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Introduction

ON MARCH 13, 1854, the Fitchburg Railroad rumbled across eastern Massachusetts before squeaking to a halt at Concord station. Waiting on the platform was a blue-eyed thirtysomething traveling to Boston to finalize a book deal. Almost certainly, he was clutching a loose-leaf manuscript far too precious to entrust with anyone else.[1] Nine years in the making, this was Henry David Thoreau's eighth and final hand-inked draft of *Walden; or, Life in the Woods*.[2]

His destination was a colonial-era brick building in downtown Boston now known as the Old Corner Bookstore.[3] This was the office of Ticknor and Fields, then New England's most storied publisher, which gave us the American works of Nathaniel Hawthorne, Louisa May Alcott, Harriet Beecher Stowe, Henry Wadsworth Longfellow, Ralph Waldo Emerson, Oliver Wendell Holmes, Julia Ward Howe, and John Greenleaf Whittier and the first American editions of many notable European authors. Within a few days, Thoreau had a fully executed contract for what would become one of the world's great books.

After meeting with his publishers on March 13, Thoreau walked over to the Boston Society for Natural History, now the famous Boston Museum of Science. As an honorary elected member, he had borrowing privileges from what was then the best scientific library in the city. From it, he checked out an obscure title by a Scottish mineralogist-physicist named James Forbes: *Travels Through the Alps of the Savoy and Other Parts of the Pennine Chain: With*

Observations on the Phenomena of Glaciers (1843).[4] At the time, this was the world's most rigorous treatment of glaciology, the physics and hydrology of glacier motion, a subject especially critical today in our warming world of collapsing ice sheets and rising seas.

Leaving Boston, Henry crossed the Charles River to Harvard College in Cambridge, his *alma mater*. From the stacks of its library, he borrowed and read in the original French *Etudes sur les Glaciers: Ouvrage accompagné d'un atlas de 32 planches* (1840) by the Swiss paleontologist and geologist Louis Agassiz. At the time, this was the most highly regarded work on abrupt climate change and the geological consequences of glaciation. Technical information from Agassiz's *Etudes* and Forbes's *Travels* was added to *Walden* prior to its publication five months later on August 9, 1854.[5]

So, how did Henry celebrate his accomplishment? For eight dollars, the equivalent of nearly $300 today, he bought an expensive piece of field equipment he'd been wanting for many years. A collapsing brass telescope imported from England with four tubular slides and a leather case.[6] The seller was Alvan Clark, