specific analysis (see, for example Innis, 1970 [1930]; Mackintosh, 1923). This rich body of work is invaluable, yet its shadow is long, and it has sculpted the trajectory of Canadian food and agriculture studies for decades (Lewis & Urquhart, 1997; McInnis, 1984; Russell, 2012.) Recently, however, the study of Canadian agriculture has benefited from a more particularistic, place-based approach (Cook, 2009; Duncan, 2011). Within this work, rather than forming the centre of analysis, macro-trends constitute the backdrop upon which equally compelling and important histories of agriculture, food and culture play out (Lacovetta, Korniek, & Epp, 2012). My study of the Holland Marsh is similarly positioned: I recognize and attend to structural, global and national trends in farming, biotechnology, and the like, but always in terms of how these trends impact and/or are impacted by the goings-on within the Marsh. My aspiration is not to gaze into the muck soil fields of the Holland Marsh from the outside, but rather to stand in them, looking out at the world beyond.

It is this conjuncture of ‘nature’, agriculture, food, locality and history, all broadly defined, that I elaborate on in the following pages. I seek, in short, to transcend the reification and fetishization of food as mere “things”. The Marsh, looked at in this way is a crucible of sorts, irreducible to simply a provider of local food, but instead a complex amalgam of history and materiality, culture and nature, at once social and biophysical, global and local. I appreciate that this casts a wide net, and defies simpler approaches to understanding and addressing the complexities of industrialized food and agriculture. I also appreciate that an intensive examination of one more-or-less geographically bounded area of agricultural production might be critiqued as too insular to have any broader appeal or relevance. However, what I hope to demonstrate throughout this dissertation is that coming to terms with eating for a more just and sustainable future requires understanding the complex social, natural, political and cultural histories of the places our food comes from.

1.1 The Holland Marsh: A brief introduction

Traveling northward from the City of Toronto, the northern slopes of the Oak Ridges Moraine highlands give way to a gentle descent to the fields of the Holland Marsh. Within the span of the southern canal – roughly 15 meters across – a variable landscape of cultivated fields, grasslands, exposed rock outcroppings, and treed hillsides cedes to uniform fields of lush green vegetables (from late spring to late fall) or rich black soil (from late fall to early spring). At the far east end of the main polder, or “Big Scheme” as it is colloquially known, and just the other side of Yonge Street, the “Little Scheme” is similarly sequestered from its surroundings by the canal system. Continuing north along the Holland River toward Cooks Bay on Lake Simcoe, the landscape – still technically the Holland Marsh – resembles more closely the scenery conjured by the image of a ‘marsh’. Marsh grasses, reeds, and small conifer shrubs populate both land and water, blurring the boundary between the two as if in a Group of Seven painting. Just before the Holland River empties into Cooks Bay, destined for Lake Simcoe immediately beyond, it is once again dammed, canalized, pumped and diverted around a final small agricultural area known as Keswick Marsh.

Figure 3. Manicured landscape - the images show the stark difference in manicured fields of the Holland Marsh versus the land beyond. Photo courtesy of the Holland Marsh Drainage Commission, August 20, 1997.

Figure 4. Highway bisect - Highway 400 is seen cutting through the width of the Holland Marsh. Photo courtesy of the Holland Marsh Drainage Commission, August 20, 1997.

In all, the Holland Marsh is a 7,400 hectare (roughly 18,200 acre) mixed-use wetland, 60 percent of which is drained agricultural land, and 40 percent of which has been preserved as marshland (Planscape, 2009). The cultivated land (roughly 3,000 hectares / 7,200 acres) supports 125 farms, producing many millions of dollars in annual revenue (Bartram, Swail & Mausberg, 2007, 1). While no definitive values exist, Planscape (2009, ii), a private planning firm specializing in rural and agricultural planning, notes that Statistics Canada estimated the value of vegetable production in the Marsh to be worth $29 million per year in 2006. The growers of the Marsh, meanwhile, estimated the annual value at $52 million per year (Planscape, 2009, ii). When these two estimates are averaged out, the net per-hectare revenue (in 2006) was $785, almost 3 times higher than the provincial average. Gross farm receipts were $7130 per hectare in the Marsh, 3.7 times higher than the provincial average (Planscape, 2009, ii). This makes the farmland in the Holland Marsh some of the most profitable in all of North America.

In contrast to the cash cropping of southern Ontario, where soybeans, corn and wheat prevail, the Marsh's more valuable crop base includes what are known as horticultural crops or market garden vegetables. While the soil can support a wide diversity of crops, the pressure to be pragmatic within an age of capitalist agriculture has resulted in a highly homogenous crop base. Combined, onion and carrot production account for 70.9 percent of the annual output in the Marsh (see figure 4). Other crops, including celery (7.3 percent), mixed greens (7.3 percent), 'Chinese vegetables' (2.7 percent) and potatoes (0.7 percent) are far less common in the area (Planscape 2009, ii). How, and why, the crop base has changed over time is discussed in greater detail in Chapter 4.

Percentage of area by crop type grown in the Holland Marsh, 2006

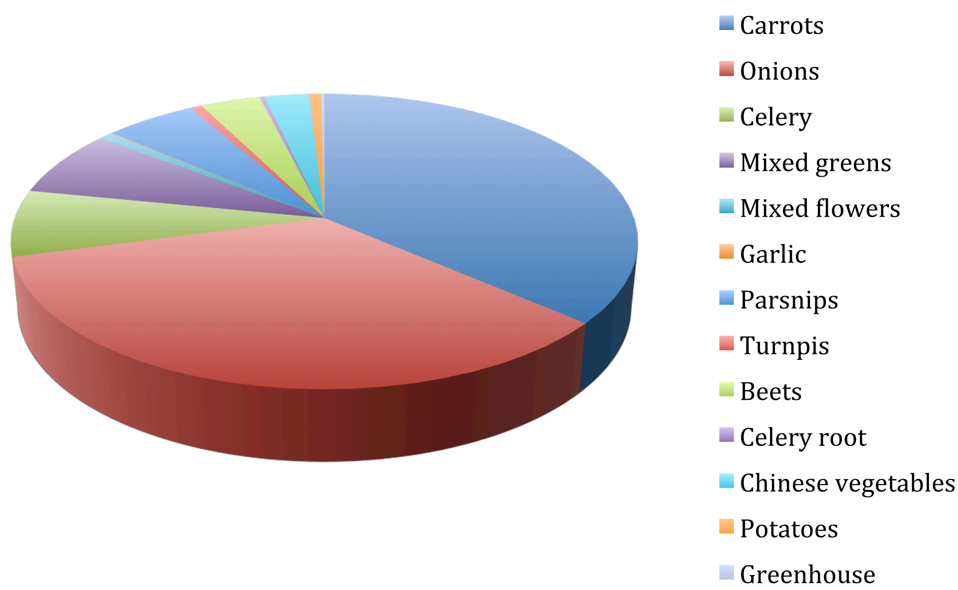

Figure 5. The crop base in the Holland Marsh - heavily specialized toward carrots and onions. Data from Planscape, 2009, p. ii.

1.2 From dismal swamp to smiling (capitalist) farms

From the start of my research, I have been flummoxed by a simple semantic riddle – how, and why, did a marsh become The Marsh? To elaborate slightly, how did a remote and reviled landscape become a fixture in the culinary imaginations of people from Toronto, across Ontario, and indeed around the world, as well as one of the most profitable per-hectare agricultural landscapes in all of North America? To borrow language from a 1925 headline in *The Globe* about the area, what happened to transform a "dismal swamp" into "smiling farms"? (*The Globe,* 1925, 2). The most basic answer, of course, is that agriculture happened. As discussed in the pages to follow, the transformation from wetland to farmland is measured in decades. Shockingly, so too is the likely life span of agriculture in the area.

Previous to becoming the agricultural juggernaut it is today, the Holland Marsh was indeed pejoratively referred to as a "dismal swamp" (*The Globe,* 1925, 2), as well as dismissed as "a mere ditch swarming with bullfrogs and water snakes" (Galt as cited in The Bradford West Gwillimbury Local History Association, 2005, 282). The first Surveyor General of Canada (and the namesake of many features in the area) Major Samuel Holland, similarly scorned the area. Elizabeth Simcoe, wife of the first Lieutenant Governor of Upper Canada wrote dismissively in her diary that the Holland Marsh was "a terrible bog of liquid mud" (Simcoe, quoted in Giblett, 2014, 157). Of course, the colonial gaze of the early settlers like Galt, Holland and Simcoe obscured the fact that Huron and Mohawk communities had been using the wetland as an important source of food for centuries (Cilipka, 2004, 18-24). To put it simply, the marsh ecology had yet to become legible as a productive agricultural landscape to the newcomers. The fish, frogs, wild rice, berries and other edibles within the wetland, while abundant, were far from what the growing European settler population understood to be food. To use the language of food philosopher Michael Carolan (2011), the early colonial settlers of the Holland Marsh valley did not have palates "tuned" to the provisions of the area. As it turns out, a subsequent generation of agriculturalists in the area tuned the landscape to their palates, instead of the other way around.

While initial talk of draining the marsh emerged as early as 1919, the uncooperative land did not yield a crop until 1925. And even then, it was only a few thousand dollars' worth of carrots and onions. The process of taming the land – at its most basic, building a 27 kilometer canal system and ancillary drainage infrastructure to drain the low laying area surrounding the Holland River – brought the early Marsh boosters in direct confrontation with the limits and challenges of nature. At the same time, resource shortages in terms of capital and labour, as a result of international priorities lying elsewhere during the war years meant that the Marsh would not emerge as a truly productive agricultural landscape until well into the 1950s. From the 1950s onward, production processes became increasingly routinized and the yields increasingly specialized. As farming in the Marsh was bent to the tendencies of an emerging corporate and global food regime (see Friedmann & McMichael, 1989; McMichael, 2009).

However, this does not mean that the project of transforming the dismal swamp is, or ever will be complete, *per se.* Throughout my time researching, thinking about and writing about the Holland Marsh, I have oscillated between commitments to two relatively well-known narrative structures (particularly within the field of environmental history) – the progressive and declensionist story arcs. On the one hand, the story of the Holland Marsh can be framed as the heroic pursuit of women and men, aided by ingenuity, hard work, technology and supportive legislation to convert a wasted wetland into productive, profitable farm land. This is the quintessentially modernist interpretation – the triumph of humans over an external, objective nature. On the other hand, I have at times been tempted to script the narrative as one in which the *hubris* and arrogance of humans have reduced a once-dynamic marshland, and an essential provider of ecosystem services to an entire watershed, into a polluted, poisoned, and homogeneous industrial agricultural landscape. Cronon (1992, 1370) succinctly summarizes these two familiar narrative structures; “if the tale is of progress, then the closing landscape is a garden; if the tale is of decline, the closing landscape is a wasteland”.

The progressive and declensionist story arcs, while not without merit, are ultimately too rigid to encapsulate the story of agriculture in the Holland Marsh (or very many other cases, as Cronon points out). The initial trend in environmental history was to take a declensionist tack, largely as a political maneuver motivated out of concern for what is a patently ailing global ecology. More recently, environmental historians have been focusing less on marking the trajectory between an ostensible starting and ending point, and more on the complex processes of ongoing change that exists in any human-environment dynamic (for recent stellar examples, see Bonnell, 2014; Loo & Stanley, 2011; MacFarlane, 2014; Steinberg, 2009). Ironically, more conventional environmental history, despite the best of intentions, may have undersold the role of ‘nature’ – and here I use the term to denote external, biophysical characteristics – by positioning it as a passive, malleable, acted-upon substance. But as some environmental historians have pointed out, environmental history is more than simply decentering humans from the past – it also means affording some autonomy to nature (Kheraj, 2014; Loo & Stanley, 2011; Langston, 2014). I am not keen to wade into debates about the degree of autonomy nature possesses, or even if autonomy is the right noun to use, but only mean to point out that nature in the Marsh (or more accurately, socionatures, as discussed below) has been as central a force in the making of Holland Marsh agriculture as humans have.

But of course the landscape would have never been transformed into what it is today were it not for the compulsion to grow food. As mentioned above, this dissertation offers an account of the rise and (potential) fall of food production in the Holland Marsh.

However, this is slightly misleading. Food, as I pointed out above, has always existed in the Holland Marsh, and by a sufficiently lenient definition, likely always will. However, what may be a more accurate characterization is that this dissertation is about the rise and fall of a distinctly capitalist kind of food production (and food) in the Holland Marsh. I speculate here a bit, though it is speculation backed up by considerable evidence discussed throughout this dissertation, but the current iteration of food production in the Marsh seems very likely to be a century long, or so, event. Indeed, already the agro-industrial formation is changing in the Marsh, as farmers adapt to the changing soil profile by growing less profitable mineral soil crops, and in some cases, building green houses on what was just years before highly productive muck soil. To be clear, the majority of the fields in the Holland Marsh are still currently covered in the coveted muck soil. However, as a result of interconnected socionatural processes, the muck soil has already disappeared in some places, and will eventually vanish altogether. Not surprisingly, grumblings have emerged amongst Marsh farmers, quietly questioning why land that was farmed up until the mid-1960s, then purchased by the Lake Simcoe Conservation Authority and converted back into 'natural' wetland, should not be brought back onto the market as farm land. This not only foreshadows conflicts to come, but also hints at the ultimate malleability of biophysical nature as refracted through capitalist production.

I also look to scholarship focused (largely) on the American mid-west detailing the historical intersection of food, economy, state, landscape change and hydrology in that part of the world. Foundational work by Donald Worster (1979, 1985) and Jeff Fiege (1999) are important influences to my understanding of the Holland Marsh as something more than ‘natural’, pastoral fields. Richard White’s (1996) work, especially his organic machine metaphor – invoked to describe the manifold social and natural processes involved in re-making the Columbia River, as well as to describe the resulting socionatural amalgam – has little to do with agriculture *per se*, yet nonetheless remains influential to the pages to follow. The work of these environmental historians has helped me to understand, through an exploration of the past, that the Holland Marsh is as much an ongoing construction and maintenance project as it is an area of agricultural production – it is a fundamentally built environment. The 27-kilometer main canal system, various pumping stations, and vast network of drainage infrastructure are not incidental to the production of food in the Marsh, but rather inseparable from it. This material reality of the Marsh has been discursively mobilized differently over life span of agriculture in the Marsh. As will be discussed in subsequent chapters, at times the imperatives of capitalist food production have compelled Marsh farmers and boosters to highlight the built, high modernist and technological aspects of Marsh production and food, while at other times, these elements have been downplayed in favour of framing the Marsh as ‘natural’, rural and pristine.

Thematically, I situate my work as an endeavor of political ecology (Heynen et al, 2006), which draws heavily on the cognate traditions of environmental history (Andrews, 2008; Cronon, 1991) and historical geographical materialism (Harvey, 1996). Though distinct fields, the commonality for my purposes between these three traditions of broadly political economic inquiry is that they each provide the means of identifying the social power inherent in the production of landscapes and agri(culture). So-called commonsense explanations of both the making and defining of agricultural ‘problems‘

themselves constitute what Robbins (2004) has labeled ‘apolitical ecologies’. In contrast to this, political ecological approaches subscribe to the idea that “social, cultural, and political-economic relations profoundly affect both the materiality of the biophysical world and our understanding of it” (Guthman, 2011, 9).

Exploring the dynamics of agriculture in the Holland Marsh utilizing the tools of political ecology is a means of moving beyond ‘problem closure’ (Hajer, 1995). Problem closure results when commonly accepted definitions of problems (for example, soil erosion, flooding, etc.) are insufficiently scrutinized and thus preclude alternative framings and interpretations of the problems themselves (Guthman, 2011, 15). My methodological approach repositions ‘problems‘ in the Holland Marsh away from self-evident issues in need of resolution into specific historical, material and geographical phenomena, which are themselves ripe for scrutiny and exploration. As Guthman (2011, 16) puts it, political ecology, as a methodological approach, is so powerful precisely because it is meant to “illuminate problems in new and meaningful ways”.

Following in the tradition of anthropologically-inflected food studies (Barndt, 2008; Mintz, 1986; West, 2012) political ecologists have also begun to take seriously the food-specific dynamics of meaning making and links between production and consumption (Heynen, 2008). This work reveals that the discursive construction of normative consumption commitments is buttressed by a substantial political economy of food advertising. However, as Soluri (2005) has pointed out, shifts in the meaning of food also reflect broader changes in cultural values. While ‘fast’ and ‘convenience’ foods reflected the consumptive values of the post-war era, more recent tropes such as ‘local‘ and ‘organic‘ reflect (an ostensible) cultural reaction against industrialized food.

The Holland Marsh has been wrapped up in these broader patterns in the cultural economy of food, though importantly, the farmers, processors and boosters of Holland Marsh agriculture have filtered these macro-processes through their own histories, cultures and positionalities. Political ecological approaches bring these cultural dynamics into view and guide my work in building a rich account of the multiplicity of processes, the role of meaning-making, and the embedded histories of people involved in agriculture in the Holland Marsh.

While political ecological methodologies excel at identifying the power dynamics in the production of landscapes and circulation of related goods and capital, until recently they have been less attuned to understanding the undercurrents of knowledge, information and expertise legitimizing landscape transformation in the first place (Goldman & Turner, 2010, 10). Agriculture in the Holland Marsh is in the very first instance at least partly a product of applied agricultural research, pedology (the study of soil) and hydrological theory. It has continued to be heavily shaped by the production, circulation and implementation of scientific 'knowledge' – most notably emanating from the University of Guelph, the provincial government, and other sources of 'expertise' in and around the GTA. Given the strong current of science and technology, and knowledge production, circulation and application running through the history of the Holland Marsh, I also draw on a body of broadly political ecological scholarship that foregrounds specifically the role of science, and scientific 'experts', institutions and power in the production of nature (Bocking, 2004; Forsyth, 2009; Goldman, Nadasdy, & Turner, 2010).

1.3 Capitalist nature and the production of capitalist agriculture

While this dissertation draws on environmental history scholars stylistically and political ecology scholars thematically, I look to a broadly defined body of critical geography scholarship dedicated to investigating the dynamics of capitalist nature in order to sharpen my focus (see Castree, 1995, 2000; O'Connor, 1993; Prudham, 2005; Smith, 1984 [2008]). Emphasizing the specificity of the kinds of biophysical nature transformed in the Marsh reveals that accounts of the broad structural and historical trajectory of capitalist agriculture constitute perhaps a too-blunt approach to untangling agriculture's inherent dynamics (for a similar argument, see Goodman & Watts, 1994). Agriculture in the Holland Marsh is in part a result of the post-war global industrial food regime. At the same time, there are important lessons to be learned from exploring the specific processes by which the area became enlisted in global agriculture and by investigating points of disjuncture between global agriculture and agriculture in the Marsh. I argue that looking at the specificity of nature in the area – or more accurately the socionatural imbroglios that have resulted from the collision of global agro-industrial forces and local particularities – reveals insights into the complex interplay between agriculture, food, history and capitalism.

One of the insights I make in the pages to follow is that the temporality of capitalism in the Holland Marsh unfolds through both secular and cyclical trends in the broader fluctuations of world capitalism. Wallerstein (1995, 2000) argues that the *longue dureé* of modern world capitalism (starting in about 1450) is propelled by both cyclical processes (Kondratieff[2] waves, the rise and demise of global hegemons, cycles of warfare,) and secular trends (concentration of capital into a smaller number of larger firms, intensified commodification, internationalization of political structures, etc.)(see Chase-Dunn, 1999, 190). In the Marsh, secular trends including deepening industrialization, techno-scientific control and commodification of biophysical nature, operate through and accentuate the impact of broader patters of global historical food regimes (Friedmann and McMichael, 1989). Capitalist agriculture and the production of nature in the Holland Marsh have, in other words, been shaped by both broader cycles of world capitalism as well as idiosyncratic secular trends.

I endeavor to elaborate a variegated account of the contingent history of Holland Marsh agriculture through an engagement with Neil Smith's (1984 [2008]) provocative production of nature thesis. I do this through an excavation of the historical relations and processes which initially led to the introduction of agriculture, and have resulted in agriculture's ongoing prominence in the Marsh. To be clear, I am not embarking on a principally theoretical piece of scholarship, at a level of high abstraction, with the intention of developing a sustained critique of Smith's (2008 [1984]) seminal production of nature thesis. Instead, I aim to provide an historical empirical case from which insight will be drawn to complement the rich tapestry of scholarship concerned with the production of nature, as part of my broader effort to exhume the history of agriculture in the Marsh. As preeminent Marxist scholars have pointed out, if the political potential of Smith's seminal work is to be fully realized, we need a multiplicity of "contextualized analyses of capital-nature relations in particular times and places" (Castree, 2000, 31; See also Harvey, 1996).

That said, Smith's work has not been unassailable, and in the pages that follow I focus on a number of conceptual aspects of Smith's work which critics have signaled as wanting (see Castree 1995, 2000; O'Connor, 1988). I first outline his formative production of nature thesis.

1.3.1 Nature, society and the production of nature

Referring to it as a "shibboleth of the high capitalist period" Smith argues that few assumptions will look so "wrong-headed or so globally destructive" as the 'commonsensical' separation of nature and society (Smith, 2008 [1984], xi). He continues:

> What jars us so much about the idea of the production of nature is that it defies the conventional, sacrosanct separation of nature and society, and it does so with such abandon and without shame. We are used to conceiving of nature as external to society, pristine and pre-human, or else a grand universal in which human beings are but small cogs. But…our concepts have not caught up with reality. It is capitalism which ardently defies the inherited separation of nature and society, and with pride, rather than shame (2008 [1984], xiv).

Smith forwards the production of nature thesis, in part, through an analytic distinction between first and second nature (although he argues that, under capitalism, this distinction has effectively dissolved). Previous to the spread of capitalism, Smith (2008[1984]) argues, first nature could be described as what is typically thought of when the word 'nature' is invoked – a tree, a carrot, or a mountaintop. Second nature, on the other hand, is made from first nature – tables, carrot juice, paintings, and the like. As Smith (2008 [1984], 65) puts it, "Second nature is produced out of first nature".

Under capitalism, however, this distinction between the two fades away within the self-expanding logic of capitalism, because no first nature is left unaltered as "capital stalks the earth in search of material resources" (Smith, 2008 [1984], 71). In other words, Smith argues that either through direct manipulation (turning a tree into lumber) or indirect impact (melting polar ice caps), no area on earth has been left unchanged as a result of human activity. Within this context, the difference between first and second nature "ceases to have real meaning…[because] human beings have produced whatever nature became accessible to them" (Smith, 2008 [1984], 78-81). He continues, (2008 [1984], 81),

> Where nature does survive pristine, miles below the surface of the earth or light years beyond it, it does so only because as yet it is inaccessible. If we must, we can let this inaccessible nature support our notions of nature as Edenic, but this is always an ideal, abstract nature of the imagination, one that we will never know in reality.

For Smith (2008[1984]), first nature under capitalism exists only as use-values. That is, first nature is simply the material 'stuff' of the external world that is appropriated for human use and exploitation. As Castree (2000, 26) puts it, first nature becomes internal to the very logic of capitalism, and through this internalization the realm of use value "becomes embroiled in the logic of exchange value on the world market". Within this context, second nature becomes merely an abstraction of nature as capitalist exchange value. Commodities are both first nature (the physical material substance) and second nature (the capitalist social relations propelling the process) at the same time. Smith (2008[1984], 79) explains,

> The same piece of matter exists simultaneously in both natures; as physical commodity subject to the laws of gravity and physics it exists in the first nature, but as exchange-value subject to the laws of the market, it travels in the second nature. Human labor produces the first nature, human relations produce the second.

The distinction between first and second nature is an illustrative analytic entrée into understanding Smith's production of nature thesis. As a way of elaborating Smith's work further, as well as remedying the casualness with which I have so far deployed the terms 'nature' and 'society', I turn to the work of other critical geographers, including Noel Castree, Erik Swyngedouw, Maria Kaika, and others.

Castree (2001), elaborating on Smith (1984[2008]) provides a useful typology for highlighting the complexity of the terms, as well as giving us language useful for overcoming a stale nature-society dualism. Castree (2001) proposes three dominant ways in which the reified nature-society dichotomy can be understood, while cautioning that these are not mutually exclusive categories, but rather overlap and intersect. The first of these is the notion of an external nature. The central thrust of this idea is that nature is god-given and pristine, existing outside of, or prior to society (pre-capitalist first nature). The second category is intrinsic nature, or the notion of the existence of essential or inherent qualities. Here, nature, including 'human nature', is understood as fixed and defined by one or more 'natural' attributes. Thirdly, Castree (2001) identifies the notion of universal nature, in which 'natural' conditions (whether of the 'natural' or 'human' realm) are assumed to be general, rather than particular. There is also a sub-clause to this notion, one that posits that a universalized nature encompasses “everything there is” (7), including humans, in a unified, global ecological system. Each of these conceptions of the nature-society relationship, according to Castree (2001), is inadequate because each trades on and reinforces the idea that nature and society are discrete entities. Kaika and Swyngedouw (2011), focusing here specifically on the discursive construction of the nature-society dualism, categorize it in a slightly different way. They argue that, particularly as it relates to policy and political decisions regarding the ‘environment’, two opposed views have emerged. On the one hand, and similar to Castree’s (2001) description of an external nature, Kaika and Swyngedouw (2011, 101) identify a nature-as-pristine view, as “vulnerable victim, or derailed, and therefore in need of saving or protecting”. At the other end of the spectrum, they identify “The end of nature” discourse, which they argue, “questions the notion of a lost and originally pristine nature…[and]…recognizes the irredeemable socialization of nature” (101-102). In either case, Kaika and Swyngedouw (2011, 102) argue that these “imagined, scripted, and symbolically charged ‘natures’” are always inadequate because they fail to take into account actually existing natures which are “complex, chaotic, often unpredictable, contingent, historically and geographically variable, and risky” (Kaika & Swyngedouw, 2011, 102)

That dominant understandings of nature and society tend to reinforce, rather than dissolve the discursive and material boundaries between the two is unsurprising. Just as Gandy (2002), Kaika (2005) and Swyngedouw (1997) argue that the separation of nature was implicit to modernism, early capitalism and various forms of technocratic and administrative rule, Smith (2008 [1984], 11) argues that the continued conceptual separation of nature and society is attributable to the ongoing dominance of industrial (and postindustrial) capitalism. He argues that an *ideology* of nature, mobilized through what he labels scientific and poetic 'modes of experiencing nature', and buttressed by the logic of capital, has meant the ongoing maintenance of a conceptualization of nature which continually remains conducive to reproducing the contemporary mode of production (Smith, 2008 [1984], 11).

Critical geographers, in particular, have elaborated on ways to transcend dichotomous and rigid conceptions of nature and society. As Castree (2001, 10) puts it, "To grasp nature's social character…to see how, in both thought and practice, the natural and the social melt into one another". Castree (2001) offers three specific ways upon which the claim that nature is social can be substantiated. First, he points to the work critical geographers have done to demonstrate that knowledge of nature is always inflected with the subjectivity of the knower/s. This both calls into question the possibility of an 'objective' nature and hints at the ways in which nature can be thought of as irrevocably social. In an early and noteworthy essay, Harvey (1974) took on a neo-Malthusian establishment in arguing that global resource 'shortages' were in fact nothing more than the uneven distribution of natural resources, the flow of which was largely determined by western nations. This critique called into question assumptions about over-population and its relationship to starvation, resource degradation and the like. In other words, Harvey exposed neo-Malthusian arguments to be fundamentally ideological and premised on a particular (and powerful) conception of nature. Others (see Anderson, 2001; Gregory, 2001; Moeckli & Braun, 2001) have moved the critique of 'knowing' nature beyond its ideological implications, and instead focus on the discursive work mobilized towards privileged knowledge(s) of nature. This critique demonstrates the ways in which power, articulated through ways of knowing about nature, is activated within gendered, racialized and colonialised knowledges (Castree, 2011, 12).

However, nature is clearly constituted by more than particular kinds of knowledge. To argue otherwise would be to deny the undeniable physicality of nature—the material aspect of biophysical nature. The second observation made by critical geographers, as outlined by Castree (2001), is that nature is also always material, but crucially, this materiality is socially mediated and contingent. As Heynen *et al.,* (2006, 6) have pointed out, gravity and photosynthesis are obviously not socially produced, but their power is socially mobilized in ways that tend to reproduce conventional power structures. Given the extent to which 'nature' is imbricated with social processes, Swyngedouw (1999, 443) argues that the social and natural are better reflected in the hybrid conception of socionature. As Castree (2001, 13) puts it, employing the term socionature,

> [I]s not at all a denial of the material reality of those things we routinely call natural….Rather it's an insistence that the physical opportunities and constraints nature presents societies with can only be defined *relative to* specific sets of economic, cultural and technical relations and capacities.

Taking this second argument one step further, Castree (2001, 15) points to the third way critical geographers have challenged the supposed dichotomy between society and nature. Here, the claim is that material nature is engaged with in socially contingent and mediated ways, but that nature is also physically reconstituted through those interactions. As Swyngedouw (1999, 445) puts it, contemporary scholars recognize.

> [T]hat natural or ecological conditions and processes do not operate separately from social processes, and that the actually existing socionatural conditions are always the result of intricate transformations of preexisting configurations that are themselves inherently natural *and* social (italics original).

This latter observation by Swyngedouw (1999) signals an important limit of Smith's production of nature thesis. Critics argue that Smith was so focused on explaining how nature is produced in the first place, that he failed to take into account "the role and importance of those produced natural environments themselves" (Castree, 1995, 21; See also Castree, 2001). It is important to recognize and expose the ways in which socionatures are produced, yet it is equally crucial, as Castree (1995, 21) puts it, to "simultaneously recognize the materiality – and consequentiality – of the particular natures capitalism produces".

Recognizing the ongoing material and discursive consequentiality of socionatures brings to light two additional, interrelated oversights in Smith's work. First, as critics have shown, the state is not the monolithic, uniformly capitalist force Smith suggests it to be (see Castree, 1995, 2001; Swyngedouw, 1999). As I illustrate in the pages to follow, the ways in which the state is imbricated in the initial and ongoing production of nature in the Marsh has changed significantly over time. I draw here on Nico Poulantzas' (1978) notion of the state as the condensation of social relations. In Poulantzas'(1978) view, the state is not merely a unified institution that stands apart from society. Instead, as Jessop (1985, 337) puts it, the state is an "*institutional ensemble*…shot through with contradictions" (emphasis original). The constellation of institutions, rules, and civil society actors that constitute the state (and its extended appendages), according to this formulation, are always shifting and cannot be reduced to a simple instrument of class power. Within the Marsh, the matrix of the state has appeared, at times, to support capital through agriculture – consider the very fact that drainage legislation enabled the transformation of the wetland into fields in the first place. At other times, however, the constellation of actors and practices of the state have impinged on agricultural production in the Marsh, through, for example restrictions on water taking or the use of particular pesticides.

This leads to the second related point: 'nature' is not produced in a vacuum, but rather within dynamic socionatural and political conditions. From a physical, material perspective, discrete pieces of biophysical nature react to and shape the production process in different, not always predictable ways. As Boyd, Prudham & Schurman (2001, 555) claim, biophysical nature does not simply bend to every edict of capital, but instead presents a variety of "obstacles, opportunities, and surprises". Careful to not hypothesize an ossified external material 'nature' Boyd et al. (2001) delineate between the formal and real subsumption of nature within industrial, capitalist production. In some industrial processes – such as mining – the characteristics of biophysical nature are such that it cannot be fully transformed, only exploited. In other industrial dynamics – agriculture, for example – the real subsumption of nature is able to occur through biological manipulation. Seed germ plasm is altered, soils are augmented, plants are designed to be more efficient, in other words, "Nature, in short, is (re)made to work harder, faster, better" (Boyd et al., 2001, 564). In either case, as Castree (2008, 146) points out "Smith tended to gloss over important distinctions and differences like this with his blanket announcement that all capitalist nature was produced".

Similarly, the 'social' contributions of socionatures' production play a more significant role in the process than Smith typically allowed. Politics – both the formal operations of governments, but also in the form of social movements, civil society action, and the like – are also enveloped in the process of 'nature's' production. Limits to the production of socionatures – while partly biophysical, as Boyd et al. (2001) point out – are also socially produced (see Benton, 1991; Castree, 1995). Within this context, environmental politics are seen to matter profoundly to the process of the production of socionature – an insight on display at various points in the history of the Holland Marsh. The production of nature, in other words, is mediated in part through the state, and supportive and divergent politics. Demonstrating that the state and politics matter to the production of nature, as I do below, reveals the process to be far more contingent than Smith (2008[1984]) allowed. The Holland Marsh – as a produced 'nature' – was not inevitable, but rather was produced (at least in part) through a confluence of contingent state power, institutions, and contentious politics unfolding over time.

To reiterate, while Smith's (2008[1984]) work is foundational, it does not account for the historically contingent, place-specific dynamics involved in the (ongoing) production of socionatures. As Castree (1995, 23) writes, "[C]apitalism produces specific natural environments but these environments are, in turn, both enabling and constraining. The point here is that they enable and constrain only *in specific relation to* the social relations they are imbricated within". My dissertation is, in part, an effort to elaborate Smith's work, and the recalibrations it has inspired outlined directly above, to develop a nuanced account of socio-ecological change and socionatural production in the Holland Marsh.

Emphasizing the notion that agricultural natures are fundamentally caught up in the broader processes of nature's production brings to the foreground the unique character of stability and crisis associated with capitalism-in-place. Specifically, and as O'Connor (1988) points out, the ostensibly self-expanding character of capital is significantly restrained by the need for non-produced (i.e. 'natural') inputs. As capital uses biophysical inputs, and creates outputs (pollution, etc.) it tends to draw down the resources available to its successful reproduction. For O'Connor (1988), biophysical properties are 'underproduced' by capital, leading to what he labels the second contradiction of capital: In order to reproduce, capital needs ecological inputs (water, landscapes, plants, etc.) but in the process of reproduction, capital destroys (or renders unusable) these things. Within the Marsh, this process can almost be demonstrated in centimeters of soil per year. The very moment the marsh was drained, exposing a rich composition of root mat, peat moss and centuries' worth of decomposed plant material, was the very moment this complex soil became more susceptible to oxidization, wind erosion, and water erosion through flooding. While there are mitigation techniques and technologies being employed to stabilize the growing medium, the soil's demise as one of the defining features of the Marsh's local competitive advantage is inevitable. The moment the Holland Marsh emerged and the moment it was doomed are one and the same. The imperatives of industrial agriculture are hastening the process, while causing considerable ancillary ecological destruction in the process.

And yet, while the landscape is an impressive and audacious matrix of drainage infrastructure, monitoring equipment, high-tech carrot and onion cultivars, highly customized equipment and sophisticated fertilizers and pest management technologies, it also exists (or at least has periodically existed) as a bucolic pastoral imaginary. Contemporary boosters of the area have invoked cultural and natural imagery of halcyon days past, and the *de rigueur* language of 'local food' to construct an imaginary which eschews the material reality of the area. Decades before, however, this bucolic imaginary was precisely the one being expunged by Marsh boosters and farmers – the narrative attached to the first vegetables to emerge from the Marsh was infused with technology, human ingenuity, assembly line precision, and mastery of nature. So while agriculture in the Marsh is rooted in a deep materiality – soil, seeds, water, and sunshine – it also exists as a dematerialized spectacle of signs, referents and symbols (see Debord, 1995; West, 2011).

In just a few generations the Holland Marsh has undergone a profound socionatural transformation. The physical terrain of the area, once a swampy flood plain for the Holland River, exists now as a manicured landscape of fields, roads, houses, processing plants, irrigation canals and culverts. At the same time, conceptions about what the Marsh 'is' have also changed. Variously imagined as a mosquito-filled wasteland, an investment opportunity, a place for home and work, an agricultural site, and more recently, a centre of high-end niche food production, the Marsh's identity has been as unfixed and variable as its material referent.

This is not to suggest a linear historical trajectory (again, neither progressive or declensionist) instead I intend to expose a rather more complicated material and discursive ecological hybridity. Indeed, the name of the area, Holland *Marsh*, conjures an ecological materiality that no longer exists. Yet the ecological imaginary of an idealized marsh - infused with what Smith (2008 [1984]) eloquently labeled an ideology of nature - still looms large in the area. Particularly when juxtaposed with the immediately surrounding urban areas, as it often is in contemporary media accounts and marketing schemes, the Holland Marsh is framed as natural and pristine, the ideal site for growing equally natural and pristine food. Yet this discursive positioning of the Holland Marsh as agricultural utopia is by no means uncontested, evidenced by recent and ongoing counter narratives which have brought housing developers, environmentalists, the power generation industry, farmers, and regional, provincial, national and international levels of government (and governance) into the mix. Nor does the privileged imaginary of the Marsh as 'pristine' and 'natural' bear out its actual materiality, given the social processes integral to its production, and the presence of dangerous levels of various toxins, including dichlorodiphenyltrichloroethane (DDT) (Lembcke, Ansell, McConnell & Ginn, 2011).

1.4 Production and consumption

In contrast to most of the scholarship concerned with food and agriculture, which tends to focus either on production, or consumption, my dissertation will explore some of the dynamics related to both consumption and production as a constitutive dynamics of agriculture[3]. The site of food's 'production' extends beyond the fields (Mintz, 1986). As Goodman (1999, 17) points out, the metabolic relations of food's production necessarily play out both in the fields and at the table. So while agricultural natures are co-produced with and through social labour in the fields, food is also 'produced' through political and cultural economies of consumption through which food is corporeally and symbolically metabolized. Within agro-food studies, however, food's production has generally been kept analytically distinct from its consumption (for exceptions, see Goodman & DuPuis, 2002; West, 2012). However, some of the most incisive food scholarship revealing the unequal power relations of food and agriculture, which can be categorized as fitting broadly within the tradition of political economy, tends to focus almost exclusively on the social relations of food's production (see for example Akram-Lodhi & Kay, 2010a, 2010b). This body of work is most concerned with exposing the relations of food obscured, or fetishized in Marxist terms, during the process of its production. 'Cultural' approaches to food and agriculture, on the other hand - typified by consumption studies - tend to focus largely on the representational power of food and agriculture (see for example Ashley, Hollows, Jones & Taylor, 2004). In other words, food from the perspective of many consumption scholars tends to be reduced to a Durkheimian totem, in that its meaning is presumed to only be culturally constructed, rendering the materiality (and nature) of food production unimportant (Goodman and DuPuis, 2002, p. 6). While these cultural/anthropological accounts highlight the shifting representational significance of discrete food commodities as they traverse transnational trading and cultural networks, they fail to attend to ways in which the site of production might also be subject to changing meanings and imaginaries[4].

My dissertation will attempt to move beyond the disciplinary boundaries which have, for the most part, maintained an artificial, disciplinary separation between food's production and consumption. I will highlight the processes linking production to consumption, and *vice versa* through an examination of both the material and ideational transformation of the Holland Marsh, and the Marsh's agricultural natures. Food and agriculture represent a primary site of metabolic interaction between the social and natural, the discursive and the material (Goodman, 1999). As such, agro-food scholarship should be at the forefront of exploring the dynamics of socio-natural co-production and the 'greening' of social theory (Goodman, 1999). The Holland Marsh is an ideal site to study the ways in which food and agriculture co-evolve through the processes of production and consumption because mediated imaginaries of the Marsh targeted at Toronto's urban population have always been at least part of the strategy Marsh farmers and farm advocates have sought to secure a viable consumer base to justify and enable production. At the same time, the materiality of the (urban) consumer base has provided ongoing threats to consumption in the form of urban sprawl, power generation requirements, and the like. This is not to say that consumption of Marsh produce has driven production, but rather to suggest that the dynamics of consumption have had a more nuanced impact on production in the Holland Marsh than much agro-food scholarship would allow for.

1.5 The socionature of the Holland Marsh

The rapid loss of farmland around the world – either permanently through development, or soil exhaustion, or temporarily through drought and flooding - makes untangling how a piece of the peri-urban landscape could seemingly move so rapidly from wetland, to productive farmland, to precarious farmland, to disappearing farmland all the more important. Put simply, humans need food to survive, though the conditions under which food is produced tend to undermine the socio-ecological conditions necessary to food's production. Nature, or more precisely, socio-nature – both in a material and discursive sense – is at the centre of this dynamic.

For the purposes of my research, however, it is more productive to dispatch of notions of 'threatened' and 'precarious' farmland, per se, and to instead frame this as part of the continual process of nature's production. The earliest forays into monetizing the Holland Marsh area consisted of harvesting 'naturally' occurring marsh grasses for pillow and bedding stuffing. Inevitably, ecological limits were met and other opportunities for capital to circulate through nature were identified and implemented, ushering in agriculture to the region. Subsequent decades have seen other socio-ecological limits emerge, become temporarily resolved, emerge again, and so on. This is not to suggest that history in the Marsh (or elsewhere) is bound to a cyclical unfolding. Indeed, understanding where, how and to what effect these limits are met and (temporarily) resolved is a key motivation of my research.

As a means of providing some analytic structure to the specific ways in which 'nature' manifests within the Marsh, and as a way of grounding my research in the specific geography, historical materiality and discursive context of the Holland Marsh area, I will interrogate 'nature' from four distinct perspectives[5]. Each of these represents a key expression or characteristic of what is typically referred to as 'nature' – though I use these analytic distinctions cautiously. As I have attempted to emphasize so far, nature is not the reified 'thing' we commonly assume it be. And furthermore, the processes by which it has come to be understood as an ossified 'thing' are pregnant with power, politics, and ideology, (Smith, 2008[1984]). Yet still, employing analytic lenses – not as ontological categories – but as a way of isolating discrete analytic components has an important illustrative value within this dissertation.

The four analytic lenses include, nature-as-land, nature-as-time, nature-as-form, and nature-as-imaginary. I choose these four categories specifically for the ways – and frequency with which – they emerge as thematic touchstones throughout the chronological telling of the history of the Holland Marsh. As I work through the historical, sequential details, tugging along the conceptual threads outlined above becomes a challenge at times. The categories are meant as short cuts back to the broader thematic and conceptual preoccupations of this dissertation, by providing some structure to the disorderly character of 'nature'.

1.5.1 Nature as land in the Holland Marsh

As Harvey (1996) has pointed out, capital is ever in search of a spatial fix - a process which both enables accumulation (by providing a physical site for production) and constrains it (through devaluation, fixity, and the like). While the primarily industrial/commercial dynamics of Harvey's formulation do not map exactly over the primarily agricultural and rural production within the Holland Marsh, land does present both opportunities and constraints to capital within the farmers' fields. Marx (1990 [1867]) and Kautsky (1988 [1899]) also understood land as a potential obstacle to the accumulation of capital through agriculture, both because land is relatively fixed in place, and because it is relatively limited in quantity (see Mann, 1990, 30). This latter dynamic is particularly germane to understanding agriculture in the Marsh, given how small the area is.

Conceiving of nature-as-land also brings into view the specific geological history of the Holland Marsh region, a crucially important aspect to the Marsh's agricultural history. Receding glaciers at the end of the last Ice Age scratched out hollow pits in the softer rock immediately south of the Canadian Shield. Over centuries, these shallow pits accumulated a rich diversity of biophysical life, eventually emerging as wetlands. In the early 1920s, entrepreneur agronomists deployed a range of technologies to drain the wetland to create fields – in some sense, literally making the land. This relationship between the geological materiality of the Marsh, and the cutting edge agricultural sciences and agronomy required to initially transform the land into productive farmland has remained imminent in the character of Holland Marsh agriculture since its inception.

1.5.2 Nature as time in the Holland Marsh

Much has been written about the extent to which the time of 'natural' production (that is, in the case of agriculture, plant growth) restricts capital's ability to accumulate through biophysical nature (Kautsky, 1988 [1899]; Mann, 1990; Mann and Dickson, 1978). Capital is, in effect, suspended in an unproductive state up until plant maturation and harvest. In yet another testament to the extent to which the social and natural are co-implicated in the production of nature (crops), a whole host of distinctly social responses have developed in order to minimize capital's losses during natural production. Labour and employment conventions in the fields, the introduction of refrigeration, greenhouse and transportation technologies, and seed germplasm manipulation have all surfaced as explicit strategies to harness and exploit the biophysical characteristics of nature useful (that is, profitable) to agriculture (see, Cronon, 1991; Kloppenburg, 2004 [1988]; Mitchell, 2007). More recently, and as I discuss in Chapter 6, the winds of a so-called ‘evergreen revolution’ are beginning to blow. Agro-researchers are plumbing the depths of the rhizosphere and seeking out new technological interventions to find ways of speeding up biophysical nature even more – to find ways of manufacturing a more efficient nature (Bhardwaj & Leff, 2014; Lazarovits, 2014).

In the Holland Marsh, the nature-as-time analytic brings into view a host of sites from which to examine the historical trajectory of nature’s production – from the introduction of early refrigeration, storage and transportation co-operatives meant to extend the amount of time harvested produce would remain fresh, through to emerging technologies which are meant to result in agricultural natures that are faster growing, longer lasting and that can be shipped further afield in the global marketplace.

1.5.3 Nature as form in the Holland Marsh

Production technologies and labour are also confronted, and typically custom designed to attend to the physical form various natures take (Prudham, 2005, 16). Within agricultural production, perishability, delicateness, colour, size and shape all factor into, and ultimately shape the social and productive processes of nature’s production. Adding to the complexity, idealized notions on the consumption end tend to shift over time, requiring, for example, that farmers produce larger onions and straighter carrots (Johnston and Baumann, 2010).

Indeed, agriculture in the Holland Marsh has been profoundly influenced by changing consumer demands, evidenced by, for example, the rapid increase in acres dedicated to growing bok choy in the past 10 years (Bartram, Swail & Mausberg, 2007). With these shifts come necessary reactions in an array of social practices - from changes in the specific labour (watering, weeding, etc.) requirements, to altering washing and packaging technologies. At the same time, nature-as-form within the Holland Marsh inevitably brings into view the very land produce is grown on. The most basic task of initially creating and subsequently maintaining the essential form of the Holland Marsh - that is, the fields themselves - has been extensive, and has, in fact, created an entire sub-industry of drainage infrastructure maintenance. The Holland Marsh is in many ways as much an ongoing construction maintenance project as it is a site of agricultural production. The initial canalization of the Marsh, while fraught with challenges, pales in complexity and effort to the ongoing attempts to sustain the form of the resulting agricultural landscape. Throughout the decades, subtle changes in the Marsh's essential form at the hands of erosion, soil subsidence, and silt and plant buildup in the canal have been vividly punctuated from time to time with full-scale dyke breaches. These instances of failing dykes, none as dramatic as that which resulted from Hurricane Hazel in 1954, are nothing short of a betrayal of the basic form of Holland Marsh agriculture and an affront to the concerted human efforts to assemble the landscape. As will be discussed in the following chapters, efforts to maintain the form of the agricultural landscape – ensuring it remains a fundamentally *productive* form – have indelibly imprinted on the history of agriculture in the Holland Marsh.

1.5.4 Nature as imaginary in the Holland Marsh

Despite the centrality of nature's materiality to agricultural production, it is impossible to consider the origin and continuation of farming in the Marsh without an appreciation for the role of nature's imaginary. Our perceptions of nature are not fixed, but as Smith (2008[1984], 11) suggests, "Much as a tree in growth…the social conception of nature has accumulated innumerable layers of meaning in the course of history". Nor are they formed *ex nihilo,* but rather our various imaginaries of nature – or ecological imaginaries – are ideologically and discursively mediated (Gandy, 2002; Kaika, 2005). As Smith (2008[1984], 11) puts it, there is an *ideology* of nature, riven with the logic of capital, which influences how we think about and experience nature.

Within the contemporary urban (and peri-urban) context, these imaginaries of nature are comprised of, and tend to reproduce, dichotomous and neo-romantic notions of city and countryside, nature and society – the reified categories the work of Smith (2008 [1984]), and others aim to transcend (Gandy, 2006; Gunster, 2004).

Within the realm of food and agriculture, imaginaries of nature are instrumental in mediating the relationship between production and consumption – particularly as it relates to contemporary notions of conscientious consumption (West, 2012). Concepts such as 'natural' and 'organic' are now well-established marketing techniques meant to inscribe crops with a bucolic character, part of efforts on behalf of commercial interests to discursively produce their products (Goodman, 2004). Enlisting particular imaginaries of nature into advertising schemes for so-called ethical products tends to further obscure relations of production while reinforcing the commodity fetish (Johnston, Biro & MacKendrick, 2009; West, 2012). As West (2012) points out, what consumers know about both the conditions of food commodity production and the material/cultural impact this has on farmers and landscapes is obscured and manipulated through contemporary marketing schemes for niche and high-end food production.

Focusing on nature-as-imaginary helps to reveal the fact that the mediated imaginaries of the Marsh have shifted through time. In some of the earliest commercial advertising, potatoes from the Holland Marsh are positioned by the Eaton's Company as the equivalent of expensive hats and fur coats - items every modern woman should never be without (*The Toronto Daily Star*, 1940, 33). Notions of progress, technological advancement and even decadence were, in effect, inscribed onto the 'nature' of the potato. In the contemporary period, conventional commercial ads as well as a variety of non-profit organizations – such as Sustain Ontario, Local Food Plus and Friends of the Greenbelt – privilege decidedly different notions of nature based on neo-pastoralism and rustic-environmentalism.

At a more elemental level, 'nature' as an abstract external category – as something 'out there' – is similarly subject to the imposition of various imaginaries, not only as a function of specific commercial interests, but rather the result of deeper seated social relations (Gandy, 2006; Kaika & Swyngedouw, 2012). This is not to suggest that there is ever one, 'fixed' meaning of nature – indeed, at any given time multiple, competing and contradictory imaginaries of nature abound – but instead to point out that imaginaries of nature are shaped within dominant structural systems, including capitalism, colonialism, patriarchy, and the like (see Castree, 1995; Redclift, 2006; and Rose, 1993).

Clearly then, imaginaries of nature are not always politically benign. Indeed privileged imaginaries of what nature 'ought' to be are a key modality through which nature is produced (Castree, 2001). To reiterate a point from above, nature's materiality is socially mediated (Heynen et al., 2006). Within the Marsh, shifting notions of what the area ought to be have had profound material effects on the landscape and its human and non-human inhabitants.

1.6 Methodology

This research relies on an interdisciplinary and mixed method approach (Creswell, 2003). Given the complexity of food and agricultural systems in general, and my desire to confront that complexity, rather than turn away from it, I will necessarily draw on a number of discrete, though related traditional academic disciplines. Primarily, as outlined above, I draw on environmental history, political ecology, and critical geography scholarship. Beyond these, I make more sparing use of other disciplines, including anthropology, political science, economics, sociology, biology and pedology (the study of soil) and some of their related sub-disciplines. I am sensitive to the potential pitfalls of creating a haphazard and watered down composite out of what are complex disciplines with rich traditions. I do not intend to demonstrate mastery of any one of these disciplines, but hope to use insights and tools from them responsibly and rigorously in order to develop a novel and nuanced account of the dynamic processes of food and agriculture in the Holland Marsh.

I operationalize this interdisciplinary approach within the framework of Burawoy's (2009) extended case method. The supposed antinomy between 'Marxist' and 'anthropological' methods is, as he demonstrates, in fact a productive nexus from which to launch social scientific inquiry. As Burawoy (2009) puts it, if the charges against each are true –that Marxist methodologies are often too general and abstract, while anthropological approaches are routinely too specific and parochial – then the space of their conceptual meeting (though importantly, not reconciliation) provides a productive point of departure.

Agriculture is not unique, though it is an exemplar of a social and industrial formation that is necessarily comprised of micro and macro forces, history and time, structure and agency. Local climatic conditions, histories, individual experiences, etc., are inevitably implicated in and shaped by broader patterns of accumulation, world commodity and input prices, and multiple layers of extra-national and national regulation. Burawoy's (2009) extended case method insists on an analysis that unifies the macro and the micro through theoretically informed empirical research. Burawoy (2009) also stresses that researchers' histories and theoretical and ethical commitments also inevitably shape the research process.

Accordingly, my own positionality - steeped in the agricultural and Dutch immigrant culture of the Chatham-Kent area of Ontario – necessarily intersects with my performance as a researcher. My first job, taken at the age of 11, was hoeing soybean, tobacco and tomato fields. For the better part of a decade much of my summer consisted of hoeing, weeding, detasseling corn and harvesting various crops. For a couple of summers, after my family relocated to London, Ontario, I returned to the Chatham area to continue working in the fields, living with my grandparents, immigrant tenant farmers from Holland. Sometimes I worked the fields of other Dutch immigrants. Very often I just worked, unconcerned with whose land I was on. Many of the first farmers in the Holland Marsh relocated from their first Canadian home in the Chatham-Kent area just after the Second World War. My own history is thus inevitably linked to the Holland Marsh – in some obvious and general ways, but also in ways I was surprised to discover during the time I spent immersed in and around the Holland Marsh.

1.6.1 Research Techniques

I discovered very early on that there has been virtually no academic work, and scarcely little else written about agriculture in the Holland Marsh, or the Holland Marsh in general, aside from newspaper articles. My first attempts at finding any existing work on the Marsh included trips to the Bradford West Gwillimbury Public Library and the Ansnorveldt Public Library. The Bradford Library (opened in 2011) is a multi-purpose community facility, boasting rows of brand new computers, community meeting space, and a wide range of programming catering to all age demographics. The Arnsnorveldt library, located within the boundary of the Holland Marsh, is a much more modest facility, housed within a former one-room school house, and open for only a few hours per week.

The librarians at both libraries were extremely helpful, and each directed me to sources that would prove invaluable. The librarians at both libraries introduced me to three short books detailing different aspects of the history of the Marsh, written by local amateur historians[6], as well as a chapter in an impressive and exhaustive history of Simcoe County, compiled by the Bradford West Gwillimbury Local History Association (2005). I used these four sources both as a way to familiarize myself with the history of the area, but also as socially embedded artifacts of the area.

I also conducted an exhaustive search for newspaper articles about the area, from 1850 through to the present, in the *ProQuest Historical Database*, and the *Historical Newspaper Data Base* through York University's library system. In both cases, I used 'Holland Marsh' and 'Holland Marsh AND Agriculture' as my search terms. As I sorted through the articles, I targeted primarily *The Globe and Mail* (*The Globe*, up until the merger with *The Mail and Empire* in 1936), *Toronto Star* (*The Star*, until 1971), *Newmarket Express* and *Bradford Times.* My search yielded roughly 450 articles, which I organized chronologically. I then created a spreadsheet comprised of key dates, headlines and text excerpts from the articles. I have used this document throughout my research as a guide to the broad historical trajectory of agriculture in the Holland Marsh. At the same time, I also approach the newspaper articles with a critical eye, understanding that they too are products of – but also provide a window into – the socio-cultural context of their production.

Given that there has been little of what would be considered formal scholarly work conducted on agriculture in the Holland Marsh[7], I relied heavily on various archives, and attempted to curate a thorough collection of available archived material. I conducted research at the Simcoe County Archives, the York Region Archives, the Archives of Ontario, and the archives at the Bradford West Gwillimbury Public Library. Each archive had a different protocol for organizing their collections, and so my approach at each one was slightly different. I worked with archivists at each one to determine the best tactics for finding any available information on agriculture in the Holland Marsh. My overall strategy initially was to cast a wide net, which resulted in roughly 600 pages of documents, ranging from relevant city council meeting minutes and reports, through to correspondence between politicians and court filings.

My textual research also included Google searches for technical reports, government reports and policies and non-profit organization studies relevant to agriculture in the Holland Marsh. This search yielded 15 relevant documents that I used as both sources of information and data, as well as artifacts. Given the long and integral relationship between the Holland Marsh and the University of Guelph's Muck Crops Research Station, I also drew on various technical and academic reports published as part of ongoing research conducted at the Station. The production of environmental knowledge is always an inherently political and contested process and technical reports from 'authoritative' sources aim to produce knowledge for specific ends (Turner, 2011). Indeed the circulation of agricultural knowledge can be interpreted as a means of producing outside 'expertise' (Lave, 2011). I approached these kinds of technical reports (primarily those published under the aegis of the Muck Crops Research Station and various government reports) from a perspective that aimed to incorporate both a *prima facie* and more critical interpretation of the reports as technologies of power.

In my analysis of all of the textual documents mentioned above, I draw on Lincoln & Guba (1985) and Hodder (1998), to distinguish between documents (personal correspondence, journals, log books) and records (prepared to document a formal transaction, marriage certificates, licenses, land transfer certificate, etc.) Importantly, Hodder (1998, 110) points out that whereas documents require more contextualized interpretations, records often reflect a 'state technology of power'. The commonality between all the sources of materials above is that they are necessarily socially embedded – both in the moment of their production, and again in my own reading and interpretation of them. As Derrida (1978) points out, no one concrete 'meaning' is conveyed through any text, but rather meaning is created in both the writing and reading of texts. Operationally, this meant that I resisted the temptation to let any one material artifact stand on its own as an un-problematic reflection of 'reality'. Instead, as much as possible, I attempted to triangulate among various texts, documents, statistical data and news accounts.

In order to develop a rich account of agriculture in the Holland Marsh, which extends to the contemporary period, I complement the archival research with semi-structured interviews. I drew on Alvesson's (2011, 2) conceptualization of 'qualitative interviews' which he argues are meant to be "'rich accounts'...[which are]...normally relatively loosely structured interviews with face-to-face contact...[and]...relatively time consuming to carry out". In total, I spoke with dozens of people – both informally while exploring in and around the Marsh, as well as in more formal interview situations – including farmers, politicians, policy experts, and representatives from farm organizations. Of these, I recorded and transcribed interviews with 12 farmers, 5 policy experts, 5 local politicians and 2 farm advocates, and again used NVivo to code and sort for themes[8]. I have chosen to keep the interviewees anonymous, using pseudonyms throughout and leaving out details that might otherwise betray the identity of a source. Ultimately I felt that providing anonymity to some and not others could risk exposing those who wanted to remain unnamed. I have done my utmost to select quotes that do not betray my intention to maintain the anonymity of the people I spoke with. Family-specific histories of some Marsh settlers can be found in the stellar *Governor Simcoe slept here: The legacy of West Gwillimbury* (Bradford West Gwillimbury Local History Association, 2005).

Given that my research focuses intensively on a relatively bounded geographic area - and thus a relatively bounded population – I also spent a good deal of time in and around the Holland Marsh. I made many trips to the area for interviews – which took place on farms, in barns or storage facilities, on the front yard of a Marsh home with a glass of lemonade, and on one occasion in the cab of a John Deere tractor during the onion harvest. I also traveled to the Marsh area to attend specific events. Some of these were large annual community events that you might see in other rural areas, themed around harvest time and featured crops, including the Bradford West Gwillimbury Carrot Fest and the Holland Marsh Soupfest. I also attended meetings of the Holland Marsh Growers' Association, and a screening of a film recently made by that organization, *The Marsh Mucker's Tale* (Reaume, 2013). As I discuss further in Chapter 6, I spent two days at the 63rd annual Muck Vegetable Growers Conference, talking to farmers and researchers, listening to presentations and walking the floor (erstwhile hockey rink) of the farm equipment and chemical trade show. On a handful of occasions, I simply wound up in the Marsh and wandered around – driving around the perimeter on the severely narrow Canal Road, or cutting through the Marsh on the idiosyncratic and potholed interior roads. With my dog, I hiked through Scanlan Creek Conservation Area, which is grazed by the Holland River as it heads toward Cook's Bay and Lake Simcoe. And out of sheer curiosity, I tracked down the point where the Holland River – a marshy, slow moving version of it at any rate – empties into Cook's Bay, Lake Simcoe and beyond – roughly 15kms north of the fields.

I took many notes and photographs during my time exploring the Marsh and surrounding area, and I have incorporated these reflections and images into my dissertation. My analysis of all of the data – but the interview data and field notes in particular – was not a straightforward process. Heeding the advice of Dingwall (1997) and Silverman (2006) I attempted to be iterative and reflexive in my approach. I approached each visit to the Holland Marsh generally, and each interview specifically (whether formally arranged or impromptu) as a "complex social event" (Alvesson, 2011, 4). As is the case with material documents, no one interview can be given *a priori* status or considered a 'true' reflection of reality – but rather an instantiation of reality produced through the interview process. Alvesson (2011, 6) calls for a "reflexive pragmatism" to navigate the ambiguities of the interview process and interview interpretations. The approach is reflexive in that it brings into view the social complexity of the interview process and understands that any 'meaning' derived from the interview process is always contestable. Balanced against this reflexivity and skepticism is a pragmatism which prioritizes "a sense of direction and commitment to accomplishing a result" (Alvesson, 2011, 7). I have drawn particular inspiration from this latter piece of advice.

One important limitation to this study is the unavailability of aggregate quantitative data relating to either general demographic trends or agriculture-specific information at the level of the Holland Marsh. The Extension Branch of the Ontario Ministry of Farming and Rural Affairs – or rather an earlier iteration of that Ministry – did keep Marsh-specific data on some crop yields, but only sporadically, and not since the 1980s. I do draw on Statistics Canada's Census of Agriculture, however, I do so with caution. The sortation areas of the census do not align with the very defined boundaries of the Marsh (i.e. anything outside of the canal system is not the Marsh proper). It is possible, however, to combine a number of sortation areas to build a statistical geography that can overlay, however clumsily, the Holland Marsh geography. Again, I use aggregate data arrived at in this way with much caution, and only sparingly. While aggregating data within the Census of Agriculture at the level of specific agricultural activity makes immanent sense, and would be welcomed by many researchers, ultimately my study does not depend on quantitative data alone. As expressed above, my study looks at a range of broad socio-natural, political and cultural dynamics – and while aggregate quantitative data would have been a welcome addition, it is not necessary to my analysis.

No two writers would assemble the story of the Holland Marsh in exactly the same way. Throughout the writing process, I struggled with whether to organize the narrative thematically or chronologically. Ultimately I chose the latter strategy for a number of reasons. The most important of these is that the story of the Holland Marsh, as I see it, is predicated on a number of structural narratives that are, themselves, expressly chronological in character. Broader trends in the development and character of capitalism over the past one hundred years, and patterns in agricultural accumulation specifically forge a dual foundational backdrop for the trajectory of agriculture's unfolding in the Holland Marsh. Organizing the work chronologically was a strategy for demonstrating the ways in which broader patterns of agricultural accumulation (see for example Friedmann & McMichael, 1989) impacted the area, but importantly, also when, where and how the specificity of the Marsh socio-ecology demanded a departure from macro-economic imperatives.

Within this context, I draw on food regime theory as a broad chronological backdrop. Friedmann and McMichael (1989), the original exponents of food regime theory, trace the contours of global capitalist agriculture as an expression and driver of global capitalism. They argue that historically contingent configurations of modes of agricultural production, capitalism and state power have resulted in discernable periods of stability and crisis in the global economy over the past 150 years or so[9]. As they put it, the food regime analytic brings together "international relations of food production and consumption to forms of accumulation broadly distinguishing periods of capitalist transformation since 1870" (Friedmann & McMichael, 1989, 95).

The first period of relative global stability demarcated by Friedmann and McMichael (1989) was from 1870 – 1914. This first food regime was characterized by monopoly trade relations between colonial (mainly, Britain) and colonized states. Settler states in particular (i.e Canada) were, during this era, important to maintaining British hegemony by providing the colonial market with a relatively cheap and abundant source of grain (see also Redclift, 2006). The socio-political instability wrought by the two World Wars also created economic uncertainty during which time, according to Friedmann and McMichael (1989) there was very little structured coherence to the global economy. As a result, there was no decisive food regime between the years 1914 – 1947. However, with the conclusion of the Second World War and the emergence of the United States as a post war power, a second food regime emerged, and lasted from roughly 1947 – 1973. This second food regime was characterized by the rise of the U.S. through the pretense of international development, primarily through the distribution of U.S. grain surpluses. This was also an era characterized by the secular trends of intensive industrialization and commercialization of the agricultural sector. As national regulations – often through international agreements, such as the General Agreement of Trade and Tariffs (GATT), which lasted from 1948 through to 1994 – were altered to accommodate the influx of capital demanded by a rapidly industrializing global agriculture, state power began to erode *vis-a-vis* a burgeoning corporate globalization (Friedmann & McMichael, 1989).

While there is much debate about whether or not a period of stability – or third food regime – has emerged during the era of intensive corporate globalization, there is broad agreement about the general periodization forwarded by Friedmann and McMichael, 1989 (see Campbell & Dixon, 2009; Friedmann, 2005; McMichael, 2009).

I weave reference to the first two food regimes – and a putative third – throughout this dissertation as I elaborate the history of agriculture in the Holland Marsh. While I employ food regime theory to guide my own periodization of the Marsh's history, I also draw on the empirical details of the local history of the Marsh and the secular trends propelling capitalist agriculture, providing a nuanced, hybrid historical approach. Chapter 2 addresses a period of time covered within the first food regime, Chapters 3, 4 and part of 5 occur within the gambit of the second food regime, and part of Chapter 5 and Chapter 6 reside within a less defined third food regime. Admittedly, at times the chronological strategy was clunky because, inevitably, thematic issues appear, digressions are needed and cross-temporal comparisons are prudent. However, over all, I deemed telling the story of the Marsh from beginning to present as the best way to convey the complexity of the matter. Within this structure, I have attempted to be faithful to the myriad sources I have drawn on and from in the account that follows.

Ultimately, I see the story through my own eyes, experiences, and understandings as a researcher, which leads me to a final limitation worth mentioning briefly: my own as a researcher and writer. While the story I tell in the following pages is based in an empirical reality, it has ultimately been filtered through my own bias, ideologies, limitations as a researcher, and the like. Ultimately, this is a version of the history of agriculture in the Holland Marsh, refracted through my capabilities and limitations. As Cronon (1992, 1349) reminds us,

> When we describe human activities within an ecosystem, we seem always to tell *stories* about them. Like all historians, we configure the events of the past into causal sequences – stories – that order and simplify those events to give them new meanings. We do so because narrative is the chief literary form that tries to find meaning in an overwhelmingly crowded and disordered chronological reality. When we choose a plot to order our environmental histories, we give them a unity that neither nature nor the past possess so clearly (emphasis original).

1.7 Dissertation overview

Immediately following this introduction, I take up a discussion of the very earliest history of the Holland Marsh area, from roughly 13,000 years ago up until the mid-1920s, and explore how various aspects of the past have enabled and shaped the current-day Marsh. Within this context, the geology of the area stands as a sturdy foundation, serving as the biophysical canvas upon which the socio-natural activity of muck farming would eventually emerge. Before the farms, however, was the wetland – a complicated, vernacular landscape, accommodating to various uses before it was transformed into fields. I discuss how a wider regional reclamation geography, enabled by a shared Great Lakes basin geology, provided the early Marsh boosters – in particular Professor William Day – with examples of drainage projects to study in southern Ontario, Michigan and Ohio. While Day and the Holland Marsh Syndicate would draw on other similar projects throughout the region, ultimately they would create their own social and political configurations in order to mobilize the resources (financial, but also political) necessary to draining the Holland River valley.

In Chapter 3 I attend to the period of time between roughly 1925 – when the excavation of the canal system began – through to 1935, by which point meager commercial agricultural production had begun. Throughout this period the nature-as-land dynamic is on full display as painstaking efforts were waged against the received reality of the marsh to transform it into so-called ‘smiling farms’. I discuss the herculean efforts required to dredge a 27 km-long canal out of the peaty bog, and argue that the spectacle of it all whetted the appetite of would-be farmers and hungry consumers alike. The transformation of the landscape was also predicated on a host of institutional and legislative supports , which preceded the draining, establishing important legal and discursive precursors to the agricultural activity to come. As the land emerged out of the swampy water, it was thrust into abstract exchange relations, assigned (inflated) value, and propelled into a complex and multi-spatial political economy of food and agriculture. The transformation of the land is no simple material thing, but rather a defining moment in the history of the Holland Marsh.

For the farmers in the Marsh, the timing of the land’s emergence could hardly have been worse. I begin Chapter 4 (1935 – 1954) by exploring the hardships the early farmers had to endure as a result of the effects of the Great Depression. The socio-natural confluence of low consumer demand on the one hand, and prodigious supply crowding the newly minted fields, on the other, made for a disastrous start to commercial agricultural production. However, as I detail further along in the chapter, after this unsteady soft launch, as it were, agriculture in the Holland Marsh truly flourished during

World War II and in the immediate post-war years. Farmers in the Marsh (and elsewhere) leveraged their new-found clout as producers of calories to feed the war effort at home and abroad to engage in unprecedented social organizing. The Marsh emerged during this era as part of the 'modern countryside' (Murton, 2007). Liberal notions of an ordered, productive and profitable rurality animated state-making projects, making farms and farmers an important part of the post war transition. At the same time, advances in chemical synthesizing, cooling technologies, and transportation infrastructure began to change farming in the Marsh, and beyond. For farmers in the Marsh, who had typically only ever shipped to the Toronto area, improvements in produce durability and transportation technologies suddenly made markets accessible around the country, the continent, and even to Europe.

The enthusiasm with which the Marsh farmers embraced the tenants of an emerging mechanized, productivist and chemical-dependent global agriculture continued well into the post-World War Two period. In Chapter 5 (1954-1980) I explore how these emerging tendencies and associated contradictions of capitalist agriculture were manifest in the Marsh. The period is bookended, on the one hand, by Hurricane Hazel (1954), a disastrous and deadly storm which exposed the hubris of the Marsh boosters, demonstrating that they had not in fact conquered nature in the Marsh. The storm would inspire the farmers, with ample state support, to redouble their efforts to expunge the area of 'nature' and its inherent contingencies and unpredictability. By 1980, on the other hand, this cavalier attitude toward the biophysical environment had resulted in the emergence of ecological and public health disasters which would put the production of nature in the Holland Marsh under intense external scrutiny.

In Chapter 6 (1980 – present) I begin by exploring the details of two prominent crises which surfaced in the early 1980s – elevated birth anomalies in and around the Marsh, and algal bloom out breaks on Lake Simcoe. The 'smiling farm' narrative was severely undercut by revelations that Marsh farming was implicated in both of these crises. This, in turn, catapulted the production of nature in the Marsh into a constellation of emerging regional environmental politics. Farmers, much to their chagrin, have been made to adjust to prevailing conservationist sentiment through various regulatory and legislative measures. At the same time, (sub)urban expansion has accelerated in the area in recent years, bringing front yards in almost direct contact with the fields, and resulting in increased tensions on both terrains. As the social and political conditions within which nature is produced in the Holland Marsh change, farmers have sought to enlist biophysical nature in ever-more efficient ways – to search for ways to control their fields and crops with (ostensibly) increasing precision in order to get as much out of the biophysical nature as possible. Ultimately, however, uncertainty and contradiction persist in the fields of the Holland Marsh.

Chapter Two. 11,000 BC to 1924 – The political ecology of reclamation and production of land in the Holland Marsh

2.0.1 Introduction

Cultivating an appreciation for the complexity of the socionatural transformation of the Holland Marsh begins with understanding its socionatural origins. There was nothing inevitable about the arrival of intensive cultivation to the Holland Marsh, but rather agricultural production is the result of a confluence of biophysical, topographical, ecological, socio-cultural and political conditions taken for granted in some traditional accounts of agricultural history (Mitchell, 1975). How these elements collided and eventuated in the production of the material agricultural landscape of the Holland Marsh is the focus of this chapter. During this formative period in the Holland Marsh, nature-as-imaginary and nature-as-land are the key analytics through which the move toward agricultural production can be understood.

The physical foundation for the farmland was established over 13,000 years ago, assembled within a millennia-long, pre-human history of grand geological processes. The resultant wetland was used by various waves of human inhabitants –from indigenous populations, and then later colonial settlers – in very different ways. Upon initial contact, white settler sensibilities rendered the landscape illegible as anything other than a wasteland – the imaginary was of a landscape of disease and despair. However, over time perceptions shifted as the result of changing material conditions, including less available, accessible farm land and the flow of information and knowledge about marsh farming throughout the shared geology of the Great Lakes basin. The pursuit of profit was part of the motivation for transforming the wetland into fields – and importantly this transformation did not occur until after capitalist farming was commonplace throughout Ontario – but the driving impulse was more than simply the pursuit of profit. As discussed below, deeper-seated cultural desires to harness, manipulate, and control 'nature' with human ingenuity and technology were equally integral animating factors.

Despite all this, the transformation from wetland to farmland could not have occurred without an enabling political milieu. A range of regulatory, legislative and quasi-judicial infrastructure buttressed the initial drainage plan. The state, not just the market, put its full weight behind the production of a particular form of nature-as-land in the Holland Marsh. In the absence of any environmentalist or even conservationist sentiment, canalizing and underdraining the Marsh was understood as land 'improvement', and as part of the broader agricultural tradition of the fledgling country. The opportunity, within this context, to renovate a wasted landscape into useful fields was far too attractive to pass up.

2.2 The wetland geology of muck farming

The story of the Holland Marsh starts before the Holland River lowlands were drained and transformed into farms, before Holocene-era indigenous populations were hunting and gathering in the wetland, and even before there was any wetland in the area to speak of. The natural history of the Holland Marsh – which is fused with its socionatural history – starts roughly 13,000 years ago at the end of the last Ice Age. During the Quaternary glacial period, the Laurentide Ice Sheet, an expanse of ice covering all of Canada and a good deal of the United States, advanced and retreated in response to temperature fluctuations over many millennia, creating a variety of geological formations in the process (Stewart, 2004).

The geological history of the Holland River lowlands, while considerably more complex, can be usefully distilled into a two-part geological anatomy of tills and ruts. As the weight of the ice advanced southward and retreated northward throughout the last Ice Age, it scoured out depressions in the relatively soft limestone and shale rock shelf abutting the higher test Precambrian igneous and metamorphic rock of the Canadian Shield to the north. Some of these depressions are quite large, such as the one occupied by Lake Algonquin, the pro-glacial lake and distant relative of Lakes Ontario, Huron and Michigan. Smaller ruts – including the Holland River lowlands – are scattered across this larger geography of glaciation.

The corollaries to these glacial recesses are the glacial tills, or piles of crushed rock debris, left behind as the Laurentide ice sheet commenced its terminal retreat northward. The largest of these features are now recognized as moraines and escarpments, hundreds of which are scattered across central and southwestern Ontario (Sandberg, Wekerle & Gilbert, 2013, 45). None of these is more important to the Holland Marsh than the Oak Ridges Moraine, which sits to the south and east of the marsh. This combination of glacial rutting and tilling makes up the essential geological features of the Holland River lowlands[10].

The overall geological condition of ruts and tills, common to the wider Great Lakes region, has provided a foundation for muck crop production in the Holland Marsh, but also in parts of Michigan and Ohio – examples I will return to later in this chapter. Within this broader regional geology, the Marsh is constituted by depressions in the shale and limestone, and connected to Cook's Bay and Lake Simcoe to the north. To the south and east, the highlands of the Oak Ridges Moraine produce a sandbagging effect, funneling water toward the Marsh lowland. The floor of the Marsh remains lower than its immediately surrounding area, and slopes gently northward toward Cook's Bay and Lake Simcoe (Lake Simcoe Region Conservation Authority, 2010, 29).

Even with the glacial rutting and tilling that constitute the Holland Marsh, there is nothing inevitable about the area eventuating in a wetland, and subsequently farmland. In other words, the work of the Laurentide ice sheet to assemble a geology conducive to resulting in a wetland was a necessary, though not sufficient geological condition for the eventual emergence of muck crop farming . In recent decades wetland geology has emerged as an academic discipline concerned with describing how relatively barren glacial landscapes transition into fecund marshes, bogs and wetlands. Similarly, the Canadian Wetland Classification System was developed to classify categories and sub-categories of particular kinds of marshes, swamps, wetlands, and the like (see Warner, 2004; Warner & Rubec, 1997). Unfortunately, because the Holland River *marsh* had been transformed into the fields of the Holland Marsh before either the classification system or wetland geology existed as a field of study, there is no record of the specific details of the creation and content of the Holland River marsh. However, it is still possible to speculate generally and with some confidence on how the marsh was formed.

The receding Algonquin Lake, which covered a good deal of southwestern Ontario immediately after the last Ice Age, deposited water and bacteria in the Holland River low lands. The geology left behind created a gently sloping watershed that traveled north and west from the Oak Ridges Moraine, eventually emptying into Georgian Bay.

As the water meandered through the Holland River valley, vegetative life eventually took hold – seeds blown in on the wind, carried and deposited in animal scat, or swept in on the river. The earliest vegetative life likely was comprised primarily of marsh grasses, sedge grasses, alder bushes and some coniferous species. For centuries, the flora would grow, die off, grow and die off again. Over time, a process known as paludification unfurled, spreading the accumulated decayed and decaying plant material – or what would become peat – latterly out from the riverbed (Warner and Rubec, 1997, 3). Over millennia an expanse of accumulated plant material filled the shallow water of the valley resulting in the creation of the marshy wetland. Technically, the Holland Marsh, before being drained, would have likely been classified – according to the Canadian Wetland Classification System – as an organic peatland. By definition organic peatlands contain greater than 40 cm of peat accumulation (Warner and Rubec, 1997, 1). Although the peat has already vanished in some spots on the edge of the marsh, in the middle where the muck and peat are deepest, there is allegedly still up to 7 feet left (P. Irvine, personal communication, September 25, 2013). Prior to being drained, the depth of peat would have been significantly more than this.[11]

This wetland geology – the rutting, tilling, pooling of water, accumulation of plant material and paludification – is essential to understanding the resulting socio-natural configuration that is the Holland Marsh. The build up of peat within the Holland River lowlands – a combination of decaying and decayed plant material, root mat, and fine silt – would inspire intrepid entrepreneurs, entice speculative investments, and seduce farmers from around the country, and indeed the world. Yet before the Holland Marsh came to be understood as a settler landscape, and subsequently a productive commercial landscape, it was met with scorn, displeasure, or simply disinterest by the colonial newcomers. The Marsh-as-marsh was, up until the early part of the twentieth century, of little interest to the growing settler population. As I discuss below, however, the precious muck soil was revealed, as it were, through a confluence of developments equal part moral, technical and profitable.

2.3 A swampy imaginary: revealing agriculture in the Holland Marsh

John Galt, a surveyor for the Canada Company famously remarked of the Holland Marsh in 1825 that it was “A mere ditch swarming with bull frogs and rattle snakes” (VanderMey, 1994, 1). Nearly forty years before this, in 1791, Canada’s first ever Surveyor General, Major Samuel Holland was happy to lend his name to features in the area[12], though similar to Galt, he failed to see any agricultural potential (Bradford West Gwillimbury Local History Association, 2005, 281). In part, the swampy landscape was a toss-away to the early surveyors – unimportant, inconsequential, empty and perhaps seen as little more than simply a nuisance. Other early colonialists would likely have felt similar to the influential journalist and social reformer George Goodwin, who devoted a good deal of his 1859 book *Town swamps and social bridges*, expanding on the notion that marshes are “dark and dangerous” places of “degradation and filth” (Goodwin, 1859, 1). Whether out of apathy, or disdain, the agricultural potential of the Holland River valley had yet to become legible as such to the early colonialists. Similarly, the nascent Canadian state did not recognize the area in any official capacity, other than as an agglomeration of physical features to be catalogued and accounted for.

As Susan Zeller (1987, 4) has argued, the early colonialists were preoccupied with 'inventory science', the "mapping and cataloguing of resources and other natural phenomena". This was no politically benign activity, though, tied up as it was with Baconianism (the belief that accumulating facts led to new scientific theories) and Newtonianism (the idea that nature is orderly, mechanical and subject to universal precepts) (Zeller, 1987, 4). Instead, as Zeller (1987) argues, these early scientific forays cataloguing the nation's 'resources' were instrumental in the forging of a national identity and the expansion (materially and ideologically) of the Canadian state. Agriculture, not only an incipient economic driver of the economy, was also crucial to the *idea* of Canada as a thriving, and worthy, colonial partner. As Zeller (1987; 241) puts it, "Canadians realized that their very future depended upon Canada's image abroad as an agriculturally promising country". Redclift (1999), making a similar claim, argues that taming the wild frontiers was, for the colonial settlers, part of the process of developing a 'proper' civil society.

On the one hand, then, it is curious that Holland and others did not understand the reclamation potential of the marsh, especially given that wetland farming has been an important agricultural practice for millennia (Verhoeven & Setter, 2010). Indeed, from as early as the Holocene period, Huron and Mohawk communities had used the Holland River valley as an important – and semi-permanent – site of grazing and hunting (Cilipka, 2004; Stewart, 2004). Whether or not the area was 'farmed' *per se* is more difficult to determine, and beyond the scope of this dissertation. However, it is worth pointing out, as Dawson (2003, 99) has that, "historians have, at best, ignored and, at worse, dismissed First Nations farming endeavors". This systematic neglect constitutes an important opportunity for future research as part of a broader effort to exhume the agricultural and farming histories (in plural) of Canada.

Wetland farming can be traced back even further to the very cradle of civilization in Mesopotamia where people congregated along river valleys and flood plains for the fertility offered by the mucky soil (Verhoeven & Setter, 2010). While there is no accurate appraisal for the total quantity of global fresh water wetlands, there have been estimates that in some regions – including Australia, Europe and North America – up to 50 percent of marshlands have been lost to conversion to agricultural lands, suggesting that wetland conversion has been a widespread historical phenomenon (Millennium Ecosystem Assessment, 2005). In Ontario, up to 80 percent of wetland areas have been transformed, lost, drained or converted to other uses (McLaughin, 1995, quoted in Giblett, 2014, 13).

On the other hand, given the preponderance of much more accessible and easily reclaimed land, it is not surprising at all that the early surveyors failed to see the agricultural potential of the area. Compared to converting wetlands into farmland, the investment required to transform far drier, and very abundant land in southwestern and central Ontario into productive farmland paled in price and effort. The specific configuration of state regulations and supports were designed to enable the conversion of woodlands, not wetlands, throughout the eighteenth and nineteenth centuries (see Lawr, 1972, Wood, 2000). The first, and far more significant wave of agricultural transformation in the province was aimed at the vast tracts of woodland throughout southwestern and central Ontario (Lawr, 1972; Wood, 2000). As Wood (2000, xviii) puts it, "The domain of southern Ontario was transformed from one ecologic category to another – from woodland to farmland – in less than a hundred years by an army of axewielding settlers and woodsmen". The rush to clear woodland for farmland in the late eighteenth and early nineteenth century was so fevered that Jones (1946) referred to the would-be farmers as "land-butchers" (Jones, 1946, as cited in Wood, 2000, xvii). No doubt this was perilous and exhausting work, however backed as it was by state support, woodland farming was far preferable to wetland farming.

Yet there is something more going on here. I argue that the nature-as-imaginary within the marshy landscape was imbued with (largely negative) characteristics by the earliest settlers. The Marsh was projected upon, its materiality discursively transformed, by generations of settlers who grew increasingly fearful and wary of swampland. Beset with Puritanical undertones and moral panic, the Holland River marsh of the nineteenth and early twentieth centuries was perceived as fit only for indigenous populations, bootleggers, and desperate settlers. However, the social context that ensured the marsh remained undeveloped for so many years also contributed as a precipitant for its eventual reclamation. The fear and mistrust the first generations of settlers had for wetland ecologies eventually turned proactive and inspired efforts by subsequent generations to tame the landscape through agriculture. That the landscape became legible, as it were, as productive farmland when it did is a result of the shifting socio-natural context within which the landscape was understood, a double process by which the muck soil was revealed both through the demonization of wetlands and the lionization of marshland farming.

2.3.1 Of morality and muck

> Man, by his depraved appetite, has turned the wholesome fruit of the earth into a destructive poison and has darkly set the upas tree where nature gave him fruitful vineyards, and has doomed his posterity to sorrow and madness.
>
> John Thorpe, Bradford, 1865

John Thorpe had passed on long before the first crop was harvested from the fields of the Holland Marsh. A Bradford resident, mill owner, and a demonstrably pious man (Bradford West Gwillimbury Historical Society, 2005, 412), Thorpe wrote a series of circulars vilifying intemperance in the latter stages of his life (Thorpe, 1864, 1865). Reading through these vitriolic expositions, one can almost imagine Thorpe perched atop the Bradford highlands that form the northern boundary of the Holland River valley, shaking his fist and straining his eyes, scanning the wetland for signs of the many moonshiners operating below. The distillers were likely drawn to the area for a number of reasons: in the late nineteenth and early twentieth century, the Holland River marsh provided would-be whiskey makers with ample protective cover against the prying eyes of the authorities (moral and otherwise) in the stands of coniferous trees and shrubs. Also, the abundant supply of water in the wetland provided a key ingredient in the "swamp water" spirit (*The Toronto Daily Star*, 1929, 2), while the ready supply of peat provided plenty of fuel for the fires needed to roast the malted barley, an essential step in the process of making scotch.

The peat, of course, had less nefarious, more popular uses, most notably as fuel for home heating. As a matter of routine – and at least initially, this was a non-commercial activity – area residents would cut large bricks of the peat out of the wetland for home use. Perhaps not coincidentally, discussions at York County Council to ramp up commercialization of the informal peat harvesting emerged around the same time discussions to convert the area into farmland began (*The Globe*, 1923, 9). To a man with the temperance zeal of Thorpe, however, one can imagine that peat harvesting was a suspect activity. And although Thorpe's derision was not directed primarily at the peat *per se,* the peat likely would not have fully escaped his scorn. To be fair, Thorpe was not alone, and many other observers ramped up the moral panic calling out the Holland River lowlands as a "dismal swamp" (*The Globe*, 1925, p. 1), a "useless marsh" (*The Globe*, 1931, p. 4) and a "desolate waste" (*The Globe*, 1933, p. 4).

In the Toronto area in the late nineteenth and early twentieth centuries, mistrust of wetlands was not simply a matter of the general wariness often accorded the landscape (see for example Giblett, 2014). Instead, in the early 1890s, a more specific threat loomed as warnings of a potential cholera outbreak in downtown Toronto escalated. Ashbridge's Bay, a wetland in very close proximity to downtown Toronto was fingered as the culprit, and put a fine point on the perceived dangers of marshes. Kivas Tully, a Toronto City Councilor and engineer began writing about the public health and economic benefits of transforming the Ashbridge's wetland into a working harbor in the mid-nineteenth century (Desfor, 1988, 79). In 1892, just one year before a cholera outbreak was predicted for Toronto, Tully wrote that if the development was allowed to commence "the source of these endemic diseases (e.g. cholera) which afflict the citizens, would be thus destroyed, and what is now a positive evil would be converted into a benefit – and a profit to the city" (Tully as cited in Desfor, 1988, 80).

As Jackson (2010, 2011) points out, although the risk cholera posed to individuals in and around Toronto during the late nineteenth and early twentieth centuries was quite low, panic nevertheless persisted. At the time, the world was in the midst of a fifth international cholera epidemic, and fear of the disease was rampant. Within this context, wetlands of all descriptions took on an evil air and were assumed to be certain breeding grounds for cholera and other diseases. The fear was such that one need not even come in direct contact with the materiality of a particular marsh – simply smelling the noxious stink of a fecund wetland was assumed to be enough to contaminate one's health (Jackson, 2010).

Previous to this, there was already a pervasive, and deeper seated suspicion of wetlands in the settler populations of North America established with John Winthrop's famous utopian call, in the 1630s, for the new world to be comprised of cities "upon a hill" (Winthrop, as cited in Vileisis 1997, 30). In an era of tense confrontation between indigenous and colonial populations, Winthrop's pronouncement amounted to a proverbial line in the sand – the hills were for the Europeans and the lowland swamps for everyone else. This Puritanical prescription – already pervasive in Europe – 'othered' swamps and wetlands and established them as dirty and godless places (Vilesis, 1997).

Through their vilification as places of disease and decay, coupled with modernity's Newtonist predilection, wetlands soon became places to conquer, to bring order to, to cleanse. As a politics of drainage emerged, Giblett (1996) argues, the act of draining became valorized as an antidote to what the wetlands represented. Draining was more than simply a way of making productive farmland; it was a way of purging the landscape of the evils of disease and waste. It was a way of exerting the Puritanical, and a distinctly masculine will over an unruly landscape. Wetlands were feminine; drainage a masculine expression. Swamps were dirty, wasteful places; drainage was a cleansing pursuit of profit and order. Marshes were indigenous; drainage was colonial "improvement".

On the Canadian frontier, as Redclift (2006, 18) argues, the propulsion behind landscape transformation was an important part in the colonial attempt to bring "social order to an apparently disordered world". As Giblett (2014, 14) puts it, "Wetlands were like heathen savages to be converted by the gospel of discipline and drain in order to live clean and useful lives". Within this context, 'taming nature' through agricultural drainage was more than simply a matter of landscape change, it was also a way of introducing civilizing values to the Canadian colony (Redclift, 1999, 119). By the late nineteenth century, a culture of 'aquaterracide', backed by a range of policy and scientific innovations, had arrived to the North American colonies (Giblett, 1996). Farming had become a viable, even celebrated antidote to the wetland condition.

2.3.2 Reclamation geographies and the genealogy of underdrainage

Once the agricultural potential in the landscape became legible, marshes, bogs and wetlands were understood as opportunities for investment and development through the imposition of agriculture. Wetlands became important sites within which biophysical nature and capital were brought together in the late nineteenth and early twentieth centuries. As Holland Marsh-area technicians, scientists, politicians, and residents became exposed to ideas about reclamation farming, the vast wetlands were transformed in their imaginations into a veritable techno-scape of ordered and efficient agricultural production. As Feldman (2011) points out, the emergence of particular landscape 'legibility' is shaped by ongoing human interpretations about the *value* of a landscape. Thus, as word of the success of other reclamation projects traveled to the Bradford area – within a milieu of shifting wetland perceptions and imaginaries – farming as a viable land use for the wetland slowly became legitimated.

Making the landscape legible as farmland opened up many opportunities for the penetration of capital and power into the Holland River lowlands. While the area had supported meager underground distillery and peat harvesting economies, as well as larger scale commercial mattress manufacturing[13], the economic activity resulting from the introduction of agriculture immediately dwarfed these preceding industries. After the initial wave of agricultural colonization that saw the transformation of the Ontario woodlands, word of the economic impact of muck crop farming filtered from towns in Michigan and Ohio down to the Holland River area.

Crucially, as the landscape was revealed as potentially productive and profitable, novel private property relations were formalized and enacted in the Marsh[14]. While the vast majority of the Holland Marsh had been privately owned for decades previous to being drained, the land was more or less valueless in monetary terms. The British originally purchased the marsh from the Ojibwa in October of 1818, as part of a much larger transaction known as the Penetang Purchase. The total area of land exchanged under the agreement consisted of 650,000 hectares (1,592,000 acres)(Bradford West Gwillimbury Local History Association, 2006, 15). The tract of land stretches from London in the west, to Lake Huron and Georgian Bay in the north, and to Lake Simcoe, and what is now King Township in the south and east. Much of this land was prime timberland and accessible agricultural land. Within the context of the Penetang Purchase, a smallish 3,000 hectare marsh was of little interest or value.

At the time of the first survey of the area, in 1819, the land was considered so valueless that no effort was made by the original surveyor to continue the concession and lot lines through the Marsh to the actual Holland River (Bradford West Gwillimbury Local History Association, 2006, 19). In a paper delivered to the Association of Ontario Land Surveyors over a century later in 1934, E. Cavell remarked that the original surveyor, "posted the lots on the high land, carrying his concession lines only to the edge of the marsh and on his plan shewed (sic) a large tract of waste land" (Cavell, quoted in Jackson, 1998, 17). Another survey of the area, conducted in 1852 by John Ryan, a provincial land surveyor, included work to extend the previous survey lines through to the river on both sides (Bradford West Gwillimbury Local History Association, 2006, 19) (see figure 4 below). Figure 4 shows that there were 22 landowners within the survey area, including the Canada Land Company, the British colonial land development corporation, indicating that at least some of the land was still held in a quasi-public land trust by the mid-nineteenth century.

Extending the lot lines through to the Holland River in the 1852 survey was largely an afterthought. Eager settlers, largely from Britain and Ireland, were drawn to Ontario during the early and mid-nineteenth century with the promise of free land (Redclift, 2006, 78). For those who were given land adjacent to the Holland River, the marshy section was a toss away. As local historian George Jackson (1998, 16) points out, "By 1852 most of the highlands had been taken up and the marsh lots were an extension of the highland lot and not considered to be of much value". In other words, the farmland on the highland surrounding the Marsh was the coveted commodity – the back end of the lots that sloped into the wetland were simply a burden one had to endure for the free arable farmland.

While the Marsh landscape can be considered a commodity from 1818 onward, in as much as it was exchanged for money between the British and Ojibwa, it remained essentially valueless for many years. The marshland had very little exchange value – in that it was simply tacked onto existing parcels of land and was largely ignored. It also had very little use value – in that it was not farmable in its current state – within an emerging settler state in which agriculture was a centerpiece.

Despite the increasing importance of agriculture to the social and economic development of the colony, it would be inaccurate to label the settler agriculture of Upper Canada or Lower Canada as distinctly capitalist during the first half of the nineteenth century. In Lower Canada (Quebec) agriculture was a semi-feudal mix of subsistence and seigneurial farming (Belshaw, 2015, 309; Russell, 2012). France created a propertied class – seigneurs – through a system of land grants and associated political rights. The farmers in Lower Canada were allowed to farm sections of land within a particular fiefdom, though the farmers did not own the land. In exchange for use of the land, the seigneur would take “feudal appropriations” from the farmers in the form of surplus wheat, labour or cash (Russell, 2012, 36. See also Ouellet, 1980).

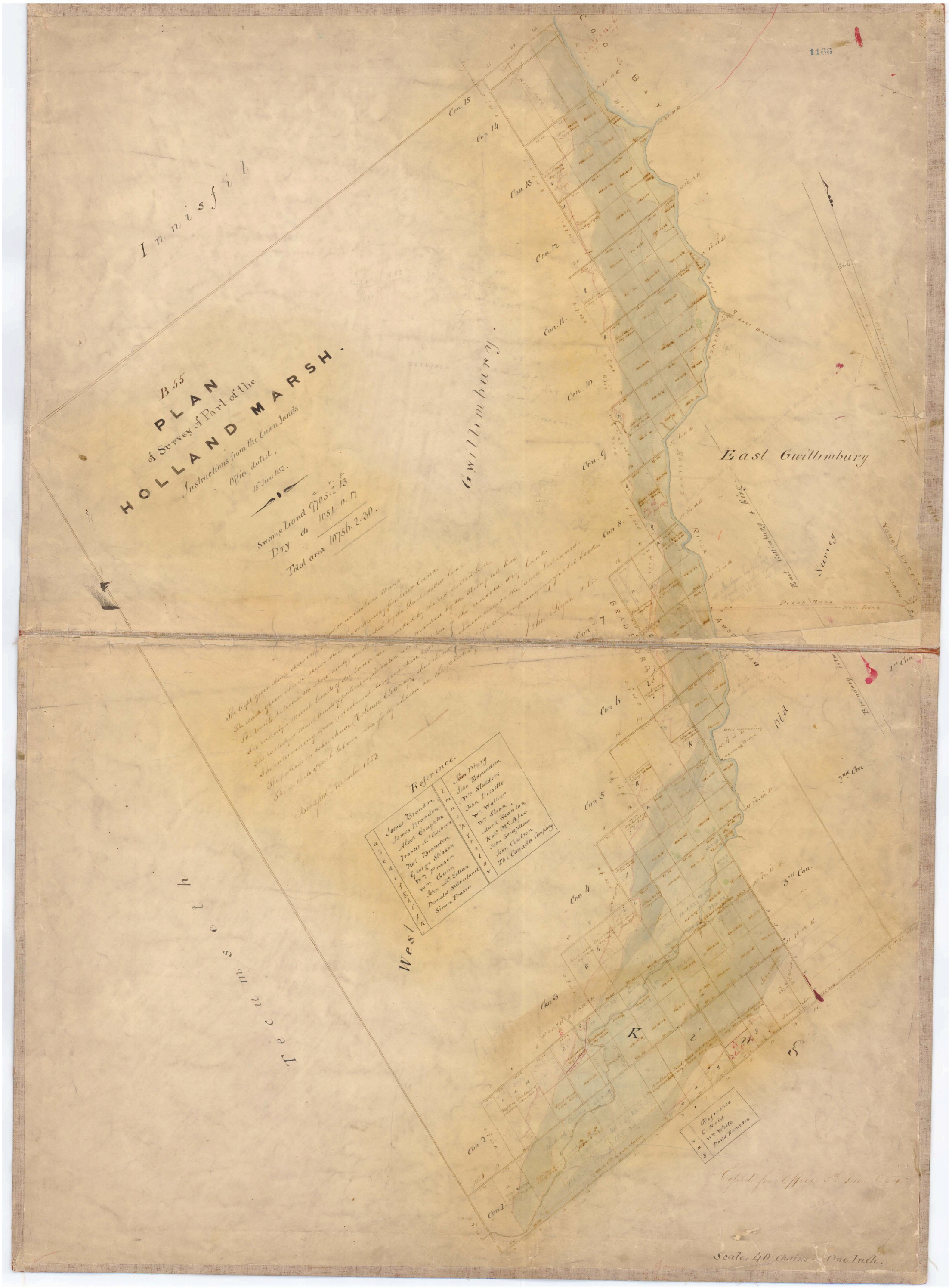

Figure 6. Ryan's survey - the lot lines on this 1852 map can be seen to be extending through to the Holland River. North of the 3rd Concession lines on the east side of the river is not complete in this survey. Courtesy of Holland Marsh Drainage Commission.

In Upper Canada (Ontario) the early agricultural system was quite different. Settler farmers were given land by the British government as part of the colonization process. This served the colonial government in two ways: On the one hand, over one million settlers arrived to Upper Canada in the first half of the nineteenth century (Redclift, 2006, 75). The promise of free land drove the settlers to colonize, and 'improve', ever more of the landscape. Land was the cost the colonial government was willing to pay the settlers for the heavy work of clearing the land, building transportation networks, and simply occupying land further westward (thus staking claim to it). On the other hand, as the settlers cleared the land and began growing wheat for export to the homeland, the British government was fortifying access to a steady supply of grain. This was a settler-colonial, mercantilist system of exchange – in which subsistence farming was still very much a part – more so than it was a fully developed iteration of capitalist farming (Belshaw, 2015; Russell, 2012).

The precise moment in which farming became capitalist (whether in Ontario, or simply farming in general) is the subject of much debate, and beyond the scope of this dissertation (see for example Brenner, 1976, 1982; Dobb, 1963 [1946]; Sweezy, 1978; Wallerstein, 1974; Wood, 2002). However, it is worth emphasizing that the social and cultural dynamics the Marsh was subject to were fundamentally altered through the process of being brought under production through agriculture. While the Marsh remained a valueless cast off landscape through the nineteenth century, this changed fairly suddenly with the prospect of drainage (though not before ownership of the land in the Marsh was consolidated in a four-man syndicate through the purchase of roughly 80 percent of the area to be drained – more on this below)[15].

The moment of drainage is crucial to the production of nature in the Holland Marsh. Not only was new physical material land 'made' through the drainage of the marsh (i.e. nature-as-land emerges) the process also necessitated new social formations and relations. Exchange relations, policies, legislation, novel scientific and technological innovations, and a land ownership syndicate all became folded into the process of the Marsh's production. As others have demonstrated, making landscapes legible – and making biophysical nature legible to capital – always involves social and political decisions, which inevitably reflect various relations of power (Braun, 2000; Robertson, 2006). In the case of the Holland Marsh, a new privileged legibility was instituted – one which continued to dismiss the value of the wetland, though it began to see the profit potential inherent in transforming the Marsh.

Indeed, the earliest news stories about the possibility of draining the Holland River lowlands focused on the putative financial windfalls by highlighting the per-acre returns (in the $300-$500 range) of similar reclamation projects in the geologically cognate areas of southern Ontario and northern Michigan. Newspaper editorialists emphasized specifically that the Holland Marsh, when drained, would yield vast wealth, not only carrots and onions (*The Globe*, 1924, X13). At the same time, boosters speculated that the Marsh would support "a thousand families of workers growing fresh vegetables" while countless others worked "in their respective factories springing up from year to year as the area develops" (*The Toronto Daily Star,* 1926, np).

One of the most evocative expressions of fervor came from the Bradford grocer W.D. Watson who, in 1911, wrote to Professor William Day, the eventual patriarch of agriculture in the Marsh. Watson writes,

> As I stood tonight at sunset and looked over our promised land with its broad acres of unbroken greatness with the wooded hills of King (County) in the background I felt a glance of pride at the immense possibilities which lies [sic] in the scheme (Watson as cited in Irwin, Filman & Gregg, 1968, 2).

This was a bold imaginary for someone standing at the edge of what had been known for decades as a wasteland. Similarly, the anticipatory, even celebratory tone of local news columns reporting on the expected profits and economic impact of farming in the Marsh belied the physical materiality of the marshland. Where did this optimism come from? Why did Watson see 'immense possibilities' in the landscape while generations of settlers before him had dismissed and/or feared it? These shifting attitudes with respect to the Marsh, and the growing faith in the landscape as a potential ally, not foe, can be understood as part of the broader process of nature's production, and connected to a wider reclamation geography.[16]

Within this context, Alexander Baird, the engineer hired to develop the initial drainage plan for the Holland Marsh, was a key conduit through which this regional reclamation was spread. Baird was a well-respected, experienced drainage engineer, having worked on drainage projects throughout southern Ontario – indeed he references some of these smaller projects in Essex and Kent counties and Point Peele in his Holland Marsh report (Baird, 1924). In the introduction to his official report, Baird (1924, 1) speculates on how profitable the Holland Marsh will become, comparing it very favourably to other existing projects,

> These lands when reclaimed and placed in a condition to permit of their cultivation and usefulness will become one of, if not the greatest producing

> sections of your part of the country and its most valuable lands and will enhance and enrich the township treasury.

Meanwhile, further south, into northern Michigan and Ohio, marsh farming was already quite established and profitable. As momentum for the Marsh drainage project began to build by the mid-1920s, rumours about the success of wetland farming in the US began circulating in local media. *The Globe* (1924, p. X13), reporting on an interview with Professor Day, writes,

> Mr. Day is very much interested in the survey which has just been made…He claims that the soil, latitude and climate are identical with those at Kalamazoo, Mich, which is famous the continent over for the quantity and quality of the celery produced on the marshes of that vicinity.

In Kalamazoo, the celery industry[17] was already well established as early as the mid-nineteenth century. By the early 1900s the industry was yielding between four and five million dollars worth of celery every year (Palmieri, 1997, 113). In addition to prodigious crops, the area was also publishing trade material meant to spread the word about muck crop farming. Kalamazoo in the late 19th century was akin to the Wild West – except celery, carrots and onions were the prized commodities, not gold. Companies like the Kalamazoo Celery Company[18] were key exponents of the hubris involved in muck crop farming during the era. In 1896, the company – leveraging a moment of alleged exasperation in the face of an overwhelming clamor for information – sponsored the publication of *How to grow celery anywhere* (Schuur, 1896). The introduction, penned by the company itself, sets the book's overall tone,

> Kalamazoo has no successful competitor in Celery Culture, either for quality or quantity produced. The celebrity of Kalamazoo celery has awakened so great an interest and desire to imitate, that inquiries received (from almost every section of the country) by principal shippers at this point regarding its cultivation, are becoming a serious burden if any attention whatsoever is paid to them. At best these inquiries could be answered only to a very limited extent. To meet the EMERGENCY we have published this book "How to Grow Celery," being a complete exposition of the methods of successful celery growing in this "famous Kalamazoo Celery" district (Emphasis original, Kalamazoo Celery Company, as cited in Schuur, 1886, 3).

There is no doubt that the success of Kalamazoo muck crop farming served as inspiration for Day and the other Marsh boosters. Day very likely would have even acquired a copy of the celery book, and likely would have even traveled to Kalamazoo to see first hand the drainage infrastructure, planting techniques, crop yields and the like. Indeed in 1910, Day took samples of muck soil from the Holland marsh back to his labs at the University of Guelph. Demonstrating a familiarity with a variety of places within the wider Laurentide geography, Day noted that the soil from the Holland Marsh was "almost identical in composition to the famous onion lands of Point Peele, the strong sugar beet area of Wallaceburg, the wonderful celery lands of Thedford in our province, and the world renowned celery sold of Kalamazoo, Michigan" (Day, as cited in Jackson, 1989, 41). Even now, contemporary farmers in the Marsh reminisce about reconnaissance trips to Kalamazoo, parts of New York and Ohio in the 1960s and 1970s (P. Irvine, personal communication, 2014, September 25). In any event, the muck crop farming in the Essex, Kent, Point Peele area of southern Ontario, as well as the Kalamazoo site certainly influenced Day and the other early Marsh boosters.

A striking element common to drainage reports (like Baird's), and the quasi-commercial communication/propaganda materials like *How to grow celery anywhere*, is the emphasis on the tools and technologies of the drainage trade. Clearly there were profits to be made from the development of wetlands – even today the Holland Marsh remains one of the most profitable per-acre agricultural landscapes in North America (Planscape 2009). However, to reduce the impetus driving the reclamation of the Holland River valley to either profits or a moral imperative to tame the land would be a mistake. For the boosters of the reclamation economy, reclaiming the wild landscape also provided an opportunity to showcase audacious technologies and cutting edge scientific research.

Indeed the chief champion and latter-day patron saint of the Holland Marsh, William Day[19] was a physicist at the University of Guelph, before moving to the Marsh to try his hand at farming the wetland in 1911. Under his direction, and with ongoing research support from the University of Guelph and the Ontario Agricultural College (OAC), the bold plan to drain the wetland was developed. For Day and the other boosters of the original drainage scheme, the feat was as much about creating new farmland through reclamation as it was about transforming the landscape with technology. Day authored a number of technical scientific booklets, published by the influential OAC, on everything from how to handle on-farm sewage disposal (1918), to tillage and crop rotation (1907), and of course, tiling and drainage (1908). However, it would be a mistake to think of Day as a farmer. While he would come to farm later in his career, he was also an academic, an experimental physicist, and an entrepreneur.

Day's (1908) central piece of academic work on drainage is essentially a report-cum-how-to-manual, very much in the style of other work published by the Ontario Agricultural College (OAC), to this day. Day (1908, 1) was clearly a believer in the technologies of drainage and water management to transform landscapes, writing, "many farms and various districts once wet and useless have been transformed by underdrainage into the most productive in the land". As a long-time scholar of drainage theory and practice, Day puzzled over why more farmers had not undertaken drainage work: "Contact with the people tells us why…the critical operations of drainage are even less understood than its benefits—farmers, generally, have no way of telling whether they have fall enough for underdrainage, what the grade of a proposed drain should be, nor any method of digging to a grade, or planning a general drainage system" (Day, 1908, 1).

Drainage constituted a body of knowledge to which the average landowner or farmer had no access . Day saw it as his duty to impart the highly technical, specialized knowledge to others. In an effort to advertise the benefits of drainage, and educate landowners and potential farmers on the practical techniques, Day and the OAC held workshops across the province. Day was holding such sessions in the Marsh area as early as 1910, and advertising through local media. One such announcement read,

> This meeting should be of special interest as some difficulty to drain is involved. Besides the discussion of the particular problem there will be a demonstration of methods of finding the fall over a ditch, determining the grade, defining true to

> grade, etc. Those of our readers interested in drainage should not miss this meeting (*The Witness-News,* 1910, np.)

There is, then, an element of technological fetishism to the early impulse driving the drainage of the Holland Marsh. One can imagine eager farmers in attendance at one of Day's seminars learning the tools and techniques of underdrainage, and having their perceptions of what farming consisted of fundamentally transformed. Day's message was that farming was not a dirty, tiresome drudgery – but instead a refined pursuit for thinking men and scientists. The farmers of the Holland Marsh would not simply work existing land with plough horses and hand tools, they would use modern techniques and cutting edge technologies to *build* and *master* a landscape. Day was not alone in convincing would-be farmers of this techno-dream, however. Instead, he was only one, albeit a central figure, in a larger network of individuals and institutions involved in the production of nature in the early days of Holland Marsh agriculture.

2.4 The Holland Marsh Syndicate – the emerging social formations of nature's production

The Holland Marsh Syndicate was born shortly after the Bradford grocer W.D. Watson first invited Day to visit and assess the marsh in 1909. Day, a noted and experienced technician, also proved to be an adept businessperson, forming the Syndicate shortly thereafter in 1911. The group consisted of five members – Watson and Day who each held five of the fifteen existing shares. R.L. McKinnon and David Baird (the son of Alex Baird, the chief engineer on the drainage project) each held two shares, and W.G. Lumbers, a produce wholesaler in Toronto, held one (Jackson, 1998, 41).

The Syndicate's initial concern was to seek out private capital to pay for the technology, materials and labour it would take to drain the marsh – an estimated $177,000 in all (Baird, 1924). Day allegedly took on the brunt of this work, seeking financial support from businessmen in Toronto (Jackson, 1989). While Day was busy attempting to raise capital, Watson remained in the Bradford area, leveraging his local connections to sign options with local landowners within the marsh for the right to purchase the land at a later date. In all, Watson negotiated options with over 70 individual land owners in the area for 970 hectares (2,395 acres) of the marsh on the West Gwillimbury side, and 1,310 hectares (3,236 acres) on the King side, or 80 percent of the entire area proposed to be drained. To be clear, this meant that, in effect, within about a year of forming, the Syndicate effectively owned 80 percent of the area intended to be reclaimed. Shortly after, Watson – the local contact and land negotiator – abruptly, and somewhat mysteriously left the Syndicate in 1912. Upon his departure Watson signed his Syndicate shares and the land options over to Day – meaning that Day himself had effective control over 80 percent of the proposed drainage area (Jackson, 1989, 43).

Meanwhile, Day's efforts to secure funding from venture capitalists had stalled. This was partly due to the fact that in the early 1900s, there was still plenty of available farmland in Ontario. Prior to the start of World War I and the end of the first food regime, markets for grain were as close to a sure bet as exists in farming given the grain-hungry British markets, the recent arrival of publicly financed grain elevators, and favourable state policies for grain production in general (Winson, 1993, 23). Within this context, investing in a scheme to drain a wetland to grow market garden vegetables likely seemed unduly risky. At the same time, the global austerity pressures of World War I meant that investors were in no hurry to dedicate scarce resources to a massive construction project to build what was essentially an experimental farm (success with marsh farming in other places, notwithstanding). Indeed, from roughly 1913 onwards all activities to drain the marsh were more or less suspended until the conclusion of the war.

In the years immediately following World War I, however, public spending was emerging as a way of boosting home (and global) economies, and as a way to develop job markets for the returning veterans. Perhaps sensing opportunity (while also conceding that private funds were likely not forthcoming) Day and the Syndicate filed a petition under the *Ontario Municipal Drainage Aid Act, 1916* in 1924, listing West Gwillimbury (in Simcoe County) as the initiating municipality (Irwin et al, 1968, 24). Given the geography of the marsh – and the fact that the Holland River is both a natural, and legal barrier between King Township and Simcoe County – the drainage plan could not be completed unless King Township council also signed on to the plan. With West Gwillimbury taking on more of the risk by signing on as the initiating municipality, and approving a by-law detailing the drainage plans in 1924, King council soon followed and signed a by-law in 1925 approving the drainage (Ontario Heritage Foundation, 1976, 3).

However, King Township's endorsement was tepid at best and they held off officially endorsing the plan until they were essentially forced to do so. Not wanting to have to invest any money in the project, King Township filed an appeal under the *Ontario Municipal Drainage Aid Act, 1916* (Ontario Heritage Foundation, 1976, 3). King Township had concerns about the cost they would have to carry if the drainage project went through, and sought an injunction on development of the area. It seems as though the national priorities of job creation, economic stimulation and agricultural expansion won out over the financial concerns of King Township council, however; the appeal was denied and the development was approved – decisions enabled through the provincial drainage legislation.

Drainage law in Ontario has a complicated, almost 200-year history[20]. It began with the 1835 *Act to Regulate Line Fences and Watercourses,* which for the first time, codified in legislation an authorization process for manipulating the flow of water through farming landscapes (Mitchell & Blacklock, 1973, 2). The 1835 *Act* also enshrined a funding principle which established that the cost of drainage construction would be shared among the individuals and bodies concerned in proportion to their interests (hence King would be on the hook for roughly 40 percent of the cost). Later iterations of the *Drainage Act* would also call for the appointment of a Drainage Referee whose roll it was to interpret the legislation, hear submissions and appeals, and generally sort out the inevitable and frequent concerns over the burden to pay construction costs. When the Holland Marsh drainage petition was approved, and King Township's appeal denied, K.C. Henderson was Drainage Referee (his long tenure ran nearly three decades, from 1906 – 1934). Henderson was an experienced drainage lawyer from Ottawa who had little time for those seeking to use appeals to block the progress constituted by drainage projects. His cavalier attitude toward drainage roughly matched that of the Kalamazoo Celery Company. At the 1915 annual meeting of the Association of Ontario Land Surveyors, Henderson – a regular attendee – reportedly gave a memorable speech, at one point opining,

> Of course the danger, as we know, is mainly in the Court of Appeal, because I have never hesitated to say this from the bench and I say it now, that I try to work

the *Drainage Act* out in such a way as to dig drains and not print appeal books (Henderson, as cited in Mitchell and Blacklock, 1973, 27).

In hindsight, given Henderson's perspectives on drainage projects, as well as those of the state, King County's appeal had virtually no chance of resulting in a cessation to the project.

Once both of the relevant townships had signed on, and agreed to issue debentures to fund the project, a petition to drain was forwarded on to the Provincial government. Henderson's personal predilections aside, this was largely a regulatory formality, given that the province had no real interest in wetland management, let alone wetland conservation, during this post war period (Mitchell and Shrubsole, 1994)[21]. That the syndicate secured additional funding for the drainage project through the *Provincial Aid to Drainage Act 1921*[22] further demonstrates the extent to which the state supported agricultural expansion throughout the province. In 1925 the Holland Marsh Drainage Commission was formed, and dredging officially began.

2.4.1 The Syndicate affair: Power and the politics of drainage

At the risk of upsetting the general chronological structure of this dissertation, the following section briefly addresses issues that came to light in the 1930s. I discuss them in the context of this chapter, however, because the events in question occurred previous to the Marsh being drained. Just as the first farmers were clearing the newly-formed land in the early 1930s, accusations were being directed at the Syndicate for their actions of a decade previous. In the winter of 1932, Clifford Case, a Conservative MPP for York North (which overlaps with the King side of the Holland Marsh) accused the drainage project of being “fraudulent and iniquitous” (Case as cited in *The Globe* 1932 Feb 2, p. 1). Case had essentially two main claims – first, he argued that, after an extensive investigation, he found that the original drainage petition prepared by the Syndicate and sent to the province was filled with forged signatures of “stenographers, brothers, sisters, and farmers’ sons” (Case, as cited in *The Globe,* 1932 Feb 2, 1), most of whom did not own land in the wetland, and many of whom lived 125km away in Guelph (where Day had lived previous) not the Holland Marsh area. Case claimed that the petition had been padded with names of people who did not own land in the area, and so had no standing in signing a petition pertaining to the Marsh. If the allegations were true, it would have been a clear violation of the *Drainage Act,* which requires that petition signatories own land in the area pursuant to the petition.

The second charge Case brought against the Syndicate was that they had failed to pay the taxes on the drained land, and schemed to have King, Simcoe and Bradford/West Gwillimbury landowners (in addition to the Province through *the Aid to Drainage Act*, 1921) pay for the entire drainage through their property tax. He claimed that the Syndicate was refusing to pay $30,000 in back taxes and was selling parcels of farmland to unsuspecting buyers, without disclosing that the taxes on the land were in arrears. Case had harsh words for the Syndicate, claiming that “They put you (landowners, King and York townships) through the wringer…they hung you up on the line and they didn’t even come back to see if you had dried up” (*The Globe,* 1932 Feb 2, p. 1). In short, Case’s complaint was that the Syndicate “was in for a big real estate speculation which would net it millions of dollars” (*The Globe,* 1932 Feb 2, p. 1).

Day defended the Syndicate vehemently in the media, arguing that all the signatures on the drainage petition were legitimate, attached to real local residents, and that the financial dealings of the Syndicate had always been conducted in good faith (*The Globe,* 1932 Feb 3, p.1). Day pointed out that West Gwillimbury, as the primary signatory of the petition under the *Municipal Drainage Act,* had breeched their contract with the Syndicate by not upholding terms of the contract stipulating that the drainage work would be completed by 1926. So while it was true that the Syndicate had not paid taxes on the land between 1926 and when the drainage was completed in 1930, Day argued that they were not responsible for the payments because the drainage had not been completed. In short, the Township was not living up to its end of the bargain, and so Day claimed, the Syndicate did not owe taxes on the land for the intervening years.

More interestingly, Day argued further that the land was valueless until drained, and that the Syndicate had been holding the land in good faith throughout the period of WWI, until enough capital and labour could be marshaled for the drainage project (*The Globe,* 1932 Feb 3, p. 3). They had paid taxes on the land (even though it was un-drained) up until they were obligated to (1926), at which point the municipal authority, having *not* met their own responsibility, became the ratepayer.

The situation evolved from a local matter, to a provincial one when Thomas Kennedy, Minister of Agriculture for Ontario got involved, saying,

> I feel the townships should investigate…I have asked King Township Council, and I shall ask the Council of West Gwillimbury Township to meet me immediately to clean up this situation in the interests of the taxpayers of the two townships. There is a petition in the hands of the Clerk of West Gwillimbury with

> names purporting to be signed by W.H. Day and R.L. McKinnon, by power of Attorney, when some of these people have admitted to me they do not, and never have, owned land in this area, and have never, to their knowledge, given Day permission to sign their names by power of attorney (*The Globe,* 1932 Feb 6, p.13).

Under pressure from the Minister, the Reeve of King township, Milton E Legge, requested an inquiry into the matter in mid-February, 1932. Legge met with the Attorney-General, W.H. Price, who requested that the Councils of King and West Gwillimbury investigate under section 257 of the *Municipal Act* (*The Globe,* 1932 Feb 13, p.13). County Judge Widdifield was appointed to the case after the first Judge that was approached, J. Herbert Denton, oddly said he was too busy (*The Globe,* 1932 Feb 13, p. 1).

Upon reviewing the case, Judge Widdifield – after initially adjourning the inquiry because he claimed the original drainage petition could not be found – released an interim report in early March 1932. He found, first of all, that there had been no wrong-doing whatsoever, writing, "If I am right in my construction of the statutes, it seems to me there is nothing left to investigate, and it will be a waste of time and money to proceed" (Widdifield, quoted in *The Globe,* 1932 March 10, p.11). At the same time, Widdifiled went on to argue that he did not actually have proper jurisdiction to make a ruling on the case, because the initial signatory of the original drainage petition had been signed by West Gwillimbury (the Simcoe county side), and not by King County. A special joint meeting of the West Gwillimbury and King Township councils and the Holland Marsh Drainage Commission was held on March 9 1932 to review the findings and determine if a Simcoe judge should be appointed to investigate the case (*The Globe,* 1932 March 10, p.11).

A few days later, on March 14 1932, it was reported that the inquiry was going to be dropped altogether. It was determined at the special joint meeting that there was not enough evidence to pursue the matter any further. As Reeve Edgar Evans of West Gwillimbury put it, “we have nothing to probe, unless we have further evidence” (Evans quoted in *The Globe,* 1932 Mar 14, p. 12). I was not able to find any record of subsequent meetings related to the issue, nor was I able to find any further evidence of the (non)inquiry in any archives or media sources.

The details of this episode are somewhat obscured by the passing of time and the lack of documentation, and so it is likely impossible to ever fully understand the veracity of Case’s accusations and what the Syndicate actually did. What is apparent, however, is the extent to which the state (and its appendages) had cause to put an end to any controversy as soon as possible. The drainage, initially decided upon as early as 1912, had already been stalled by the First World War, a lack of capital and labour, and various construction delays. Case’s accusations risked furthering delaying farming in the Marsh by having the land tied up in litigation for months, or possibly years longer. Keep in mind that by 1932 the land was drained and very small test plots were already in production, and yielding significant harvests. In other words, the Holland Marsh was tantalizingly close to becoming the agricultural juggernaut Day and the other marsh boosters dreamed it would be. At the same time, a provincial government looking to boost employment and economic activity during an era of acute economic depression had very little incentive to further delay the development of the Holland Marsh.

This is not to suggest that the strong incentive to drain the wetland resulted in a cover up – indeed, there may well have been nothing to cover up. Case's accusations may have been baseless. His angry reaction in the media may have simply been political grandstanding. However, what is made clear through this episode is the extent to which culture and politics are enmeshed in the process of landscape change and the production of nature. The *social* perceptions of the Marsh had changed dramatically in a relatively short period of time. It had once been reviled and feared, and simply ignored as a cast off – and by the 1930s, public battles were being waged between politicians and businessmen over the very same landscape. As the political and cultural context outside the Marsh shifted, the landscape within morphed as well. By the early 1920s, Canada was facing some of the highest recorded unemployment rates in the country's history due to declines in manufacturing and an agricultural sector struggling through drought and the effects of the Great Depression. The potential of the Holland Marsh – the cultivated imaginary of smiling, profitable farms which would employ thousands of workers – stood as an alluring prospect to local and regional government leaders in ways that could not have been thinkable to the first colonial settlers.

2.5 Conclusion

There is nothing inevitable about the arrival of farming to the Holland Marsh. Nor is there anything particularly 'natural' about the Holland Marsh, contrary to the imaginary cultivated by contemporary Marsh boosters (see www.hollandmarshgold.com). The retreating Laurentide Ice Sheet established the wetland geology of glacial rutting and tilling which yielded a landscape that would eventually foster thick peat. The 'first nature' of this landscape, however, was transformed – both discursively and materially with the introduction of farming to the area.

While the instrumental pursuit of profit played a part in driving the imposition of agriculture (as conventional political economists would point out (Mitchell, 1975), there were other, equally important dynamics propelling the process. Desires to tame the landscape, to advance the colonial project through cataloguing the land, and to improve the land through cultivation were each crucial to the development of agriculture in the Holland Marsh. The culture of 'aquaterracide' (Giblett, 1996) backed by a range of scientific and policy interventions was part of a broader thrust of 'taming nature', and in this respect part of normalizing nation building through landscape change (Redclift, 1999).

Notwithstanding the bootleggers and marsh grass harvesters, up until 1925 human driven physical changes in the landscape had not been systematic. That is, there had been no wide spread agricultural-related changes in the Holland Marsh. However, as I have attempted to emphasize, the production of nature in the Marsh required a good deal of discursive and material work well before a single carrot was ever grown. The land became subject to different ownership and regulatory regimes, it was bought, sold and traded for, and it was projected upon by a generation of eager farmers – and again, all before a single seed had been sown.

Yet while the Marsh boosters had, to some extent, mastered nature-as-imaginary through excited news headlines and tales of abundant yields in Michigan and Ohio, they had yet to confront the messy reality of nature-as-form and nature-as-land. As the dredging machine was about to make its first cut of the 27 km canal that would eventually encircle the Holland Marsh, one can imagine that the mood among the Marsh boosters and onlookers was generally optimistic. Their mastery over 'nature' was about to be realized, as the smiling farms were chopped out of the dismal swamp. Yet what was meant to be a two-year project ended up taking over three times as long – partly because another World War intervened, though also because the biophysical nature of the Holland River marsh was far less co-operative than the Marsh boosters could have imagined.

Chapter Three. 1925-1935 – Politics, state, and soil: The production of fields in the Holland Marsh.

3.0.1 Introduction

In the preceding chapter, I explored how nature's form (the materiality of the wetland) and imaginary (created through the general rhetoric of dismal swamp to smiling farms, as an example) lay the groundwork for the future development of agriculture in the Holland Marsh. The state encouraged the drainage through enabling legislation, support of pro-'improvement' bureaucrats (Henderson, the eager Drainage Referee), and capital in the form of funds to pay for the project. For their part, Marsh boosters and a supportive media deployed a range of imaginaries heralding a Promethean dream of tamed landscapes, corralled water, rich muck soil, and profit. All of this, however, occurred before a single meter of the canal had been dug, before a single excavator had been started, and well before a single vegetable had been grown in the Holland Marsh.

This chapter will attend to a seminal decade in the history of the Marsh, between roughly 1925, when excavation finally began, through to roughly 1935, by which point regular, however unprofitable, crop production had been established.[23] This is the period during which the material landscape of the marsh was thoroughly transformed from a wetland to farmers' fields through a confluence of policy, technology, labour and capital. This period in the history of agriculture in the Marsh largely confirms Smith's (2008[1984]) perspective that the production of nature is willingly facilitated by the state. However, important exceptions also emerge during this era – nascent critiques highlighting the ecological damage caused by agriculture in the Holland Marsh – which hint at the importance of environmental politics to come, an oversight in Smith's (2008 [1984]) work, as Castree (1995) points out.

During this period of the history of the Holland Marsh, nature-as-land emerges as a crucial modality, as land was literally created, portioned off, bought, traded for and sold. The land of the marsh was commodified in ways that departed dramatically from anything that had occurred in the area previously. The discursive and material transformation of the landscape also had an attendant conceptual element. As the dredging machine cut its way through the peat and clay, and as arterial drainage ditches were dug and tile laid, land emerged. However, the visceral materiality of the process of making this land belies the attendant conceptual abstraction that was taking place. Just as the land was emerging, it was also being thrust into abstract exchange relations, assigned (inflated) value, and propelled into a complex political economy of food and agriculture. The transformation of the land, then, is no simple material process, but rather a defining moment in the history of the Holland Marsh.

At the same time, the materiality of the *process* of drainage cannot be ignored. Up until work on the canal began, draining the Holland Marsh remained purely theoretical. William Day and Alex Baird did have some experience with other drainage projects in southern Ontario, and were familiar with the details of still others in northern Michigan and Ohio, yet neither had been at the helm of such a large project. Meanwhile, the dredge workers, local people, and would-be farmers who had all heard so much about the promise of a *drained* marsh were confronted with the inconvenient reality of the *draining*, a process that ended up taking about 5 years longer than expected. The form of biophysical nature is not always so easy to change. Throughout the process the physical materiality of nature presented itself, stubbornly resisting the tidy image Marsh boosters had in mind for the transformation. Heat, cold, frozen ground, broken machinery and exhausted workers all exposed the fact that if agriculture was to come to the Holland Marsh, it was going to take more than a few headlines about smiling farms.

The remainder of this chapter will describe the coordinated efforts deployed to transform the Holland Marsh. I begin by describing the Herculean processes involved in dredging the original canal. I then move on to discuss the supporting organizations, regulations and legislation that supported and enabled the work. After this, I discuss the defining feature of the Holland Marsh – its soil. I conclude by discussing some of the ecological contradictions that were initiated at the outset of the drainage, which continue to haunt the Holland Marsh scheme[24].

3.1 The (political) science of underdrainage

> "[P]rofitable returns from farm lands depend first of all on effective drainage" (In the preamble to a summary of Ontario drainage law, Irwin 1967, 1).

In the early part of the 20th century, water management was considered a sub-discipline of the science of farming. This was particularly true within the Great Lakes basin, with its shared geological history – but even beyond, into the American Midwest and other parts of Canada. Controlling water in the fields seemed to be the main preoccupation of farmers, with crops an ancillary benefit (see for example, Fiege, 1999; Stunden-Bower, 2012). Within the Marsh, William Day was the chief prognosticator of underdrainage, with the *gravitas* of the Physics Department at the University of Guelph and the Ontario Agricultural College behind him.

From the mid-1920s until the post-war recovery, Ontario's economy, dependent as it was on agriculture, struggled along as did most other agricultural-dependent economies (Winson, 1993). While there was little public money available for investment during the period (especially during the war years), the preponderance of potential (that is, un-drained) farmland in Ontario would have been very attractive as a central part of a job creation/economic recovery strategy. Day's own estimates, in 1909, put the number of hectares of current farmland, simply in need of *improved* underdrainage in Ontario at over 1,906,000 hectares (4,710,000 acres). He added to this another 2,023,000 hectares (5,000,000 acres) of untouched landscape comprised of "slash land…swamp, marsh and wasteland" (Day 1909, 24), for a total of nearly 4,050,000 hectares (10,000,000 acres) simply in need of drainage. Day argued further that if only the drainage infrastructure on existing farmland was improved, those 1,906,000 hectares would see an average increase of $50 per hectare, for a total increase in annual yield of $94,200,000 – without even factoring in the economic impact of draining the untouched land, or the labour required for such an ambitious project. Day does not provide references or any explanation for the estimates. This is likely due, in part at least, to the fact that the *OAC Bulletins* were more a tool of popular communication (or perhaps popular imagination) than they were an academic forum. It is, as a result, difficult to confirm the veracity of the estimates. However, it is clear that invoking the potential of a $94,200,000 increase in provincial farm profit would have piqued a broad interest during a period of acute economic depression.

This extension work by the OAC was part of a broader spread of generally progressive agrarian politics that emerged in the immediate aftermath of World War I

(Winson, 1993; Wood, 1975). The United Farmers of Ontario ran a slate of political candidates in the 1919 Ontario general election and won enough seats to form the government, demonstrating the extent to which agrarian politics were at the fore of many Ontarians' minds during the era (see Winson, 1993). The OAC, within this context, was meant to be a supportive, rather than a revenue generating enterprise. Indeed, as it related to drainage, the College would send "drainage advisors" to willing farmers and landowners free of charge – part of the state's efforts to support farmers and increase the total amount of land under active production in the province. The majority of the costs involved – the advisors' salaries – were paid for by the province. However, other marginal costs were to be covered by the farmer/landowner. Day described the details of the OAC's expectations in a 1909 publication;

> There is no charge for the services of our drainage advisors…but their travelling expense, consisting of railway fare at a cent a mile each way for this work, meals on the way, if any, and cartage of instruments, if any, must be paid by the parties for whom the surveys are made (Day, 1909, p. 24).

The work of the OAC under the direction of Day further reveals the state's preference for agricultural land use over existing landscapes – confirming Smith's (2008 [1984]) accusation that the production of biophysical nature is propelled by capital and facilitated by the state. At the same time, however, Day's underdrainage work with the College was not *only* about the pursuit of profit – instead it also comprised an attempt to introduce a greater degree of control to the unkempt landscape – to build it into a more manageable, predictable form. A two-part *Bulletin* authored by Day (1909, 1909a) articulates the penchant he (and by extension, the OAC and provincial government) had for drainage – and the extent to which drainage was a priority for the Provincial government in particular. The first in the series explains the benefits of drainage and tiling, extolling the advantages of better soil, earlier seeding times, control of water through damming, and the like, while the second describes the process of building the infrastructure. Day (1909a, pp. 15-16) describes the tricky process of surveying the land – an essential step in corralling the landscape for farmland – while pointing out the indispensability of the College,

> [W]hen it comes to planning of a general system for 50 or 100 acres, a system composed of several miles of drains, every part of which must fit in with every other part, the grades of which must be sufficient for effectively draining all low spots, and yet not require too deep digging in knolls, the depths of which must, nevertheless, be great enough in flats to protect the tile from frost, the outlets for which must be ample and free – when it comes to the planning of such a system, many of which are imperative in almost every county if proper drainage is to be secured, few, if any, have been or are now in a position to undertake such work intelligently, and for obvious reasons: Firstly, because some knowledge of surveying and mapping is needed, and secondly because a surveyor's level is essential, neither of which the farmer has. Nor until recently has he been able to obtain assistance in the matter.

Although somewhat condescending, Day is right in his assumption that very few farmers would have had any formal training in conducting land surveys, and likely would not have had the resources to purchase surveying equipment – thus the need for provincial support to train a generation of farmers to transform wasted wetlands into productive fields. From the mid-1920s through to the post World War II years, most of the new farmers to Ontario immigrated to Canada from northern and eastern Europe, often arriving with very little material wealth. Even if some immigrant farmers brought with them specific skills, expertise or knowledge about drainage from their home-countries, Day and the OAC would likely have not been interested, preferring instead to institute a routinized, scientific set of drainage protocols. These newcomers were conscripted into the mammoth project of laying a meshwork of underdrainage tile clear across the province, one field at a time, and were expected to heed the direction of personalities like Day. Elaborating the strategy in part, Day continues (1909a, 16),

> In the autumn of 1905, however, the department of Physics, which had for some years been teaching the subject of drainage, was authorized to go out through the Province, when farmers applied for assistance, and make a general survey of the land, locate the outlets and the drains, determine the grades and size of tile, and finally send the farmer when ready a map of his farm showing the complete system of drains, the grades, the sizes of tiles, etc. It is the writer's intention to give here a brief description of the method of surveying the land and laying out the system, and a detailed description and interpretation of a map, not in the hope of enabling farmers to undertake these general surveys, for we know the work is too involved and the instruments needed to delicate and expensive for that, but in order that when we have made a survey for a man and sent him his map, a copy of

> this bulletin will enable him the better to understand the map and construct his drains according to it. (Day, 1909a, 16-17).

The work of Day and the OAC clearly demonstrates the extent to which the province supported agrarian production. However, it also displays a disregard for wetland landscapes. Framed slightly differently, the OAC's early extension work can be seen as a device by which the state promoted and reinforced privileged ways of being in and interacting with particular landscapes. There is a clear instrumentality in the perspective of the early Marsh boosters, backed by the province, which positions the landscape as useful only in as much it is acceptably ordered, controlled, and profitable. Certainly the Marsh had use value to many people previous to the introduction of agriculture –the early indigenous populations, bootleggers and draft dodgers-cum-naturalists made use of the Marsh previous to its transformation. By the early part of the twentieth century, the promoted use, in keeping with the agriculture-driven economic development policies of Canadian settler state politics (see Wood, 1999), was to transform the wetland into fields. Various appendages of the state apparatus – including the *Drainage Act*, the Ontario Agricultural College and its bulletins – built up a cultural, discursive and even legal scaffold to support the material transformation of wetland landscapes and the production of nature in the Holland Marsh.

While the predilection for drainage was perhaps not unanimous in 1920s Ontario, it was very nearly so. Anything resembling contemporary environmentalism was decades off, and even conservationism in the province had yet to fully take form. It was not until the establishment of the *Conservation Authorities Act* in 1946 that conservationism was codified and supported by state legislation and funding mechanisms. This demonstrates important limits the state, politics and social movements can impose on the production of nature, a theme I take up in Chapter Four. However, in the early-mid 1920s, there was scarcely any opposition to the notion of underdrainage in general, or draining the Holland Marsh, in particular. Only two instances in which individual opinion deviated from the dominant, pro-drainage sentiment of the day were revealed within the archival record. Even though objections to the project were few, they remain notable. These early contrarian perspectives demonstrate that, even if the state is monolithic – as Smith (2008 [1984]) suggests – reception of state direction and preference is not. Despite the vast architecture of support for the project, dissenting perspectives still emerged. And while it had little impact on the project initially, the spirit of the protest to the drainage would carry on, manifesting as a more developed environmentalism in the 1960s and beyond.

In the first case of critique of the drainage plan, Dr. D.A. Bentley, head of the Department of Biology at both the University of Toronto and the Royal Ontario Museum, raised some concern that draining the Marsh would result in the loss of bird habitat. In a 1926 column in *The Toronto Daily Star,* Bentley pointed out that there had been no research (nor anything included in the engineer's report) about how draining the marsh would impact the resident birds. Ultimately, however, Bentley concluded "I do not think, however, that there is any cause for alarm in Ontario yet…There is still a great deal of territory where birds of these types may find a living" (Bentley, as citied in *The Toronto Daily Star*, 1926, 2). In contrast to this meek objection to the project, a far more critical voice of the initial plan to drain the Holland Marsh emerged about a decade later. Bride Brode, a columnist for *The Globe,* wrote scathingly in 1937 that the drainage project was “criminally wasteful” and “actual theft from the future” (Brode, 1937, 13). I return to her biting critique further along in this chapter.

In this respect, the efforts of Day, the OAC extension program and the province to cultivate a pro-drainage milieu cannot be ignored. Appeals to science and technology – and emphasizing the technical difficulty of the work – were ways of imbuing the pro-drainage perspective with authority. Underdrainage within this context was not simply about turning swampland into fields, but rather it reflected a higher purpose animated by the mobilization of cutting edge science, technology and techniques. Unprecedented in ambition and scope (within 1920s Ontario), drainage of the Holland Marsh clearly fits within the pro-drainage sentiment of the day, but it also extends and amplifies that logic. To onlookers, the Marsh project was an exemplar of the pro-drainage perspective, a showy project backed by academic experts, the OAC and the provincial government. The scientific dazzle captured the imagination of local residents and media, in a profound collision of culture and science. As the *Globe* (1926, np.) reported, the drainage of the Holland Marsh was the showcasing of scientific advancement – a shared cultural moment and the expression of a dream:

> Seeing this great change, those watching this great reclamation project begin to understand in a concrete way that it is not an experiment, that the dream of a generation of advanced agriculturalists is about to be realized and the Holland Marsh will be converted into a garden that will blossom as the rose and support a thousand families of workers growing fresh vegetables for Toronto and other cities of the dominion.

There was clearly an aspirational element to the drainage project. The Puritan values of cleanliness and orderliness motivating the original idea to drain the marsh discussed in Chapter Two began to become a material reality by the mid-1920s. After decades of false starts the dredging was about to begin. The Marsh boosters, would-be farmers and general on-lookers would watch in awe as the wild landscape was ripped apart and neatly reassembled into orderly, sanitized and productive farmland.

3.2 Dredgers, ditches and diggers – Carving the Holland River lowlands

Dredging began on September 25, 1925, following Alex Baird's engineer's report – a document, incidentally, he had first begun working on as early as 1910. The plan was an audacious one – to cut a 27 kilometer-long ditch, up to 20 meters wide and 2 meters deep, around the Holland River marsh; dam the northern end of the Holland River near Yonge Street; and install two pumps near the dam capable of moving over 75,000 liters of water, each, per minute (Bradford West Gwillimbury Local History Association, 2005, 287).

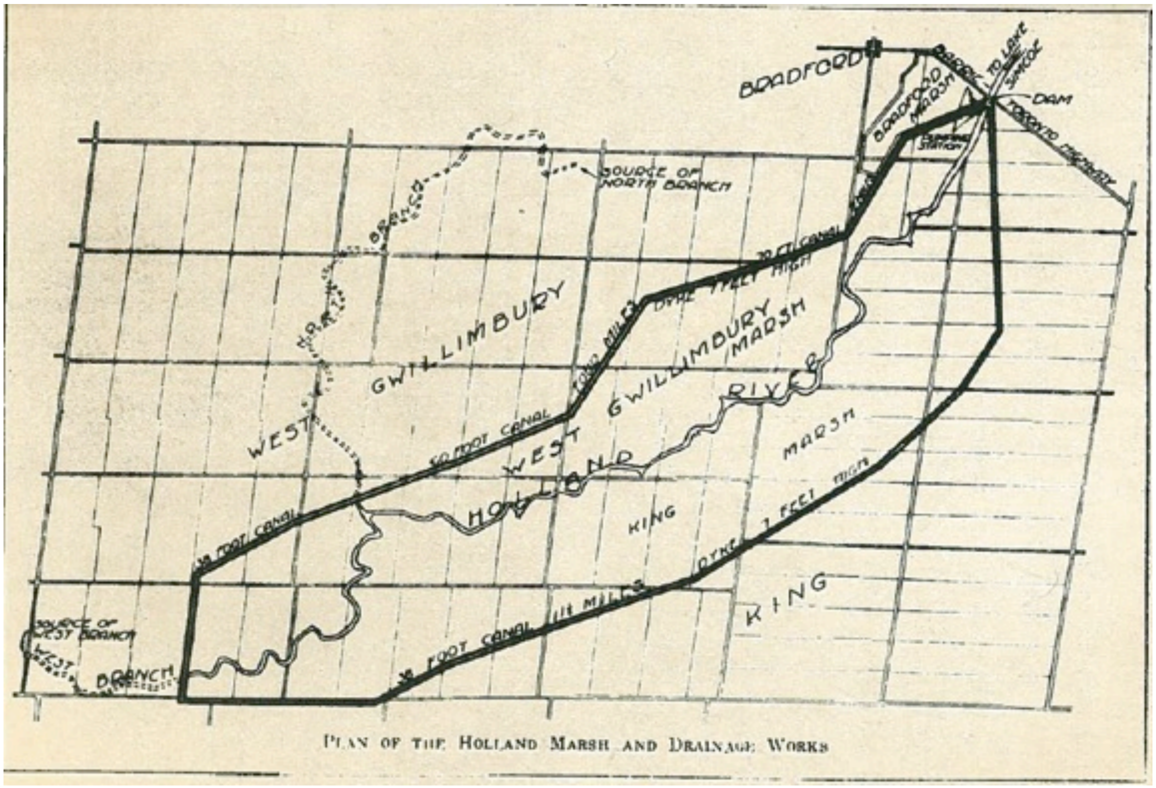

Figure 7: Drainage plan from 1924 (Source: Irwin et al. 1968). An earlier version of this map was included in Baird's original drainage proposal in 1911. Retrieved from Archives of Ontario, B388426 – ARDA Holland Marsh.

Dredging the canal was as much a public spectacle as it was an engineered construction project. According to one source,

> The crowd on the riverbank raised a cheer as the dredge nosed into the bank and lifted the first buckets of muck, soil and water; the first cuts in carving out the 27-kilometer canal around the perimeter of the Holland Marsh (Bradford West-Gwillimbury Historical Society, 2006, 281).

The dredging machine was brought to the Bradford area by rail in four pieces, and assembled onsite. It was almost 25 meters long and 9 meters wide, with a 20-meter boom (see figure 6 below). There was a shorter 11 meter 'dipper stick' mounted to the main boom, on which a large shoveling device, capable of excavating two-cubic yards of material at a time, was mounted. The dipper stick swung on the boom through a system of cables and pulleys, propelled by a steam-powered engine. As the dredger worked, it would cut through the plant material and moss, through to a layer of clay below. The material was pulled up and deposited on the outside of the canal to create an embankment as the dredger moved along. (Bradford West Gwillimbury Local History Association, 2005; Jackson, 1998).

The dredger itself was more or less amphibious. It was designed to be able to drag itself through the hybrid water-land landscape with its boom arm, but also to float in the canal as it was dug. The engines were powered by coal, wood, or a combination thereof, and it took 5 people to run the dredger. Two houseboats followed the dredger: One provided sleeping and eating accommodations for the dredger's crew, and the other carried fuel. Two much smaller dredgers were simultaneously in operation, one which worked on digging the Small Scheme, the other which worked on the eastern part of the main canal (Bradford West Gwillimbury Local History Association, 2005, 286). The dredger would typically work 24hrs a day, from the time the marsh had thawed in the spring through until it had frozen in the winter.

Figure 8: Dredging machine, tile machine, ditch digger, broken land. Top left, the dredging machine. Top right, men stand in front of a tile machine with a row of tile. Bottom left, a ditch digger in action. Bottom right, the drained marshland is broken. Pictures courtesy of the Innisfil Library online archive, Our Stories. www.ourstoriesinnisfil.ca

The work to build the main canal lasted from the fall of 1925 until the spring of 1929. Despite a few challenges related to weather and mechanical failure/maintenance, the dredging of the canal proceeded remarkably smoothly, if a little behind schedule. The construction company hired to do the work, Cummins and Robinson, received their last payment in March of 1929, at which point the township of West Gwillimbury was responsible for putting any of the final touches on the project.

The transformation of the landscape was not yet complete, however. While the canal did facilitate a certain amount of draining, a complicated network of ditches and drainage tiling was needed as well. Landowners had to carve up their newly formed land with ditches running inward to the Holland River, or away from the river, toward the canal, or both, depending on where their fields were. These ditches (most of which were lined with tiles) facilitated further drainage and control over water in the fields. Whereas digging the canal was largely a public infrastructure project, in as much as Simcoe County, King County and Bradford each paid in proportion to the amount of drained land in their jurisdiction, fine tuning the drainage of the land with ditches and tiling was the responsibility of individual landowners. As a result, the network of ditches and tiling emerged slowly and unequally, with some land not being ready for crops until after the end of the Second World War.

As the dredger slashed its way through the perimeter of the marsh, it was not only transforming the landscape, but it was also establishing the conditions for the introduction of new social relations within the Marsh. Stellar work by the now-deceased local historian George Jackson demonstrates how much land changed hands specifically between 1911 and 1924 as the Marsh Syndicate went on its buying spree as discussed in the previous chapter (see Jackson, 1998, 119 - 122).

According to Jackson (1998, 119-122), by 1924 – just as the dredger was about to take its first bucketful of swamp – there were over 70 landowners in the Marsh (whether or not these were discrete, independent owners, as discussed above, remains unclear). Figure 6 shows a section of the map used in Baird's 1924 drainage proposal (the illegible names were hand written in much later by Jackson). A similar section of a much more recent map of the Marsh (see figure 9) illustrates that there are now hundreds of landowners in the Marsh, with much smaller parcels of land.

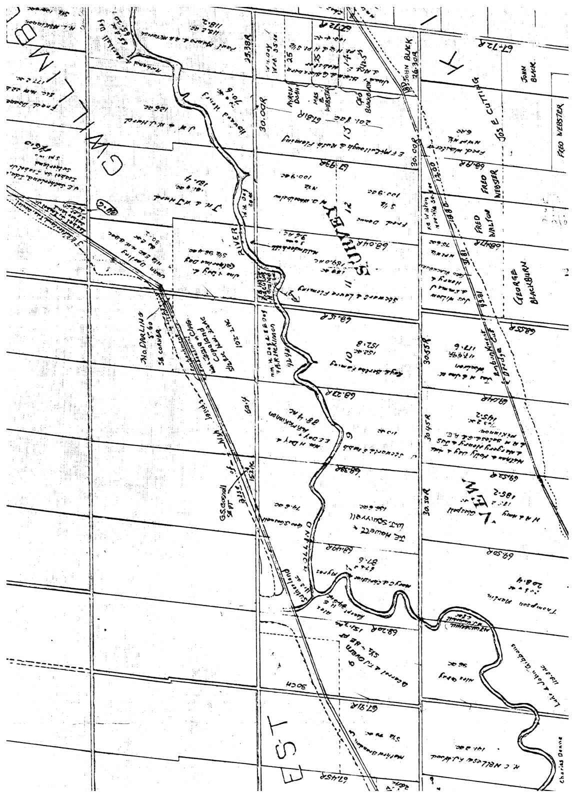

Figure 9. Holland Marsh, 1924. A section of the Holland Marsh, circa 1924. (Jackson 1989, 50-51).

Figure 10: Holland Marsh, 2002. A section of the Holland Marsh, 2002. Courtesy of the Bradford Print Shoppe (K. Smart and Associates 2002). Photograph by the author.

As discussed in Chapter Two, from as early as 1818 – without taking into account how First Nations structured ownership of the Marsh area – the Holland Marsh was held under private and/or Crown ownership. Transforming the area from a more-or-less valueless swamp into highly productive fields did not change this. However, canalizing the area and converting it to fields did fundamentally alter the *character* of the property, and by extension, the implications of owning it. Suddenly the land was catapulted into a multiscalar geography of agricultural production. Even in the 1920s (and indeed, much before this, see for example, Mintz, 1986) agriculture was global in scope. Indeed Day and the other Marsh boosters had visions of providing markets not only in Toronto, but also across Canada and beyond with fresh produce from the fields of the Holland Marsh. And although this vision would not come to fruition until the 1940s, the fields of the Marsh would very much become implicated in global patterns of agriculture accumulation and trade in the decades to come. Had the land not been drained, this would not have been the case. Indeed there is good reason to believe that had the land remained a marsh, the entire area would be protected as a wetland now. As I discuss in Chapter 6, as environmental sensibilities were changing in the 1960s and 1970s, local conservation authorities bought up much of the marshland that shares a hydrological system with the Holland Marsh – wetland that remains protected to this day.

Converting the wetland into fields also meant that property owners - not only farmers – would anticipate a profit, bringing the newly formed land into circulation in historically unprecedented ways. Again, until the land was 'improved' with underdrainage and canalization, it was largely valueless – a fact which, in part, allowed Day and the Syndicate to purchase so much of it previous to draining. The land itself, then, in addition to the crops emerging from it, became a commodity – something to be bought and sold for increasingly escalating sums of money. By as early as 1934, Day himself was flipping land to willing buyers. He took an ad in the classified section of *The Toronto Daily Star* featuring 315 acres of land "under scientific production" for $10,000 (*The Toronto Daily Star,* 1934, p. 34).

The land-as-field had a drastically higher value compared to the land-as-wetland for a variety of reasons (and here the nature-as-land, nature-as-form, and nature-as-imaginary analytics are relevant). First, the newly emerged land was 'serviced' in a way it had not been previous to canalization. In the case of the aforementioned 315 acres Day was advertising for sale in 1934, the land had been further 'improved' with an additional network of underdrainage, conveniently directing all excess water out toward the canal, and Lake Simcoe beyond. And while the bill for these improvements was being largely shouldered by the state, the land was privately owned and owners could ask a price the market would bear, in light of the improvements. Another part of the rapid increase in the price of land was the aspirational, ideational identity attached to it. Day and the local news media had been highlighting the vast profit potential in growing market vegetables for years previous to the draining. Pointing to places like Celeryville, Ohio and Kalamazoo, Michigan, would-be farmers were tempted with promises of extravagant per-acre yields and profits, an imaginary that helped justify the cost of the land.

At the centre of this land dynamic, however, was the soil itself – an unassailable substance that promised $702 an acre in 1930, or over twice the $318 per acre average revenue in the Marsh today (*The Toronto Daily Star*, 1930, p. 22; Planscape, 2009).

To understand the allure of the land produced through drainage, one must appreciate the specific biophysical properties of the land. The recently reclaimed Marsh was much more than conventional farmland – there was plenty of farmland in Ontario to be had. Within the Marsh, however, the land was comprised of virginal muck soil, millennia in the making, and exposed for the very first time. The muck took on an almost magical quality, and indeed Day opined in one public presentation that in the Highlands (the areas directly adjacent to, and surrounding the Holland Marsh) wheat farmers would have to raise a preposterous 1000 bushels of wheat per acre to equal the per acre revenue enabled by the muck soil (*The Toronto Daily Star*, 1930, 22). This is not a simple financial appeal – Day, having been embedded in agriculture for as long as he had been, would have known that even 100 bushels per acre would have been a stretch for the vast majority of wheat farmers. Instead, Day's exaggerated claim is a reflection of the mysticism attached to the muck soil – a mysticism Day certainly worked to cultivate with his salesmanship.

Similarly, the amount of time and effort it had taken to drain the marsh added to the almost supernatural character of the muck soil. While lesser soils could be had by simply removing a few shrubs, muck soil required the painstaking work of dozens of men and women over many years, highly advanced machinery and significant public investment. For almost five years, a rapt public watched workers, dredgers, engineers and scientists plod away on the drainage project. Readers of the *The Globe* were assured that "samples of the soil in the swamp [were] taken and sent to Ottawa for analysis", confirming that "the soil is of the very highest quality" (1925, 10). The Homemaker, a weekly women's column in *The Globe* gushed over "The level verdure of the Holland Marsh" (1928, 10). By the early 1930s, headlines in both *The Globe* (1931, np), and *The Toronto Daily Star* (1930, 22) raved about that fact that Day's harvest from his 37 acre test plot was valued at $26,000. In 1933, an editorialist waxed about the "'black muck' soil, enriched by yearly decay of lush vegetation" assuring readers that when the muck is under full cultivation, "the Holland Marsh, so long a desolate waste, will be the scene of intensive cultivation on a scale hitherto unknown in Canada" (*The Globe,* 1933, 4). So central was the yield of the drainage – the muck soil – to the identity of the area, farmers in the Holland Marsh would come to be known colloquially (and somewhat disparagingly at times) as 'Marsh Muckers'[25]. By the early 1930s the Holland Marsh was well on its way to becoming as famous as Celeryville or Kalamazoo – Canada's own salad bowl – and similar to those places, the muck soil was the featured star.

3.3 Socionatural soil and muck crop farming

"Manure is worth more than a man with a doctorate" (Gostomski 1588, quoted in McNeill and Winiwarter, 2006, 2).

All the years of work, the planning, the public and private investments, the vast effort to carve a 27 kilometer canal through the Holland River lowlands, were all done for one reason – to access the muck soil. The near-legendary status of the soil in places like Kalamazoo, Michigan and Celeryville, Ohio had engrossed Professor Day and others in the Bradford area for decades. And for decades the soil had lain tantalizingly close, yet frustratingly so far away, covered by millions of liters of swampy water. Yes, the ultimate intention was to grow vegetables, but controlling the water to expose the muck soil was a massive victory on its own.

This is all to suggest that the muck soil in the Holland Marsh has both a social and natural basis – it is a product of popular imaginary and human intervention as much as the biochemical and biophysical properties of millennia-worth of rotting vegetation. The dynamics that created (and subsequently continually re-create) the muck soil are essential to the making of food, agriculture and culture in the Holland Marsh. Given how central it has been to shaping the Holland Marsh, and to add emphasis to its socionatural hybridity, the following section dwells briefly on the history, science, and politics of muck soil.

3.3.1 Pedology and the anatomy of muck soil

Far from being simply the stuff covering the surface of the earth, soil is a very complicated thing. The basic unit of soil is known as a pedon, defined as "the smallest, three-dimensional body at the surface of the earth that is considered to be a soil. Its lateral dimensions are 1-3.5 mm and its depth is 1-2 mm" (Soil Classification Working Group, 1998, 5). Pedons accumulate into dozens of different kinds of soils, defined through a complicated taxonomic system consisting of orders, great groups, subgroups, families, and series. This taxonomy has developed iteratively over the course of roughly 100 years in Canada through the work of regional soil surveys[26].

The earliest versions of soil surveys were largely an exercise in Newtonian inventory science, mostly tailored to the burgeoning Canadian resource economy. Pedology (the study of soil) grew rapidly in the early 1900s in Canada, and by the mid-1930s, most provinces had some modest survey infrastructure in place (Soil Classification Working Group, 1998, 1). Typically, university departments of agriculture, soil or chemistry would work with provincial and federal departments of agriculture cooperatively to conduct soil surveys on areas of commercial interest. Given the kind of economic importance the soil had to the regional agricultural-dependent economies of Ontario, Saskatchewan and Alberta, it is not surprising that these areas were the most heavily surveyed in Canada by the mid-1930s (Soil Classification Working Group, 1998, 2).

However, soil surveying in Canada remained largely fragmented until a shared technical language emerged across the country through the National Soil Survey Committee of Canada, formed in 1940. The Soils Section of the aptly named Canadian Society of Technical Agriculturalists held the original organizing meeting. Later changed to the Canada Soil Survey Committee, and currently known as the Canadian Soil Information Service (CSIS), the variously named body has always been housed federally, within the department responsible for agriculture (a title which also changes periodically). In addition to establishing and enforcing a shared technical language of soil for all provincial and territorial counterparts, the early version of the organization also provided standardized definitions for key terms, a taxonomic structure and an air of authority to the burgeoning science of soil. In its modern form, the CSIS acts as an authority and clearinghouse for information on soil designations, while also functioning as a "coordinating body among the soil survey organizations in Canada supported by the Canada Department of Agriculture, provincial departments of agriculture, and departments of soil science at universities" (Soil Classification Working Group, 1998, 2).

The rise of pedology in Canada and the attendant emphasis on soil classification in the early to mid-1930s is crucial to understanding how the muck soil was understood by the earliest Marsh farmers, and how it has continued to be understood. As McNeill and Winiwarter (2006, 2) point out, soil's history has too often been ignored in accounts of agricultural and economic history. As remedy to this oversight, they argue that soils are "entities with histories" which are both impacted on, and in turn impact the so-called 'human' world (McNeill and Winiwarter, 2006, 3). They argue further,

> What people believe about soils influences (although it does not necessarily determine) what they do with them, whether they conserve and nurture them, whether they abuse and abandon them. What people understand – and misunderstand – about soils is thus a necessary part of any history of the nexus between soil and society (McNeill and Winiwarter, 2006, 3).

It is difficult to say, of course, what the first growers in the Marsh in the early 1930s believed about the soil. What is clear, however, is that there seemed to be a central misunderstanding, willful or otherwise, about a fundamental aspect of the nature of the soil. The Organic Order of soil, as defined by the Soil Classification Working Group, contains 30 percent 'organic' material per volume (in distinction to clay, rock particles, crushed mineral, etc.). The organic materials which comprise the soil are always at different stages of decomposition – as an example, leaves worked into a garden in the fall will, by mid-summer the following year, likely be fully decomposed and unrecognizable as leaves. Similarly, bogs, swamps, wetlands, fenlands, and the like, all have organic materials at different stages of decomposition, ranging from a fibrous, peaty texture, through to a fully decomposed silt-like material[27]. Of course this makes for a dynamic situation because the hummification (the degree to which material is decomposed) of the plant material is constantly changing – this is a simple biophysical reaction.

The earliest Marsh farmers and boosters either did not understood the complex dynamics of the muck soil, or they were not particularly concerned with the details. The central contradiction of the organic order of soil, when brought into the context of capitalist agriculture, is that the moment the water which created it is removed, it becomes far more unstable, and ultimately will vanish completely. This is an illustration *par excellence* of O'Connor's (1988) second contradiction of capital. The reason the muck soil is bound to disappear is quite simple – decomposition requires oxygen. Swamp and marsh water are hypoxic, or low oxygen ecologies, due to the fact that they contain so much dead plant material. As plants grow, mature and die off, they fall into the water that supports them, creating layer upon layer of dead plant material. The process of decomposition is significantly inhibited by the absence of oxygen – and given that marsh water is hypoxic, plant material decomposes at an extremely slow rate. This also means that the peat/muck mix accumulates at a very slow pace. According to a report jointly published by the Ontario Ministry of Agriculture, Food and Rural Affairs and the Muck Crops Research Station[28], it takes roughly 500 years of plants growing, dying off, and slowly decomposing to result in just 30 centimeters of muck soil (McDonald and Chaput,1998, np.). Muck soil, in other words, is not a renewable resource on a commercial, capitalist time scale.

The relatively stable plant material, once uncovered, becomes very unstable, and oxidizes (and thus decomposes) at a rapid rate – the technical term given to this process is 'subsidence'. According to the same report this constitutes a "major chronic problem" of organic soils (McDonald and Chaput, 1998, np.). (The unstated assumption, of course, is that subsidence is a 'major chronic problem' within the context of capitalist agriculture.) Mizra and Irwin (1963) conducted what appears to be the earliest study to measure the rate of subsidence in the Marsh[29]. They found that the organic soil in the Marsh subsides at a rate of about 30 centimeters (1 foot) every ten years, which constitutes a "substantial and serious loss" (Mizra and Irwin, 1963, 253). Thirty-six years later, McDonald and Chaput (1989) repeated Mizra and Irwin's 1963 calculation, and arrived at a similar conclusion, suggesting, "muck soil, *intensively cropped*, subsides at a rate of 30 cm of soil every 10 years" (emphasis added, 1989, np.). They continue,

> This process can be slowed by the application of copper, a well-designed water-control program, a wind abatement and cover crop program and minimum cultivation. These steps are essential for long-term continued use of organic soils for agriculture. With good water table control and soil management practices, the rate of subsidence can be reduced to 4.7 cm every 10 years (McDonald and Chaput, 1989, np.).

According to McDonald and Chaput (1989), when optimal subsidence-mitigating conditions are implemented, almost 5 centimeters of soil will be lost every decade. To put this in different terms, 30 centimeters of soil (which, as pointed out above, would take roughly 500 years to form) could vanish in 60 years, *under optimal conditions*. In the worst-case scenario, that same 30 centimeters of soil would decompose and erode away in as few as 10 years, if Mizra and Irwin's (1963) original calculation holds true.

Incredibly, the problem of subsidence, though a significant, ultimately terminal issue does not appear in any of the documents, reports or newspaper articles I collected from the period leading up to, during or immediately after the draining of the Marsh (mid-1920s to mid-1930s). In fact, it is not until Mizra and Irwin's 1963 study of subsidence in the Holland Marsh that the issue seems to come up at all. There are very few other instances of this issue arising – and even farmers I interviewed seemed to not be overly concerned with the issue. They understand that subsidence is happening, and are resigned to the fact that there is nothing they can do to stop it. As mentioned earlier, in some of areas on the edge of the Marsh, the muck soil is completely gone. Farmers in these areas have either transitioned to less profitable mineral soil crops, built green houses, or have simply abandoned the land, at least for now.

In any case, employing mitigation techniques to slow the soil subsidence does not fit within the logic of industrial, commercialized, intensive farming. The political economy of capitalist agriculture demands a formula of minimizing input costs, and maximizing profit. It is a prescription that does not permit for long-term ecological planning, but rather demands immediate term pursuit of profits. There is a fundamental disconnect between the time horizons of the muck soil and capitalist agricultural production. Within the context of scrambling to secure an income for another year, farmers are largely unwilling (perhaps unable) to take on the task of mitigating subsidence. The fact that farming within the Marsh is conducted so intensively (with farmers tending to relatively small acreages, ranging from roughly 50 to 200), means that they cannot afford to let land lay fallow as often as conservationists would recommend. Taking even 10 acres of land out of production for a season could mean the loss of tens of thousands of dollars in income. More recently, the Muck Crops Research Station and the Lake Simcoe Region Conservation Authority have implemented various initiatives to slow the pace of subsidence, though uptake of the programs has been slow. I return to the issue of subsidence and subsidence mitigation in Chapter 6.

3.3.2 Muck soil and the production of protest

Although the earliest Marsh farmers and boosters in the period between the late 1920s and mid-1930s seemed to conceive of the muck soil as a renewable resource – an essentially infinitely fertile growing medium, there were dissenting (and prescient) voices which would foreshadow environmental critiques and conflicts to come. One of the earliest critiques of the Marsh came from the pen of a woman in a column that regularly appeared in *The Globe* titled "Woman's Point of View", written by author Bride Brode. Her condemnation of the draining of the Holland River valley stands in stark contrast to the overwhelmingly prevalent sentiment of the time. Brode (1937, 13) writes, in part,

> The drainage of the Holland Marsh looms as one of the great and inexcusable mistakes – to call it by no harsher name – of those who have the right to say what shall and shall not be done with this territory or that. The drying up of the great cisterns that nature provides for the slaking of the thirst of the country around them, has been criminally wasteful so far as the present is concerned; it has been actual theft from the future. Also – and this should have been considered – good gardeners know that bog land, while it yields an almost tropical luxuriance in the first season or two...the soil, having no substance, does not last.

Brode's vivid indictment condemns the drainage project as an unmitigated environmental catastrophe, robbing future generations of the inherent benefits of the wetland. Her reaction is at least in part a result of what many others (willfully, or otherwise) ignored – that the muck soil degrades rapidly, becoming less productive not long after being brought into production, and eventually subsiding completely. Brode's critique is all the more impressive given that, as mentioned above, she seemed to be the only dissenting voice. At the time she wrote the column, the *Conservation Authorities Act,* which was not law until 1946, was still nine years away. It was also an era of high unemployment in a time when agriculture was a key economic driver. Suffice it to say, Brode's opinions would not have garnered much attention – though it is notable that *The Globe* even consented to the piece being published at all.

Indeed, when Brode's column criticizing the Marsh came out, the local media were in the midst of covering one of the great socionatural contradictions of early Marsh farming – the yields were prodigious. So much so that the local markets became glutted and prices had bottomed out. Many farmers could not give their produce away, leading many to let it lay rotting in the fields. I discuss this in more detail in the following chapter, but the point here is that critiquing the Marsh was a very unpopular position in the mid-1930s. An embryonic environmentalism may have been materializing by the mid-1930s, but it was not being directed at the Marsh, in part because to critique the Marsh in the midst of such suffering would have seemed insensitive. Brode is well aware of the cultural tenor of the moment and carefully differentiates between the struggling farmers, and the original Marsh boosters,

> Sympathy is the emotion that must stir everyone with a heart on hearing of the plight of those who have staked their little all on a smallholding in the Holland marshes. But sympathy is not at all the emotion roused when we think of those who were in the main responsible for the drainage of that area (1937, 13).

Courage and political acumen aside, Bride Brode's critique of the draining of the Holland Marsh – and of those responsible for draining it – had little traction in an era when farmers were failing due to overproduction. The tragedy unfolding in the fields almost added to the seductive, enigmatic character of the muck soil. The muck was somehow exceeding the fevered expectations foisted upon it and producing such abundance that families were losing their farms. The soil was literally overpowering human capacity to accommodate its bounty. As Brode rightly observed, the soil would subside and the yields would moderate. Yet in the early years, the biophysical characteristics of the muck were stoking a mythic imaginary. This was no regular soil, but rather it was seen as an ancient and powerful muck soil that brought ruin to lesser farmers unable to contain its power. Farmers, would-be farmers and the vast majority of the general public understood the muck soil at the Holland Marsh as a superlative growing medium, and as mentioned above, McNeil and Winiwarter (2006, 3) point out that ideas about soils tend to have material effects. Within this context, conserving the soil or ceasing farming operations as a step toward landscape conservation were all but unthinkable. The production of nature in the Holland Marsh turned on this mythic conception of the soil as somehow preternaturally productive – this imaginary, in others words, is co-implicated in the process of nature's production in the Holland Marsh. The hype surrounding the soil served to discourage, or render unthinkable, virtually all divergent opinions, and ultimately facilitated the introduction of agricultural production. Perhaps not surprisingly, the chief exponent cultivating the myth of the Holland Marsh muck soil was Professor Day. I turn now to a discussion of his test plot, technology and the salesmanship that helped build the social life of the muck soil.

3.4 Technology and test farming on Day's acres

Day's dedication to the Holland Marsh was relentless, though his passion lay beyond simple farming. He could have remained in Guelph, retained his posts at the Ontario Agricultural College and the University of Guelph, and farmed the land of the County of Wellington. Instead, he left his work in Guelph and relocated to Bradford to supervise the drainage, run The Syndicate, and of course, farm the emerging land of the drained Marsh. Day's foray into farming – while reportedly quite profitable – was also expressly experimental. Again, he could have farmed anywhere, but he chose the Marsh because it afforded him the opportunity to engage a variety of technical, intellectual and practical challenges – problems to be solved through rational thought and experimentation. Farming in the Marsh allowed Day to demonstrate his command over water through drainage; his command of the soil through tillage; and his general command over biophysical nature with technology – feats he was ever-willing to share with the public through local media. His own 37-acre test plot was a demonstration project of sorts, developed to show off the yields the technologies of underdrainage, canalization, and modern farming had enabled[30]. Local media willingly played along, covering what amounted to Day's post-season press conferences, where his ostensible mastery of nature was on full display. The *Toronto Daily Star* (1930, 22), quoting Day writes,

> Last summer we realized we had a dry season on us, so we cut through the retaining bank and let the water into our ditches. Soon the soil, which on the surface had been dry and dusty, was wet and moist. We have pumps in wet seasons to protect us, and irrigation to protect us from drought.

Day was demonstrating more than simply the fact that the Holland Marsh muck soil was more productive than mineral soil. Instead he wanted to show that it was controllable, removed from the vagaries of weather, an almost infallible landscape upon which farming became surgical. Not only would this level of control ensure profitable farming, more than this, Day was quick to point out that predictable, controllable soil also meant steady employment,

> The relation of this reclamation scheme to the unemployment problem of this community, and indeed, the province in general, is worth noting. During the past season from 20 to 25 people were busy most of the time on 37 acres, in the height of the celery harvest 43 were counted at one time, including three truck drivers, who were busy hauling the celery to Toronto (Day as cited in *The Toronto Daily Star,* 1930 December 30, p. 22).

The level of (apparent) control over his immediate surroundings, coupled with the above average yields, a willing work force, and his predisposition to a kind of technocratic-optimism gave Day confidence that Marsh produce would traverse the country one day. In these heady early days, the optimistic Marsh boosters, with an unrelenting faith in technology in tow, led them to make bold predictions:

> In regard to lettuce, whole sale firms in Toronto state that never before has there been Canadian lettuce on the Toronto market throughout the entire season…We look forward to the time when Holland Marsh will supply the head lettuce for all Canada during the summer season (Day, as cited in in *Toronto Daily Star,* 1930 December 30 p. 22).

It is impossible to know what specific technological developments Day had in mind to enable lettuce, a notoriously travel weary crop, to remain fresh while traversing the country. Even in California where the “green gold” rush of the late 1920s and early 1930s led farmers in the Salinas valley to plow under crops and sell off cattle to plant iceberg lettuce, transportation and cold storage remained significant limitations moving lettuce more than a couple hundred kilometers (Freidberg, 2009, 169). Likely, Day (and others) were optimistic that plant biologists would develop hardier lettuce while engineers would develop better cold storage and faster trains, and fresh lettuce would zip around the country unimpeded by decay and rot. As the *Globe* (1931, 6) pointed out, Day was a convincing visionary sort – if a wetland could be transformed into such prodigiously profitable farmland, nothing seemed impossible, “A few years ago this portion of the Bradford district was not even thought of agriculturally, but a few facts submitted by Professor Day tend to disillusion even the most skeptical”.

3.5 Conclusion

The genesis of European-style agriculture in the Holland Marsh was driven by much more than simply the pursuit of profits – though profits certainly did materialize and were part of the equation. But, as Chapters 2 and 3 have demonstrated, reducing the introduction of agriculture to the Holland River valley to simple economics would be misleading. In contrast to conventional political economic approaches to agriculture, the above has not overlooked the ever-present socionatural dynamics of nature’s production in outlining the historical origin of agriculture in the Holland Marsh. Political ecological and cognate scholarship (Castree, 1995; Smith 2008 [1984]) help to reveal that equally important to the transformation of the Holland River valley was the desire to tame the land, to order it in such a way that it became useful, in instrumental terms, while displaying a phantasmagoria of cutting edge technologies. A small army of physicists, engineers, farmers, technicians, and machinists were enrolled in the process of transforming the Holland River valley into a technological landscape of culverts and canals, dykes and dams. These efforts to transform the land and form of biophysical nature were buttressed by a semiotic flank propagating the foundational imaginary of the muck soil. As will be discussed in subsequent chapters, this desire to render the landscape controllable (in both material and discursive terms) continues to shape the landscape in profound, at times troubling ways.

Yet as others have pointed out, the process of transforming biophysical nature is always constrained by its physical properties (Boyd et al., 2001). Those who toiled to reclaim the Holland River valley confronted a range of biophysical phenomena which complicated farming in the Marsh. The ever-changing biophysical dynamics meant (and continue to mean) that, contrary to the claims otherwise, the Holland Marsh has never been (nor likely ever will be) fully rationalized, controlled or controllable. Despite the best material and discursive efforts of many, and the applications of the newest technologies, floods still occur, insects and disease still thrive, and crops still fail and rot. And yet the moral, technological and financial drivers motivating the early Marsh boosters persist.

This important period in the history of the Holland Marsh – from 1925 to 1935 – confirms Smith's (2008 [1984]) perspective: The state was very much active in facilitating the production of nature in the Marsh. Without the supportive legislation and municipal funding, the transformation would have never occurred – or it would not have occurred as early and quickly as it did (recall Day's earlier failure to secure private investment to fund the drainage project).

While protest of the transformation was meager, it remains noteworthy, and foreshadows more substantive critiques in the decades to come. The politics of nature's transformation, to some extent underemphasized in Smith's work, is thus revealed as central to the process of nature's production. The transformation of the Marsh continued largely undisturbed precisely because of the pervasiveness of a particular kind of (environmental) politics which valued smiling farms over a dismal swamp. This amenable political milieu, however, was only temporary as new environmental politics emerged in the years to come. Perhaps Bride Brode sensed this, and drew on it for inspiration in her own, very early, environmental crusades.

However, the central ethos of the Marsh boosters established in these early days continues to permeate the Holland Marsh today – indeed the compulsion to control and manipulate the *minutiae* of nature has never been stronger, the ability never more developed and the stakes never higher. Just as some of the very first applications in Canada of freshness-extending technologies for leafy vegetables were used in the Marsh, many other novel technological innovations continue to occur in the Marsh. This continued innovation is a result of both the early human history of the Marsh – in the initial and ongoing presence of the University of Guelph in the fields. However, the spirit of innovation and technological development is also the result of the socionatural circumstances of the marsh: The Marsh Muckers have many times been required to develop technologies to suit the unique 'natural' characteristics of their fields because the political economy of commercial agriculture has not made it profitable for machine, seed and pest management companies to develop tools for such a niche landscape. I will return to this theme in subsequent chapters. For now, I turn to a discussion of the wide spread arrival of crops, and the limits, challenges and opportunities socionatures presented in the mucky processes of scaling up Day's test plot.

Chapter Four. 1935-1954 – From fields to yields: Crops, markets and the (temporary) production of stability in the Holland Marsh, 1935 – 1954

By the mid-1930s the canal system was complete, much of the ancillary drainage infrastructure had been put into place, and regular agricultural production had arrived to the Holland Marsh. While the Marsh boosters had been busy with the production of land and fields for the previous two decades or so, from the mid-1930s onward the focus shifted to the production of agricultural crops. As the Marsh boosters and farmers turned from a focus on the production of land and fields, to the production of crops, a changing constellation of actors, institutions, and biophysical characteristics became folded into the production of nature in the Holland Marsh.

The central focus of the farmers during this tumultuous two-decade period between 1935 and 1954 was to control the crops in order to produce some stability – a condition the farmers had largely achieved by the fall of 1954. At the macro-level, this was partly due to the consolidating U.S. global economic hegemony – a cyclical trend in global capitalism which ushered in the second food regime after World War Two – along with the stability it (temporarily) produced in world agriculture (Friedmann and McMichael, 1989).

In the Marsh, the farmers attempted to corral the biophysical characteristics of the crops in as profitable a way possible by drawing on secular trends in the form of emerging technologies; calling for the development of physical infrastructure, including roads and storage facilities, and; agitating for important social infrastructure. These developments are not incidental to the production of nature in the Holland Marsh, but are rather constituent elements, as detailed in this chapter. The social and physical infrastructure that emerged during this period signaled the beginning of the process of fine tuning the landscape and farming practices to the biophysical requirements of the crops. The carrots, onions, lettuce and celery grown in the Marsh required a different supportive infrastructure than the corn and wheat grown immediately outside the perimeter of the canal, and the landscape began to reflect this during the 1935-1954 period.

The institutionalization of agrarian politics in the form of various quasi-governmental organizations and farm-friendly regulations and supports were also instrumental in shaping the success farmers would have in the post-war period (see Winson, 1993, 66). At the same time, emerging technologies would begin to facilitate the transcendence of certain biophysical limits. These were tentative, but important steps which would foreshadow the industrialization of agriculture to come. This chapter will explore how these socionatural interventions were co-implicated in the production of Holland Marsh crops, and how the crops – in turn – aided in the production of temporary stability.

4.1 Instability and crisis in the Holland Marsh

The Canadian economy was mired in deep economic depression during the inter-war period. This reflected a broader trend owing to (temporary, though foreboding) ecological collapse in the form of a multi-year drought, coupled with an anemic financial system south of the border. At the same time, many agricultural workers – and labourers of other sectors – were struggling to find work. The work that was available often paid less than it once did. In California's Salinas Valley, as an example, the throngs of "Dust Bowl refugees" were considered lucky if they were able to keep a job at half of what they were making a decade before (Freidberg 2009, 178)[31]. In Ontario meanwhile, average monthly wages for farm workers fell from $75 in 1920 to a low of $32 by 1933 (Statistics Canada, 2014). Making matters worse, scarcity meant commodity prices remained persistently high, meaning food was unaffordable for many. However, higher commodity prices did not translate into higher profits for farmers. In Ontario, annual total net farm income went from roughly $133 million in 1926 down to a low of $40 million in 1932 and 1933 before recovering fully, though not until 1941 (Statistics Canada 2014a) (See figures 11 and 12 below).

Monthly farm labourer wages in Ontario, 1920 – 1950

Figure 11 Monthly Farm labourer wage in Ontario from 1920 – 1950. Unadjusted dollars. Statistics Canada 2014.

Annual total net farm income in Ontario 1926 – 1950

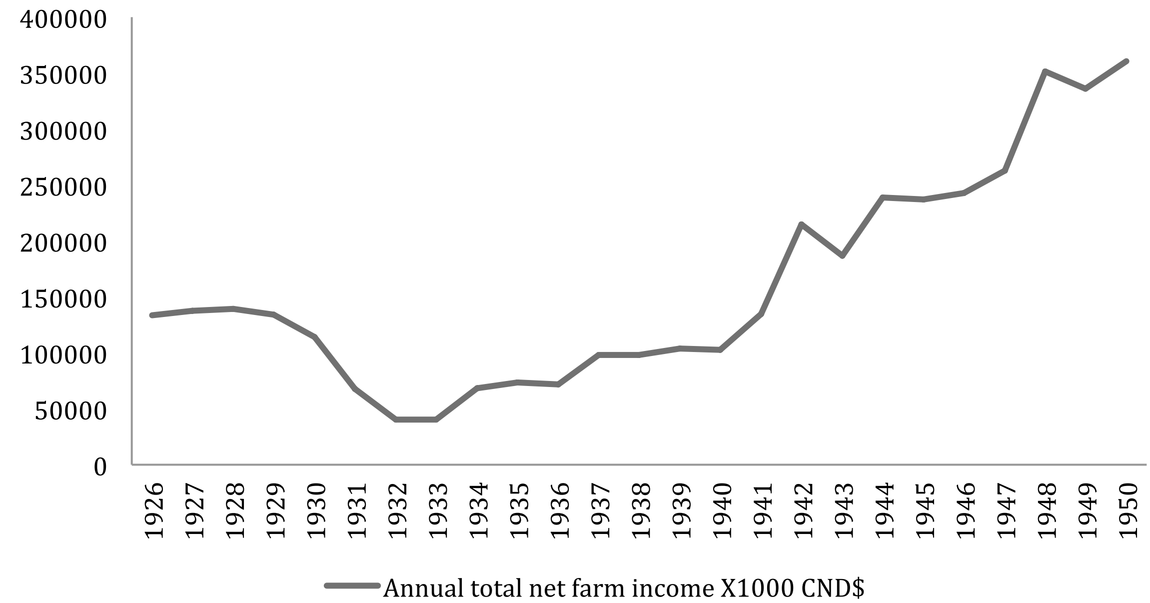

Figure 12 Total farm net profit in Ontario from 1926 – 1950, Constant 2000 dollars. Statistics Canada, 2014a

The troubles of the mid-1930s were the result of a socionatural confluence of events. A complex amalgam of drought, labour surplus, and stock market collapse exacerbated the negative impacts on both the supply and demand side of the agricultural sector. In contrast to this trying inter-war period, the World War II years and beyond – from roughly 1939 through to the 1950s – can be considered the 20th century apex of Friedrich Engels' much earlier speculation that "The peasant is a very essential factor in the population, production and political power" (Engels, 1970 [1894], quoted in Bernstein, 2006, p. 450).[32] As the rains came, wartime consumption increased demand, and nascent welfare state agricultural policies began to emerge, farmers' fortunes would change dramatically. They would emerge from the turbulent inter-war period of global instability as a powerful political economic block and a key player in the consolidation of welfare state power throughout the mid-1940s and 1950s[33].

Perhaps sensing their growing leverage, and wanting to insulate against lean years like those they experienced throughout the late 1920s and early 1930s, a new agrarian politics emerged in Canada as farmers began unprecedented efforts to organize, network and strategize as a distinct political block[34]. While Canadian farmers have a long history of progressive organizing – including deep ties with the Co-operative Commonwealth Federation, the more radical forebear of the New Democratic Party – the level and sophistication of farm organizations increased dramatically during the 1940s and 1950s (see Winson, 1993). Farmers began asserting their political and cultural clout, through their crops. Anger over lettuce prices, as an example, which led to extreme violence in California during the late 1930s and 1940s (see Freidberg, 2009), manifested itself more peacefully, yet still stunningly, in and around Toronto. To protest prices, Marsh farmers were known to drive truck loads of lettuce into town, set up in the parking lot of a major grocery chain, and hand out free lettuce. This illustrates the political tenor many farmers adopted throughout the 1930s and 1940s, but also the extent to which the produced natures of the Holland Marsh were at the centre of this emerging politics. The National Farm Radio Forum, the Canadian Federation of Agriculture, the Ontario Federation of Agriculture, as well as the introduction of and key developments in the Farm Marketing Act all meant that farmers were increasingly supported by the state, as well as each other (Sandwell, 2012; Veeraraghavan, 1985).

4.1.2 The confounding cornucopia

It had always been assumed that the many mouths in Toronto would consume the food produced in the Marsh – indeed the assumption was built into the original drainage proposal as a justification for the project. Until the farmers in the Marsh had their first significant yields, however, the prospect had remained largely an abstract one. Until the mid-1930s, actual crops remained a dream– however enticing –for the agricultural boosters in the Marsh. Biophysical nature, such as it was, consisted of the wetland and water, sedge grass and mosquitoes. In other words, the Marsh boosters confronted 'nature' as 'wild' and 'untamed', and set to manipulating and ordering the land for the purpose of transforming it into a productive landscape. And again, throughout this transformation, and until Professor Day's test plot yields, actual crops remained largely in the realm of speculation and anticipation.

In contrast to this, by the late-1930s, the biophysical characteristics the Marsh growers had to confront had changed significantly. After over a decade preparing the landscape, Marsh farmers were for the first time forced to confront the biophysical nature of crops. The impressive yields Professor Day was achieving in the early1930s[35] were just the beginning of a torrent of onions, carrots, lettuce, radishes, potatoes and cabbages to come. The bioavailability[36] of key nutrients in the fresh muck soil – including potassium, phosphorous and nitrogen – coupled with a string of fair weather growing seasons made for abundant yields throughout the 1930s.

After a few years the farmers managed to adjust to the yields and were better able to (ostensibly) control the crops – though this control was always, inevitably, precarious.

However, in the early days, the crops rolling off the fields were overwhelming to the farmers – both in sheer quantity, as well as in terms of the demanding biophysical characteristics of the crops. Both nature-as-form and nature-as-time were crucial considerations for the farmers as they adapted their own practices to the requirements of the crops – as an example, lettuce would quickly rot and carrots would become limp if left in the heat for too long. This meant farmers had to work quickly and seek out emerging technologies to tame the biophysical characteristics of their crops.

In order to maximize the profit potential of the crops – to get the most out their produced natures – a host of social interventions and new social formations emerged. Previous to the development of reliable and affordable storage and transportation technologies, the most efficient and effective technology farmers had were their own bodies, and those of other farm labourers. With very few tractors, harvesting machinery, or spray machines, the earliest yields in the Marsh required a significant labour force. From planting, to weeding, harvesting and transportation, the vast majority of the work in the 1930s was done by hand. One long-time resident explains the manual labour involved in the early days of Marsh farming:

> Onions require a lot of hand weeding...Onions you plant, thin, and weed them all by hand. At harvest, you pull them, put them in windrows, then into a bushel, take them to the stopping machine, catch them again in a bag and stack the bags on orange crates. Then put them in the barn if it rains, then back outside again when it clears up, so they can dry…How many times have you handled the onions? (Matt Valk, as cited in Bradford West Gwillimbury Local History Association, 2006, pp. 296-297).

For a time, the demand for stoop labour, the relatively easy yields, and government programs distributing small parcels of land in the Marsh made it a key destination for those looking for work in a time of high unemployment. In one program run by the federal government, families headed by unemployed men were given 5 acres of land and a modest shack, all at no charge. The cost was borne in equal proportion by the municipality the family was from, and the destination provincial and federal governments (*Toronto Daily Star*, 1935, 26).

Programs like this and others meant that the total acreage under tillage increased from about 25 hectares (roughly 60 acres) in 1932 up to over 400 hectares (1,000 acres) by 1934, dramatically increasing the population in very short order (*Toronto Daily Star,* 1935, 26). Transplanting families – often with no farm experience – into the Marsh meant that not everyone was successful[37]. However, many of the new farmers were skilled enough to coax significant yields the newly emerged muck soil.

The combination of highly productive soil and rapid population increase, coupled with a lack of markets to sell the produce to, created strain on the social fabric of the Marsh. Most families were still digging out of their poverty of the Depression, and chasing a better life in the fields of the Marsh, meaning that the stakes were extremely high. The escalating tensions led to some rather xenophobic perspectives within the Marsh. Notably, in 1937 existing Marsh farmers balked at the idea of bringing immigrants – specifically Dutch immigrants – into the area. To some extent, the farmers were simply reinforcing an anti-immigration position which roughly aligned with the Canadian federal government's own[38]. A program jointly funded by the governments of Canada and the Netherlands sought to settle Dutch immigrants in Canada, generally, and the Holland Marsh area, specifically. However, in 1937 farmers in the Marsh protested to T.A. Crerar, Federal Minster of Mines and Resources, claiming that bringing more farmers into the fields would lead to more produce, and further saturate an already glutted market (Crerar, 1937, 1). The farmers claimed – as recounted in a letter from Crerar to the Premier of Ontario – that they were already only getting five cents for a dozen bunches of celery, and that any further downward pressure on prices would put many of them out of business[39].

In addition to flows of international migration during the late 1930s, farmers were moving to the Marsh from other parts of Canada, following tales of cheap – or sometimes free – land and abundant yields. In particular, farmers from Western Canada, fleeing the misery and poverty of the prolonged drought on the prairies, moved eastward to the Marsh[40]. In all likelihood, at least throughout the1930s, the farmers making the eastward trek would not have fared any better in the Marsh than where they had come from. Those coming from the west would have spent years struggling to get anything to grow in the dried, desiccated fields, only to find the opposite problem in the Marsh – overproduction. As reported by *The Globe and Mail* (1937, 17), one such family "was driven from Western Canada by the drought only to be again faced with threatened poverty because [their] crops are too abundant" (figure 13).

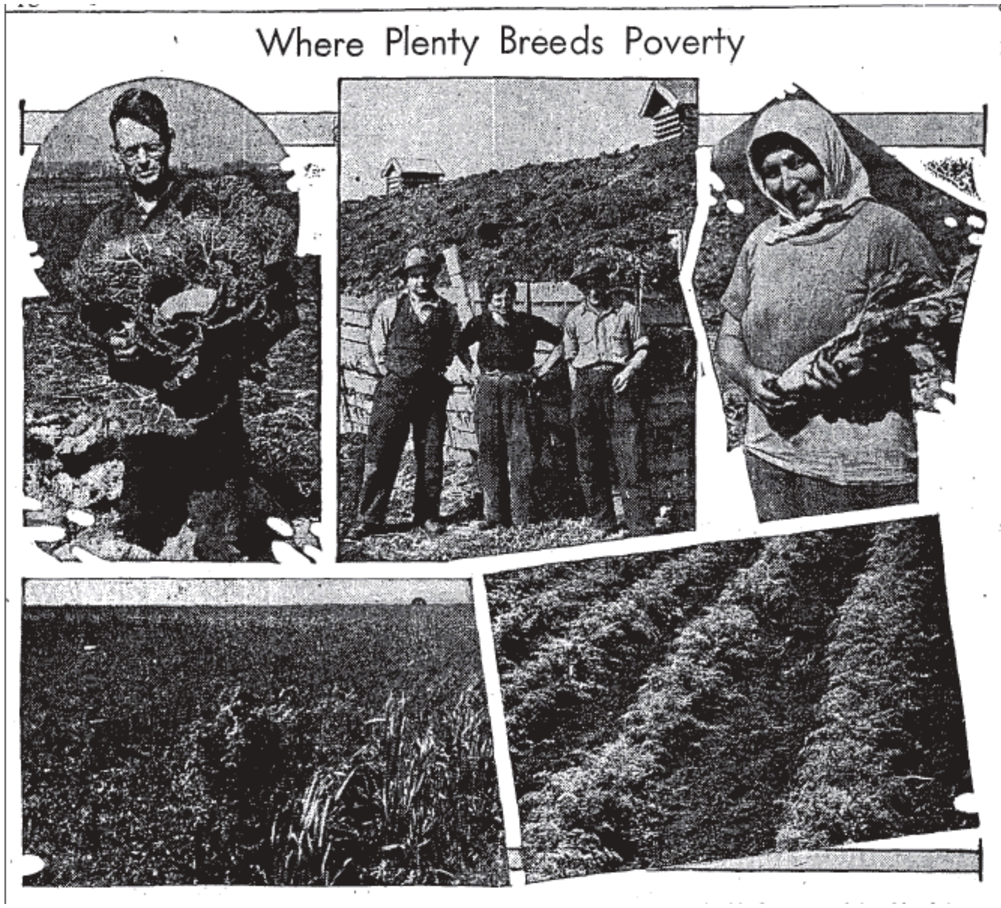

Figure 13. An abundance of produce and labour - this made for hard times in the Holland Marsh in the late 1930s. *Globe and Mail* 1937, p. 17.

Conditions in 1937 were so bad that produce simply lay rotting in the fields, was ploughed back into the fields, and was showing up in massive piles at garbage dumps in Toronto (*The Globe and Mail,* 1937, 17). *The Globe and Mail* (1937, 17) reported on how absurd the situation eventually became for at least one Marsh farmer:

> He showed the reporter his little pink slip from the market. The bushel of cauliflower was dumped into the garbage when it spoiled before a buyer could be found. The turnips met the same fate. For the rest of the shipment he received \$6.70. From this amount the market deducted \$1.41 for commission and handling fees. His baskets cost him \$2.62 and the charge for hauling the vegetables to the

> market was $2.66. Added together and subtracted from the total return these figures indicated that Mr. Ferguson went into debt exactly 19 cents on his shipment of produce.

The farmers' struggles were clearly not merely a 'natural' problem, born only of the fertility of the fields and the copiousness of the crops. Instead, the institutions, rules, and practices mediating the production and exchange of the crops were equally implicated. Local grocery stores and markets in Toronto, somewhat cynically and disingenuously, perhaps, began to trade on the farmers' widely known struggles. Stores like the Stop & Shop (figure 16) invoked the farmers' hardships to convince customers to buy more produce – to "Plan vegetable menus and lend a helping hand" (*The Toronto Daily Star,* 1937, 17). This, and similar ads, are on the one hand simply commercial appeals meant to increase the Stop & Shop's sales figures. However, the ad also reveals one of the fundamental problems Marsh farmers faced in the mid-to-late 1930s. The problem was not so much an abundance of crops, *per se*, but rather an abundance of a particular kind of crops. Had every farmer in the Marsh been growing a different kind of vegetable, local markets would have likely been able to absorb the supply. As it stood, though, capitalist farming in the Marsh sought to exploit specific characteristics of the soil, meaning that production consisted of a highly specialized crop base entailing primarily onions, carrots, celery and potatoes. Like the other muck farmers in Kalamazoo, Celeryville and elsewhere, the farmers were drawn to growing the kinds of crops that would maximize the profit potential of the muck soil. Growing lower value crops, such as wheat or soybeans does not make much sense within the strictures of intensive, small plot, capitalist agriculture. Growing wheat in the muck soil would be seen as a waste of good soil. Aside from this, the economies of scale required to grow wheat in the Marsh were absent – wheat farmers, even in the 1930s, required far more than the 5 or 10 acres most Marsh farmers had in order to turn a profit. Nature was being produced in the Marsh, though the compulsions of profit and capitalist agriculture required that it be a particular kind of nature.

The Marsh farmers could have diversified their crop base as a way of reducing the supply of carrots, onions, lettuce and celery. Increasing the variety of crops grown in the Marsh while reducing the acreage dedicated to the conventional muck crops would likely have meant higher prices all around. However, this would likely have been seen as too risky a strategy, and certainly outside the script of Celeryville and Kalamazoo. Rather than attempt to increase their profits and livelihood security by shifting away from growing a narrow group of table vegetables, the Marsh farmers consolidated their focus on the conventional muck crops. From their perspective, the problem was not about too many carrots and onions, but instead a lack of demand for the carrots and onions. The answer seemed simple: band together, organize and make markets for the crops they grew.

Figure 14. Stop & Shop - among other retailers, Stop & Shop invoked the struggles of the Marsh farmers to compel shoppers to "Plan vegetable menus and lend a helping hand" (*The Toronto Daily Star,* 1937, p.17).

4.2 Market madness in the Holland Marsh

As the fields of the Holland Marsh continued to churn out a seemingly endless supply of fresh vegetables, the contradiction may not have been readily apparent: what was heralded as the strength of the area was also, initially at least, its weakness. The original vision Day and the other Marsh boosters had of a socionatural conveyor belt churning out fresh market vegetables – after a lengthy and turbulent start – had largely come to fruition. Yet the sheer volume in with which the produce was emerging from the fields by the late 1930s, and the fact that it had to be sold fresh were at odds with the social and technological infrastructure available at the time. In other words, the volume and freshness of the produce – *in the absence of marketing infrastructure, refrigeration and efficient transportation technologies* – were clear liabilities in the mid-to-late 1930s.

Time, then, was not on the Marsh farmers' side. Unlike farmers of more storable crops (corn, wheat, soybeans), Marsh farmers had to sell their crops within days of harvest. Wheat farmers could ration their harvests out over months in order to avoid glutting the market and thereby maintaining some control over price, but Marsh farmers did not have this luxury in the 1930s. In this sense, the biophysical characteristics of Marsh crops were instrumental in shaping farming practice in the Marsh. In other words, the farmers and the fields were co-produced, as Castree (1995) might put it.

In addition to the lack of markets for the produce, there was also a conspicuous absence of supporting technologies to ship, store and preserve the produce. At the same time, farmers themselves had very little social infrastructure with which to voice their displeasure or agitate for an improvement in the conditions of their livelihood. As it stood in the early 1930s, farmers were at the mercy of the middlemen – the brokers that sold the produce to buyers in Toronto. Recall the unfortunate farmer who owed the buyer 19 cents after shipping a load of produce to Toronto. The result was that farmers had very little control over produce, or their income, once the crops had left the fields. They were price takers, not price makers, as the saying goes. This uneasy realization had begun to set in by the late 1930s.

4.2.1 Social organizing and the challenges of collective action in the Marsh

The Marsh farmers' frustration was part of a broader discontent sweeping across the province during the era. The agricultural extension work of the provincial government and the OAC, related to issues like underdrainage – the very kind Day was instrumental in delivering to the Marsh – was increasingly seen by farmers to be the function of an out of touch, top-heavy bureaucracy. As Sandwell (2012, 173) points out,

> By the mid-1930s, many rural dwellers across the country had largely given up what limited faith they might have possessed in provincial efforts to improve farming and farm life by providing university-educated experts to teach farmers scientific methods through farm instruction. The Great Depression had made it clear that these initiatives were largely beside the point.

To the struggling Marsh farmers – many of whom were recent immigrants, hardened by their experience and the endemic discrimination they faced in their new country – the top-down advice from the OAC was approaching offensive. Farming techniques and drainage, which were vastly improved upon by the influx of immigrant Dutch farmers who brought an abundance of marsh farming experience with them from their homeland, were not the issue. Farmers did not need to be further educated by a paternalistic extension program. They clearly did not need help growing vegetables, given that high yields comprised the central problem in the first place. The farmers may not have known the solution to their troubles, but they were clearly tired of so-called experts telling them what the answers were (Sandwell, 2012). Within this context, a host of farmer-led organizations emerged, giving farmers a platform from which to collectively voice their frustrations. The farmers' chorus around the province by the mid-1930s articulated that the most pressing issues they faced were related to "marketing, distribution, farm incomes and social organization" (Sandwell, 2012, 173).

Of course, farm organizations played a role in Ontario previous to the 1930s, but they became more active, important and robust during the late 1930s through to the 1950s (see Veeraraghaven, 1985). The earliest farm organizations in Canada included the Patrons of Husbandry and the Patrons of Industry, both of which emerged in the 1880s in response to what is considered the first 'cheap food policy' in Canada, brought in by the government of Sir John A. MacDonalnd in 1879 (Veeraraghavan, 1985). Further along, in 1919, The United Farmers of Ontario wielded considerable power in the operation of formal politics, and are credited with playing a key role in the defeat of the Conservative government in the 1919 provincial election (Mizener, 2009, p. 5; See also Tennyson, 1969)[41].

While these earliest farm organizations did not survive into the 1930s, others emerged to take their place. Nationally, the farmers' movement of the 1930s was led by an upstart Canadian Chamber of Agriculture (forebear to the Canadian Federation of Agriculture), at times a combative organization and vociferous advocate for farmers' rights (see Sandwell, 2012). At the provincial level, the era also saw the birth of the Ontario Federation of Agriculture (OFA) and the National Farmers' Union Ontario branch (Veerarghavan, 1985)[42]. In 1936, the founding conference of the OFA, then referred to as the Ontario branch of the Canadian Chamber of Agriculture, brought delegates together to outline priorities for the new organization. The parent Canadian Chamber had, just two years before, established their own priorities, including uniting and coordinating the interests of farmers across the country through provincial chapters, and promoting the social and economic well-being of all farmers (Zwerver 1986, 11). When delegates met to establish an Ontario branch of the Chamber in January of 1936, they ratified support for the national priorities, while establishing that support for marketing boards and producer and seller collectives would be key regional priorities (Zwerver 1986, 13).

In an address to the gathered delegates of the 1939 annual meeting of the Ontario Chamber, President H.H. Hannam forcefully restated these priorities. In his reportedly rousing speech, Hannam openly critiqued the Canadian government for standing by while a generation of farmers was driven to poverty for lack of markets. Hannam emphasized that a familiar culprit caused the trouble: low prices.

> This factor, which is the most important of all, means continuing hard times for primary producers the world over…the problem of basic commodity prices, to give the producer an adequate living, is one which the leading nations have failed to solve (Hannam as cited in Zwerver 1986, 16).

Bolstered by the rhetoric and increased presence of the Ontario branch of the Chamber, and in reaction to the worsening conditions, farmers in the Holland Marsh banded together to form the Holland Marsh Growers' Co-operative Exchange in 1937 (Bulmer 1937). The goal of the Growers' Co-operative was essentially to collectivize aspects of production, distribution and selling. In a draft of its founding document, the group writes that it intends to,

> Co-operatively produce, grade, buy, sell, manufacture and deal in fruits and vegetables and their by-products and all other products of the farm; to buy, sell, manufacture and deal in containers, feed, fertilizer, machinery and all other farm supplies and to do all things incidental or conducive to the attainment of the aforesaid objects or any of them (Bulmer, 1937, 1).

A main concern for the Marsh farmers involved in drafting the regulations and establishing the Growers' Co-op seems to have been reining in the rapidly escalating power of the commission agents to draw off the farmers' already-meager profits. While direct-to-market selling was still a common practice in the 1930s, there was a rise in commission agents as farmers became increasingly desperate to find markets for their produce. The commission agents, essentially middlemen, would facilitate the selling and distribution of produce, mostly to markets in Toronto. Standard practice dictated that agents took in excess of 12.5 percent commission on transactions, plus a set fee based on the size of shipment (see Bulmer, 1937).

To the farmers, the commission agents were selling access to markets in Toronto and beyond – a precious commodity given the extent to which supply was outstripping demand. To the grocers and market-owners in Toronto, the commission agents were selling a predictable, reliable source of produce. And in mediating between the two, commission agents emerged as *de facto* graders of produce because, in the 1930s, Marsh produce was not subject to standardized grading schemes like some other commodity groups in the province. This position gave the agents an inordinate ability to manipulate both the farmers and grocers. When buying from the farmers, the temptation for unscrupulous agents was to convince the farmer that their produce was of a lesser grade, and offer a correspondingly lower price. When selling to the grocers, the agents would reverse the claim and insist on the high quality of the produce, and demand a higher selling price. The agent would therefore be left with their 12.5 percent commission, a set fee based on the size of the shipment, plus the difference in price between what they bought the shipment for and what they sold it for (Bulmer, 1937).

Farmers were not alone in their frustration with commission agents. Federal legislation enabling the formation of marketing boards passed in 1934 was ruled unconstitutional by the Privy Council of the United Kingdom (still the court of final appeal at the time) in 1937, in part because it was seen to infringe on provincial jurisdiction. In order to fill the void left in the absence of federal legislation, the provincial government passed the *Farm Products Control Act, 1937*. Some of the earliest boards established were for peach growers, asparagus growers, cheese makers, and for Holland Marsh crops (*Globe and Mail,* 1937, p. 4; Ontario Ministry of Agriculture, Food and Rural Affairs, 2014, np). In theory the marketing boards provided new opportunities for farmers to market their produce as part of a larger collective, within which consistent grading schemes could be agreed upon and routinized marketing protocols established, thereby lessening the ability of the middlemen to manipulate prices and giving farmers more control over their agricultural natures through collective marketing.

In practice, however, many farmers remained skeptical that marketing boards would bring them any benefit. The government's overture seemingly was not enough – indeed even the Deputy Minister of Agriculture, J.B. Fairbairn, himself a farmer, was publicly critical of the government's inaction and began calling for the creation of a centralized food terminal. Ideally the terminal would provide a meeting place where farmers and marketers could meet together, eliminating the need for middlemen altogether. The terminal would "permit control of supply and demand, and would yield better prices to the producers as well as bring substantial advantages to the consumers and retailers" (*Toronto Star,* 1937, 4). Yet despite these early calls for a food terminal by Deputy Minister Fairbairn and others, funding and materials were difficult to acquire during the war years. As a result, construction on the Ontario Food Terminal would not begin until 1952 (Toronto Star, 1952, 13).

Throughout the 1930s and 1940s, Marsh farmers relied on the provincial *Farm Products Control Act, 1937* which provided the enabling framework for the founding of the Holland Marsh Growers' Co-operative Exchange and the Holland Marsh marketing board, both of which emerged in 1937. In either an overture to local autonomy, or an early iteration of the scalar politics of off-loading, the *Act* provided local authority for the establishment of local boards, giving the local leaders "considerable powers of regulation" (McMurchy, 1990, 1).

Typically marketing boards and producer co-ops were comprised of discrete commodity groups – potatoes, hogs, wheat, etc. Indeed by the late 1930s a number of commodity-specific boards were already well established, including the Tender Fruit Producers' Marketing Plan, the Ontario Asparagus Growers' Marketing Plan, and even a plan for cheddar cheese marketing (this was later rolled into the Ontario Milk Marketing Plan) (McMurchy, 1990, 2). In contrast to this, the first Marsh marketing board and co-op were based on regional origin, rather than a specific kind of crop. As McMurchy (1990, 3) points out, however, the newly enabled boards and co-ops were designed to succeed through uniformity, not heterogeneity.

> Regardless of all of the other programs that marketing boards may develop, the need to enforce a common position among their own producers is paramount…It is normal and expected that there will always be differences in opinion between producers on various points. It is vital for marketing boards that they maintain sufficient credibility among producers to persuade those producers who do not

agree with the majority's decisions to abide by such decisions nonetheless. This credibility is attained by establishing the boards as producer organizations elected by producers (McMurch, 1990, 3).

Within the Marsh, the main factor inhibiting the establishment of a stable marketing board infrastructure was the relative heterogeneity of the crop base in the Marsh in relation to the aim of supportive marketing infrastructure. While the crop base in the Marsh was quite homogeneous – which in part led to a glutted market, necessitating marketing infrastructure in the first place – it was still more diverse than what was included in the typical marketing board. The biophysical distinctions of carrots, onions and lettuce, and resulting divergences in marketability, growing imperatives, transportation requirements, storage needs, and the like, are differences not easily distilled into a common position and wrangled into one marketing board or co-op. In other words, lettuce growers in the Marsh have very little in common – as farmers – with onion growers. While a lettuce grower in the late 1930s might want to prioritize mobile refrigeration, and road and rail construction, an onion grower might be more interested in stationary cold storage technologies. The biophysical characteristics of each crop led to divergent political priorities.

The intensifying plight of the farmers also stoked latent cultural antagonisms – highlighting the cultural heterogeneity of the area – a heterogeneity that exists at times uneasily throughout the history of the Marsh. The Reeve of King Township, complaining of the absence of cohesion within the struggling Holland Marsh Growers' Co-operative Exchange noted, "It's hard going on the marsh, except for the Italian settlers, who ship direct to the city in their own truck and cut out the commission agent" (Jefferson, as cited in *The Toronto Daily Star*, 1938, p. 6). Going even further, a long-time Marsh farmer, A. Nienhuis opined, “When you have Dutch, English, Germans, Italians, Ukrainians, and others, it’s hard to get them together in a united front without determined leadership – and we haven’t had that” (Neinhuis, as cited in *The Toronto Daily Star* 1938, 6). Making matters worse, the spiritual leader of the Marsh, and an executive on the struggling Holland Marsh Growers’ Co-operative Exchange, W.H. Day, died suddenly in his field, in July of 1938 (*The Toronto Daily Star,* 1938, 6).

Perhaps not surprisingly, then, the Growers’ Association was struggling just a year after it was formed. The rules specified that the farmers who had signed on to the agreement (roughly 140 of the 160 operating in the area during the era) had to sell their produce through the Exchange. However, those who did not join (as well as many who did) were accused of ‘bootlegging’ produce to wholesalers (*The Toronto Daily Star,* 1938, 6). Meanwhile, those that did sell through the struggling co-op felt that they were not being fairly treated. According to one farmer, William Valenteyn, representing a group of disgruntled farmers,

> Some of us sent produce to the growers’ association for which we got nothing in return. In other cases, we received not 10 per cent of the value of our crops. Some of us still have money owing from the association. (Valenteyn, as cited in *The Toronto Daily Star,* 1938, p. 6).

While this first attempt at organizing the farmers of the Holland Marsh struggled to unite a relatively heterogeneous crop and cultural base, it also failed to address the farmers’ central concern – the extent to which commission agents were able to profit at the expense of the farmers. Indeed, tempers seemed to flair precisely because the commission agents were still largely in control of profits, despite the presence of the marketing board and Holland Marsh Growers' Co-operative Exchange. D. Nolan, a Marsh farmer and ex-Reeve of Bradford was quoted as saying that the commission agents were "cutting [their] throats" and that they had "the settlers at their mercy, and they're taking full advantage of that fact" (Nolan, as cited in *The Toronto Daily Star*, 1938, 6).

In the end the tumultuous first attempt to establish a marketing board for the geographic region of the Marsh, and to forge a unified organization comprised of Marsh farmers fell apart about a year after it began. The official reason the Ontario Farm Product Control Board gave for revoking the Holland Marsh marketing board's license was that too many farmers were selling outside the Co-operative Exchange's infrastructure – a clear and punishable violation of the rules (Farm Products Control Board, 1938). However, the relative heterogeneity of the crops, the increasing desperation of the farmers and the influence of latent cultural antagonisms certainly played a part in the dissolution of the marketing board and Holland Marsh Growers' Co-operative Exchange. Not until 70 years later, in 2008, was there another attempt to launch a similar organization, the Holland Marsh Growers' Association (HMGA)[43], which is more an advocacy organization than it is a marketing board. Thus far there has never been another marketing board exclusively based in the geography of the Marsh. However, the HMGA does provide some support to farmers and has helped to develop local markets by leveraging recent interest in local food

Ultimately the late 1930s represented a nadir of sorts for agriculture in the Holland Marsh. While individual farmers would, and continue to struggle, never have the conditions of deprivation been as systemic as in the late 1930s. In part, this is because of the protective measures farmers within the Marsh, and beyond were able to institute in the coming years, demonstrating a point agricultural scholars have made clear: agriculture is rarely (if ever) completely capitalist (see Akram-Lodhi & Kay, 2010, 2010a; Brenner, 1976, 1982; Kautsky, 1988[1899]). At the same time however, the organizations and state supports intervening to insulate farmers against the unregulated market helped drive the continued transformation and manipulation of biophysical nature in the Holland Marsh. The kinder, gentler capitalism in the fields ended up facilitating the continued use of the Holland River valley as fields, along with the ecological destruction that entails.

4.3 Social supports, physical infrastructure and the emergence of Holland Marsh agriculture

With the Second World War in full swing, a number of developments occurred that had a significant impact on the production of nature and agricultural practice in the Holland Marsh. First, perhaps learning from the false starts of the 1930s, farmers became far more successful at organizing the social infrastructure they needed to support the development of markets and their survival as farmers. As a result, the 1940s saw the strengthening of provincial supports and the introduction of important local ones. And with the strengthened social networks came the ability to advocate for and organize important physical infrastructure projects. New transportation networks and the emergence of nascent storage and cooling technologies allowed the Marsh growers to turn the liability of freshness into an important asset. Second, given Canada's importance as a provider of calories during the Second World War (Mosby, 2014), Canadian farmers emerged as a respected and powerful political block during the war and immediate postwar years. For farmers in the Marsh, the war provided hungry markets for the abundant supply, but it also meant a chance for the farmers (many of them newcomers) to 'prove' themselves as valuable, contributing members of Canadian civil society. In this section, I begin with a discussion of the cultivation of wartime credibility, and follow with an account of the social and physical infrastructure that emerged during World War II and immediate post-war years.

4.3.1 Wartime sacrifice and the stabilization of agriculture

Through the materiality and discourse of war, food itself became deeply entwined with state-making through nationalism and anti-fascism (Mosby, 2014). As consumers of food, non-farmers were expected to endure shortages of staples such as oils, butter, grains and meat, while making do with what was at hand. As producers of food, farmers were expected to endure shortages of labour, materials and machinery – indeed during the 1943 harvest, farmers in the Marsh were collectively losing an estimated $20,000 a day to rot and over-ripening for want of labour to harvest the crops (*The Toronto Daily* Star, 1943, 5). The hundreds of students who lived in work camps in the Marsh during the war years from late summer until school started in September were recalled to the fields in 1943 after school had resumed. F.W. Davis, Manager of the Ontario Farm Service Force asked that 300 of the students be allowed to return, "It will be impossible for these crops to be harvested unless those students who have been working on farms during the summer return for another two weeks" (Davis, as cited in *The Toronto Daily* Star, 1943, 5).

Partly as a result of the farmers' hard work, and partly a result of the cultural, political and material importance of food to the war effort, farming as a noble, even heroic pursuit, displaced far less flattering narratives which framed rural people as inferior to their urban counterparts. The lowly Marsh Muckers were emerging as crucial contributors to society in the eyes of the public. War-time rhetoric became entangled with agriculture and catapulted farmers and farm workers onto the discursive frontlines (see also figure 15 below). During the 1943 planting season, farmers,

> [O]rganized themselves into a sort of mobile commando unit, a sort of combined operations force, and as a field dries, no matter on whose farm, this commando unit swoops on it with tractors and horses, and gets it turned over and seeded in short order (*The Toronto Daily Star,* 1943, 12).

In the war-time firmament, collective action was understood as essential, and farmers were celebrated for displaying the kind of selfless team work that was needed to win the war, both at home, and abroad – and popular culture and media were quick to use military rhetoric to emphasize farmers' contributions. In 1941, ads in the newspaper also called on women to join the fight in the fields as a way of helping the beleaguered people of Britain,

> Unless pickers are forthcoming, 8,000 bags of onions will remain unharvested. Here is an opportunity for women who have been sympathetic about Britain's onion plight to give a helping hand in Canada's program to release food for Britain (*The Toronto Daily Star*, 1941, 33).

The role farmers played in providing food domestically and abroad certainly had a role to play in Canada's emergence as a middle power by the end of the war. At the same time, the duties of war at home gave recent immigrants a chance to demonstrate their patriotism to their new homes, while providing the state with an opportunity to conscript recent immigrants into the trappings of nationalism. The (largely) European diasporas in the Marsh were celebrated for seizing on the opportunities to contribute,

> Holland Marsh settlers are proving themselves second to none in Canada when it comes to patriotism, according to Victory Loan campaigns…Germans, Czechs, Italians, Romanians, Russians, Poles, Scandinavians and many other nationalities live in peace on the marsh and are showing their loyalty in this campaign, although incomes were poor up until this year. (*The Toronto Daily Star,* 1942, 8).

The emergence of the Marsh farmers (and their rural counterparts elsewhere) as respected, contributing members of society can be understood as part of a broader process of the rise of a 'modern countryside' (Murton, 2007). The use value of the countryside, and the political power of its inhabitants, became readily apparent during the late 1930s and early 1940s, shifting slightly the dynamic between the city and countryside. Liberal notions of an ordered, productive and profitable rurality animated state-making projects, making farms and farmers an important part of the post war transition. Luckily for the farmers of the Holland Marsh, this cultural shift was occurring just as the fields were coming into production.

Figure 15. Grocery ads - Holland Marsh potatoes are imbued with wartime rhetoric and 'heroic' farmers are celebrated for their contribution to the war effort (*The Toronto Star* 1942, p.11; *The Toronto Star* 1942, p.12).

COMMANDOS "INVADE" HOLLAND LANDING CELERY PLANTATIONS

Over 100 farm commandos from Ontario and Quebec are accelerating celery cultivation in Holland Marsh district. Housed in brand new quarters built by the settlers, the commandos operate on army lines without military discipline. The program is jointly operated by the Farm Service Force, Y.M.C.A., and Y.W.C.A., and the government has supplied materials. Four of the group shown setting out celery plants from an ingenious machine which rapidly covers the ground are, LEFT to RIGHT: Paul Fauteux, Montreal; James Stewart, Pembroke; Eddie Zimba, Newmarket, and Rudolph Esterhouse, Holland Landing.

Figure 16. Commandos "invade" Holland Landing - wartime rhetoric to rally the agricultural troops. (*The Toronto Star*, 1943, p. 8).

The political and cultural ascendance of farmers and their organizations was further facilitated by what some have observed to be the mechanization and scientific period of agriculture in Canada (Reaman 1970). According to Reaman (1970), 1940 – not 1939 – was the true start of World War II, at least as far as the Canadian agricultural sector was concerned. The Canadian economy was just starting to pull out of the Great Depression, and stocks of most food commodities had been exhausted due to the double pressures of war time – on the one hand an increase in demand to meet the soldiers' caloric needs, and on the other, a decrease in supply, at least initially, as the agricultural sector figured out how to maintain production with significantly less expertise and labour (Reaman 1970). In any case, the farmers that were left were expected to increase production in order for the Canadian government to meet its obligations to the war efforts in terms of food exports to the front lines, while also ensuring the domestic population still had enough to eat (National Farm Radio Forum, 1943). With a dearth of labour[44], mechanization emerged as perhaps the only viable solution, and coupled with early forays into fertilizer and pesticide development, led to rapidly increasing yields.

4.3.2 Social organizing, physical infrastructure, (im)permanent stability

Despite (or perhaps because of) farmers' struggles throughout the 1930s, the OFA transformed in the 1940s and 1950s into a permanent, robust and integrated farm advocacy organization (see Zwerver, 1986). This largely progressive and successful period of the organization's history was ushered in during the spring of 1940, when members voted to allow membership to women and women's farm organizations. At the same time, there was a shift to decentralize power as the organization sanctioned and supported the development of county-level decision-making bodies across the province (Zwerver, 1986, 17). The early 1940s also saw the OFA establish Young People's Committees in each county and a Province-wide Federation newspaper designed as a communication and learning tool (Zwerver, 1986, 17). Perhaps most importantly, in 1944 the OFA was enshrined as an officially recognized association under the *Agricultural Associations Act*. This enabled the organization to obtain the power, in 1946, to collect membership fees[45], providing a stable funding mechanism and allowing the organization to develop its programming and advocacy work.

Despite never coming to fruition, some Marsh farmers attempted to organize a Holland Marsh growers' union in 1948 and 1949. The farmers expressed four familiar issues they wanted animated by the union: (1) fair marketing protocols to prevent the unscrupulousness of commission agents; (2) a reduction in the price spread between producers and consumers; (3) a uniform inspection protocol throughout the province, and; (4) legislated floor prices for agricultural commodities (*The Globe and Mail*, 1948, 7). Ultimately, the union failed to materialize in any meaningful sense, seemingly due to lack of support and interest. The principles motivating the organizing group, however, were carried on partially by other active farm organizations, including the OFA.

Another important development for farmers across the province was the launch of National Farm Radio Forum, a joint initiative between the Canadian Broadcasting Company (CBC), the Canadian Association for Adult Education (CAAE), and the Canadian Federation of Agriculture (CFA). With the motto, "Read, listen, discuss, act" (Sandwell, 2012) the Forum ran across Canada throughout agriculture's off-season between 1941 and 1965. It was designed to bring farmers together to collectively learn and engender social activism through the rapidly expanding new media of radio. In addition to radio programming on various topics of concern to farmers across the country, printed educational materials were mailed out to registered participants in advance of each broadcast to facilitate discussion in local groups. At its peak, in 1949, the Forum had over 21,000 individuals registered as participants and had inspired the establishment of 1,600 local discussion groups (Sandwell, 2012,171)[46].

Within this emerging farmer-friendly milieu of the World War II and immediate post-war era, momentum was gathering for social organizing among farm organizations both federally and provincially. For the farmers in the Holland Marsh, still recovering from the collapse of their earlier efforts to establish a marketing board and co-op in the mid-1930s, there was inspiration to be had in the success of provincial and national organizations. Beginning in the 1940s, Marsh farmers returned to social organizing, but this time around focused their efforts more explicitly and intentionally on the development of physical infrastructure.

By the late 1930s and early 1940s innovations in cold storage technologies were emerging in areas of intensive horticultural cultivation in the US, notably California, as well as within the muck crop areas of the Great Lakes basin in places like Kalamazoo, Michigan and Celeryville, Ohio (see Freidberg, 2010; Petrick, 2006). I discuss the socio-natural dynamics of cold storage in the Marsh in greater detail in the following chapter, but suffice it to say for now that the introduction of reliable, affordable and widespread cold storage had a profound impact on the production of nature in the Marsh. While eventually almost every farmer would have his or her own cold storage facility, in the early/mid-1940s the technology was still very expensive. The costs were prohibitive for all but the most commercially successful growers, meaning that for the vast majority of farmers, access to cold storage meant banding together, despite crop and cultural differences.

In 1946, 158 of the roughly 500 growers in the Marsh pooled financial resources to develop the Bradford Co-op Storage plant (Egan, 1946, 8). Drawing also on support from enabling federal legislation, including the *Cold Storage Act* and the *Co-operative Marketing Loan Act*, the federal and provincial governments each provided grants covering 30 percent of the cost to build the facility, leaving the farmers to cover the remaining 40 percent (*The Toronto Star,* 1945, 8). A 1945 report to York County Council determined, not surprisingly, that a cold storage facility was very much needed in the Marsh, "The report pointed out that in view of the tremendous loss of vegetables through lack of proper storage, this plant would be of great value" (*The Toronto Star* 1945, 8). At its peak, the plant had the capacity to store up to 50,000 crates of vegetables at a time, representing a significant capability to manipulate supply and avoid a glutted market. The Bradford Co-op also contained an ice-packing plant which allowed farmers to ship their produce further afield of the Marsh than had previously been possible. Having the capacity to put crates of vegetables on ice before shipping significantly lengthened the amount of time crops could be kept fresh, and therefore the distance over which the crops could be shipped. This meant that Marsh farmers were no longer solely dependent on the local Toronto market, but rather could look to sell their produce further afield. Indeed, in 1946, lettuce from the Holland Marsh was, for the first time, consumed from Saskatoon to Halifax (Egan, 1946, 8). Another private facility, which other farmers could access for a fee, was also opened in 1946, The Holland River Garden Company.

The facility – equipped with an icing and shipping wing – could allegedly ice an entire rail car of produce within minutes (Bradford West Gwillimbury Local History Association, 2006, p. 303).

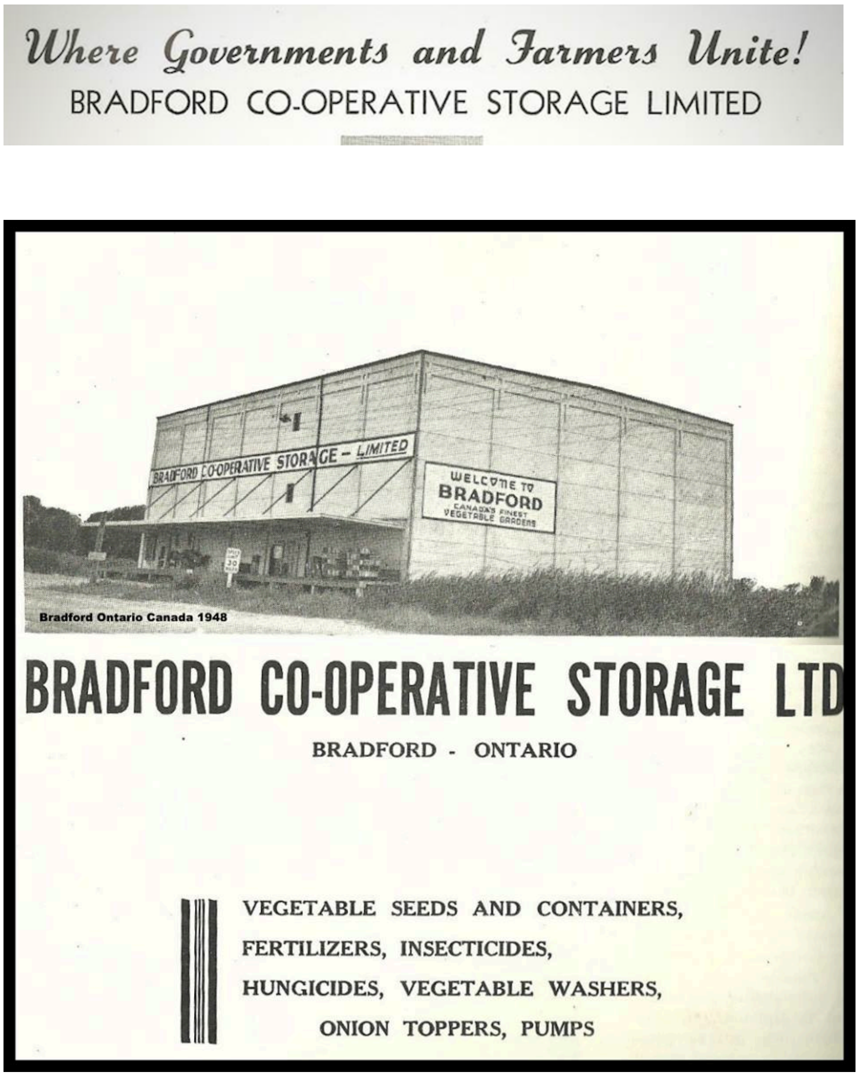

Figure 17. Bradford Co-operative Storage Ltd. - the first publicly supported physical marketing infrastructure in the Holland Marsh. Photos courtesy of Nick Molnar, no date.

20 TRADE AND TRANSPORTATION

A VIEW OF HOLLAND RIVER GARDENS CO. LIMITED'S ICE-PACKING PLANT, APPROACHING FROM THE NORTH.

Holland River Gardens Co. Limited is equipped with the most modern equipment for the washing, grading and pre-cooling equipment. The plant is also equipped with the most modern facilities for the ice-packing of vegetables and the bunker icing and blowing of top-ice in railroad cars.

A VIEW OF HOLLAND RIVER GARDENS CO. LIMITED'S COLD-STORAGE PLANT AND ONION SHED, APPROACHING FROM THE SOUTH.

Holland River Gardens Co. Limited's aims are to promote and expand with ever-increasing efficiency the marketing of fresh vegetables, grown in the Holland Marsh area, employing the latest in processing, packaging and shipping, thereby rendering a service to the producer, distributor and consumer.

Figure 18. Holland River Gardens - a privately owned and operated storage and packing facility. Photos courtesy of Nick Molnar, 1949.

Figure 19. Dominion ad for Holland Marsh head lettuce - by the mid-1940s the 'dismal swamp' imaginary had been replaced by an emerging theme of freshness, as illustrated by this 1945 Dominion ad for Holland Marsh head lettuce. (*The Toronto Daily Star*, 1945, p. 23).

Other important physical infrastructure projects were started in 1946, including the construction of Highway 400. Up until then, the only road linking the Holland Marsh with Toronto (and markets beyond) was the increasingly congested Yonge Street. The new highway was contrasted with the "narrow brush mattresses of the muskeg of the marsh", with a four-lane super-highway that would enable motorists "to sail across the wet flatlands at 50 miles an hour" (*The Globe and Mail,* 1936, 3).

Unfortunately for the growers of the Holland Marsh, the physical infrastructure they were relying on as their salvation was much slower moving than the natural cycle of the seasons, and the seemingly ever-increasing yields pouring out of the fields. During the latter war and immediate post-war years, rock aggregate for concrete could not be mined fast enough to keep up with demand across the province, resulting in massive delays in various construction projects, including the completion of Highway 400, which would not open until the early 1950s. Marsh growers meanwhile lacked the financial resources to build as much storage as they needed, stuck in a cycle perpetuated by price: As long as wholesale prices remained so low, farmers would not have the financial resources or access to the credit they needed to build more storage and cooling facilities, yet they would not be able to control the wholesale price by manipulating supply until they had access to more storage and cooling facilities. The storage shortage was so acute that the Ontario government began making various publicly owned facilities available for storage, including buildings at the Canadian National Exhibition in Toronto (*The Toronto Daily Star,* 1950, 11).

Still, throughout the late 1940s and early 1950s, supply remained stubbornly prolific, largely uncontrollable, and thus mostly unprofitable. This remained particularly true of the more perishable, less storable vegetables, including lettuce. Eventually, Holland Marsh growers would cease growing lettuce almost entirely, somewhat reluctantly ceding the market to subsidized growers in Quebec. Yet during the 1940s and 1950s the clumsy process of specialization – an incipient imperative of the mass industrialization of the agricultural sector during the era – was still playing out in the fields. Before the farmers gave up on growing lettuce in the Marsh, much of it was plowed back into the fields, because it was cheaper than storing and shipping it. As one reporter described it,

> According to the men who grow vegetables, selling lettuce at the price they receive from wholesalers (two cents a head) is an absolute losing proposition. In their fields they have enough lettuce to make every housewife happy, at half the current price (10 to 15 cents) – but somewhere between the time their product is dumped on the wholesaler's floor and the time it appears in a grocery store

window, the price of lettuce is in line with everything else. It's high enough to keep Mrs. Toronto going all out on lettuce. Thus a surplus builds up (*The Toronto Daily Star,* 1948, 1).

Figure 20. Appeals to 'Mrs. Toronto; - women farmers in the Marsh make appeals to "Mrs. Toronto" in order to further develop local markets for Marsh produce (*The Toronto Daily Star,* 1948, p. 1).

Despite the problematic nature of lettuce – or rather the problematic set of socio-spatial relations Marsh farmers were attempting to insert lettuce into – Marsh farmers were indeed increasingly meeting the needs of "Mrs. Toronto" by the early 1950s. Though there was no unified organization to animate the collective concerns of all farmers in the Marsh, progress was still being made on developing necessary physical infrastructure – roads, storage, icing plants, and the like. While still in embryonic form, these emerging technologies and infrastructure allowed the farmers greater control over the supply of their crops. Instead of glutting the local market with produce every fall, the growers were beginning to have the capacity to control the supply –increasingly able to manipulate nature-as-time and nature-as-form. They were confronting and (partially) transcending the biophysical limitations of their crops through the manipulation of the time and form of their crops. Emergent cold storage and icing facilities lengthened the shelf life of the produce, meaning that the farmers could hold much of their yield back in the fall, and allow it to trickle out over the course of a few months. At the same time, the development of mobile cold storage, and improved road and rail networks opened up markets for Marsh produce across the continent. The Marsh farmers were no longer dependent only on the local market, but rather could reach willing buyers across the country, from "Mrs. Saskatoon" to "Mrs. Halifax".

4.4 Conclusion

By the early 1950s, the social and physical infrastructure the Marsh farmers had struggled for was yielding two important benefits. First, they had begun to harness freshness as a profitable biophysical attribute. Freshness of the produce was improved to the extent that muck crops were arriving at their destinations in better shape than at any point in the history of the Marsh, despite traveling greater distances. What was earlier a liability – freshness – was transformed into an asset to be leveraged by the farmers. Moving into the 1950s, the notion of freshness became both a material reality, and a discursive strategy mobilized to develop markets, both locally and further afield. The factors contributing to the production of freshness – social organizing and physical infrastructure – are lost within more conventional approaches to the history of agriculture. Indeed, the notion that freshness is a produced socionatural attribute is largely taken for granted (Freidberg, 2010). Second, the earlier liability of volume was also transformed into an asset through the application of emerging technologies. Enabled by the development of improved cold storage transportation and upgraded transportation infrastructure, the dispersal of produce created a kind of artificial scarcity across space. While originally bound to market outlets nearby (essentially in the Greater Toronto Area), improvements in transportation allowed Holland Marsh crops to be sold as novelty items in Halifax, Saskatoon, and New York. With the horizon of these new markets, Holland Marsh produce also became a scarcer commodity in the Toronto area.

By drawing on the conceptual insights of political ecology, the ways in which the biophysical properties of the crops – abundance and perishability in particular – were implicit to changes in farmer practice and alterations in the landscape around them are made clear. The farmers were bending their practices, politics and landscape to the requirements of the crops. Given that most histories of agriculture in Ontario are written firmly within a political economic register, and typically focus on cash crops (wheat, corn, soy beans), these insights into the specificity of the production of stability in the Holland Marsh are well overdue (see for example Lawr, 1972; McInnis, 1984; Mitchell, 1975).

However, as a result of the farmers' work to control certain biophysical characteristics of their crops, ecological contradictions of the agricultural enterprise in the Holland Marsh would soon begin to surface. This was the beginning of a period of the Marsh's history – an era extending into the contemporary period – that was arguably (and tragically) ushered in by the Hurricane Hazel flood of October 1954. Lives were lost, harvests were decimated, and fields were washed away. Yet despite the torrent of news coverage and commentary on the devastation wrought by Hurricane Hazel, no one thought to point out that the so-called ‘natural disaster’ was, in at least equal measure, social in character. In other words, the Marsh had ceased to become – at least discursively, a marsh. To the farmers (and customers in Toronto and across the continent), the Holland Marsh was emerging as a sophisticated and technological landscape of food production. As *MacLean’s Magazine* put it in 1953, the Marsh had emerged as the “biggest kitchen garden in the country…a dreary stretch of ancient lake bed…[transformed into]…a black goldmine”(Campbell, 1953, 19). The busy struggling of a farm community over two decades – through social organizing and physical infrastructure projects meant to wrangle profits out of their produced natures – had effectively erased the memory of the Holland River Valley, the wetlands, and the marsh. The first nature of the marsh had been transformed into a socionatural agricultural landscape. Yet the contradictions upon which this transformation relied would be revealed, beginning in the 1960s, and throughout the 1970s and 1980s. However, the infamous hurricane in the fall of 1954 introduced the folly of ignoring the contradictions of nature’s production in dramatic fashion. I begin Chapter 5 with a discussion of the dramatic moment when *the Marsh* was transformed into merely a marsh once again.

Chapter Five. 1954-1990 – Agricultural modernization and contradiction in the Holland Marsh

By the early 1950s the vision of the original Marsh boosters – Professor Day, the Syndicate, and others – had seemingly come to fruition. The disparaging imagery of the 'dismal swamp' had been thoroughly expunged from popular imagination, replaced by a sanitized imaginary of domesticated, albeit slightly unruly, crops. At the same time, the materiality of the landscape had similarly been tamed. The disorderly marsh had been torn apart, under-drained, canalized and reassembled into orderly fields producing steady, plentiful yields. Meanwhile hungry and profitable markets were springing up across Canada and the United States, made accessible by nascent storage and shipping technologies, providing an increase in demand for market garden crops Marsh farmers were only too happy to meet. In short, by the 1950s, the domesticated "smiling farms" promised decades before had seemingly arrived in the Holland Marsh (*The Globe,* 1925, 2).

From the early 1950s onward, the cultural and political clout farmers had in previous decades began to wane substantially in the context of rural restructuring (Mitchell, 1975, 14). As Winson (1993, 89) points out, "farming as a unifying activity for a substantial proportion of the population entered a period of rapid change". Following broader national and global trends in agriculture during the era, growers in the Holland Marsh would embrace the tenets of productivist, specialized agriculture – mechanized, chemical-dependent farming that would not only increase yields, but would ostensibly insulate the enterprise of farming from unpredictability (see for example Scott, 1998; Stoll, 1998; Winson, 1993). Scott (1998, 262) argues that the post-war agricultural system sought a "radical simplification" of agriculture in order to make farming "more directly apprehended, controlled, and managed". This system – which he referred to as "high-modernist agriculture" (Scott, 1998, 262) – was mobilized through attempts to mechanize and standardize processes in order to produce a more uniform, predictable biophysical nature. Within this context, the trend was toward the development of more durable crops, more efficient farming practices, and flatter, more extensively drained and irrigated fields. The emergence of high-modernist agriculture, as Scott (1998) puts it, would also usher in a shift in the scale of agriculture. While farming had been 'global' in a nominal sense for centuries (Mintz, 1986; Soluri, 2005), the extent to which agriculture moved from a local, to a globally integrated enterprise shifted substantially in the post-war period[47].

The Marsh, however, while subject to these broader trends in the political economy of agriculture, would remain somewhat insulated from them. The strengthening imperatives of global trade, and multi-national monopolistic chemical and seed companies would have an impact in the Marsh, however, it would be an influence refracted through the specificity of the muck socioecology. The Atlanticist food order (Wilson, 2001), characterized by government support (in terms of public investment and enabling legislation) for mass production, mass consumption and global trade of agricultural products constitutes only part of the broader historical development of the Holland Marsh during the 1950s, '60s and '70s. These grand trends in the political economy of agriculture apply unevenly in the Marsh, given the manifest difference in the agricultural crops grown there. Although carrots and onions would come to be globally traded commodities eventually, in the immediate post-war years muck crops were not nearly as important globally as grains and oil seeds. This accounts, in part, for the paucity of work attending to vegetables other than cash crops in accounts of the history of agriculture in Canada (see for example Winson, 1993; Wood, 2000).

Yet even as the Marsh farmers translated and adapted the emerging edicts of an increasingly productivist and globalized agriculture, they would not escape the associated ecological contradictions. The negative externalities and undervalued costs of chemical inputs and a reliance on a rapidly expanding network of markets would undoubtedly impact farmers in the Marsh, along with most other farmers in the industrialized and industrializing worlds. These ecological contradictions would manifest themselves in ways specific to the Marsh,, ultimately resulting in the imposition of limits on the production of nature in the Marsh as an era of environmental politics emerged.

Celebrations heralding the beginning of a new era of agriculture in the Marsh wrested from the unpredictability and limits of biophysical nature belied the ecological contradictions just below the veneer. To be sure, ecological troubles of the kind Bride Brode anticipated in her scathing condemnation of the drainage of the Holland Marsh as "one of the great and inexcusable mistakes…criminally wasteful so far as the present is concerned…actual theft from the future" (1937, 13) began to surface in the early 1950s. In 1953, the Lake Simcoe Conservation Club successfully petitioned the Ontario government to ban further development of the part of the marsh that extends north beyond Yonge Street (or Hwy 11). The club argued,

> [A]ny further development of the marsh as farmland will lead to the extinction of nesting and spawning grounds. The natural resources have decreased alarmingly. Further agricultural development will lead to the complete extinction of all fish

> and wildlife in the marsh (Lake Simcoe Conservation Club as cited in *The Globe and Mail,* 1953 November 4, p. 15).

Yet with the introduction of chemical dependent farming in the Marsh, 'environmental' concerns moved beyond the conservationism of Brode's critique, becoming instead internalized matters of human health, safety and livelihood. A host of ecological and human health concerns appeared during the 1970s just as the ultra-productive muck soil began subsiding noticeably, issues I take up later in this chapter. Yet before all of these ecological externalities unaccounted for in the popular celebration of Marsh agriculture, the arrival of Hurricane Hazel served to underscore the hubris of the Marsh boosters. Hazel dramatically emphasized the point that 'nature' could never really be conquered – certainly not as it was widely presumed to be.

This chapter will address the era of agricultural modernization in the Marsh, detailing how the muck socio-ecology adapted to the edicts of an emerging industrialized agriculture, and highlighting the resulting contradictions. I begin with perhaps the most fundamental of these contradictions, dramatically exposed in October 1954.

5.1 Hurricane Hazel and nature's revenge

With crops rolling off the fields as though from a well-oiled conveyor belt, farmers in the Marsh could be forgiven for forgetting about the fundamental biophysical character of the geological landscape of the pre-agricultural Holland Marsh. Indeed, by the early 1950s the Marsh had been thoroughly separated (at least discursively) from its material referent, and had emerged as the quintessential example of modernist, profitable agriculture. In fact the muck growers were doing so well that just over a year before they were in desperate need of charity as a result of their own catastrophe, Dutch farmers in the Marsh were doing well enough financially to send $100,000 to aid flooded farmers in the Netherlands (*The Globe and Mail*, 1953, 4).

The summer before the storm, the Marsh was being fêted for its exemplary yields and innovative applications of technology. Farmers from across the province descended on the Marsh for a tour in the summer of 1954, hosted by the fledgling Ontario Soil and Crop Improvement Association. Participants were exposed to a phantasmagoria of bursting fields and state-of-the-art packing facilities (Stonehouse, 1954, 5). Poised on the "threshold of becoming the nation's salad bowl" (*The Globe and Mail,* 1954 June 23, p. 8) the bounty resulting from the Marsh farmers' ostensible victory over biophysical nature was about to be shared across the country. As *The Globe and Mail* (1954 June 23, p. 8) gushed just three months before the hurricane descended on the area,

> Man's [sic] victory over limp lettuce with construction here of the first vacuum cooling plant for leafy vegetables in Canada will soon make it possible for housewives in Vancouver and Halifax to buy lettuce as fresh and crisp as the day it left the prolific market gardens of the district.

In the midst of the harvest of yet another bumper crop, the storm gathered in early October of 1954, as many of its kind do, in the Caribbean Sea. After causing significant damage to a handful of island nations and parts of the eastern seaboard of the U.S., Hurricane Hazel arrived in southwestern and central Ontario on October 15th, 1954. Initial weather reports indicated that the storm would dissipate upon arrival to Ontario; however the reverse was true. The storm intensified and suspended over central Ontario for the better part of two days. Winds of up to 110 kilometers an hour were recorded in the Greater Toronto Area, and nearly 300 millimeters of rain fell (hurricanehazel.ca).

Figure 21. Water returns to the Holland Marsh. From top left clockwise, image #9141, #9708, #8907, and #10044. Photos retrieved from ourstoriesinnisfil.ca.

The economic toll was immense, with some estimates putting the cost of the storm for Ontario at over $100 million ($1 billion in current dollars, see www.hurricanehazel.ca). According to Ontario Ministry of Agriculture documents, Marsh farmers claimed crop losses of nearly $2 million (Hilliard, 1954, 2). Hazel's human impact was even more brutal, leaving thousands of families across central Ontario homeless, and 82 people dead. In the Marsh, one person was killed and the damage to the fields and farming infrastructure was nothing short of catastrophic.

Given the wetland geology of the area, much of nearly 300 millimeters of rain that descended from Hazel was simply absorbed into the peat, muck and porous bedrock – at least initially. When the Marsh became supersaturated, and when the broader Lake Simcoe watershed was unable to absorb any additional excess moisture, the water began to back up and the flooding occurred furiously. One long-time resident recounted how sudden the flooding was.

> I was 15 years old. I was at home with my dad, and it had rained really hard for about two and a half days. But everything was still stable at 6:30. At 6:45 the neighbour and I were out digging trenches between the houses and the water was up to our knees already. It was instantaneous. Our cellar filled with water, almost to the top step, in half an hour. Three or four young guys, one guy had a driver's license, we drove out to the road, and the water hadn't really risen that high. It had risen, but…We watched the water rise up to the 400. And the cars were starting to stop. And the church. The church, Springdale, floated about a mile into the bank of the 400… It raised the water level so fast that farmers had only about 10 minutes to choose between to take the tractor or the truck, which was going to be more useful. It was unbelievable. (J. Smith, personal communication, September 3, 2013).

The water descended on the Marsh from all directions as Lake Simcoe overflowed and backed up the Holland River, toward the Marsh. The canal and pump system were clearly outmatched, and the dykes were easily shredded by the torrent of water. A post-mortem of the events found that the thousands of baskets and crates of harvested vegetables acted as a kind of buckshot, propelled by the force of the water, and aiding it to blast through the dykes. Within hours the entire Holland River lowlands had once again become a lake. As the *Toronto Daily Star* put it three days later,

> Swollen and ugly the river rose, washed away banks and dykes, homes and machines, smashed the puny works of man's (*sic*) years of toil and created a lake, bringing the valley in full cycle back to its starting point. (*Toronto Daily Star,* 1954, 18).

As weather events typically are, Hurricane Hazel was framed as a 'natural' disaster. But of course the storm was only a disaster in as much as it impacted 'man's (*sic*) puny work' – in as much as it impacted human settlement, revealing the social character of the storm. The Marsh, in other words, reacted to the storm in more or less the way it would have in the absence of agriculture – the peaty muck soil absorbed as much water is it could until the basin became supersaturated and overflowed. However, the reporting in the days following Hurricane Hazel, understandably angry in tone, reproduced a discursive binary between nature and society through a demonization of the former and lionization of the latter. The discursive distancing of the Marsh from its 'natural' origins – a project decades in the making – had been eliminated in just hours. Interestingly, some familiar disparaging language returned to circulation with respect to the Marsh. According to one observer, from the air, the Marsh "resembled nothing so much as a huge, sluggish, mud-laden pond…the water lies, inert and paralyzing, over the richest farmland in Canada" (Blackmore, 1954, 11).

The incursion by biophysical nature – in this case, especially water – was clearly devastating to the Marsh farmers. They had spent the better part of three decades constructing a landscape specifically designed to control water. The canal system, the bridges and overpasses, the dykes, and the intricate network of drainage ditches, were all victims of the flood in the farmers' eyes. As "the muddy waters spilled over the proud highway that was once the province's main road to the north" (Blackmore, 1954, 11) more than the fields or decades of work were being washed away – the Promethean vision of Day and the early Marsh boosters was at risk. As one headline put it, Hazel had turned "prosperous market gardeners [into] penniless refugees" (*The Toronto Daily Star*, 1954 October 18, p. 7).

Figure 22. Nature's return caused the farmers to flee - at least temporarily. *The Toronto Daily Star* 1954 October 18, 7

Figure 23. Nature's return - Top (#9081) - people are rescued from the lake and brought to dry land. Bottom (#8965) - pumps hard at work, (re)draining the Marsh. Photos retrieved from ourstoriesinnisfil.ca.

Efforts to regain control over the profitable fields were swift and decisive. Vehicles, hay bales, and other detritus left in the wake of the storm were used to reinforce Highway 400 into a massive dyke, to hold the water west of the highway at bay, while the water east of it was pumped out toward Lake Simcoe[48]. Within days of the flood, pumps were flown in from around Canada to begin the work. For nearly a month and a half, an army of machines pumped 170,000 gallons of water per minute, 24 hours per day (*The Globe and Mail*, 1954 October 19, p.1). Once the fields were sufficiently drained, 'operation mop up' commenced – a military style undertaking to remove the mountains of water-logged, decaying vegetables, shattered houses and barns, and other debris. The provincial Deputy Minister of Public Works determined that the work was "too onerous, odorous and unpleasant a task to be done manually" so a fleet of heavy and high-powered equipment, along with 2000 contract workers, were brought in to clear the fields (Hilliard, 1954, 25).

Re-draining the Marsh was heralded as an "engineering miracle" (Blackmore, 1954, 11), and while millions of bushels of onions, carrots and potatoes were lost, the entire marsh was drained before the water could freeze, saving the following year's season. Indeed, some farmers even managed to salvage some crops that had been put in storage before the storm hit. Decades-old concerns re-emerged, however, as biophysical nature in its pathogenic form (cholera, and other water-borne disease) was feared to have returned to the Marsh after the flood, through the waterlogged vegetables. Ultimately, after a mild public health scare, the Ministry of Health ruled saleable "All vegetables which are normally cooked before eating, e.g., beets, potatoes, carrots", while those which are typically eaten raw were directed to be destroyed (Phair, 1954, 1). Both the provincial and federal governments provided rapid and abundant financial aid, temporary housing, and clean-up support, and by the following spring, the vast majority of farms and farmers were prepared for the season.

In the aftermath of the flood, the provincial government established the Carswell-Shaw Commission to appraise the overall damage of Hurricane Hazel, and to make recommendations to avoid similar levels of devastation from other (inevitable) storms and floods. The Commission made a number of recommendations demonstrating an appreciation for the socionatural character of the disaster, including putting a moratorium on building in flood plains, and establishing green belt areas in the Humber and Etobicoke river valleys (Carswell & Shaw, 1954). The authors further recommended that in the case of the Holland Marsh, specifically, the main dyke be raised 18 inches and widened enough to allow the farmers' houses to be rebuilt on the dyke, not back in the fields where they had been.

The surprisingly activist recommendations from the Carswell-Shaw Commission can be understood, in part, as a function of the remarkable extent of the damage left in the wake of the event. Hazel was a powerful storm that caused significant damage throughout the Caribbean, the US and Canada. The severity of the storm gave political leaders, policy makers and even farmers cause to re-examine human-environment relations. However, the recommendations of the report are also part of a broader context of early conservationist thought percolating throughout Ontario during the late 1940s and early 1950s.

The Ontario Conservation and Reforestation Association, started in 1936[49], had been instrumental (and successful) in lobbying the provincial government for enabling conservation legislation. In the early 1940s, the Conservative government, cleaving to the left in response to growing popular support for the social democratic Cooperative Commonwealth Federation, established a centralized Department of Planning and Development, which included the Conservation Branch. Later, in 1946, the *Conservation Authorities Act* was established to provide guidance and funding for municipalities to create local conservation authorities based upon watershed geographies (Robinson and Cruikshank, 2006, 4). This led, in 1951, to the formation of the Upper Holland Valley Conservation Authority – the precursor to the Lake Simcoe Region Conservation Authority (the current-day conservation authority with jurisdiction over the Holland Marsh).

Despite the catastrophic damage from the storm, the recommendations from the Carswell-Shaw Commission, the institutional presence of the Upper Holland Valley Conservation Authority, and the growing conservationist sentiment of the era, very little changed in terms of farming practice as result of Hazel. Within a year of the storm, human settlement in the Marsh, not on the embankments, as the Carswell-Shaw Commission had recommended, had returned – perhaps even grown. Very little dyke work, save for the most necessary repairs, was completed. The thought of abandoning farming in the Holland River Valley was unthinkable. Indeed, by 1955 the Holland Marsh had become the exemplar of Ontario agriculture once again – the Celeryville or Kalamazoo of its day and region – held up as a template for wetland development from the shores of Lake Huron (*The Toronto Daily Star* 1955, November 5, p. 23), to the bog lands of Northern Ontario (*The Globe and Mail* 1955, March 24, p. 8). Just five months after the catastrophe in the fields of the Holland Marsh, Conservative party member from Temiskaming, A.R. Herbert, regaled the Ontario Legislature with his Promethean vision for northern Ontario,

> [A] large area of some hundred square miles where black muck of the type originally found at Bradford await but draining and clearing to become productive

> of the same type of vegetables grown so profusely at the Holland Marsh (Herbert as cited in *The Globe and Mail* 1955, March 24, p. 8).

The crops emerging from the muck fields had simply become too prolific and profitable to consider interventions detrimental to their production. At the same time, the speed and determination of the Marsh farmers to clean up the damage of Hurricane Hazel seemed to add to the lore of the area. The Holland Marsh emerged from Hurricane Hazel solidified as a reference point for archetypal muck crop farming, finally an equivalent to Celeryville or Kalamazoo. The lessons available from Hazel, however, were not part of the conversation. A group of "industrious new Canadians from Holland and Belgium", for example, were busy converting a duck hunting preserve near Lake Huron – referred to as a "waste land" – "into rich market garden plots" just a year after the catastrophic flooding, death and destruction wrought by Hazel in the Marsh. (*Toronto Daily Star,* 1955 November 5, p. 23).

Figure 24. The Holland Marsh, still an exemplar - despite the threat of catastrophic flooding, the conversion of wetlands into fields continued to be celebrated post-Hazel, and the Holland Marsh was held up as the exemplar of success. (*Toronto Daily Star*, 1955 November 5, p. 23).

An editorial in the *Toronto Daily Star* (1958 November 15, p. 10) just a few years later gushed excitedly about the so-called "black gold rush" occurring in the Marsh. The celebratory piece puts a fine point on the pace of the Marsh's transformation, and also gestures, with tongue firmly in cheek, at the frontiers of muck crop farming.

> Thirty years ago you could shoot wild ducks in the heart of the Holland Marsh, south of Bradford, and nobody would hear your shots. Twenty years ago you could buy land in the newly drained wilderness at a few dollars an acre and build a shack far from your nearest neighbour. Today you have to pay over $1,000 for

> that acre and chances are you'll live in a streamlined house as modern as Metro Toronto, complete with TV, maybe a couple of sleek new cars, and friendly neighbours all over the place. Tomorrow, if you want to join the black gold rush, you may have to buy land at the bottom of what is now Lake Simcoe. (*Toronto Daily Star*. 1958 November 15, p.10).

In the end, Hurricane Hazel – the annual anniversary of which still inspires a handful of romantic news stories heralding the ultimate triumph of humans over nature – only served to reinforce the perspective that the landscape could be controlled. More than this, the storm fortified the view that the landscape *should* be productive and profitable. Perhaps Hazel's gravest sin was to reintroduce an unpredictable 'nature' back into the Marsh – a trespass the farmers, with ample support from the state, worked diligently to rectify. The fields of the Marsh emerged post-Hazel more thoroughly expunged of their 'natural' origins as farmers redoubled their efforts to sculpt the landscape into something somehow outside of nature. By the late 1950s, the smiling farms imaginary was as strong as ever as the fields emerged as a thoroughly technologized landscape, replete with fancy cars and colour TVs. The clear message was that despite Hazel's unwelcome incursion – or in part perhaps because of it – the Holland Marsh was a sanitized, safe and modern site of food production – a Fordist factory in the fields (McWilliams, [1935] 2000).

5.2 Post-Hazel and the triumph of specialization

The timing of the Marsh's emergence as a highly productive agricultural landscape, while perhaps coincidental, was not incidental. The era of productivist agriculture was in full swing by the mid-1950s – a capital-intensive approach to agriculture-cum-celebration of science and technology in the pursuit of intensification and increased yields (Scott, 1998; Winson, 1993). While profits and yields soared as a result, chemical, technology and machine-dependent farming also ushered in the productivist treadmill – a reliance on capital-intensive inputs begat a further reliance on capital-intensive inputs (see for example Ward, 1993).

The introduction of new technologies during this era was a strategy for overcoming what Mitchell (1975, 18) labels the "cost-prize squeeze" – the combined costs of production out pacing increases in farm income. Farmers confronted with this squeeze will typically lower production costs and/or increase yields. Many farmers will employ both tactics. As Winson (1993, 90) notes,

> For the most part, the forces pushing net farm income down were met by attempts to increase the volume of production on the farm with the 'tractorization' of agriculture and a dramatic increase in the use of chemical sprays, it become possible, at lease for some, to work much more farm land without raising the input of increasingly expensive farm labour. The incorporation of ever greater volumes of chemical fertilizers and other inputs, such as hybrid seed varieties, helped boost yields per acre.

Within the Marsh, these pressures took on a greater acuity, given the intensive (in contrast to extensive) character of cultivation. At least part of what makes muck farming so profitable is the scarcity of available land. The number of muck soil acres under tillage at any given point is a fraction of the number of acres of mineral soil under production across the province. This point was not lost on farmers of the Marsh in the late 1950s.

Postwar suburban expansion coupled with a rural landscape already largely under production (see Wood, 2000) served to compel would-be farmers and agricultural speculators to set their sights on new conquests for drainage. Given an increasingly crowded southern and central Ontario, the frontiers of agriculture were seen to lie at the bottom of untouched swamps and lakes.

Yet muck crop speculators eager to start their pumps were confronted with a shifting ecological paradigm, one in which the *Conservation Authorities Act* made it difficult, indeed largely impossible, to turn wetlands into fields. Increasingly, the state was intervening in unfamiliar ways by placing limits on the production of nature. A gathering spirit of conservationism was providing a counterpoint to farming as an activity of land stewardship. While Day and the early Marsh boosters were seen to be 'improving' the land with underdrainage – seen to be doing a service by bringing the land into production through cultivation – by the late 1950s and early 1960s an embryonic environmentalism (or at least conservationism) was beginning to emerge. To be sure, the early conservationism was largely instrumentalist in character, with advocates arguing for the protection of fishing and hunting grounds, and the like. Yet still, the era of *extensive* agriculture in Ontario had come to a close. No longer could new land, whether down the road or at the bottom of a swamp, be easily had in Ontario, meaning that farmers were forced to focus on *intensive* farming – on getting the most out of the land they did have.

With so few opportunities for investing in the creation of more land, Marsh farmers, for the most part, turned toward investing in their existing land as a way of increasing production and profits. Investments in intensification were made in various ways in the Marsh, but the driving force behind the pursuit for profits was crop specialization. The form that biophysical nature took (in the form of crops), and the social configurations of agriculture in the Marsh began to shift to accommodate crop specialization. Put differently, what was grown and how it was grown began to shift fundamentally in the mid-1950s. Indeed, a novel field of plant breeding – phytoengineering – emerged in the 1950s, the explicit intention of which was to design more uniform and durable crops (Scott, 1998, 267). As two exponents of phytoengineering noted, "Machines are not made to harvest crops...In reality, crops must be designed to be harvested by machine" (quoted in Scott, 1998, 267).

Figure 25 below illustrates the extent to which the crop base in the Holland Marsh has changed since the 1950s. The dramatic shift in lettuce production provides an illustrative example. While in 1954 more land in the Marsh was dedicated to lettuce than any other crop, very little lettuce is grown in the Marsh today. What little lettuce production remains is not the robust iceberg variety popular in the 1950s and 1960s, but rather mixed greens and mesclun mix, a lettuce with a much different socio-cultural and political economic profile[50].

Crop coverage in Holland Marsh – 1954, 1967 and 2009

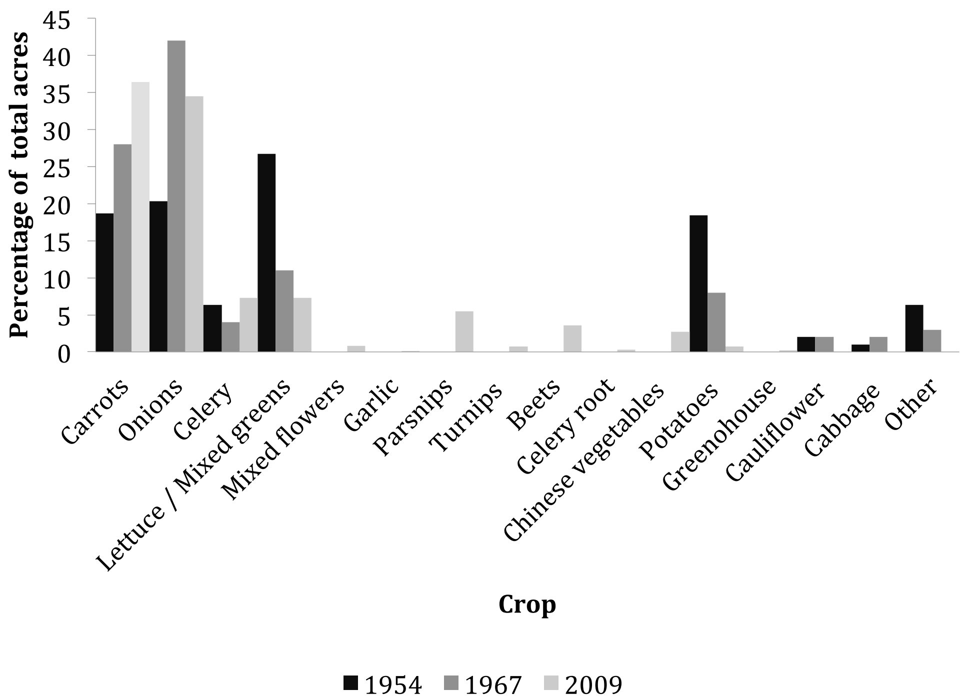

Figure 25. **Shifting nature, composition of crop cover – this changed dramatically between 1954 and 2009[51]. (Department of Agriculture, 1954; Department of Food and Agriculture, 1967; Planscape, 2009**

As lettuce production migrated from the Holland Marsh, almost all of it landed in Quebec. It is not clear why Quebec farmers (or the province, through supportive subsidies and legislation) seemed to pursue the lettuce market to the extent it did – a fact that reinforces the need for far more scholarly work on the histories of various agricultures across Canada. However, it is clear that Quebec actively pursued specialization in lettuce, and quickly became by far the most prolific lettuce-growing province in Canada. In 2011, as an example, Quebec greenhouses grew 70 percent of the greenhouse grown lettuce in Canada (Agriculture and Agri-Food Canada, 2013).

For a time, however, the Holland Marsh was a lettuce juggernaut, shipping lettuce across Canada and throughout the U.S. Some of the older farmers in the Marsh remember the transition away from lettuce, and point specifically to provincial legislation as the driving force behind the change.

> We all used to do lettuce and celery. When I married Tony, we grew lettuce and celery too. But slowly, there's only about 2 or 3 farmers out here now, because Quebec kills us, because the province of Quebec understands the importance of feeding people, and they subsidize their Quebec farmers. So they can push it into our markets cheaper because they're gonna get subsidized. (J. Bake, personal communication, August 27 2013).

Others point to ostensible qualities of the relatively newer muck soil in Quebec, compared to the longer-farmed Holland Marsh muck soil.

> Quebec had much newer soil than we did, and so they had better quality. But for some reasons we had better celery quality than they did, but I don't know the reason for that and I don't think they do either. So we tend to have better celery

> than they do, but they have better lettuce. There used to be 2000 acres of lettuce grown here at one time. (P. Irvine, personal communication, September 25, 2013).

While crop specialization has increased over time, cultivation in the Marsh was in some ways an exercise in specialization from the very beginning. The original Marsh boosters did not drain the land with the intention of growing grain or tomatoes, or with the thought of raising cattle or sheep. The Marsh was always intended for growing primarily carrots, onions, and, to a lesser extent, celery.

This is due, in part, because Day and the early Marsh boosters learned from other muck croppers in Michigan and Ohio that carrots, onions and celery leveraged the biophysical and biochemical attributes of the muck soil and temperate climate to a greater extent than did other crops. The soft, peaty soil is much gentler on carrots and onions during harvest than mineral soil. The tighter packed, granular mineral soil tends to be more abrasive than muck soil, causing micro scratches on subterranean vegetables as they are pulled from the earth, and resulting in shorter storage life. Beyond this, there are a number of reasons that make carrots and onions particularly well suited to muck soil – but also productive crops to grow together. As a long-time muck crops researcher notes,

> So, onions and carrots actually are almost perfect rotation crops. It would be hard to pick ones that are better. One's a monocot, one's a dicot, the root structures are different, the chemicals, the insecticides, the insects and diseases are completely different, the herbicides you use on them are almost entirely different. But, you're rotating, you know, one year it's onions, one year it's carrots (B. Lewis, personal communication, January 16, 2014).

The so-called natural advantages of the Holland Marsh and the extent to which specializing in carrots and onions seems like an obvious choice is, however, predicated on the productivist assumptions of capitalist agriculture. Specialization is, after all, first and foremost an accumulation strategy (Stoll, 1998). It typically makes sense, within the logic of capitalist agriculture, to concentrate production on a particular crop in as much as focusing on a specific crop fits within the logic of profit maximization. There is nothing inevitable about this union of nature-as-form and nature-as-land in the Holland Marsh, but rather it is the result of social and natural processes. Muck soil can support a wide variety of other crops, but none fit both the biophysical and biochemical conditions of the soil and climate *and* the social constraints of profit quite so well as carrots and onions.

It was this socionatural confluence that caused an acceleration and intensification of crop specialization (toward onions and carrots) in the Holland Marsh in the 1950s, 60s and 70s. It was a decisive shift facilitated by a move toward a more industrial form of agriculture, at a time during which a fledgling agro-industrialism was beginning to have a profound impact on how food was grown, processed, sold, transported and consumed. Science, technology and capital were deployed in the fields and beyond in order to rationalize production, reduce risk, and increase sales. The speed and magnitude with which biophysical nature was being transformed and metabolized in the Marsh increased considerably under the escalating demands of profit – the production of nature in the Holland Marsh was about to become far more intensive than it ever had been.

5.3 Making muck crops: Research, markets and marketing

The Experimental Station for Organic Soils was established in the Holland Marsh in 1946. Now called the Muck Crops Research Station, the facility has run essentially as an extension program of the Department of Horticulture at the University of Guelph since then, save for the few years it operated under the auspices of the Ontario Ministry of Food and Agriculture[52].

The Station extended and formalized the presence of the University of Guelph established by Professor Day in the very earliest days of the Marsh. The nearly continual presence of formalized research in the Marsh is unique for agriculture in Canada. There are a handful of other research stations across the country, and most provincial governments do have some form of research-based agricultural extension programs, but none of these are dedicated in quite the same way to such a specific, niche form of production targeting such a relatively tiny geographical area[53].

The Station's work ramped up in the late 1950s and early 1960s, and focused largely on plant pathology, pest management and cultivar trials[54]. Although the Station's research was always primarily applied work, meant to be manifest in the fields of the Marsh, it has rarely been directly commercial. Within the broader political economy of global agriculture, the Holland Marsh is of negligible value. So while the Station does do some fee-for-service research for seed, fertiliser and pesticide companies, the results are only very narrowly applicable in an applied sense (i.e. to other muck soil) and thus largely valueless within the logic of global agri-business.

However, within the Marsh, the impact of the Station has been significant on a number of fronts, the most important of which is through the cultivar trials program, which began in the early 1960s. Although commercial interest in plant germplasm dates to at least the late 19th century, the biotechnology revolution in agriculture arrived much later (see Kloppenburg 2004[1988]). Famously, in 1951 James Watson and Francis Crick succeeded in identifying and isolating deoxyribonucleic acid (DNA), crucial genetic material that, among other things, transmits genetic information responsible for inherited traits. In the millennia previous to Watson and Crick, agriculturalists slowly adapted crops (either intentionally, or not) through the selection of seed from plants with desirable qualities – high yielding, robust to cold, resistant to drought, etc. With the discovery of DNA, and the subsequent development of techniques to manipulate it, scientists could begin creating changes in seed germplasm by direct manipulation at the molecular scale.

While the Station does not conduct genetic modification onsite, their cultivar trials are designed to test genetically modified seeds on behalf of various seed companies. Every spring the Station typically will grow dozens of different kinds of carrots and onions to test which ones 'perform' best. The seeds, supplied by various agro-seed companies who pay to have the Station run the cultivar trials[55], are designed to express various profitable traits. Both time and form are particularly important in this respect. As farmers in the Marsh were gravitating toward growing primarily carrots and onions in the late 1950s and early 1960s, the fledgling cultivar trials were facilitating a further specialization within this narrower crop selection. Not only were fewer kinds of vegetables being grown, fewer varieties of each vegetable were being grown. As demanded by an increasingly commercialized, industrialized agriculture of the 1960s, desirable traits in cultivars moved away from taste, toward uniformity, colour, resistance to pests, durability in storage and shipping, and rapid growing time. As one long-time, multi-generational farmer candidly admitted,

> One of the things…a carrot grown in the muck, peat, mostly muck peat type soil, is a lot tastier than anything else you get out there. If you grow the right variety. Unfortunately, we're growing varieties that you could drop on the floor and the carrot won't break, because we mechanically harvest and all that. It looks nice, but it doesn't taste all that great sometimes. Most of our carrots, some of our carrots, I wouldn't even eat them. It's just got that…they look great, but they don't have the taste. Then other varieties that we grow, man, I can't stop eating them. But you grow them because that's what the store…they like a nice looking carrot right? (P. Wilson, personal communication, January 20 2014).

To be clear, the Station does not formally endorse any particular cultivar – though grades are assigned for discrete qualities (uniformity of shape, appearance), as well as over all performance for each cultivar. In addition, qualitative descriptions of the mature vegetable are provided for each cultivar trial. For the 2012 trial of a brand of carrot known as Achieve, the evaluation notes included,

> Good length & width, Good smoothness, Good weight, Tapered & full tips, Good appearance, Uniformity of shape a little uneven, Fair exterior colour but a little uneven, Extra-large core size, Cavity spot slightly noticeable, Poor to average interior blending, Red ring around core (40-80%), Translucency throughout the core (20-80%) (McDonald, Janse, Vander Kooi, Riches & Tesfaendrias, 2013, 163).

The results of the cultivar trials are presented at the annual Muck Vegetable Growers' Conference each year, and are also compiled into a hefty report and published each year by the University of Guelph (see for example McDonald et al., 2013). The farmers' process for deciding which seeds to grow from year-to-year is based on a variety of calculations, and the results of the cultivar trials loom large in the calculation. It is very unlikely that a farmer would grow seed that had not been subject to a cultivar trial at the Muck Crops Research Station, and equally as unlikely that a seed manufacturer would attempt to introduce a new variety of seed into the Marsh without having the Station test it first. In this respect, the Station can be understood as an intermediary between the broader political economy of seed manufacture (and farming more generally), and the Marsh farmers.

The presence of the Station, physically located within the fields of the Holland Marsh for the past decades, is in many ways the embodiment of the productivist ethic gathering during the late 1950s and early 1960s. The Station functioned (and continues to function) as a site of translation between the global imperatives of commercial, industrialized agriculture, and the *in situ* specificity of muck crop farming. In addition to the cultivar trials, the Station also conducts 'minor use' testing on chemical fertilizers and pesticides. With funding from Agriculture and Agri-Food Canada, the Station tests the applicability and efficacy of various pest and nutrient treatments on muck crops – chemicals that were originally designed for use on larger scale cash crops, such as corn or soybeans. There is no financial incentive for the manufacturers of agri-chemicals to go through the lengthy process of registering a chemical for use on a crop of niche production, so the state facilitates the process by paying research stations to do the work. In this respect – through minor use testing on carrots and onions – the Station has had an impact fine tuning the production of nature within the Holland Marsh, but also beyond to other muck crop areas in Ontario, Quebec and further afield.

Figure 26. Crops on display at Muck Conference – carrots are shown at the 63rd annual Muck Vegetables Growers Conference, April 9, 2014. These samples represent a few of the dozens of varieties of seed tested in cultivar trials every year. Photos by author.

5.3.1 Production beyond the fields – consumer tastes and the postwar diet

Aggressively profit-driven agriculture in the Marsh emerged, at least in part, beyond the fields. The postwar years brought a significant shift – qualitatively and quantitatively – in consumer demand. At the dinner table, this was expressed as a demand for an idealized form of freshness and convenience (Freidberg, 2009). As nature's biophysical form was manipulated into uniformity for the purposes of facilitating production in the fields – phytoengineering – it was also increasingly sculpted to meet consumer expectations of freshness, and authenticity.

Increasingly, these consumer expectations were mediated through the emergence of food retail chains and mass-market advertising in the postwar period (Winson, 1993, 111). In the case of the food from the Holland Marsh, large grocery chains invoked science in advertisements as a way of adding *gravitas* and authority to their claims of freshness (figure 27 below). This had the effect of semiotically reinforcing the notion that the Marsh had transcended its murky origins to emerge as a domesticated and sanitized site of scientific production. More than this event, the implication of the ad below (and many others like it) is that freshness, while perhaps a characteristic inherent to vegetables, exists insufficiently in 'nature'. Only through the application of science and technology can the full potential of nature's freshness be realized.

Figure 27. "Science assures you quality-controlled freshness". An ad featuring Holland Marsh celery boasts of advancements in agriculture. "Through scientific quality-control, aided by 'round the clock refrigeration, backed with 40 years experience, DOMINION is able to maintain the exclusive standard of freshness your family deserves!" (*Toronto Daily Star,* 1959 July 22, p. 21).

For farmers in the Holland Marsh, there was some limited truth to this productivist narrative. As growers began shipping to markets further away in order to avoid glutting the local markets and driving down prices, time (particularly in the beginning) was not on their side. Unlike cash crops that hold value relatively steadily over time – think grains and oil seeds that can be stored for long periods of time – the fresh produce rolling off the fields of the Marsh has a much shorter shelf life. Time as a characteristic of biophysical nature – the amount of time it takes a given piece of produce to lose its freshness – became a serious concern for farmers on the Marsh.

Through a combination of the cultivar trials, which sought to breed traits that would extend the vegetable's shelf life and make them more resistant to damage during shipping, and improvements in packing, shipping and storage technologies, growers were able to manipulate their crops to be more resistant to time and space. These interventions ensured, or at least increased the chances, that the carrots, onions and celery emerging from the Marsh met the expectations of consumers – that they were in suitable condition for consumption in an increasingly competitive consumer market. Indeed, long before the Holland Marsh Gold branding scheme had been conceived, 'Holland Marsh' was a phrase very often semiotically fused to vegetables through advertising in ways other geographic origins are not. Carrots became "Holland Marsh carrots", and onions "Holland Marsh onions" in order to capitalize on the natural imaginary of the area – a very carefully crafted natural imaginary, purged of the invocation of wetlands, swamps, mosquitoes, and the like. During the era of high-productivism, consumers wanted their nature with a dose of sterilizing modernism.

Nature's imaginary can be seen here to have material impacts in the fields as nature-as-form, time and land were manipulated in order to cater to shifting consumer expectations. As farmers organized production around meeting commercially mediated imaginaries of what various crops ought to look like, they were altering the biophysical composition of biophysical nature within the Marsh. As they sought to do so in as efficient and profitable way possible, they transformed their own material practices. I elaborate on this evolution in Marsh farming below.

5.4 Modernization and mechanization in the Marsh

Emerging high tech crops and shifting consumer expectations in the immediate postwar period created changes to the material practices of farming in the Holland Marsh. Since the very beginning, the materiality of the muck landscape had demanded customized applications of technology. Mass manufactured equipment tended to be too large and heavy for the boggy fields of the Holland Marsh. The typical tractor was unfit for a handful of reasons – the chassis was too heavy, the axels were too narrow, the tires were too thin – all of which would result in it sinking into the muck, as happened many times in the earliest years of farming in the Marsh. As a result, many of the machines used in the Marsh, from spraying equipment to onion harvesters, are either built in whole in the Marsh or are heavily modified by Marsh farmers. The specific mechanical demands of the muck soil have even spawned a cottage industry of sorts, with at least two light equipment manufacturers and modifiers operating within the boundary of the canal.

Previous to the era of high productivism, however, agriculture in the Marsh was largely a low-tech, stoop labour, family affair. Many families made do working 5 or 10-acre parcels of land, by hand, and selling their produce to packers in the Marsh, or grocers in Toronto. However, as demand increased, costs rose, and farmers looked to produce a more efficient, uniform biophysical nature, farming changed significantly in the Marsh. Two companies, in particular, were responsible for ushering in the productivist paradigm to farming in the Marsh in the early 1960s – Federal Farms Limited and Hardee Farms.

Non-farmers from Toronto founded both companies. Abraham Dees, a "farm-born city slicker" (*Toronto Daily Star,* 1960 July 13, p. 10) founded Hardee Farms Ltd in 1954, and Phillip and Morris Latchman formed Federal Farms Limited in 1948. In 1970, Federal Farms would restructure in an attempt to deal with cash flow issues, and emerge as Federal Diversiplex Limited. Not long after this, in 1978, Federal Diversiplex and Hardee would merge, creating COBI Food Services Inc., a food manufacturing and distribution company still in operation, though with no discernable presence in the Marsh.

While their tenure was short, Hardee Farms and Federal Farms Ltd. had a significant impact on the Marsh.

Both Dees and the Latchman brothers were considered "collar and tie" farmers, more businessmen than agriculturalists, fêted in the popular and industry press for bringing "sophistication" to farming (Chisholm, 1962, np). The Latchman's *bone fides* came from their background as middlemen – buying low in and around the Holland Marsh, and selling high in Toronto. In an address to a group of financiers and financial analysts in New York City in 1962, Morris assured the crowd,

> [P]lease remember that we are not farmers in the business of farming. We are merchandisers in the business of farming. We were experienced in product movement, marketing and distribution in the vegetable industry long before we planted our first stalk of celery (Latchman, 1962, 9).

Both Hardee and Federal poured vast amounts of capital into farming in the Holland Marsh. Indeed, over-extending cash flows and alienating themselves from potential investors would ultimately undo both companies. In the early 1960s, however, both companies were flush with capital. Hardee owned over $5 million worth of muck soil, spread throughout the Holland Marsh, southern Quebec, and parts of Florida, in addition to state of the art processing facilities. Foreshadowing the financialization of agriculture to come, Hardee Farms raised the capital required for such prolific holdings by becoming the first farm business in Canada to be publicly traded on the Toronto Stock Exchange in 1960 (*Toronto Daily Star,* 1960 July 13, p. 10).


Super-Mechanization Makes Muck Bloom

Figure 28. Hardee Farms - Hardee Farms ushered in the era of super-mechanization to the Marsh, as this 1960 *Toronto Daily Star* headline put it. (*Toronto Daily Star,* 1960 July 13, p. 10).

Federal Farms meanwhile, owned about 450 hectares in the Marsh, a significant land holding given that most farmers operated on 4 to 10 hectare plots in the 1960s. Even today, many families in the Marsh make due with 40 to 80 hectare tracts of land. Federal also processed roughly half of the produce grown in the Holland Marsh, as well as vegetables from around North America at their facility in the Marsh, and then shipped to super markets throughout Canada and the US (Latchman, 1962, 5). Indeed, in the early 1960s, Federal's main business was to supply supermarket chains with "a constant, day in day out source of fresh vegetables for their shelves, in enormous quantities" (Latchman, 1962, 3). In an audacious stunt meant to display their agricultural mastery, Federal Farms became the first company to ship Holland Marsh produce overseas, sending 2000 cases of celery to Britain in 1963 (*Toronto Daily Star,* 1963, 6).

The most significant contribution to shaping the production of nature – and the associated embedded social relations – within the Holland Marsh, for both companies, came in the form of technological innovation and research. Hardee's activities in this respect were largely centred on water management in muck soil, developing a hydrological system that could allegedly "keep one step ahead of alternating floods and droughts" (*Toronto Daily* Star, 1960, 10). The system was designed with the ability to oscillate between drainage and irrigation, able to meet both demands with a single system. They also developed techniques to manipulate water levels to warm the muck soil when there was risk of frost or unseasonably cold weather.

Federal Farms' innovations, arguably more significant and lasting, resulted in some fundamental changes in the ways in which produce in the Marsh is processed, distributed and sold. Three are worth mentioning here. First, one of the most enduring contributions Federal made was their adoption of the pallet box (see figure 8 below), which Latchman argued "revolutionized production" in the Marsh and "made high-speed, efficient production line operation possible" (Latchman 1962, 6). Although the pallet box is now omnipresent on the Marsh landscape, previous to 1960 all Marsh produce was stored in either bushel baskets or light wooden crates (see figure 29). The extent to which the pallet boxes facilitate more efficient farming is worth emphasizing briefly. Previous to the pallet boxes, vegetables were picked and dropped into bushel baskets or light crates. The bushels or crates were then picked up, by hand, carried to a flat bed trailer, and lifted up by hand onto the trailer. The baskets would then be brought to either a processing or storage facility. In the storage facility, they would be lined up in rows, or sometimes stacked very carefully for fear of damaging the produce. In the processing facility, they would be manually emptied, and sent back into the fields to be refilled. In short, the baskets and light crates were incongruent with mechanization.

The pallet box, on the other hand, was custom designed for the era of mechanization – with the new boxes, the process of harvesting was considerably sped up and transportation and storage became far more efficient. Importantly, the pallet box also enabled mechanical harvesting (see figure 30). Once Federal brought the pallet box technology to the Marsh, onions and carrots could be mechanically harvested directly into the pallet box, which was already loaded onto a flatbed trailer. With a holding capacity of roughly a tonne, the pallet box can be off loaded with a forklift, and whisked away to either a storage facility or processing line. In a storage facility, the pallet boxes can be vertically stacked without damaging any produce, and in such a way as to take advantage of nearly every square foot of storage space.

The most important impact of the pallet box, however, was the effect it had on the speed of production. The laborious process of filling, moving and packing the bushel baskets and light crates by hand was eliminated with the introduction of the pallet box. Suddenly, a tonne of onions could by swept away by a machine, moved around with ease, processed, stacked in cold storage, or loaded onto a truck with the pull of a lever. As Latchman (1962, 7) put it “For the layman, the best analogy I can draw is this: the pallet box has been to Federal Farms, what the airplane has been to travel”.

The second important innovation Federal Farms introduced to the Marsh was vacuum cooling. Federal did not invent vacuum cooling, but they were the majority owner of Brad-Vac Cooling Company Limited, the first vacuum cooling plant of its kind in Canada. Federal Farms, through their Brad-Vac subsidiary, was also the Canadian patent rights holder for a cooling technique used primarily on lettuce and celery. All vegetables begin to degrade the moment they are harvested. Once the ‘field heat’ is removed, however, the degrading process slows considerably. The quicker a vegetable can be cooled, the less it will degrade. Brad-Vac had the capacity to cool 8,000 heads of lettuce in 20 minutes in the early 1960s, and in the process extend the shelf life of each one of those heads of lettuce from 2 to 3 days, to 5 to 7 days – this represented an enormous competitive advantage for the farmers who could afford to use the facility.

Figure 29. Crates and bushel baskets - Top. Workers loading light crates and bushel baskets onto a flat bed trailer (#9750). Bottom. Bushel baskets of carrots waiting to be picked up (#8745). Photos courtesy of http://www.ourstoriesinnisfil.ca/

Figure 30. Pallet boxes - Top: Since Federal Farms brought the technology to the Marsh, similar stacks of pallet boxes have become ubiquities. Bottom: An onion harvester automatically fills pallet boxes on a flat bed trailer, with the assistance of one farm labourer. October 2014. Photos by author.

For lettuce in particular, this was a revolutionary technology. A fickle, delicate and labour intensive crop was made far more robust by the advent of rapid cooling. Indeed the Brad-Vac plant made it possible for Marsh farmers to seek markets for their lettuce far beyond the Greater Toronto Area. By the early 1960s, Federal was shipping lettuce from Newfoundland to the Rocky Mountains, and throughout the eastern and mid-western U.S. – this constituted significant expansion of the traditional market for Marsh crops. As Latchman (1962, 8) estimated in a speech to Wall Street financiers, "With Brad-Vac, our market has expanded from two million people to 100 million".

A final technology that fundamentally changed farming in the Marsh is polyethylene. Similar to the vacuum cooling process, food grade plastic wrap helps to prolong the freshness in vegetables. By the late 1950s many Marsh farmers and businesses were wrapping everything from lettuce to carrots and onions in polyethylene. Similar to the pallet box and rapid cooling technologies, Federal Farms did not invent food grade polyethylene, though they did have the capital to become an early adopter of the technology and certainly served to popularize its use throughout the Marsh. Using plastic wrap to pre-package vegetables was primarily a way for farmers to appeal to discerning post-war consumers and the ascendant chain grocery stores looking for freshness (or at least the appearance of it). The plastic packages were convenient for the chain stores to purchase and display, and were attractive to customers in an emerging era of modern, sanitized consumerism (Freidberg, 2010). The plastic packaging gave a sense of uniformity, of predictability and of freshness. It helped to expunge just a little more of the feral 'nature' from the produce of the Holland Marsh, creating a more industrialized, commercial product. As Latchman (1962, np) put it, "our idea was that packaged vegetables should be of consistent quality year-round – just like a can of soup is consistent, no matter what season” (quoted in Chisholm 1962, np).

Each of these interventions, in their own way, was ultimately meant to produce a ‘better’ nature – a fresher, more durable, more attractive crop. Although they may have not understood it as such, both Dees and the Latchman brothers were dealing in the complexity of the production of socionatures. The innovations they introduced to the Marsh were meant to transcend the limitations of nature-as-form and nature-as-time, while trading on the nature-as-imaginary of postwar consumer demands for sanitized freshness.

By the time Federal Farms and Hardee Farms merged in the late 1970s, the Holland Marsh had been transformed into an industrial agricultural landscape – a highly mechanized and rationalized landscape producing increasingly homogenous crops. However, and as O’Connor (1988) speculates, transformations of this kind are never benign, but rather are accompanied by an inherent contradiction – so-called negative externalities which degraded the very socioecologies the farmers depended on for their livelihoods.

5.5 The gathering contradictions of agricultural modernization

If business was good on the Marsh previous to Hurricane Hazel, it was spectacular a decade after the storm. Weather persisted as a minor irritant from time to time and had some minor impact on seasonal yields and price, but the many technological, capital-intensive investments in the Marsh were managing to control the biophysical nature of and in the fields enough to allow for widespread profits. But if these were the halcyon days of the Holland Marsh, the peace and profit belied the growing contradictions of productivist, capital-heavy and intensive agriculture.

Indeed, by the mid-1960s social and ecological relations in the Marsh were showing signs of stress. Shifting labour demands in the Marsh as a result of mechanization, and the associated proliferation of packinghouses eliminated jobs in the fields, but created them in the factory. Federal Farms, and other packinghouses including River Gardens and United Farms engaged in a noteworthy and very public battle with unionized employees striking for better conditions and wages. The increasingly powerful packers attempted to invoke a still existent clause in labour law that denies farm labourers the right to collectively organize and bargain. The Ontario Labour Relations Board ruled against the packers, determining that packinghouse employees were not farm workers, since they did not actually work on farms (Ontario Labour Relations Board, 1963; Ontario Labour Relations Board, 1964; *Toronto Daily* Star, 1963, 26). The Board's decision in the original case filed by Federal Farms read, in part;

> With respect to its plant operations the Board finds that the respondent is not engaged in agriculture or horticulture but rather that the respondent is engaged in a commercial enterprise of preparing vegetable produce for market.

In other words, the employees that worked in the processing facilities and packing plants were factory workers, and thus had the right to organize their labour. The victory, while important, was ultimately temporary. Within years of the ruling the imperatives of global agriculture would result in the consolidation and elimination of many processing and packing facilities in the Marsh, and beyond. The recent closure, and then partial re-opening of the tomato processing plant in Leamington, Ontario puts a fine point on the continued instability of Ontario-based vegetable processing in an era of global, industrialized agriculture (see for example CBC, 2014; Ligaya, 2013).

In addition to labour strife, other socio-ecological issues emerged in the 1960s. For the first time in the history of the Marsh, there was concern for the muck soil itself. There had, in past, been fleeting anxiety subsequent to Hurricane Hazel (and other minor flood events) over the fact that the soil was carried from the western part of the marsh toward the eastern end as the water drained, creating an unequal distribution of wealth, as it were. These concerns were quickly allayed and the piles of muck were evenly distributed with trucks and tractors. By the mid-1960s, however, the fears were more systemic, related to the longer-term sustainability of the soil. In 1963 the Ontario Agricultural College at the University of Guelph found that the muck soil was subsiding at a rate of 1.3 inches per year, "a high rate of subsidence", especially given that it was frozen solid 5 months a year (Mizra and Irwin, 1963, 248). The authors emphasized that this rate of subsidence equalled roughly one foot every ten years, "a substantial and serious loss of organic soils whose average depth is 3ft or less" (Mizra and Irwin 1963, 253[56]).

Although some subsidence is inevitable, Mizra and Irwin posited that a well-designed water management program could reduce the rate of soil loss and extend the productive life of the Marsh. In 1967 (after yet another significant flood) a Special Committee was struck, headed by a co-author of the subsidence study, Dr. Ross Irwin. The Special Committee was charged with the task of studying,

> [A]ll aspects of the drainage of the Holland Marsh, notably, (1) pumping facilities, (2) interior centre drainage (Holland River), (3) interior main drainage

> network, (4) use of drainage and irrigation water, (5) dykes, (6) soil depletion, (7) flood control (Gregg 1967, 2).

It is unclear what, if anything, ever materialized from the Special Committee or the proposed study. It is telling however that the Special Committee, which was assembled specifically to investigate the problem of subsidence in the Marsh, was not instructed to investigate the role of farming and cultivation activities. Subsidence is, after all, a distinctly socionatural phenomena – partially the product of water and wind erosion, and the natural decay of organic matter in the muck soil, though hastened by the human activities of intensive cultivation.

Other ecological contradictions were beginning to be exposed by the late 1960s and early 1970s, as well. Following growing concern regarding the use of chemical pesticides inspired by Rachel Carson's (1962) *Silent Spring,* the use of DDT was severely restricted in Canada on January 1, 1970. Biologists were debating the extent to which the bioaccumulation of DDT in fish in Lake Simcoe was cause for concern (see Bolton, 1969; Claridge, 1970), but researchers were having trouble securing funding from the provincial or federal governments to study the actual Marsh soil for signs and implications of harmful pesticides (see Dilschneider, 1970). One lifetime resident of Bradford offers a telling anecdote about pesticide use on the Marsh;

> Well, it requires a tremendous amount of fungicides and a tremendous amount of insecticides to grow the crops they do. Me, personally, two friends of mine I went to high school with. I was too young, but they were at a place out near the 400. And for that time in the 1950s they really were paying well. I was too young, I couldn't get a job. And I'm glad I didn't. If I did, I would be dead now, I think.

> Because they carried the weed killer in the sprayer on their back. And they never wore a shirt. And their bodies took on the liquids. One guy died in his 40s and the other guy died when he was 55. Both died of liver failure, you know? And they used open tractors and sprayers. Even now we walk on one of the canals, my wife and I. And if you see a tractor two miles away or a mile away, you can smell that stuff. (J. Smith, personal correspondence, September 3, 2013).

Although the Marsh was initially given special permission by the provincial government to continue using DDT after the onset of the January 1970 ban, eventually, the chemical was disallowed everywhere. Regardless, a variety of other sources of contamination were already beginning to be highlighted as problematic in around the Holland Marsh. From health risks associated with parathion, a chemical used to replace DDT, through to nitrogen and phosphorous run off causing algal bloom outbreaks on Cook's Bay and Lake Simcoe, the ecological contradictions of muck crop farming were becoming increasingly apparent.

Not to be overlooked, issues related to the discursive and material expansion of the Greater Toronto Area began to appear in the Marsh in the 1970s as well. Real estate ads from the growing town of Bradford boasted of newly built homes "only minutes from Hwys 400 and 85. Situated on a 2-acre lot with a magnificent view of Holland Marsh" (*Toronto Daily Star,* 1974, 11). Torontonians, meanwhile, were urged to explore the "other Yonge Street" – the section that grazes the northern end of the Marsh – in the weekend section of the *Toronto Star* (*Toronto Star,* 1979, A3). These physical corridors linking Toronto with the Marsh, (Yonge Street and Highway 400) so often used to move produce, were increasingly used to facilitate a growing leisure economy of day-tripping

Torontonians. Idealized, bourgeois conceptions of pastoral agriculture bumped up against the reality of an urbanizing countryside – one day tripper noted in a letter to the editor their "shock and dismay" at seeing a billboard erected on the side of Highway 400 in the Marsh, which imposed a "disastrous effect [on the] beautiful landscape" (Olsen, 1972, 7).

By the late 1970s, land use conflicts were emerging at the intersection of peri-urban agriculture and suburban expansion, leading the province, for the first time, to hire researchers to investigate land use planning and agricultural land (Fraser, 1975). Sensing that perhaps the tide was changing, the Urban Development Institute conducted its own study, concluding, dubiously, that urban expansion posed no risk at all for peri-urban agriculture (Claridge, 1977).

5.6 Conclusion

Beginning in the mid-1950s, the contradictions of nature's production under capitalism began to manifest in the fields of the Holland Marsh. The dramatic events of Hurricane Hazel provided an opportunity for a recalibration of agriculture in the Marsh, though instead the techniques of modernist, productivist agriculture were intensified. At the same time, a nascent environmentalism was emerging, leading the state to begin imposing limits on the production of certain kinds of nature – no longer was underdraining wetlands *de rigueur*. Contrary to Smith's (2008 [1984]) perspective, the state was beginning to inhibit, rather than facilitate capital accumulation in the fields through agriculture.

Without the option of simply making more farmland – available to them in decades previous – farmers sought to get more out of existing land – to make 'nature' work “harder, faster, and better” (Boyd et al., 2001, 564). Innovations introduced to the Holland Marsh by Dees and the Latchman brothers sought to harness the time, land and form of biophysical nature in order to intensify production. At the same time, commercially mediated imaginaries of nature played into the material changes in the fields as farmers responded to an emerging post-war food aesthetic.

By the 1970s, the contradictions of capitalist agriculture – O’Connor’s (1988) second contradiction of capital – began to manifest in earnest. As the farmers intensified production, they also deepened the extent to which they were drawing on the conditions of production – the soil was subsiding, the water was contaminated, and the health of the human and nonhuman ecologies were beginning to decline. In sum, the emerging socionatural, political and economic challenges the Marsh was facing heading into the 1980s were symptoms of the gathering contradictions of an unsustainable, capitalist agriculture, coupled with the ascendant pressures of an urbanizing countryside. Productivist agriculture had resulted in more profit on the Marsh, but it also created an agriculture more dependent on capital, chemicals, research and technology. Any recollections of the Marsh as a wetland or lessons from Hurricane Hazel, were by the late 1970s, distant memories. Production continued to increase unabated, and socioecological contradictions were piling up in the Marsh. I turn now to a more thorough discussion of these contradictions as they emerged throughout the 1980s, 1990s and 2000s.

Chapter Six. 1980-Present – A legacy of contradictions and (re)making the Holland Marsh

The industrial logic underpinning global agriculture beginning in the postwar period hit full stride by the late 1990s. Capital-intensive, input-reliant, and long haul agriculture of the so-called green revolution in agriculture emerged as the *de facto* approach to farming in the last decades of the 20th century. Increasingly, this operative logic was becoming edict – farmers not willing to subscribe to the rules of industrial agriculture had little chance of success. Technologies developed in the 1960s and 1970s related to seed manipulation and cooling, storage and shipping of fresh produce had been improved upon and widely dispersed by the 1980s, making 'distance and durability' the new pivot of an emerging world agricultural system (Friedmann, 1994). A new international division of agriculture emerged during this period, catering to year-round access to fresh produce for affluent consumers in the global north (Raynolds, Myhre, McMichael, Carro-Figueroa & Buttel, 1993). As agricultural capital relocated to climates in which two or three harvests of fresh produce per year could be had, a host of what Friedmann (1991) labeled New Agricultural Countries emerged. As McMichael (2009, 150) puts it, the contemporary global political economy of agriculture and food is further distinguished by various shifts:

> [F]rom public to private initiative, from staple grains to affluent foods (animal protein, fruits and vegetables, chemical feedstocks), and from domestic to global markets.

Traditionally more perishable crops – fruit, carrots, onions, etc. – were by the 1990s more fully integrated into global exchange markets, meaning that Marsh farmers were brought into competition with growers from around the world. The uneasy reality of trade liberalization created downward pressure on price due to low cost carrot and onion imports from California, and later China. Pressures from rapid (sub)urbanization, increasing (and increasingly public) concerns over pollution and contamination from the fields, the compulsion to adopt new technologies, and a dramatic increase in regional regulatory regimes have all complicated the prospect of muck crop farming over the past 30 years.

The most profound change in the Marsh, beginning in the 1980s, is the extent to which it became subject to external interest and scrutiny. Previous to the 1980s, the Marsh – while a curiosity to many outside of it – remained largely insulated from outside influence. However, this rapidly changed on two fronts. First, negative externalities of intensive capitalist agriculture began to manifest themselves in the fields of the Marsh, and beyond. As human and non-human health deteriorated in and around the Marsh, the state and quasi-state actors moved in to regulate and impose limits on nature's production in the Marsh. The state, in other words, came to amend its position and began restricting, rather than only facilitating agricultural production in the fields of the Holland Marsh. Second, the rapid (sub)urbanization of the countryside brought the city closer to the Marsh, and vice versa, both materially and semiotically, creating points of tension between the farmers and their urban consumers. In this respect, land use planning and local politics have been revealed as vital to the process of nature's production in the Marsh.

The farmers' strategy (gamely facilitated by burgeoning corporate research, development and bio-technology sectors) for coping with these colliding pressures has been to find ways to enlist biophysical nature in the agricultural process in ever-more efficient ways – to search for ways to control biophysical nature with increasing precision in order to get the very most out of the declining fields. Higher than average crop yields have been a feature of Marsh agriculture since Professor Day's first test plots. However, the political economy of agriculture was far different in the 1920s than it was in the 1980s and beyond. Annual yields needed to bring in enough money to cover escalating input costs, increasing costs of living, and the like. As farming in the Marsh approached the new millennium, the stakes for choosing the right seeds, pest treatments, and crop-monitoring regime were never higher.

Yet while the pressures of capitalist agriculture permeated the Marsh, it was an uneven, incomplete infiltration. Despite the best efforts of a multitude of farmers, engineers and planners to corral, contort and control biophysical nature over the decades, 'nature' continued to be unpredictable. Weather was too wet or too dry, too hot or too cold. Water transgressed dykes, backed-up pumps and flooded fields. Equally important, social and material limits in the form of conservation regulation and legislation, starting in earnest in the early 1990s, have also shaped the production of nature in the Holland Marsh. The politics of environmental conservation and rehabilitation have imposed a new production paradigm in the Marsh, led to material changes in the fields, and called into question the future of farming in the Holland Marsh. This chapter will explore the ecological contradictions of farming in the Holland Marsh, the persistence of capital-intensive, productivist techniques, and the current and future challenges the farmers face.

6.1 Menacing fields and the unmaking of ‘smiling farms’

By the early 1980s the contradictions of chemical dependent, capitalist agriculture were beginning to be exposed in the Holland Marsh. The generous use of synthetic fertilizers, fungicides and pesticides over the decades had led to some decidedly undesirable yields that were beginning to impact the health of the land, water and people in and around the Marsh. The pathologies – symptomatic of the wide-spread adoption of productivist agriculture – were revealed to an increasingly anxious public in a litany of dire news headlines throughout the early 1980s. In the first few years of the 1980s, the bad news in the Marsh was seemingly endless, and departed distinctly from the ‘smiling farms’ narrative of the original Marsh boosters in the 1920s (*The Globe and Mail*, 1925). The more alarming headlines include: “Holland Marsh widely polluted, report says” (Keating, 1982, 4), “Simcoe’s fishing future gloomy” (Power, 1983, D08), “Birth defects high in the Holland Marsh” (Hall and Graham, 1981, A07), and “Probe rural birth defects” (Toronto Star, 1981, B02).

These reports displaced the cast of hardworking farmers and high yield carrots and onions with a far bleaker tale of toxic farms, polluted lakes, dying fish and human birth anomalies. The emerging disasters seriously challenged the identity of the Holland Marsh as a unique peri-urban get-away or as a site of pristine, natural peri-urban farming. Instead, the Marsh’s biophysical nature was cast as a threatening, menacing force, demonstrating once again, the tangled discursive and material character of the production of nature.

The Marsh’s bucolic imaginary began to be challenged in earnest when a Newmarket-area pediatrician contacted the York Region’s Medical Officer of Health in the summer of 1978 to express his concern over "the apparent high number of congenital anomalies among infants born to families in the Holland Marsh area" (Williams, et al., 1981, 1). At the Officer's request, researchers at the University of Toronto and various regional health authorities conducted a feasibility study to determine whether or not a full-scale community health survey of the Holland Marsh area should be launched (Williams, et al., 1981).

Even before area medical authorities caught on, evidence of chemical contamination had already been mounting. High levels of DDT, a substance banned a decade previous, were found in the soil and water of the Holland Marsh (Miles & Harris, 1978; Miles, Harris & Moy, 1978). To be clear, the DDT found was not the result of recent use, but rather a legacy of prior use. That the compound was still found in perceptible concentrations long after the ban is a testament to the chemical's persistence. Additionally, the organophosphorous compounds ostensibly designed as safer alternatives to DDT (many of which, including parathion, malathion and diazinon, have been banned or restricted in recent years) were found to be rapidly accumulating at dangerous levels in the water and soil of the Marsh and beyond (Miles & Harris, 1978; Miles, Harris & Moy, 1978). These findings were more or less confirmed by Ministry of Environment scientists in 1981 (Embree, 1981), however, Williams et al. (1981)[57] left these findings out of the feasibility study requested by the Medical Officer of Health.

Despite the accumulating evidence of chemical contamination, and despite finding that the differences in congenital abnormalities in the Marsh and the control areas were "statistically significant[58]", and that the Holland Marsh was a "high risk" area for birth defects (Williams, et al., 1981, 1), the authors ultimately concluded that an exhaustive community health survey was not warranted. Instead, they seemed to elect for a 'wait and see' approach. Meanwhile, presumably to cast some doubt on the findings that the Marsh constituted a 'high risk' area for birth anomalies, while distancing themselves from the potential fallout, officials at both the Ministry of the Environment and the Ministry of Agriculture publicly challenged aspects of the very study they had a part in producing (Hall and Graham, 1981, A07). The ruling provincial Conservative Party of the day was not filled with keen environmentalists, to be sure. In addition to challenging the more troubling aspects of the report by Williams et al. (1981) the provincial government was also publicly called out by the opposition Liberals in the summer of 1981 for abandoning plans to clean up Lake Simcoe (*The Toronto Star,* 1981, D16).

The reasons for not pursuing the matter further, while perhaps partially political, cannot be attributed entirely to the unreceptive political climate. Proving causation in clusters of non-communicable disease is a notoriously challenging scientific proposition, even within in the contemporary context (see Assunção, 2012; Coory & Jordan, 2013; Elliott & Wartenberg, 2004). The authors indeed pointed out that the data were "tentative" (Williams, et al., 1981, 1) given the small sample size (495 total births in and around the Marsh) and duration of the study (a 5 year period between 1973 and 1978). Williams and colleagues do admit that "there is a body of scientific thought in the literature calling agricultural chemicals, particularly organophosphorus pesticides, into question" (Williams et al., 1981, i), though they continue, "No direct link between the chemicals and congenital anomalies has been demonstrated" (Williams et al., 1981, i). Williams and colleagues could have determined in their feasibility study that the abnormally high number of birth anomalies in the Holland Marsh area constituted a ready empirical case to test the hypothesis that organophosphorus pesticides have no impact on infant health. They could have also concluded that further study was warranted, given that the incidence of birth anomalies within the Marsh was statistically significant. Instead, they determined that further study was not warranted, a position seemingly encouraged by officials from the Ministry of Environment[59]. Given the improbability of ever being able to determine causation in a case such as this, and the resource-intensive character of cluster analysis (see for example, Ministry of Health, 2015) it is not surprising that Williams et al. (1981) would recommend no further investigation into the matter, regardless of the political tenor of the day.

The authors do share an original causal hypothesis, revealing perhaps an urban bias which is dismissive of the Holland Marsh and its inhabitants. They note that their original assumption was "that patterns of intermarriage among families" in the Marsh was a risk factor for birth abnormalities, a hypothesis eventually dismissed due to "the apparent ethnic diversity of the area" (Williams et al., 1981, i). In other words, their initial working hypothesis was that endemic intermarriage and inbreeding among people in the Marsh had led to the high rates of birth anomalies – a supposition that exposes a gross misunderstanding of the social and cultural history of the Holland Marsh.

In any case, Williams and colleagues ultimately concluded that the burden of conducting a full-scale community health survey out-weighed the potential benefits. They write,

> Community surveys of potential risks and hazards are difficult to design in terms of rigorous scientific requirements, costly to execute, they may involve hundreds

> of people, and, they take time. In summary, the results of the study indicate that a community survey of risk factors is neither warranted nor feasible (Williams et al., 1981, 30).

Despite the decision to not undertake further *public* study, the Ministry of Environment did commit to ongoing monitoring of water and soil samples (Drowley, 1981, 1). Regulatory changes were forthcoming in the early 1980s, but the political reaction to the Williams et al. (1981) report reveals that, at least in the beginning, the provincial government was reluctant to address – or even publicly acknowledge – the existence of environmental degradation and contamination in the area. Conceivably, this reluctance was at least partly a result of wanting to protect the image and the industry of the Holland Marsh. In an era of high unemployment, agriculture remained a steady economic driver in Ontario.

Yet, despite the apparent efforts of the governing Conservative party and others, containing the ecological deterioration in the Marsh was difficult given the unpredictable character of biophysical nature, and its disregard for ostensible boundaries. The considerable efforts made by the early Marsh boosters to physically partition the Marsh from its immediate surroundings with a canal were, inevitably, incomplete. In reality, the Marsh only ever *appeared* to be severed from the surrounding landscape by the canal system. Attempts to control the landscape were not as complete as may have been assumed. The Marsh remains very much connected to its surroundings, particularly the Simcoe watershed, through the flow of surface and groundwater. The ostensibly necessary socionatural interventions required of capitalist agriculture – the use of pesticides, fungicides and fertilizers to protect and boost yields – under-produced the immediately surrounding ecology, as O'Connor (1988) might put it. Through the process of production, the farmers were destroying the conditions necessary for further production. Human health within the Marsh suffered, but the negative externalities inevitably moved beyond the boundaries of the Marsh. As the water (and chemicals) transgressed the borders of the canal system via the Holland River and ground water flows, the health of Lake Simcoe also declined.

By the early 1980s Lake Simcoe was dying a very public death. It was becoming hypoxic – starved of oxygen. This was particularly true of Cooks Bay, the southern most part of Lake Simcoe, and the direct catch basin of the Holland River (Nicholls, 1981, 10). Researchers (Draper et al., 1985; Neil & Robinson, 1985; Thomas & Sevean, 1985) pointed to dangerously high levels of phosphorous in the water, and very clearly implicated farming in the Holland Marsh as a significant source of the contamination. Phosphorous, a key ingredient in fertilizer, was accelerating algae growth in Lake Simcoe, and the algae were metabolizing dissolved oxygen in the lake at an unsustainable rate. This resulted in significant flora and fauna causalities, ultimately threatening the fresh water fishing industry in the area.

While health matters in the Marsh were largely invisible, mostly out of sight aside from the occasional news story (at least up until this point), phosphorous runoff was far more conspicuous. As elevated levels of phosphorous exited the Holland River, large algal blooms blanketed the surface of Cooks Bay and southern parts of Lake Simcoe. The blooms were not only threatening the health of the lake's flora and fauna, and the viability of the fresh water fishery, they were an ugly nuisance for recreationists and holiday makers. Local boosters had begun positioning Lake Simcoe as a vacation destination closer to home for Torontonians, in light of a flagging economy, and high interest rates and gas prices. As *The Globe and Mail* put it in 1981, “Phosphorus pollution in Lake Simcoe, about 50 miles north of Toronto, has resulted in algae creeping across the bays, fouling the water and coating shoreline rocks with oily green slim” (1981, A10). The efforts to transform Lake Simcoe into a getaway for the urban middle class were severely undercut by the green, slimy, transmogrified lake.

Phosphorus choking Lake Simcoe, study finds

Simcoe’s fishing future gloomy

Simcoe group tries to weed out problem

Lake choking on phosphorus-fed plant growth, conservation official says

Figure 31. Gloomy headlines - headlines documenting the complicated relationship between phosphorous and Lake Simcoe. (Top, Rickwood & Taylor, 1985, p. A7; Middle, Power, 1983, p. D8; Bottom, Innis, 1992, p. A15)

The collective public finger pointed at the Marsh. To be fair, there were other contributing sources across the watershed, including urban effluent (sewage, soap residues, and the like, especially from the burgeoning towns of Aurora and Newmarket) within the Simcoe watershed. The net result, in any case, was a three-fold increase in phosphorous levels from estimated pre-settlement rates (Evans et al., 1996). Decades of over-fertilizing, and of treating the canals and the Holland River as disposal ditches had finally come to a crisis point. The provincial government, still reluctant to be seen as putting "the squeeze on farmers" or of favouring an "agricultural-economic trade off" wanted to find solutions that did not interfere with agricultural production (Nicholls 1981, 10). As a result, the issue was largely left unaddressed until well into the early 1990s.

Increasingly, however, non-and-quasi-state actors were beginning to have more influence in public and private matters, including environmental health and farming. In the early 1980s, The Lake Simcoe Region Conservation Authority (LSRCA) spearheaded the Lake Simcoe Environmental Management Strategy[60]. Led by the increasingly influential, and autonomous, LSRCA, the Management Strategy was an initiative meant to address the ailing ecological health of Lake Simcoe. There was here, undoubtedly, a symbiosis of sorts: the budding LSRCA put itself at the centre of a very public debate about the health of Lake Simcoe in light of government inaction, boosting its own brand while addressing the broader ecological issue. The strategy featured a series of reports on the health of Lake Simcoe, many of which focused specifically on the dynamics of phosphorous leaching in the muck soil of the Holland Marsh (Draper et al., 1985; Rupke & Associates, 1985; Thomas & Sevean, 1985).

Phosphorous interaction with mineral soil was fairly well understood, but in the mid-1980s, very little was known about how the element interacted with (and importantly, leached from) muck soil specifically (Thomas & Seven, 1985). Researchers with the LSRCA found that the Marsh soils were indeed saturated with phosphorous from over-fertilization, and that it was leaching into Lake Simcoe. However, they also found two significant complicating factors unique to muck soils. First, phosphorous is created when the muck soil mineralizes, or subsides. As the muck soil breaks down (as it inevitably does, as discussed in the previous chapter) phosphorous is created. Although this is considered to be of "minor significance" (Thomas & Seven, 1985, 9), with phosphorous levels already so damagingly high, any amount of phosphorous leach was too much.

Second, Thomas & Seven (1985) found that as the soil subsided, the effect was a greater concentration of phosphorous per unit of soil – that is, the existing amount of phosphorous, plus the phosphorous created during the process of subsidence, now existed in an overall smaller volume of soil. This is significant – "a serious concern for the future" (Thomas & Seven, 1985, 12) – because the higher the concentration of phosphorous in a given volume of soil, the more readily it leaches. So while the phosphorous problem in the Lake Simcoe watershed was largely caused by agricultural activity, the problem was exacerbated by Marsh farming *specifically*.

By the early 1990s, and as a direct result of the work conducted by the LSRCA, programs to reduce phosphorous loading had been implemented. An ongoing focus has been on determining how much external phosphorous is required in muck crop fertilizers, an issue the Muck Crops Research Station continues to study. Coupled with national bans on phosphate additives in laundry soap and the like, and ongoing monitoring of phosphorous levels, Lake Simcoe has seen a significant reduction in overall phosphorous levels in recent decades (Winter et al., 2007).

The initial public, and eventual political concern over pollution levels in the Holland Marsh and phosphorous levels emanating from the Marsh contributed to two developments that would have significant impacts on agriculture in the area. First, pressure from the public and non-state actors would result in increased scrutiny of farming practices in the Marsh. This was spurred on by public concern for the ecology of the Marsh and surrounding area, such as it was. This would eventuate in the implementation of various legislative and policy interventions meant to regulate the production nature in the Marsh by both state and non-state actors. As regional environmental sensibilities emerged throughout the 1980s and 1990s, the Marsh was pulled into a regional geography of conservation, and featured prominently as a site in the province's conservationist agenda. Second, and as an attempt to maintain competitive in the global trade of horticultural crops, ecological modernism flourished in the Marsh. Farmers, private business and the state doubled down on modernist notions of the production and control of biophysical nature in attempts to build a better, more efficient and more ecologically sound nature.

6.2 City, countryside and conservationism in the Holland Marsh

Efforts aimed at rehabilitating the material ecology and the ecological reputation of the Marsh began in earnest just as the city and countryside were becoming increasingly intertwined, both materially and discursively. On the one hand, the urban areas and supportive urban infrastructure around the Marsh – which had been present since the initial draining of the Marsh – were rapidly expanding outward, bringing the city closer to the Marsh, as it were. On the other hand, nature's imaginary – an idealized notion of the agricultural pastoral – began to be leveraged by Marsh farmers, Marsh boosters, and developers in new ways. Whether invoked to sell carrots, onions or peri-urban real estate to urbanites, ‘nature’ in the Marsh has been heavily conscripted in recent years. In effect, these efforts have brought (at least discursively) the countryside closer to the city.

At the same time, rehabilitating the Marsh’s reputation as a safe, natural area of agricultural production has also relied on a contradictory discursive move – a imaginative distancing of the Marsh from proximate urban areas, especially Toronto. The Marsh would come to be (re)defined in contrast to urban areas – in a sense those working to rehabilitate the Marsh’s ecological reputation have attempted to recuperate some of the wildness the earlier Marsh boosters worked so fastidiously to expunge from the fields in the first place. The Marsh-as-urban getaway, or pastoral agricultural, has no appeal if the Marsh is seen to be a toxic. However, while notions of an external and pristine ‘nature’ in the Marsh have been exhumed to sell produce in Toronto and empty house lots in Bradford, it is a patently different kind of biophysical nature than the historical, pre-agricultural variety. This new conception of nature has come with a litany of material regulations and technological caveats stipulating new ways of being and interacting with the fields and crops.

6.2.1 The city, countryside and crops: Contradictions and conflicts in the new nature of the Holland Marsh

High interest rates, escalating housing prices, and the pursuit of cheap land ignited a building boom in the hinterlands of the Greater Toronto Area beginning in the early 1990s. On the south side of the Marsh, Aurora, Newmarket and Vaughan began to creep northward, while on the north side, Bradford and Barrie expanded southward. More recently, discussions have emerged within the Bradford city council to incentivize commercial and industrial development on either side of Highway 400[61]. While the

Marsh will continue to be protected (at least for now), building as close to it as possible – in order to maximize the utility of both the produce from the Marsh, as well as creating employment closer to Bradford and the urbanizing hinterland – is emerging as a high priority. As one Bradford politician put it:

> They'll never build on the Marsh. The only development I championed was putting employment on either side of Highway 400. My argument is, people can say, 'Oh, either side of the 400 is valuable farm land'. Well that ship sailed when you paved it over with 6 lanes of highway, so now let's maximize the utility of that massive piece of infrastructure, so you can actually put a business there, or businesses plural there. You hop on an interchange, and you get to the largest market in the country in, you know…from our border to Steeles Avenue is 20 minutes. I measured it. I know these things. (G. Thompson, personal communication, September 3, 2013).

Local job creation is a key priority for many urban politicians in and around the Marsh. Given the mechanization and consolidation of agriculture in recent years, agriculture now employs far fewer people than it once did, and farm populations are diminishing – an appreciable trend since at least the 1980s (Beaulieu, 2015; Pond, 2009; Winson, 1993). At the same time, beginning in roughly the early 1990s, housing developers in Bradford, capitalizing on relatively cheap land, began luring homebuyers to the area with the promise of the "Bradford bonus", including proximity to the Holland Marsh and "a pleasing mix of…small-town charm and big-city conveniences" (Lovering, quoted in Brennan, 1997, K1). This double pressure – an increase in population and a decrease in agricultural work – created the impetus to make local job growth a key priority in the area.

The west part of Bradford, in particular, has experienced intensive (sub)urban development in recent years. A new commercial/retail development consisting of dozens of stores, and straddling both sides of Holland Street West, now anchors significant residential developments of hundreds of homes directly adjacent to it. Increasingly, the pull of this commercial/retail power centre draws residents from across Bradford, threatening ongoing efforts to revitalize the downtown core. A couple of blocks from the commercial/retail centre, at the intersection of Holland Street West and Professor Day Drive, sits a brand new library, archives and community centre, providing further amenities on the west side of town.

Figure 32. Prof Day Drive and Holland Street West. The new Bradford West Gwillimbury Public Library is in the rear left. Photo by the author.

Figure 33. Sprawling city meets the fields - rows of new houses form burgeoning subdivisions in Bradford, increasing the need for new roads, water service, sewage disposal, power generation and the like. Photos by the author.

These changes in and around the Marsh – the accelerated material and discursive urbanization of the countryside throughout the 1980s and 1990s – are emblematic of Marsden's (1999) 'consumption countryside'. While Marsden's focus lies in Europe, his observations are instructive to the North American context. As a host of broadly political economic trends emerged in the 1990s, including intensified neoliberal globalization, new information and communication technologies, and the de/re/regulation of state activities, the countryside was pulled into an increasingly globalized, and urbanized world – or rather the increasingly globalized and urbanized world began to be extended into the countryside. As a result, as Marsden (1999, 506) puts it, rural areas became "progressively less self-sufficient, self-contained and sectorally controlled, and ever more open to the wider forces (economic, social, political) shaping…global development". The impacts of these scalar, socio-political and economic dynamics, as Marsden (1999) points out, are felt most profoundly, and differentially, at the local level.

As Bradford expanded and other villages in the area grew into towns, and towns into cities, a host of infrastructural needs emerged, ranging from road improvements and expansions, through to sewage treatment facilities, garbage dumps, and power generation plants. This is the often-invisible (to urban residents) shrapnel spiraling out of urban development. Yet to farmers in the Marsh the pressures of the urban growth around them have had material impacts on their trade. In some instances, these frustrations have occurred over idiosyncratic issues. In one recent case, farmers were frustrated by the inability to make a left turn out of the Marsh toward one of the main packing plants in Bradford because traffic on the road has become so heavy in recent years. Given that farmers often make multiple trips per day, and more importantly depend on selling their produce to the packing houses for their income, being held up in traffic is no petty inconvenience. Eventually the issue was resolved when a local politician agitated to have a traffic light installed at the intersection in question – however, residual resentment about the business of local roads remains.

In other cases, issues garnering wider attention have arisen. Conflict over the siting of a gas-fired power plant within eyeshot of the Marsh in 2008 was particularly fierce. According to the project proponents, the York Energy Centre, owned by Pristine Power, was designed to be a peaking generation facility, meaning that it would only produce energy when the grid requires additional capacity. With the recent population growth in the area, however, energy is increasingly in high demand, leading many local residents to believe that the plant would run – burning gas and polluting their environment – far more than officials with the York Energy Centre claimed in their proposal (see for example *Aurora Banner*, 2010, October 25; *Aurora Banner*, 2010, November 8). Opponents argued that siting the plant so close to the Holland Marsh and the south canal posed too great a risk to the ecological health and economic viability of the area, should a spill ever occur (Eek, 2009; Lu, 2011). Beyond this hypothetical possibility, it was feared that the emissions from the plant, and the water resource it would require as a matter of routine operation would put the environment and farms at risk. The farmers felt that their concerns were misguidedly dismissed within a planning process that privileged the production of joules over the production of calories – however as one farmer blogger put it, "you can't eat energy" (Eek, 2009). Despite the angry opposition, construction of the plant – and the associated pipeline infrastructure needed to distribute the power – proceeded and was completed in May of 2012.

Figure 34. The York Energy Centre - still a controversial development, sits just beyond the south canal of the Holland Marsh along Dufferin Street. Photographs by the author.

Developments on the immediate margins of the Marsh are, not surprisingly, typically opposed by the farmers (see Eek 2009; Reaume 2009). They are viewed as threatening incursions and have created anxiety within the farming community. As the farmers look from the Marsh up to the hills beyond, increasingly they see urbanization colonizing the hills. Not surprisingly, farmers have begun to feel "under siege" (Southworth, 1999, A23) – and as one Marsh farmer put it, "I feel like I'm beginning to farm inside a city" (as cited in Stein, 2000, A27). As urbanites looking for cheap real estate and a pastoral lifestyle move to the countryside, the tensions increase. Rural sociologists refer to this phenomenon as "rural migration", and define it as, "the movement of largely affluent urban or suburban populations to rural areas for specific lifestyle amenities, such as natural scenery, proximity to outdoor recreation, cultural richness, or a sense of rurality" (Abrams, Gill, Gosnell & Klepeis, 2012. See also, Gillon, 2014; Holmes, 2006). The rural migrants buying land in the Marsh, perhaps even more than the commercial/retail/infrastructure developments in the highlands, are seen as direct threats to the fields. As one farmer observed,

> You get some people from the city, nothing against city people. We need city people, we love city people, however, when they're investing in real estate, they buy it and think, "Well, I can do whatever I want to with it." No, you can't. And they set up a business, or they start burying construction materials (in the fields)…You have people who will come out here, and they get 10 acres and a house and they pay half a million for it and think, "Oh my god, I've died and gone to heaven". Because in the city you get a postage stamp and pay $500,000 for it. (J. Bake, personal communication, August 27, 2013).

Part of the worry is that urbanites buying land in the Marsh are increasing the spread of tenant-farmed land in the Marsh and further adding to farmer vulnerability. While no definitive aggregate data exists on land tenure in the Marsh, it seems that as non-farmers move in, more and more land is being rented out to farmers, rather than owned by them. At the same time, differences in what farmers and non-farmers value about the land have also become apparent. One long time farmer has seen an increase in this dynamic in recent years,

> You tend to rent some of other people's land with yours. But it's also hard to…what's happened is that you have a house, a nice house, and a barn, a little outdated maybe, but anyway. It's almost useless for us to buy that, because we don't need that 300, 400 thousand dollar home, and that barn is just totally outdated, and we don't need that. And you get somebody from Toronto, and they say "Oh, I like that house, I'd like to live here, and I get 5 or 10 acres of land". So sometimes it just goes to total strangers. And they just rent it out to you. Sometimes they try to farm it themselves, but that doesn't work. Well, they get a little bit of income. Say they paid $500 thousand for the whole thing, for 10 acres and the house and all that stuff. It doesn't pay for us to buy it (P. Irvine, personal communication, September 25, 2014).

Figure 35. City and countryside collide - in the northeast end of the Holland Marsh / Bradford. Photos by the author.

Urban aesthetics and imaginaries – in other words, the ideas and perceptions that so-called 'city people' have about nature – clearly also have a role in shaping the materiality of the Marsh. Modern day Torontonians moving to the Marsh, to an ostensibly empty, open, natural landscape, make the same mistake that the original Marsh boosters did. Both the contemporary 'city people' and the original Marsh boosters had perceptions about nature and landscape that erase important and ongoing histories. What was a First Nations' fishing grounds, cover for bootleggers, or an important part of a complex ecology was dismissed by the early Marsh boosters in much the same way current-day agriculture and agricultural practices are often dismissed by urban notions of the rural.

Bradford residents, as an example, have been known to complain about the very fields they have chosen to live near – the fields they have been drawn to based on a pastoral imaginary. Complaints from residents of Bradford, based on noise, or odor, have become fairly routine as a symptom of the colliding city and countryside. One farmer advocate expressed her frustration in what she sees as the threat posed by urbanization:

> So we're not pumping pesticides into the water, the lake, or anything like that. Pesticides are being used for sure, but the products now are almost entirely reduced risk materials. There are a few exceptions. But the growers are doing a very good job of applying them properly, and managing them properly. But, when somebody's got their newborn baby out in their back yard, and they think they can smell something, you know, that doesn't help. So too much…too much urbanization close to the Marsh is always a threat… Irrigating at night is the best time to irrigate, but you know the neighbors complain because the pumps keep

> them awake, and of course they have to irrigate when it's hot and dry, and people have windows open, unless they have air conditioners, but you know. (B. Lewis, personal communication, January 16, 2014).

Certainly the expectation of all residents, whether urban, suburban or rural, should be to be able to live free from the risk of chemical poisoning. And, of course, bringing concerns to the fore, as did the Newmarket Medical Officer of Health in the late 1970s, often can have important implications. Complaints from urban residents on the southern hills of Bradford about the odor of pesticide treatments are certainly justified – this is not meant to minimize them. However, it is worth pointing out that these conflicts arise precisely at the intersection – in some cases quite literally – of the fields and front yards. While this will undoubtedly result in a variety of longer-term implications, it is clear that already farmers are worried that it means the continuation of a broader, somewhat disconcerting trend, of farm practices being determined by non-farmers. As one long-time employee of the Muck Crops Research Station put it:

> I think that's the biggest threat that …it's the pressure from people who aren't farming, to change farming practices or stop farming. So that's a pressure that I'm concerned about (B. Lewis, personal communication, January 16, 2014).

6.2.2 Food safety, traceability and shifting agricultural production

One of the most recent examples of the material consequences of the disjuncture between rural and urban notions of external, biophysical nature – and one of the most problematic from the farmers' perspective – is exposed through the emerging food safety regime. Food safety standards, as they relate to agriculture, were developed beginning in the late

1990s in Canada. However, in recent years, the development of food safety legislation and protocol by the federal government, non-profit sector and private business has increased. A second-generation farmer commented on the recent rise – and imposition – of food safety regulations:

> A big one is food safety. It's huge. It's pretty stressful, too. It came on, I would say, for the carrot and onion growers, it came on about three years ago, four years ago. We were just getting bits and pieces of it, but then all of a sudden, I would say two years ago, it came to the point where we were told that in order to supply Loblaw's, anyone who didn't have it wasn't going to ship to that company. (H. De Jong, personal communication, January 20, 2014).

Food safety can be understood as an extension of the logic of grading in some respects. In much the same way that grading can be traced back to an ideal typical, urban aesthetic regarding what crops ought to look like (see Petrick, 2006; Soluri, 2005), food safety is an expression of urban notions of cleanliness and sanitization. Despite the recent popularity of the farmer market ethic – or perhaps in part because of it – very few people ever actually see the process of food production. It is certainly true that industrialized agriculture has led to a number of contamination scares in recent years, including various listeria and e coli-related recalls of spinach and lettuce, not to mention the recent mad cow disease outbreaks. Yet, at least from the perspective of the farmers, the food safety laws and protocols have been developed without an adequate appreciation for, or knowledge of, the material practices of farming. One long-time farmer observed:

> This food safety, a lot of it, there's nothing wrong with it. But it's gone nonsense. Whoever was sitting at the table that drew up these rules, not one of them was a

> farmer, or somebody with any common sense. It was…you know, wash your feet before you get in the field. Like how do you do that? It's just crazy. There's some stupid, stupid rules. (A. Zylawy, personal communication, January 20, 2014).

Urban notions of cleanliness, sanitization and sterility permeate food safety regulations. Dirt, even on our farmers' market carrots, is a rare sight these days. But the aesthetics of cleanliness and uniformity ushered in with grading and storage, shipping and packaging technologies in the 1960s and 1970s have ceased to be sufficient in the new era of pathogenic panic. The intention of the industrial food system – in the wake of various pathogenic outbreaks – is now to produce hermetically sealed, sterile food. For the new food safety regime, the pursuit of disinfected food starts in the fields. As one of the Marsh farmers explains:

> Okay, the food safety thing, I'll give you an example. You have to have sanitary wipes and all that stuff, in the tractor. For example, if something breaks in the field, you get oil on your hands, you're not touching the crops. So that's one example, having that stuff in the tractors. They want washrooms in the fields for the workers so that if they're weeding and they have to go to the washroom, they have a place to go to the washroom, they don't take a leak somewhere else and not wash their hands. (H. De Jong, personal communication, January 20, 2014).

Both regimes, grading and food safety, leverage particular (urban) notions of biophysical nature into profit – the straighter carrot sells for more than the crooked carrot, just as the 'certified food safe' carrot sells better than one that has not been certified. Both grading and food safety also penetrate and shape the entire production process. Visually appealing and uniform crops do not just appear, *ex nihilo,* but rather are the result of a host of processes, systems and calculations which run from seed germ plasm through to harvesting and storage (see for example Soluri, 2005; Stoll, 1998).

Similarly, food safety regulations and protocols have shaped the production process, primarily through the mechanism of traceability. Increasingly, high volume buyers of Marsh produce, including Walmart, Loblaws, McDonalds and Costco, are responding to government food safety legislation and requiring farmers to monitor their crops through entire production cycles. As one farmer explains:

> Traceability is they want you to monitor everything. They want you to monitor the day you harvested, what variety, how many boxes. And then when you store them, they want you to monitor it. Where did they get shipped to? How many are left? If I load a truck, they want me to document that I looked inside the truck that there was no dead rats, for example. There was no…debris on the ground showing that there were animals in the truck, for example. So you document that and write that down (H. De Jong, personal communication, January 20, 2014).

Food safety, through the paradigm of traceability, extends back from the hand of the urban consumer, all the way to specific areas of specific fields. As an example, each pallet box of carrots farmers harvest is, in effect, geocoded. The carrots in any given pallet box are tracked as they are stored, hauled to a packing facility, washed, sorted and bagged. As the bags of carrots are shipped to Toronto, Halifax, New York City, the United Kingdom, or any number of other places, each carrot can still be traced all the way back to a tiny strip of muck soil. While traceability and food safety have created an abundance of good press, a cottage industry of tech companies providing high tech 'solutions', and a number of regulatory agencies, the impact this entire infrastructure is having on the actual safety of food is still unclear. What seems to be clearer, however, is that the essence of traceability can be traced, as it were, to urban expectations of sanitized and sterile crops – a tamed, predictable and innocuous biophysical nature.

Persistent modernist beliefs in the absolute controllability of biophysical nature, present in the Marsh since its inception as an agricultural enterprise, have deepened as a result of the increasingly urbanized countryside. The conflicts and consequences of a crowded countryside are likely to become more acute as urbanization continues to intensify in the area. In the meantime, farmers continue to work to get as much out of the fields as the muck soil continues to subside. In order to attend to these growing socionatural challenges, the farmers are embracing the promise of the high technology of a putative third agricultural revolution.

6.3 The evergreen revolution and building a 'better' nature in the Holland Marsh

At the 63rd annual Muck Vegetable Growers' Conference[62], hosted by the Muck Crops Research Station and the University of Guelph, Dr. George Lazarovits gave an illuminating presentation titled "The new era of diagnostics and biological control" (G. Lazarovits, public presentation, April 9, 2014). Dr. Lazarovits, Director of Research at A&L Biologicals, a private, for profit agricultural research and diagnostics laboratory, told a crowd of close to 75 people (consisting of farmers, crop researchers and agro-industry representatives) about Dean Glenney, a corn and soybean farmer in Dunville Ontario, a small town close to where the Grand River meets Lake Erie. Dr. Lazarovits told the crowd that Glenney noticed that the rows of corn and soybeans closest to the fence posts in his fields seemed to be more successful than the average plant. The stalks grew taller, the ears of corn were fuller and plumper, and the plants seemed more resistant to extreme weather conditions. Flummoxed initially, Glenney eventually speculated that the difference had something to do with the fact the soil of the rows closest to the fence posts was often not tilled as thoroughly. Hitting a fence post with a tiller can result in costly repairs to both the fence and machine, so rather than risk catastrophe, Glenney would typically give the fence posts a wide berth.

Testing his hypothesis, he began to till fewer acres, and eventually he stopped tilling his fields altogether. When he seeded in the spring, he was careful to drive his seeder in the exact same spot from year-to-year, in order to minimize soil compaction. He also seeded in the same non-compacted, non-tilled soil every year. An agricultural engineer by trade, Glenney even custom built a special seeding machine to minimize soil disturbance. Glenney refers to this technique as 'fence row farming', and it is premised on leaving the soil as undisturbed as possible. As he puts it, "The secret is to just get out of the worms' way" (Glenney, quoted in Vo 2014, np).

It is worth emphasizing that no-till farming did not originate on Glenney's farm. The technique has been used around the world, for decades (Lal, Reicosky, Hanson, 2007). Still, for the past few years, Dean Glenney has been a quasi-celebrity among the farming community in Ontario. In 2015 Glenney was even crowned the Soil Champion by the Ontario Soil and Crop Association (see Schaer, 2015). The attention he has been getting is, within the farming community, no idle curiosity. Glenney's fence row farming, as Lazarovits pointed out to the attendees of the Muck Vegetable Growers' Conference, has consistently generated corn and soybean yields twice the national average. Lazarovits has been studying Dean Glenney's farm and farming techniques in an attempt to isolate the science (and, thus harness the profit potential) of Glenney's fence row farming. He claims his findings are confirming recent speculation in the broader commercial agricultural research sector that a third agricultural revolution is underway. As Lazarovits put it to the conference attendees in early April 2014:

> From 8000 BC to 1950 we went through the agricultural revolution. From 1950 to 2010 we went through the green revolution. And from 2010 to 2050 we're going to go through the *evergreen* revolution (emphasis added, D. Lazarovits, public lecture, April 9, 2014).

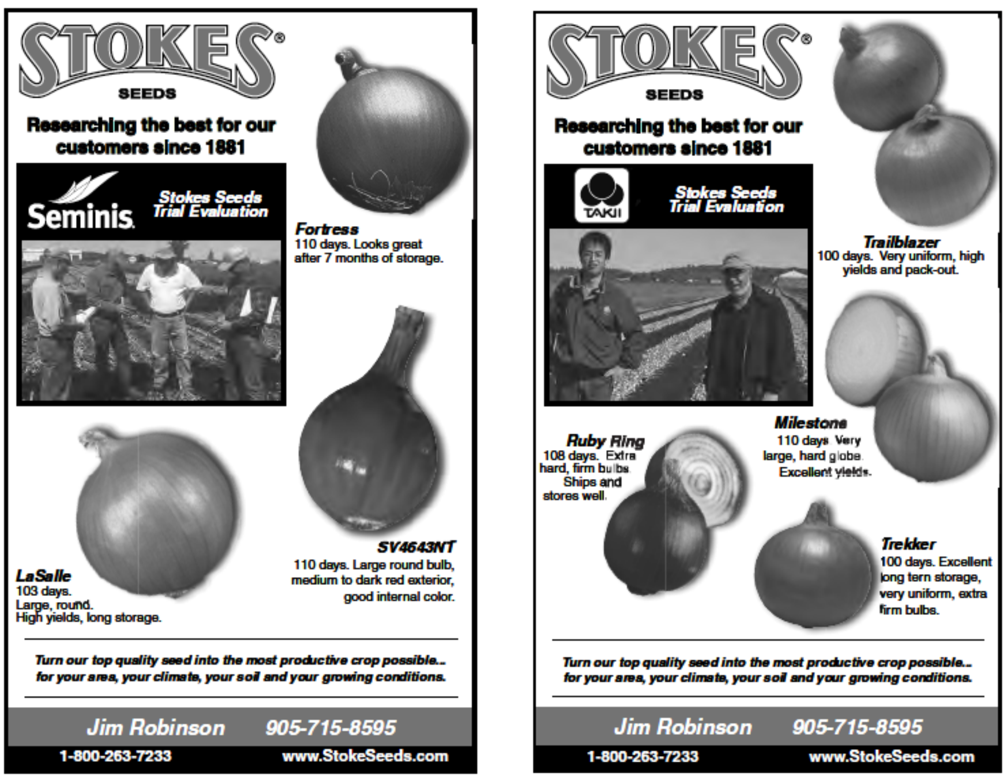

Figure 36. Signs of the green agricultural revolution – these linger in the Marsh. Seed manufacturers, wholesalers and researchers annually take out ad space in the Muck Vegetable Growers Conference directory to advertise choice seed types, highlighting the desirable traits of each. (62nd Annual Muck Vegetable Growers Conference Industry Directory 2013,p. 19 and 32).

The so-called evergreen revolution in farming is taking place in the rhizosphere, an ever-changing, curiously indefinable area at the root-soil interface. First identified by the German agronomist Lorenz Hiltner in 1904, the rhizosphere is a complex physical, biological and chemical, protean amalgam. It “is not a region of definable size or shape, but instead, consists of a gradient in chemical, biological and physical properties which change both radially and longitudinally along the root” (McNear, 2013, 1). In other words, as roots change shape as they grow, the scope of that particular rhizosphere changes in kind. Hiltner also discovered that root exudates – chemical secretions from the root – are constantly changing as well, which results in continual changes in the chemical and biological composition of the rhizosphere (Harmann, Rothballer & Schmid, 2008, 7).

Scientists of various agriculture-related disciplines now believe the rhizosphere to be, in effect, the most important factor in plant health and crop yields. Lazarovits speculates that through a prolonged period of non-disturbance, Glenney has developed a unique, robust microbial ecosystem uniquely adapted to corn and soybeans – an ecosystem that stimulates a robust and tailored rhizosphere. Early results of his experimentation have demonstrated that the soil bacteria and pythium in Glenney’s soil are fewer and far more uniform than in control soil, suggesting that Lazarovits’ tailored ecosystem speculation is on track.

As the alleged third agricultural revolution unfolds, some concerning and familiar arguments are recirculating. Indeed, the Indian agronomist Monokombu Sambasivan Swaminathan, considered by many to be one of the fathers of the green revolution, is now a chief prognosticator of the so-called evergreen revolution (Bhardwaj & Leff, 2014). Analogous to the green revolution before it, the evergreen revolution is promising lower input costs, higher yields, and more profit for farmers. But while the green revolution relied heavily on chemical inputs (fertilizers, pesticides, and the like) and genetic manipulation of seed germplasm, the evergreen revolution will allegedly improve on these past practices with better science and information. In some ways, the modernist proclamations of twentieth century agriculture are simply being rearticulated through the science and technology of the twenty-first century.

The failures of the green revolution in agriculture typically go unspoken in the boosterist accounts of the putative third agricultural revolution. Yet it is worth recalling the many negative social and ecological impacts of technology-reliant, profit-driven agriculture. Kloppenburg (2004, 6) provides a useful list;

> These include the exacerbation of regional inequalities, generation of income inequalities at the farm level, increased scales of operation, specialization of production, displacement of labour, accelerating mechanization, depressed product prices, changing tenure patterns, rising land prices, expanding markets for commercial inputs, agrichemical dependence, genetic erosion, pest-vulnerable monocultures, and environmental deterioration.

Yet many patterns of the green revolution are being reproduced by the coming evergreen revolution, including an emphasis on ecological modernist, productivist notions of biophysical nature. While Glenney was content to simply get out of the way of the worms, a whole host of commercial, profit-driven agricultural companies are scrambling to very much implicate themselves in the rhizosphere through the manipulation of rhizosphere bacteria. As Lazarovits puts it, “We have to figure out how to exploit these microorganisms to produce better crops" (Lazarovits, quoted in Telford 2013, np). He explains further:

> What we're hoping to do – and many companies are very interested in this – is to develop a method of bio-fertilizing plants, putting those good guys back in the soil. And if you can do that, it may take much less than the five or six years to get the growth promotion that Dean's site took (Lazarovits, quoted in Andrews 2013, 35).

This is Glenney's "leave it alone" approach, in a hurry – an attempt to impose a capitalist timescale on a biophysical process in order to speed up the arrival of increased production. The evergreen revolution is emerging in familiar ways to the green revolution before it, but refracted through the paradigms of just-in-time delivery, information and communication technologies, the Internet and social media. And while understanding and, more to the point, manipulating rhizosphere ecologies are so far incomplete projects, a new wave of science and technology, based on information and diagnostics, is already blanketing the fields.

Lazarovits' presentation on Glenney was well placed, given that the *hubris* – and commercial appeal – of this forthcoming iteration of agricultural activity is on full display at the annual Muck Vegetable Growers Conference. In some ways Lazarovits' presentation was evocative of Professor Day's test plot yield demonstrations eighty years previously. Of course, the particular technologies on display differ, yet each represent attempts to harness biophysical nature through cutting edge technologies for the purpose of increasing profits. In a departure from Day's presentations in the 1930s, the contemporary conference, designed primarily to bring muck crops researchers and farmers together, heavily features commercial agro-chemical, agro-technology and agro-research companies. These companies are willing to pay for access to the conference participants – potential customers – through presentation slots, trade show displays and paid advertisements in the conference directory. The trade show portion of the conference, set up on an erstwhile hockey rink at the Bradford and District Community Centre, features a mix of agricultural equipment manufacturers, chemical and technology companies, seed companies, and farm management companies. Regardless of the function, all companies emphasize the extent to which cutting edge technology is an essential element of farming in the contemporary period.

The technologies promise to reveal to farmers the *real* secret of farming, which is not to simply get out of the worms' way as Glenney suggests, but instead to push biophysical nature aside. One such technology, Field Manager Pro 360, promises to enable farmers to "see [their] farms like never before" (Figure 2 below). The product ostensibly enables farmers to probe below the surface of their fields with a stratified, analytic precision. The tacit pledge is that exposing the sub-surface stratum will reveal important, commodifiable information to farmers.

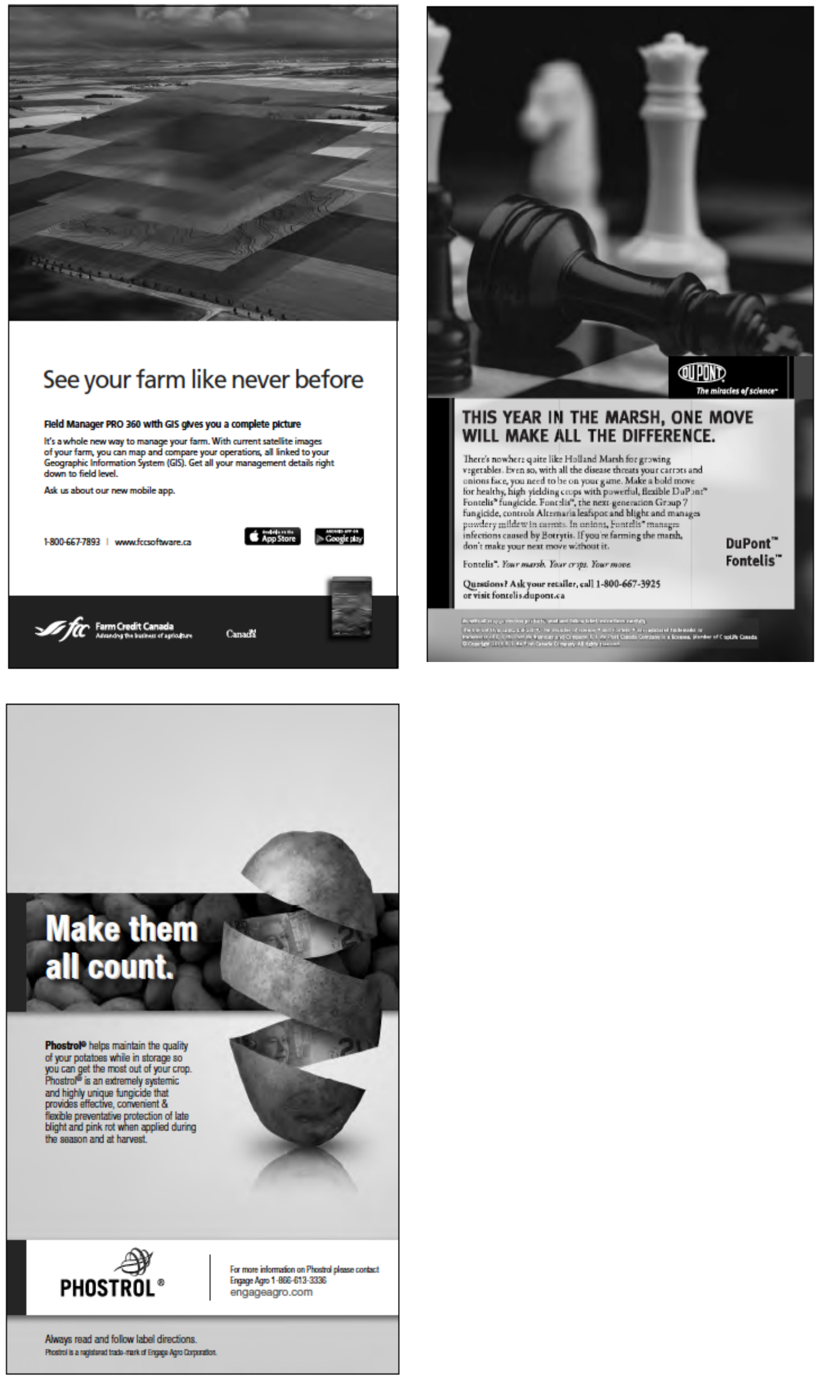

Figure 37. Signs of the evergreen revolution. (62nd Annual Muck Vegetable Growers Conference Industry Directory 2013, p. 25, 55, and 73.

Within the paradigm of capitalist farming, peering into the depths of one's field is only useful in as much as it is profitable. Phostrol, a phosphorous-based fungicide manufactured by NuFarm similarly suggests in the ad above that peeling back the skin and gazing into the very heart of biophysical nature can (perhaps should) similarly reveal undiscovered profit. The image of a money-lined potato is striking and demonstrates the extent to which the pursuit of profit through the exploitation of biophysical nature has become normalized in capitalist agricultural production. Perhaps all farmers do not see their carrots, onions and potatoes lined with twenty-dollar bills, but the normative implication here is that they should. DuPont, meanwhile, warns farmers that, "This year in the Marsh, one move will make all the difference" (Figure 2 above). The promise in the ad seemingly strips away the inherent contingencies of contemporary capitalist agriculture – inclement weather, poor markets, and the like – reducing the determination of success down to the use of DuPont's fungicide. The operative notion here is precision – with one, almost clinical, sure-fire "move", Marsh farmers can be guaranteed of a profitable season.

The notion of precision is increasingly pervasive in the Marsh. While there is a rich tradition of (attempts at) controlling aspects of biophysical nature in the Marsh – from the initial canal development to tame the landscape, through to the introduction of cold storage and shipping technologies, and so on, the precision paradigm strives for something beyond simple control.

Figure 38. Precision fertility - bringing the controlled atmosphere of a greenhouse to the fields of the Holland Marsh. . (62nd Annual Muck Vegetable Growers Conference Industry Directory 2013,p. 13).

Modernist notions of human control over biophysical nature have been doubled down – the expectation now is that biophysical nature is fully able to be manipulated, customized, sanitized of uncertainly and unpredictability. DuPont promises surgical-like precision with "one move", while PlantProof claims to bring the kind of control previously only afforded to indoor greenhouse environments to outdoor environment of the muck soil of the Holland Marsh (Figure 38). Attempts are being made, in other words, to transcend the messy, contingent outdoors of the fields through a discursive and material transformation, with an intended result of an imposition of ultimate control.

The evolution of seeding in the Marsh is emblematic of the desire to construct and control biophysical nature with evermore precision. While initially farmers in the Marsh, much like anywhere, used to collect seeds each year to sow the following season, that practice has long since ceded to an international political economy of seed manufacturers. As one long-time Marsh farmer recounted:

> They used to do that, in the very, very beginning for a little while. But that petered out pretty quick and it's all gone now. There are certain areas that really lend itself (sic) for growing, reproducing seed. And it's like a dry climate where they do that. And they also now have places in South America, so if they have a crop failure here, they still have a chance of getting the seed for you in South America. You got two chances. And, so, these seed companies have become multi-national, they're just all over the world. (P. Irvine, personal communication, September 25, 2014).

Of course the seeds grown in the Holland Marsh have been modified, designed and tested to express certain – profitable – characteristics, including uniformity, yield, weight, and the like (see figure 38 above). These are the seeds of the green revolution. Seeds of the evergreen revolution, however, typically undergo further processing, with a coating of growth promoting, pest deterring chemical material applied to each before it is planted. Each seed is encrusted with an application of various chemicals – but importantly, this coating is designed to give each seed a sculpted uniformity. The chemicals promote profitable growth, as has been the case for decades now, while the shape of the seed facilitates precision planting. In the high stakes context of muck farming, the distance between seeds is a crucial consideration. Most of the farmers now use a variation of an air seeder – a device that controls the application of each seed with air pressure. Rather than allowing the seed to roll on a belt, as traditional seeders do, air seeders control the coated, uniform seed with a much higher degree of precision, allowing farmers to apply seed with great accuracy. As one farmer who had recently converted to using an air seeder explained:

> You know, you wanna put 9.5 seeds per foot, well you can put 9.5 seeds per foot. Before you used to have to guess, you used to weigh the seed and do all that stuff. And still, depending on your speed and that, you're always off. Now, it's very accurate, you get a lot better crops. (H. De Jong, personal communication, January 20, 2014).

The pursuit of seed application perfection is a tactical intervention, part of a broader strategy farmers employ in order to simply stay in business in an increasingly competitive sector, and in a context of increasingly precarious ecological conditions. An additional motivation for precision specific to the Marsh is the simple reality of the subsiding muck soil. Already on the edges of the Marsh farmers are experimenting with growing greenhouse or mineral soil crops where the muck has disappeared. The notion of simply walking away from the Marsh, and letting it return to whatever socionatural hybrid it might become if left fallow, is out of the question. The ostensible strategy is to farm more carefully – with more precision – in an attempt to prolong the life of the muck soil, to get as much profit out if it as possible before the soil vanishes.

In a similar vein, the use of diagnostic technologies in the Marsh, while present for many years, has intensified recently. The Integrated Pest Management program run by the Muck Crops Research Station, versions of which are offered by all of the major seed and agro-chemical companies operating in the Marsh, provides extensive field surveillance and feedback. While field scouts are still used by most pest management programs – usually summer students, literally walking the fields looking for outbreaks and infestations – drones are beginning to show up above the fields of the Holland Marsh. Armed with high-powered cameras, the drones are the latest technology conscripted into the increasingly fevered world of crop surveillance. Although the use of drones is not yet mainstream in the Marsh, according to one farmer, the Muck Crops Research Station has been experimenting with drones as part of their Integrated Pest Management System for at least a couple of years (A. Zylawy, personal communication, January 20, 2014).

Once a drone, farmer or field scout has identified an infested site, the common practice now is to text message, email or tweet a picture of the infestation either to a specific office (the Muck Crops Station, or a commercial agro-chemical company), or to a wider community of farmers in order to identify the pest and devise a treatment. One farmer explains the process:

> You know guys with their smart phones now walking their crops, checking it. They see some kind of weed, take a picture of it, put it on twitter, "What is this?", or they send it, they email it to their crop advisor at Cargill or wherever they get their inputs from, and they get back to you and say, "Oh you need this chemical, this crop protection treatment product". It's neat. You can get answers right away now there's not that lag time. It's pretty neat – it's exciting stuff. (C. Roesch, personal communication, September 12, 2013).

Undoubtedly the pursuit of precision has served to change, in some fundamental ways, the process of farming in the Marsh. Farming is a fickle undertaking, even within the carefully built environment of the Holland Marsh. The elimination of contingencies through manifold technologies – advanced pesticide treatments, re-building the canal, seed coatings and air seeders – is, however, only ever partial, and largely based on perception. The biophysical nature farmers want – pliable, predictable and profitable – and the one promised to them by the purveyors of agricultural technologies and techniques remains, and likely will remain, beyond reach. Biophysical nature will continue to operate in uncontrollable ways – possibly through ever-evolving diseases and pests in the muck soil, perhaps through a storm of similar magnitude to Hurricane Hazel, and inevitably through the subsidence of the soil. Attempts to forestall and eliminate the variability, degradation, and downright surprising character of biophysical dynamics remain an important fulcrum on which the production of socionatures teeters (see for example Boyd, Prudham & Schurman, 2001).

As political ecologists point out, however, the production of nature includes a variety of processes outside the biophysical dynamics of the non-human world (see for example Heynen, Kaika and Swyngedouw, 2006). Legislation, rules and regulations, institutions and governments are always imbricated in the process of the production of socionatures, and this remains true of crops. Within the Marsh, the politics of nature's production have typically been enabling – that is, the state has provided supportive regulation and legislation to allow farming to occur (as an obvious example, allowing the conversion of the wetland in the first place). However, more recently the production of nature – of the agricultural variety – has been impacted by state intervention, creating tension to be sure, as well as social and material changes in the fields.

6.4 Socionature, regulation and conflict: the production of nature in the Holland Marsh

Institutions, rules, regulations and legislation have always been pertinent in the Marsh, particularly since the introduction of agriculture to the area (recall the original enabling legislation of the *Ontario Municipal Drainage Aid Act, 1920*). However, as part of the more general trend of external forces penetrating the Marsh, beginning particularly with the movement to restore the ecology and ecological reputation of the Marsh in the mid-1980s, there has been a considerable increase in the regulatory and institutional presence in the Marsh. Various Ministries, departments and organizations, both state and non-state actors, are all attempting to shape biophysical nature according to their various prerogatives and normative conceptions of what the socioecological constitution of the Holland Marsh ought to be. Jaime Reaume, then-Executive Director of the Holland Marsh Growers' Association, put a fine point on the matter in a 2014 pre-budgetary presentation to the provincial Standing Committee on Finance and Economic Affairs,

> I deal with basically twenty-three ministries. I always laugh about the fact that I deal with twenty-three provincial ministries, fourteen federal ministries, two conservation authorities, one county and one region that really don't get along very well, five municipalities, and I have a myriad set of regulatory regimes that we all have to fall under. That is very hard for the farmers (Reaume, quoted in Ontario 2014, np).

Regardless of the actual number of ministries, authorities, regions, rules and regulations with some jurisdiction within the Marsh, the qualitative impact is clear. Farmers are extremely frustrated by what they see as unnecessary interference to their livelihoods. For current-day Marsh farmers – most of whom grew up in the Marsh helping their parents and grandparents on the farm – the increased regulation of the Marsh is something that has happened over the course of their adult lives – rather rapidly, in other words. One disgruntled farmer summarized the general sentiment: “We’re over-regulated. All these authorities. It’s getting crazy…talk to the other guys…everybody wants to regulate you to death. For what?” (A. Zylway, personal communication, January 20, 2014).

A good number of regulatory changes over the past 20-25 years are related to environmental and land use management – in part, as discussed above, to restore the ecology and ecological reputation of the Marsh. Perhaps not surprisingly, then, these rules and regulations tend to be the ones that the farmers most resent. Among these, a recent initiative by the provincial Ministry of Environment to monitor water taking for irrigation in the Marsh has been particularly contentious. The province requires, with few exceptions, any company or organization that uses more than 50,000 liters of water per day to obtain a permit and track their water usage. Marsh farmers see this as needless meddling because their fields are surrounded by water, and drought has never really been an issue for them. As one long-time farmer put it:

> We’ve now had since 1934, Lake Simcoe, that has never failed. And now they want us to…we’ve been irrigating out of there for 80 years...and now they want us to let them know how much we get out of there. Maybe in the future they want to control it? And that’s good for areas where people are running out. But let’s worry about that if Lake Simcoe were to dry up and we would have to control it. We don’t need any permits for that. And it’s just a government regulation that’s useless (P. Irvine, personal communication, September 25, 2014).

Along similar lines, the Lake Simcoe Region Conservation Authority (LSRCA) has a number of initiatives clustered largely around protecting and restoring water quality in the Marsh, and beyond – work enabled by the passing of the *Lake Simcoe Protection Act* in 2008. From phosphorous monitoring and reduction programs, through to riparian protection programs meant to reduce the amount of soil erosion and silt transference, the LSRCA has had an increasingly prominent role in shaping nature in the Marsh. Not surprisingly, the LRSCA's role in the socioecological politics of the Marsh has at times been fraught. The introduction and privileging (through incentives and programs) of a particular, normative socionatural perspective lies at the heart of the enmity[63]. As an example, in a recent (2009) "report card update", the LSRCA gave the West Holland River a grade of 'D' for phosphorous concentration. Within the Holland River sub-watershed, the LSRCA clearly fingers agriculture – specifically Holland Marsh agriculture – as the culprit of ecological distress and demise:

> Impacts from the agricultural areas include the removal of riparian vegetation; the input of sediment-laden sediment (sic) which impacts both water quality and the habitat of fish…the use of large volumes of water for irrigation, and the changes to the hydrology of the system by the artificially maintained polder system; channelization (LSRCA, 2010, p. 2).

According to the Ontario Ministry of Environment, only four percent of the phosphorous entering Lake Simcoe originates in the Holland Marsh[64]. This suggests that the Marsh is a very small contributor of total phosphorous, though it is worth pointing out that it is the only source, of the five total, identified with such specificity. All other agricultural activity in the watershed, as an example, is folded into "watershed streams" which includes “streams or tributaries that include the runoff from urban, rural and agricultural areas in the watershed” (Ontario, 2010, 11). So while a four percent contribution may not seem significant, the LSRCA has deemed it noteworthy enough to single out – a point which has not gone unnoticed by farmers in the Marsh.

Perhaps more poignantly, the Ministry of Environment (MOE) identifies the Marsh as problematic as a result of its current socioecological configuration as fields. Referred to as “natural heritage features” in the *Lake Simcoe phosphorous reduction strategy* (Ontario 2010), the MOE emphasizes that wetlands “help to regulate water quality by filtering contaminants and retaining excess nutrients before they reach water sources” (Ontario 2010, 12). The MOE further points out that the “loss of key natural heritage features and shoreline areas along Lake Simcoe has impaired the ability of the natural heritage system to perform these multiple functions” (Ontario, 2010, 12). In other words, had the marsh of one hundred years ago – which ostensibly performed these water quality services – not been turned into an area of intensive agricultural production, phosphorus levels in Lake Simcoe would be much lower. The Marsh, then, is a double culprit according to the MOE. On the one hand, agriculture in the Marsh is responsible for adding to the overall phosphorous load in Lake Simcoe through the over application of fertilizers, soil subsidence and the like, and, on the other hand, agriculture in the Marsh has resulted in phosphorous from other sources not being removed from the hydrological ecology. As a general remedy, the MOE’s protection plan calls for the safeguarding of existing wetlands and remediation and restoration of “natural areas or features” (Ontario, 2010, 12). In other words, it appears that the MOE would prefer to see the Marsh returned to its pre-agricultural state.

This perspective seems to clash with that of another central institutional and regulatory presence in the Marsh – also an appendage of the provincial government – the *Greenbelt Act, 2005*. This pioneering legislation enshrines a variety of protections for the rural countryside generally, and agricultural land specifically (see Pond, 2009). The protected area, or Greenbelt – the largest of its kind in the world – is comprised of a large swath of land that curves around the so-called Golden Horseshoe of Lake Ontario, from the Niagara Escarpment in the south, through to the Oak Ridges Moraine in the northeast.

The regulatory regime of the Greenbelt Plan includes a distinctive delineation for agricultural land, "Specialty Crop Area". At the moment there are two such designated areas in the province, the Niagara Peninsula Tender Fruit and Grape Area and the Holland Marsh. According to the province's documents, the Niagara area was afforded special status "based on provincial soil and climate analysis of current and potential tender fruit and grape production areas" (Ministry of Municipal Affairs and Housing, 2005, 13). The Marsh, meanwhile, was given the designation based on a fairly vague description, including "provincial muck soil analysis and current agricultural production in the region" (Ministry of Municipal Affairs and Housing, 2005, 13).

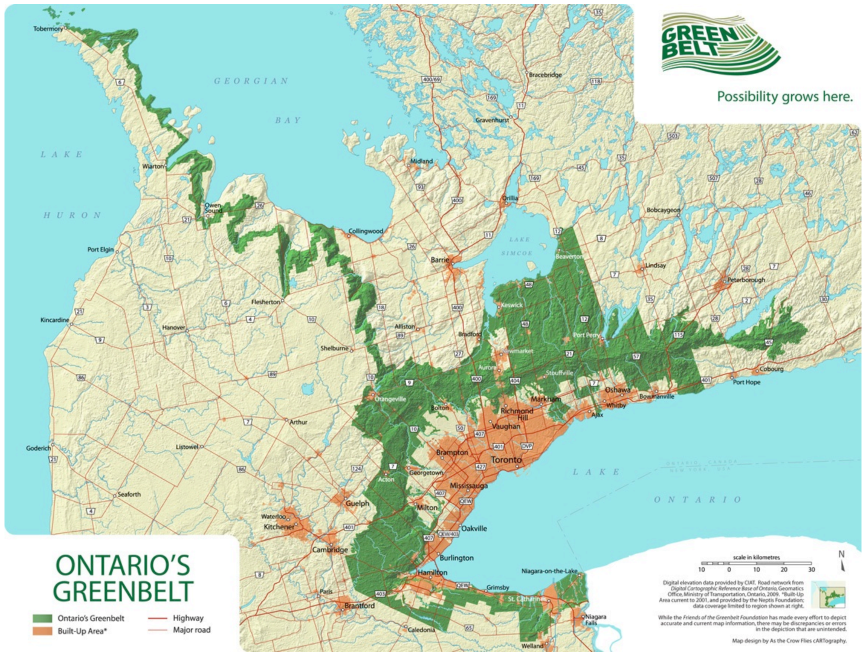

Figure 39. Ontario's Greenbelt - The Greenbelt is indicated by the green area, and concentrated urban areas are marked in pink. Map accessed from http://www.greenbelt.ca/maps

Functionally, the Specialty Crop Area designation includes rigorous land use parameters and restricts the ability of regional and municipal governments to redesignate land uses in the Marsh. Only "normal farm practices and a full range of agricultural, agricultural related and secondary uses[65] are supported and permitted" (Ontario, 2005, 13).

The definition and implications of the Specialty Crop Area designation were updated recently in a Provincial Policy Statement, the preeminent land use planning and development mechanism in the province. According to the current definition, a Specialty Crop Area is, in part, "designated using guidelines developed by the Province, *as amended from time to time*"(emphasis added, Ontario, 2014, 49). Also according to the latest Provincial Policy Statement, Specialty Crop Areas are defined as areas that grow “tender fruits (peaches, cherries, plums), grapes, other fruit crops, vegetable crops, greenhouse crops, and crops from agriculturally developed organic soil” (Ontario, 2014, 49).

The recent policy statement also outlines conditions under which activity other than farming can be conducted within a Specialty Crop Area. The extraction of mineral aggregate resources is allowable, according to the 2014 Provincial Policy Statement, “provided that the site will be rehabilitated back to an agricultural condition” (Ontario, 2014, 28). However, if full restoration cannot be achieved, mining and development of aggregate resources is still permitted, provided “there is a substantial quantity of high quality mineral aggregate” (Ontario, 2014, 28) in the area.

Despite the ostensible intentions of the Greenbelt – to protect the countryside generally and farmland specifically – there remains an economic *caveat* that reveals an instrumentality to how the province conceives of biophysical nature and landscapes within the Greenbelt plan. It is not surprising, for example, that the two Specialty Crop Areas – the agricultural areas afforded the most comprehensive protections – are also among the most profitable agricultural lands in Ontario. Similarly, mining and aggregate extraction are highly profitable ways of exploiting land, and likely for this reason, allowable – even privileged – within a supposedly ecologically protected area.

For the farmers, the introduction of the Greenbelt has been received, for the most part, as yet another set of rules and regulations that might eventually have some impact on them. Many farmers also see the plan as a potential and partial element protecting their agricultural livelihoods. Area residents typically invoke the idea that the Marsh is in a ‘floodplain’ as evidence that it will always remain agricultural land and never be built on. Some now understand the protections afforded to agriculture under the Greenbelt Plan as further proof of the immutability of agriculture in the Marsh. As one farmer, who refers to the protections for the Oak Ridges Moraine, which is part of the Greenbelt, explains,

> Well first off, we're not really worried it's going to be taken over by development, because it's zoned for agriculture. And it's also in a flood plain. And it's also a green area, Oak Ridges Moraine, as well. So it's protected from industry (P. Irvine, personal communication, September 25, 2014).

Optimism is almost a job requirement for farming, given the vagaries of weather, markets, and dozens of other factors likely to intervene in one's livelihood and income throughout the course of any given year. So it is not surprising that most farmers in the Marsh feel similarly – that farming will always exist in the Marsh. Farmers do admit that muck crop farming may end, but they are confident that the transition to mineral soil and greenhouse farming (which has already begun) will provide them with the opportunities and lifestyle afforded by the muck soil. However, the farmers' optimism in this case may be misguided. The protective measures currently afforded by the *Greenbelt Act, 2005*, are, like those of any piece of legislation, impermanent, subject to political machinations and election cycles, and may very well change. The current definition of the Holland Marsh as a Specialty Crop Area is premised, in part, on the uniqueness of the muck soil. However, as the soil subsides, leaving only mineral soil, the question of whether or not the area will continue to be a protected agricultural area is a very valid one. In the meantime, the entire Greenbelt Plan is currently under an extensive review process, and almost certainly some changes will be made. Indeed, in the most recent intervening

Provincial Policy Statement (Ontario Ministry of Municipal Affairs and Housing, 2014), the definition, parameters and protections afforded the Specialty Crop Areas have already changed from those originally set out, as discussed above. Furthermore, suggestions that the Holland Marsh will always remain agricultural land and never be built on because it is a floodplain espouse a kind of ecological determinism and ignore the fact that the fields already constitute a built landscape, carved out of a previously existing wetland. Ultimately the question of whether agriculture will remain in the Holland Marsh over the next 100 years is impossible to answer at this point. How biophysical nature is defined and produced, and what kinds of biophysical natures are produced, will all be central to the future of Holland Marsh agriculture.

6.5 Conclusion

The hubris of the green revolution resulted in a decidedly toxic socionatural amalgam in the Holland Marsh, leading to the emergence of a variety of socioecological contradictions during the last decade of the twentieth century. While initially obstructionist, or at least reluctant to be transparent about the extent and impact of chemical-dependent farming in the Marsh, the provincial government eventually became interested in regulating the production of nature in the area when the condition of Lake Simcoe's ecological health led to public shaming. New rules and regulations on chemical and phosphorous use in the Marsh eventually changed the socionatural configurations beyond it, and algal blooms are no longer as significant an issue now as they were 20 years ago. As a legacy of this, the provincial government, through the Ministry of

Environment (along with the LSRCA) and the *Greenbelt Act, 2005* has become increasingly implicated in the production of agriculture in the Marsh.

A close inspection of farming in the Holland Marsh, particularly over the past 30 years, demonstrates the extent to which the state, politics and planning are active forces regulating the production of nature. The imposition of water taking and traceability protocols, and the banning and restriction of certain pesticides – as examples – have changed the conditions of farming in the Holland Marsh. At the same time, this chapter has also demonstrated that the state can operate in contradictory ways – limiting the production of nature through agriculture on the one hand, while enabling it on the other (through the Specialty Crop Area designation). The state, contrary to Smith's (2008 [1984]) formulation, is revealed as a dynamic, active and contradictory actor within the complex dynamic of nature's production.

The compulsion of competition and the struggle for livelihood has led many Marsh farmers to embrace the coming evergreen agricultural revolution promised by the burgeoning agro-technology and agro-research sectors. These industries claim the ability to create a more precise and profitable crop, without the negative externalities of the green revolution technologies. As farmers, aided by the agro-tech sector, push to transcended the biophysical limits of crops in the pursuit of ever-increasing profits, however, the specter of O'Connor's (1988) insights regarding the second contradiction of capital loom.

The Marsh farmers are at the centre of these divergent, competing conceptions of what kinds of biophysical nature are (or ought to be) produced in the Marsh. To be sure, the farmers pursue the most immediately profitable path possible, as they always have.

Increasingly, however, they are doing so in a regulatory and technological *milieu* rife with radically different normative conceptions of what biophysical nature in the Marsh ought to be. Farming continues – almost improbably – despite the crush of (sub)urbanization, soil subsidence, and litany of federal, provincial, regional and municipal rules, regulations and legislation in and around the Marsh. Yet inconsistencies in the kind of socionatures resulting from these myriad processes and protocols mean that the farmers operate in a radically ambivalent context. Despite decades striving for certainty and predictability, ultimately uncertainty and contradictions persist in the fields of the Holland Marsh.

Chapter Seven. Conclusion: The production of agricultural nature and environmental history

On January 23, 2015, Avia Eek, a long-time Holland Marsh farmer and councilor for Ward Six in King County tweeted about a recent trip to the grocery store with her husband, Bill.

> Bill & I did some grocery shopping tonight. 3# of #Canada #onions $1.99. Our #Farmers are getting $3.00 for 50# #disgusted. (Eek, 2015).

Records from the *Toronto Daily Star* confirm that farmers were getting essentially the same price (between $2.85 and $3.25) for 50lbs of cooking onions in the spring of 1958 – almost 60 years previous to Eek's tweet (*Toronto Daily Star*, 1958, 18). I found the *Toronto Daily Star* produce market column a few months earlier, and when I saw Avia's tweet, I sent a reply highlighting the similarities in price. I also included a digital reproduction of the original column in the *Toronto Daily Star* (figure 40 below).

> @eekfarms, Toronto Star, March 1958. 50lb cooking, $2.85 – 3.25, crate of Spanish, $4.00-4.25. Almost 60 years ago. (Classens, 2015).

Produce Markets

Trading on the Toronto wholesale produce markets was slow to steady today. Liberal supplies of most commodities were available except peppers, Brussels sprouts and beans which continued to be in short supply. Ford rhubarb firmed to higher for the better quality. A few offerings of Ontario washed carrots sold well as did Holland Marsh cooking onions. Waxed turnips firmed depending on size. The potatoes were steady to firm.

APPLES—		
Ont., McIntosh, bus fcy	3.25	3.50
Ont., Spy, bus., fcy.	3 25	3 50
Ont. Delicious, bus., fcy.	3 50	4 00
N Y McIntosh, box, fcy.	3 25	3.50
B C Delicious Can. x-fcy.	4.50	5 00
B C Newtons, x-fcy.	4.25	4 50
ASPARAGUS—		
Cal., crate	8 75	9.00
BEETS—		
Ont 50-lb No 1	90	1.15
CABBAGE—		
Tex., Cal w/b	3 00	3 50
Holland crate 50-lb	3 50	3 75
CARROTS—		
Ont. bus., 50-lb No 1	2 25	2 50
Cal., Tex 4-doz bun	4 75	5 25
CAULIFLOWER—		
Cal L A crate	4 75	5 25
CELERY—		
Cal., std crate	5 50	6 00
CUCUMBER—		
Ont., hothouse, ctn. 1 doz.	1 70	1.85
LETTUCE—		
Ont., leaf, 2-doz w/b	2.55	3 00
Ariz., Cal., 2-doz ctn.	4.75	5 00
MUSHROOMS—		
Ont., 5-lb carton	2.40	2.50
ONIONS—		
Cooking, 50-lb carton	2 85	3 25
Spanish, crate	4 00	4.25
PARSNIPS—		
Ont., box, No 1, washed	1.75	2.35
PEARS—		
Oregon, Russ, Bosc.	6 00	6.50
B C, Anjou, box., fcy.	5 75	6 25
POTATOES—		
PEI, 75-lb, No. 1	3.25	3 40
N B., No. 1, 75-lb	3 10	3 25
Marsh, bus., No. 1, wsh.	1 75	2 00
Fla., 50-lb	4 50	4.65
Arrivals, PEI 25, N B 6 diversions PEI 3 on track: PEI 50, N B. 9		
RHUBARB—		
Ont., 10-lb, carton	2 25	2 45
SPINACH—		
12x19 oz.	1.55	1.75
TOMATOES—		
Mex, fla, ctn 10 cello	3 15	3 25

Figure 40. Change and stasis - onion prices in the Holland Marsh, 1958. (*Toronto Daily Star*, 1958, p. 18).

The exchange between Avia and me set off a number of responses from other Twitter users commenting on the low onion prices with thoughts and opinions on everything from the increased cost of production to the greed of the oil and gas industry undermining other key sectors of the Canadian economy. It was a quintessentially twenty-first century discussion about some very old issues. The lowly onion, an enduring agricultural product of the Holland Marsh since the very beginning, had gone digital.

The reasons for low onion prices in 2015 reflect a socio-natural amalgam of persistent and emergent issues. On the one hand, 2014 was a bumper year for Holland Marsh onions, exceeding even the prodigious yields many in the area are accustomed to. The local market was flooded with high quality onions even before the problem was exacerbated by reemerging Cold War geopolitics. Responding to growing tensions with the European Union, the Russian government set a variety of trade embargos, including for the importation of onions. The drop in demand for onions this created crippled major producing markets in Europe, including the Netherlands, costing the sector there tens of millions of Euro (Gunter, 2015, np). This complicated geopolitical impasse effectively created a glut of onions on the global market. Excess European supply spilled out around the world, including to the Caribbean, a key destination for Marsh onions (Davidson, 2015, 7). A bumper crop locally, combined with excess supply in the global market combined to drive down prices, leaving farmers in the Marsh with a significant surplus of onions that they had great difficulty finding a market for.

Marsh farmers of 2015 are thus confronted with a very similar problem to that of their forbears of the 1930s. When the Marsh was first brought into agricultural production in the early 1930s, supply far outstripped the demand of the local market, causing farmers to simply plow their crops back into the muck. In 2015, cold storage, transportation and advanced seed germplasm manipulation technologies are such that the crises of glut and price can be forestalled, though not indefinitely. By the late spring of 2015, the 2014 vintage onions in cold storage had approached the end of their shelf life, which forced farmers to dump the crop for whatever price they could get, wherever they could get it – cutting their losses while figuratively plowing the 2014 harvest back into the field. This vignette – tragic though it is for the Marsh farmers who, once again, are bearing the brunt of a disjuncture between supply and demand – encapsulates the dynamics I have attempted to highlight and articulate throughout these pages.

First, and most importantly, I have endeavored to compile a rich history of agriculture in the Holland Marsh. There are far too few accounts of local and regional histories of agriculture in Ontario, or around Canada for that matter. The profound impact agriculture has had on the fabric of Ontario has been captured to some extent through macro, province-wide histories (Wood, 2000; Mitchell, 1975). However, these accounts cannot capture the local particularisms, stories, and cultures of the sundry agricultural regions across the province. Muck crop farming, as a handy example, is scarcely mentioned in any of the canonical contributions of Ontario's agricultural history (see for example, Wood, 2000; Mitchell, 1975). Capturing the history of the Holland Marsh is crucially important to adding texture to our understanding of Canada's agricultural past, present and future. It can help us move beyond thinking about agriculture (in the singular) and instead refocus on exploring the agricultures (in plural) that exist across the province, and country.

As our understanding of particular agricultural histories deepen and evolve, we may also gain insight into the character of capitalism. Although it remained a minor point in my examination of the Holland Marsh, there is embedded within the narrative a history of capitalism as it expressed in the evolution of the Marsh. The earliest, pre-agriculture relations in the Marsh were not mediated by capital. However, beginning with the introduction of agriculture to the Marsh in the late 1920s, there has been a deepening level of commodification, industrialization and techno-scientific control within the

Marsh. These seculars patterns in capitalism have played out over the broader backdrop of cyclical trends (and changing food regimes), and have been shaped by the biophysical, historical and geographical constraints and opportunities of the Marsh's specific socioecology. Deliberately examining the temporalities of capitalism in specific historical geographic contexts remains an important endeavor for future projects. What other vernacular agricultural landscapes and histories have been glossed over in broader accounts of agriculture at the national or provincial-level? What might these histories teach us?

This dissertation also adds to the growing, but still scrawny, body of work detailing the environmental histories of agriculture in Canada. While there are some recent stellar examples of this kind of work (Cook, 2009; Duncan, 2011; Stunden-Bower, 2012), there are innumerable stories left to tell about the development of different kinds of agricultures across the country. One of the key insights I have attempted to elaborate – drawing on environmental history and political ecology – is the complex coproduction of 'nature', history, and farming in the Holland Marsh. Within this context, shifting perceptions of nature – nature-as-imaginary – has been revealed as a driving force of landscape change in the Marsh. The cultural resonance of biophysical nature – what 'nature' 'means' within a given time and place – is directly related with how it is conscripted into use. The same dismal swamp that was written off by a generation of colonial explorers was understood just years later as an opportunity to exercise colonial control and demonstrate mastery over nature. How the Marsh has been understood has had a profound impact on how it has been used and the shape it has taken.

Within this general direction, a more specific focus on the environmental history of agricultural labour in this country would be especially useful. My own work has fallen down in this respect, though not without making an effort. I ultimately decided that the story of farm labour in the Holland Marsh was a project unto itself, and rather than include a tokenistic overture, I chose to leave the question of farm labour largely out of my dissertation. No doubt there are fruitful explorations to be made at the intersection of labour and agricultural history within the Canadian context. Holding farm labour as an analytic category of concern would likely be especially useful in identifying and isolating systemic injustice in the history of Canadian agriculture. Comparative studies between eras of distinctly capitalist farming of the contemporary period, and the mercantilist and the seigneurial systems of Upper and Lower Canada respectively, could be particularly illuminating.

I have also attempted to make a contribution to the body of social science literature focusing in and around the Greater Toronto Area. The dynamism of the peri-urban area of this massive agglomeration provides fertile ground for studying the intersection of culture and nature (see for example, Sandberg, Wekerle & Gilbert, 2013), though there are many stories left to tell. Within the context of the Marsh, a number of local historians have compiled narratives on different aspects of the Marsh's history, including, The Bradford West Gwillimbury Local History Association (2006), Dorthy Cilipka (2004), George Jackson (1998), and Alberta VanderMey. I found this work invaluable to my own. More recently, Gilbert (2014)[66] has written a chapter linking John Muir's transformation into the patriarch of American conservationism with the time he spent hiding out in the Holland Marsh while dodging the draft for the American Civil

War. These kinds of innovative and revealing histories are waiting throughout Ontario for the time, diligence and determination it takes to unearth them.

Beyond this, in a conceptual register, I have attempted to demonstrate throughout the preceding chapters that 'nature' has indeed been produced in the Holland Marsh. From dredging the canal to reveal orderly 'smiling farms', through to the rhizospheric tinkering of the forthcoming third agricultural revolution, 'nature' in the Marsh is, to quote Smith (2009, 6), increasingly produced "all the way down". I have aimed to provide a fleshing out, of sorts, of Smith's (2008[1984]) provocative production of nature thesis as a way of demonstrating that the historical geographical particularisms of time and place matter to the process. In this respect, my dissertation responds to the challenge established by Castree (2000, 31) to provide "contextualized analyses of capital-nature relations in particular times and places" (See also Harvey, 1996; O'Connor 1988).

At times the state has appeared to operate as a monolithically capitalistic force within the Marsh, as Smith (2008 [1984]) might argue. From the early twentieth century, through to roughly the late 1950s, the state was (on the whole) supportive of whatever initiatives industry proposed for the Holland Marsh – from the initial drainage through to the chemical recklessness of the green revolution. Despite the apparent one-sidedness of its actions during this period, however, it is clear that the state was not a coherent, monolithic force. The dynamics O'Connor (1988) anticipates in terms of the second contradiction of capitalism were implicit in the state's support of agriculture in the Marsh. While not evident initially, by the 1980s the ecological externalities of intensive, industrial agriculture in the Marsh were manifesting in ecological catastrophe. Responses to these ecological contradictions and limits were imported into the very fabric of the state through various protective polices and production regulations. In other words, even when appearing to act as a unified, coherent force, the state's actions are far more ambivalent and contradictory when looked at in an historical trajectory.

Over time, and in response to public outcries about the condition of the ecological health of the Marsh and surrounding area, the state's presence in the Marsh has become a much more obviously activist force. Any farmer is happy to share multiple ways in which the state regulates, impinges upon and restricts the conditions of production – from monitoring water taking and banning chemicals, through to food safety and traceability protocol, the state has erected multiple obstacles to production.

It is worth briefly emphasizing the material effect of these environmental politics. As mentioned in the introduction, the Holland Marsh is a 7,400 hectare (roughly 18,200 acre) mixed-use wetland, 60 percent of which is drained agricultural land, and 40 percent of which has been preserved as marshland (Planscape, 2009). Were it not for protective legislation – which in turn inhibits the production of more agricultural land – a 2,960 hectare wetland would not exist. The social limits placed on the production of nature clearly have important knock on effects.

As Castree (1995, 21) points out, Smith (2008 (1984)] tends to overlook the consequences of produced socionatures in the continual (re)production of subsequent socionatures. The historicity of the Marsh demonstrates that ongoing socionatural change is fundamental to shaping the context of future socionatural change. The drainage of a wetland on the scale of the Holland Marsh for any purpose in contemporary Ontario is nearly unfathomable. However in 1920s Ontario, it was heralded as an exemplary land improvement project. The intervening years consist of a trajectory – by no means inevitable – of contingent historical moments assembled over the course of nearly a century. As the landscape has changed over time, the institutional matrix of the state – the branches, ministries and policies of the state apparatus – implicated in the Marsh shifted in response. Similarly, what 'nature' meant to various figures and populations throughout the past 100 years has been a dynamic, and decisive force in how nature has been produced in the Holland Marsh.

Indeed, in some respects, the history of the Holland Marsh pivots on the changeable character of its natural imaginary. The earliest colonial settlers to the area – recall John Simcoe and John Galt – imagined the marsh as a wasteland, "A mere ditch swarming with bull frogs and rattle snakes" (Galt as cited in VanderMey, 1994, 1). The total erasure of indigenous histories and cultures in the area was similarly the result of an egregiously imagined *terra nullius.* Many years later, W.D. Watson would look out onto the same wetland and imagine fields teeming with crops, and in 1911, wrote evocatively to William Day about his vision. As a reminder from Chapter 2, Watson writes:

> As I stood tonight at sunset and looked over our promised land with its broad acres of unbroken greatness with the wooded hills of King (County) in the background I felt a glance of pride at the immense possibilities which lies in the scheme (Watson as cited in Irwin, Filman & Gregg, 1968, 2).

In the years between 1911 and 2015, multiple and often competing ideas about biophysical nature in the Marsh have come and gone. And in the historical undulation of these various imaginaries, the Marsh has emerged as it is today. As I stated in the introductory chapter, I am hesitant to impose either a declensionist or progressive narrative structure to the history of the Holland Marsh. That is, I do not want to suggest that the ongoing imagining of the Marsh has resulted in the creation of either a vaunted pastoral sanctum or a devastated septic wasteland. The truth is rather messier than either of these edifices permits.

Still, there have been severe material effects – declensionist, even catastrophic in character – as a result of the production of particular kinds of nature in the Marsh. The health of humans and non-humans alike has suffered in and around the Marsh as a direct result of agricultural activity. The question – one which may never be answered fully – is the extent of the damage. The remaining ambiguities about the Marsh's role in elevated levels of birth anomalies in the 1960s, as an example, will likely never be conclusively resolved. However, given that many of the chemicals used at the time have since been banned – precisely because they have proven to be detrimental to human and non-human health – it seems clear that farming in the Marsh played some role. The impacts the Marsh has had on the immediate and surrounding health of human and non-human ecologies – in both historical and contemporary contexts – are widespread and similarly difficult to gauge.

This ambivalence signals an ongoing tension in the Marsh – at least since the popularization of environmentalist sentiment in the 1960s or so – between 'the environment' and farming. Farmers insist that they are stewards of the land because their livelihoods depend on the health of the land. Yet this clearly does not make every farmer an environmentalist. Maintaining the land in a state amenable to agricultural production, in practice, usually diverges significantly from what an environmentalist would consider stewardship. O'Connor's (1988) second contradiction of capital would seem to apply within the context of capitalist agriculture in the Holland Marsh. Even a hypothetical organic, co-operative variety of farming, within the context of the delicate muck soil, is perhaps too destructive to be considered ecologically sound. Yet at the same time, growing vegetables does seem intuitively to be 'environmentally friendly' in some respects.

Part of the problem of evaluating the ecological impacts of the production of nature in the Marsh is that in order to do so, an arbitrary baseline of sorts has to be established – an imaginary time when the ecology of the area was ostensibly 'better' than it is now. The instinct is to assume that the Marsh's pristine apogee was at some point in its pre-agriculture existence, and every intervention since then has been tantamount to pulling another petal off of the rose. This, of course, is a far too linear conceptualization, and one which disregards the subtler aspects of the production of nature I have attempted to reveal throughout this dissertation. Yes, there has been ecological contamination of the human and non-human environment, however it is also the case that harmful chemicals have been banned and discontinued, phosphorous levels have been moderated, and safer, healthier farming techniques continue to emerge. In other words, protective social limits have been placed on the production of nature in the Holland Marsh. If the basis of comparison is pathogenic or bacterial, one could make the argument that the Marsh is cleaner now than it was previous to the introduction of agriculture, given that the risk of contracting cholera or malaria in the Marsh now is virtually non-existent.

This is not to let farming off the hook completely. As many have pointed out, the compulsion of capitalist, productivist agriculture is to seek profit above all else, which tends to be socially and ecologically unsustainable (Friedman, 2005; Guthman, 2011; Kloppenburg, 2004; Weis, 2010). The underlying structural issue is, as O'Connor (1988) observes, the fact that nature is ‘underproduced’ by capital, leading to his second contradiction of capital: In order to reproduce, capital needs nature, but in the process of reproduction, capital destroys the very nature it requires, or at the very least renders it unusable. These so-called ‘negative externalities’ of farming in the Marsh (and elsewhere) continually lurk throughout the production process. In the case of the Holland Marsh the most fundamental contradiction of production relates to the soil: The more intensively the soil is farmed, the more quickly it subsides.

As I have mentioned elsewhere, the muck soil is a delicate composite of root and plant material at various stages of decay. When the water was drained off the land, exposing it to dramatically increased levels of oxygen, the rate at which the plant material decomposed increased exponentially. The moment the muck soil was uncovered, it was inevitably doomed to disappear, even if it was never farmed. Farming, however, expedites the process, and already the muck has vanished from outer sections of the Marsh, exposing a layer of mineral soil below. Farmers have been experimenting with growing mineral soil crops such as corn, as well as building greenhouses in these areas. It is difficult to say how long it will be until all of the muck soil in the Marsh is gone, but that it will one day be gone, and that the process is occurring in earnest, are irrefutable facts of the Marsh. And this begs an obvious question: When the last bit of muck soil is gone 10, 20, or 30 years from now, what will become of the Holland Marsh? It seems likely that the deterioration of the muck soil will happen slowly enough to allow farmers in the area ample time to adjust to the changes, should they want to, and to continue farming mineral soil or greenhouse crops. However, it also seems clear that the Marsh will be a very different place in the absence of that formidable biophysical, cultural and economic substance – the muck soil.

Yet the fact that the muck soil will inevitably disappear, whether or not it is farmed, does not absolve farming from blame for its loss. As Castree (2000, 31) points out, normative assessments of produced socionatures emerge only from contextualized analyses of particular cases. It seems fair to conclude that exhausting a delicate soil which took millennia to build up, in a matter of decades, is an unsustainable way of enlisting land in agricultural production. At a more fundamental level, and as O'Connor (1988) argues, all capitalist agriculture is unsustainable in that it necessarily depletes the conditions necessary to production.

One possible future for the Holland Marsh was conjured by Pierre Berton in a *Toronto Daily Star* column published in 1961. In the piece, Berton muses about the 'history' of the coming half-century, painting a dystopian future of over-population and food shortages. Owing in part to the cultural resonance of the Marsh during the early 1960s, Berton (1961, 31) saw fit to include a mention of it in his short piece:

> In 1989 the Mayor of Metropolitan Toronto proudly announced that the city had reached a total population of five million. This huge consumer market, he said, ensured the prosperity of the Queen City which had out-stripped the rosiest predictions of the demographers. A few people complained about the price of bread, what had risen to $5 a loaf because of the wheat scarcity, and there was some nostalgia, too, about the good old days of green vegetables. But it was generally agreed that the draining of the Holland Marsh and its conversion into a

popular midtown apartment district had been a magnificent engineering feat. As the mayor said in his statement: "You just can't stop progress."

As I discussed in the previous chapter, urban development is rapidly filling in the space around the Marsh. And despite the farmers' insistence that the land will never be built on because it is a flood plain and/or because it is protected as a Specialty Crop Area by provincial legislation, increased population density is not out of the realm of the possible. As the muck soil subsides, it is likely that the provisions afforded to it under the Specialty Crop designation will also erode – there is nothing particularly distinctive about mineral soil, after all. Similarly, the degradation of the muck soil will also erode the value of the land in the Marsh. According to a 2013 report, land in the Marsh is valued at between $20,000 and $25,000 per acre (Remax, 2013, np.). To put this into perspective, prime agricultural mineral soil land in the same area (Oro-Medonte, just north of Barrie) is valued at $6,000 to $8,000 an acre (Remax, 2014, p. 21). Indeed, the price of an acre of muck soil in the Marsh is second in value in all of Canada only to the tender fruit land of the Fraser Valley in British Columbia (Remax, 2013, np). At the same time, former agricultural land re-zoned for residential and commercial development in the area around the Marsh fetches as much as $54,000 an acre (Remax, 2014, p. 4). As regional populations grow, land becomes scarcer, and the distinctiveness of the Marsh erodes, Berton's predictions may still come to pass. Perhaps another transformation is in store for the Holland Marsh, and the production of agricultural natures will cede to the production of a distinctly different variety.

The challenge – which goes far beyond the scope of this current project – is to imagine what socioecologically sound agricultural production might look like, in the

Marsh specifically, but also more broadly. I do not profess to have the answer, however it does seem clear that solutions will not be found in either techno-centrist or eco-centric approaches. Observing that all nature is produced is a far different argument than suggesting that all nature is controllable, as techno-centrists believe (see Castree, 2000). The folly in assuming that nature has been fully tamed has been revealed at many times throughout the history of the Marsh. The problems of unsustainable farming in the Marsh (and elsewhere) will not be solved through engineering and the application of more technology alone.

At the other end of the spectrum, subscribers to deep green or eco-centric perspectives might argue that agriculture should be halted in the Marsh, and the land be left fallow in order to return to a pre-agricultural state. This standpoint ignores the lessons of Smith and others regarding the contemporary unlikelihood (if not impossibility) of a pristine 'first nature'. More than this, radically eco-centric prescriptions such as this could never square with the reality of agricultural production. It is an inescapable fact that humans need food to survive, and some disturbance of the 'natural' environment is necessary in order to feed us all.

Green Marxist perspectives – comprised of a heterogeneous collection of scholarship, which cannot be elaborated here (see Benton, 1996; Castree, 2000) – provide some insight into the production of socially and ecologically sound natures. As Castree (2000, 31) points out, ecoMarxism provides conceptual resources which can cut through the "indiscriminate mysticism of deep green strands of eco-centrism or the universalist arrogance of Copernican strands of techno-centrism". Socio-ecologically sustainable farming in the Marsh would likely include some scaling back of operations, and leaving a good deal of land fallow for various periods of time, as the eco-centrists might prescribe. At the same time, however, science and technology could help inform more sustainable on-farm practices within a paradigm which emphasizes human and non-human health, not only ever-increasing production. Fostering a more socio-ecologically just agriculture in the Marsh would require the state to support non-capitalist ways of organizing production. The question of what non-capitalist farming in the Marsh (and elsewhere) might look like is an increasingly urgent one as the demand for food rises, energy prices increase and climate change shifts the global terrain of tenably arable land.

Notes

[1] The Soil Classification Working Group of Agriculture and Agri-Food Canada publishes

[2] Kondratieff cycles – or K-waves – named after the Russian economist Nikolai Kondratieff, are theorized as 40-60 year blocks of time which include an expansion (the A-phase) followed by a contraction (the B-phase) of the world economy (see Robinson, 2011). Wallerstein (2000, 249) argues that the last 70 years or so have been a single Kondratieff cycle, beginning in 1945, including an acute A-phase from 1967 to 1976, and a protracted B-phase since then.

[3] For a more thoroughgoing discussion and analysis linking production and consumption in global agriculture, see Clapp, 2012.

[4] See Cook and Crang (1996) and (Crang) 1996 for traditional 'commodity chain' analysis. For an account that examines the relationship between shifting meaning of both commodities and the site of their production, see West (2012).

[5] I borrow the first three of these analytics from Prudham (2005) and add in the fourth – nature-as-imaginary - in order to capture an important element of capital's confrontation with nature within the Holland Marsh specifically, and as it relates to food natures more generally.

[6] Cilipka, 2004; Jackson, 1998; VanderMey, 1994. Ishwaran (1977) wrote about Dutch immigration during the pre, inter and post-war periods, making passing reference to the various agricultural livelihoods many Dutch took up in Canada.

[7] A number of books by local authors and groups have been published on various aspects of the history of the Holland Marsh and Bradford area, including: Bradford West Gwillimbury Local History Association, 2005; Cilipka, 2004; Jackson, 1998; VanderMey, 1994).

[8] The Nvivo software allows for coding through the development of 'nodes'. Functionally, this meant that I highlighted bits of the interview transcriptions and tagged them with thematic language. I developed the code (nodes) organically by spending time with the documents, and re-reading them a number of times. I amended the nodes a number of times as I iteratively worked through the documents, re-classified some bits of text, developed new nodes, and eliminated others. Ultimately I ended with 30 total nodes, some of which have sub-nodes nested within them. The most populated nodes (and sub-nodes) – that is, issues that seemed to come up the most during the interviews, included, (1) regulation (food safety, traceabilty and water taking), (2) institutions (Holland Marsh Growers' Association, Lake Simcoe Region Conservation Authority, provincial and federal governments), and (3) production (chemicals, crops, equipment, fertilizer, harvesting, packing, seeds, soil, and storage). These themes are reflected throughout this dissertation, though more heavily emphasized in the final two chapters.

[9] I offer an extremely truncated discussion of food regime theory given that I draw on it only sparingly throughout the dissertation. For more, see Campbell & Dixon, 2009; Friedmann, 2005; Friedmann & McMichael; Goodman & Watts, 1994; McMichael, 2009;

[10] For more on the landscape left behind after the glaciers, see Chapman and Putnam's (1951) seminal work *Physiography of Southern Ontario.*

[11] I discuss the dynamics of the muck soil in more detail in the following chapter – suffice it to say for now that over millennia the vegetative material built up because it decomposed so slowly, due to low levels of oxygen in the water – or hypoxia, typical of the water in wetlands. Once the land was drained, however, oxygen became abundant, kicking off rapid oxidization (decaying) of the peat material. As the vulnerable organic material of the peat layer breaks down, it erodes away, eventually disappearing all together, exposing the clay-based substrata.

[12] A plaque at the Simcoe County Museum commemorates Holland's surveys of Upper Canada, resulting in the building of Yonge Street and various namesakes including the Holland River, Holland Marsh, Holland Landing, a small village just east of the Marsh and Holland Street in Bradford (See Bradford West Gwillimbury Local History Association 2005, 1).

[13] The marsh was first used for commercial purposes starting around 1901 when marsh hay, or sawgrass, began to be harvested for various purposes including mattress stuffing, packing for shipping fragile goods ("packing grass"), and rope making (Bradford West Gwillimbury Local History Association, 2005, 283-284).

[14] As the story goes, a Bradford grocer named Dave Watson invited Professor William Day to the marsh to investigate the possibility of draining it for agriculture in 1912. Later that year, Day, Watson and two other investors formed a syndicate and purchased 4,000 acres of the wetland – facing some legal battles related to the purchase a number of years later. I discuss this further in Chapter 3. (see Bradford West Gwillimbury Local History Association, 2005, 284-285; Cilipka, 2004, 32).

[15] When the Marsh was first drained, beginning in 1924, the entire 7,000 acre area was divided into 77 ownership parcels. Currently there are roughly 800 ownership parcels (see Ministry of Agriculture and Food, 2010).

[16] Willis Merriam (1961), an agricultural economist at Washington State University, conducted a post mortem, of sorts, of the reclamation project. He confirms that the early Marsh boosters were right to dream of profits by stating "Economically it would appear that the Holland Marsh area is one of the most successful drainage reclamation projects on the continent" (1961; 140).

[17] The Kalamazoo celery industry was peaking in the 1930s and 1940s, just as production was ramping up in the Holland Marsh, particularly in the immediate post-war years. Shortly after that, the hardy Pascal Celery that dominated the markets began to be grown in California. The existent industry in Kalamazoo, but also other places like Celeryville, Ohio, was decimated. Within a couple of decades, most farmers in the area had switched to growing bedding flowers (Palmieri 1997; 113). That the California celery industry was so robust likely drove down prices, even in Ontario, creating a disincentive for growers in the Holland Marsh and possibly partly explaining why celery has remained such a marginal crop in the area, despite being a species particularly suitable to muck soil.

[18] The book was reissued at least once, ten years later in 1896, this time sponsored by the Union Seed Company.

[19] Day has an impressive array of namesakes including a building at the University of Guelph, and a school and two roads in the Bradford area. Additionally, there is a brass sign dedicated to him that sits in front of the Bradford City Hall.

[20] Mitchell and Blacklock (1973) point out that there have been over 150 amendments to the Drainage Act since its inception, and that the Act has largely been assembled piecemeal, in response to various problems and issues as they arose.
[21] The Province remained largely uninterested in protecting wetlands from agricultural reclamation until the late 1940s and early 1950s. Currently there are a range of regulatory and process mechanisms in place to protect wetlands from development, though in practice, wetlands continue to experience incremental transformations (see Watlers and Shrubsole 2003).
[22] The Provincial Drainage Aid Act was originally created in 1900. Amendments in 1920 made the Act pertain only to projects with costs in excess of $10,000 (Mitchell and Blacklock 1973, 29).
[23] Commercial production was still a number of years off, however, 1930 marks the year that Day's test plot was put into full production, the results of which were shared widely with the media.
[24] The Holland Marsh created environmental anxiety before it had even been created. As early as 1926 scientists were concerned with the impact draining the marsh would have on local bird populations (*The Globe,* 1926, 2).
[25] The moniker was recently showcased in the title of a Holland Marsh advocacy video titled, *The Marsh Mucker's Tale* (2014). Similarly, the Holland Marsh Gold brand, associated with the advocacy group Holland Marsh Growers' Association, gestures at the monetary value of the soil (www.hollandmarshgold.com). Simply put, the soil resonated (and continues to resonate) throughout the popular imagination as a result of media reports and other cultural representations.
[26] Unlike flora or fauna taxonomies, soil taxonomies are not universal. While the Canadian system is informed by soil taxonomies developed in the US and by the United Nations, it remains distinct. As an example, muck soil such as that found in the Holland Marsh is classified as organic soil in Canada, and as histisol soil in the US. Not surprisingly, and similar to the Canadian experience, the soil classification work of other jurisdictions is housed within departments of agriculture, or in the case of the UN, the Food and Agriculture Organization (FAO).
[27] A relational taxonomy – the von Post Scale of Hummification – was developed to categorize the extent of decomposition of the plant material in organic soil.
The scale ranges from H1 (completely undecomposed peat moss) through to H10, (completely decomposed). An additional metric represents the moisture level of the plant material and ranges from B1 (dry) through to B5 (very wet). See von Post 1922; Verry et al. 2011 for elaboration.
[28] The Muck Crops Research Station is effectively a joint satellite office of the University of Guelph and the Ontario Agricultural College. It has been in operation almost as long as crops have been harvested in the Marsh, and will be discussed in more detail in Chapter 6.
[29] Some of the earliest research on muck soil, published by the Research Branch of the federally funded Agriculture Canada in 1933, perhaps not surprisingly, was designed to investigate how applicable various kinds of muck soil were for commercial agricultural production. The first research on subsidence of muck soil in Canada seems to have come

later on in the decade, published out of the Sainte-Clothilde Experiment Substation in Quebec (Anstey, 1986, 143-144).

[30] Day's work, in this respect, had a similar motivation as works such as *How to grow celery anywhere* and also Albert E. Wilkinson's (1916) *Muck crops.*

[31] For vivid accounts of this dynamic, see John Steinbeck's *The grapes and wrath* (1939) and *Of mice and men* (1937) which memorialize the socio-cultural and material fall out of the Great Depression on labour, especially in California.

[32] Engels, Marx's collaborator, sought to understand how peasants (or farmers) as a social force, in rural areas and beyond, functioned to either usher in or inhibit capitalism. In other words, he was motivated to understand how class struggle played out in the countryside, and analyze what kind of implications this had for the wider society, state formations, and the like – and put the struggles of farmers at the centre of his analysis.

[33] I am drawing here, thematically, on the body of scholarly work referred to as food regime theory. As the key exponents of the original formulation, Friedmann and McMichael (1989) argue that periods of relative global stability from 1870-1914 and 1947-1973 can be traced to particular constellations of global political power. The concept links relatively politically and economically stable periods of world history with particular hegemonic arrangements of the production, circulation and consumption of food. This global stability was fractured by the instability of the inter-war years – though the groundwork for the particular brand of American post-war capitalism was laid partly through expanded agricultural production throughout World War II and years following. (See Friedmann & McMichael 1989; Friedmann, 2005; McMichael, 2005, 2009).

[34] In some ways this was a second wave of concerted agrarian politics, at least in Ontario. After winning a record 44 seats in the 1919 Ontario provincial election, the United Farmers of Ontario (UFO) formed a coalition government with the Labour Party. Internal tensions within the party coupled with shifting political tides resulted in the UFO only electing 17 members in the 1923 election, and never making a serious challenge for formal political power – that is governing power – again (see Winson, 1993, 30-35).

[35] There is no way to verify these claims, which Day made in December 1930 (*Toronto Daily Star* 1930, p.22). A 2009 report by Planscape reports that the net revenue per hectare for Ontario is roughly $280. The same study indicates that Holland Marsh net revenue returns are nearly three times the provincial average, at $785 per hectare.

[36] The term bioavailability refers to the extent to which nutrients are available to plants within a given soil system. Bioavailability is governed by more than simply the nutrient load within the soil itself, however nutrient levels are a crucial determinate (see Comerford, 2005).

[37] In a letter to the Editor dated May 12 1937, a dissatisfied and struggling farmer writes "We were brought in here by the government…we try to get along but nobody can get very far…when we came to the marsh we knew we would have a couple of hard years ahead of us…We will keep on trying and trying hard to make a success of the Dutch settlement, but…we can't get much done with encouragement like the council of King township gives us" (*The Toronto Daily Star* 1937, p.5).

[38] If Crerar's own position can be considered that of the government's he represented, the institutionalized racism/classism is thinly veiled. In a 1937 letter to the Premier of

Ontario, M.F. Hepburn, about the Dutch immigration program, Crerar writes, “The tendency amongst the assisted is to give up when difficulties arise, and in these days when public relief is so wide-spread, to fall back upon a charitable public or upon the state. The man who has worked and saved some capital has learned an important lesson in the management of money and if he saved it in farming, he comes with a good agricultural background”. (Crerar 1937, 2).

[39] In the end Crerar did recommend that the program continue, but suggested that to be eligible for the program, the Dutch immigrants should have to demonstrate that they had savings of at least $1000. The program was part of a much larger wave of Dutch immigration to Canada from the mid-1930s well into the post war years.

[40] In an ironic twist, the Commissioner of Fruit and Vegetables of the Federal government purchased 65 carloads of produce from the Marsh farmers in 1937, at prices 50 percent higher than they were getting in Toronto. The produce was shipped, by rail, to communities in Western Canada as part of the Federal drought response (*The Globe and Mail* 1937, 1).

[41] For a compelling history of the role of women in agricultural organizations, through organizations such as the Women’s Institute, and others, see Monda 2001.

[42] Another important contemporary general farm organization, the Christian Farmers Federation of Ontario had various permutations starting in the early 1950s, though not emerging as a permanent fixture until the early 1970s (Patterson 1997).

[43] The HMGA, along with 27 other organizations across the province – some based on geography, and some based on crop type – form the Ontario Fruit and Vegetable Growers’ Association. The OFVGA is by far the largest advocacy organization in Ontario for growers of edible horticultural crops. See http://www.ofvga.org/ .

[44] Of course women and children were an important base of labour during the war years in both the agricultural sector, and beyond (Mosby 2014).

[45] All farmers in the province of Ontario who net over $7000 still must belong to, and pay a membership fee to either the OFA or the Christian Farmers’.

[46] Although National Farm Radio Forum ended in Canada in 1965, the model was very successfully exported around the world. By the early 21st century, similar Forums had an estimated monthly global audience of 150 million, across 70 radio stations throughout 110 countries (Sandwell 2012, 172).

[47] The emergence of a fully global agriculture was facilitated by a number of developments, including the creation of more durable crops, and the emergence of faster, more reliable storage and shipping technologies. There was also a more structural impetus at play as national regulations regarding international trade especially were altered to accommodate the increasingly corporatized agricultural sector (see for example Friedmann & McMichael, 1989.)

[48] This was initially a form of triage. Fearing that the entire Marsh could not be drained by the time winter arrived and the water froze, the decision was made to focus on saving the larger section east of Highway 400. In the end, winter arrived later than expected and the drainage was speedier than anticipated, so the entire Marsh was drained.

[49] Interestingly, the Ontario Conservation and Reforestation Association was formed by Watson Porter, the editor of *Farmer’s Advocate,* a trade agriculture journal (see Robinson

and Cruikshank 2006).
[50] For more on the history and implications of the transition away from the postwar industrial lettuce to the contemporary mixed greens, see Friedmann 2011 and Guthman, 2004.
[51] For reasons mentioned in the methodology section in the introduction, this is not a perfect comparison. There is no reliable, routinized crop cover data for the Holland Marsh. The 2009 data is reported in an economic analysis report compiled by Planscape (2009). The 1967 data was reported in a press release by the Ontario Department of Agriculture and Food, announcing the formation of a Special Committee to study drainage issues in the Marsh (Department of Agriculture and Food, 1967, p. 2). The 1959 data was compiled by the Department of Agriculture as part of their post mortem assessment of the damage resulting from Hurricane Hazel (Department of Agriculture, 1954).
[52] For a brief history of the Muck Crops Research Station, see http://www.uoguelph.ca/muckcrop/historystation.html
[53] The relationship between institutions, the state, farmers, land, agricultural production and *in situ* agricultural research stations in the Canadian context is another area ripe for future study. Agricultural extensions, formalized through the land grant system in the American context has been well-studied, yet almost no work has been conducted on the dynamics of agricultural extension in the Canada.
[54] The Station, while small, has a reach beyond the Holland Marsh. They often collaborate on research projects with the University of California, testing various aspects of carrot cultivation for the California market, which produces several degrees of magnitude more carrots than all of Canada. The evolution of the Station, including the Integrated Pest Management Program will be discussed in the following chapter.
[55] The Station similarly conducts trials on other farm inputs, including chemical fertilizers, pesticides and fungicides. The results of all of the trials are communicated to the farmers through a variety of evolving means, discussed more in the following chapter. Suffice it to say for now that the Station does not endorse any particular product or cultivar over any other, and in this respect, they remain neutral.
[56] It is worth pointing out that Mizra and Irwin published their results over 50 years ago. While there has never been a systematic update of their study on subsidence in the Marsh, their estimates bear out as fairly accurate. There is still muck soil in the middle of the Marsh, where it has always been deepest, but very little remains on the edges of the Marsh. Indeed some farmers have begun planting mineral soil crops, such as corn and beans, while others have built green houses to grow flowers and tree seedlings in potted soil.
[57] The three page report documents findings of water testing in the Holland River and finds high levels of DDT and organophosphourous compounds, in some cases in accumulations over 10 times the “desirable levels” set out by the Province. This report was found in the same folder as the study by Williams et al.1981 in the Archives of Ontario, with “report not published” hand-written on the top of the first page of the report. It seems to have been a memo sent from the Ministry of the Environment to Bradford-area MPP George Taylor.

[58] The authors found that there were 28.3 incidents of congenital abnormalities per 1,000 births in the Holland Marsh over the study period compared with 9.5 incidents per 1,000 births in Aurora, Newmarket, and King City (Williams et al., 1981, p. 2).
[59] Meeting minutes attached to the draft report (Williams et al., 1981) indicate that Ministry officials pushed to heavily qualify the findings, likely as a way to reduce the impact of the report on the public. Indeed, the minutes note that the public message of the report should include, "no need for alarm at this time, the situation continues to be monitored" (Drowley, 1981, 2).
[60] The Lake Simcoe Environmental Management Strategy was the centerpiece of the LSRCAs growing influence in the area, and consisted of a multi-year research project meant to rehabilitate the water quality in Lake Simcoe.
[61] Plans to widen Highway 400 through King Township were announced during the writing of this dissertation (winter/spring, 2015). The section from King Road/Highway11 through to South Canal Bridge (where Highway 400 meets the Marsh from the south) will be widened from 6 lanes to an interim 8 lanes, including grading for the intended eventual 10 lanes. A number of overpass bridges will be replaced, including the South Canal Bridge. There will almost certainly be conflict over this massive infrastructure project. (See Pavilons, 2015).
[62] The conference was held in the Bradford and District Community Centre on April 9 and 10, 2014.
[63] I spoke with staff from the Lake Simcoe Region Conservation Authority at the Muck Vegetable Growers Conference. The LSRCA typically has an information booth set up as part of the trade show at the conference. In informal discussions I was told that farmers are fairly reluctant to engage in or take advantage of any of the programs and services the LSCRA offer. An interview with another LSRCA employee confirmed this, though this particular employee felt that tensions were lessening and farmers were becoming more amenable to at least the riparian planting program, as a result of increased outreach and consultation with farmers. As he put it:

> So over the years we've had limited uptake from farmers, by and large, along the river and the drainage canals, to plant buffers. What we've been experiencing recently, and I'll say five years or so, has been a greater participation in planting buffers (D. McMichael, personal communication, April 3, 2014).

Nevertheless, the general friction between conservation authorities and farmers has not gone unnoticed, apparently leading some conservation authorities to consider dropping "authority" from their title.
[64] According to the Ministry of Environment (Ontario, 2010, p. 12), four percent of the phosphorous in Lake Simcoe originates in the Holland Marsh, fifty six percent is from watershed streams, twenty seven percent is atmospheric phosphorous, seven percent is from effluent from local sewage treatment plants, and six percent is the result of surrounding septic systems.
[65] According to the Greenbelt Plan, secondary uses are defined as "uses secondary to the principal use of the property, including but not limited to, home occupations, home

industries, and uses that produce value-added agricultural products from the farm operation on the property" (Ontario 2005, 53)

[66] Drawing on the work of Muir's biographers (Wolfe, 1945; Fox, 1981), Giblett (2014) underscores how important his time in the Holland Marsh was to his understanding of the natural world. Allegedly Muir identified his refuge in the Marsh as one of the two most formative moments of his life, the other being time spent with Ralph Waldo Emerson, "not his meetings with President Theodore Roosevelt, nor with the Sierra Nevadas, nor the California sequoias" (Giblett, 2014, p. 156).

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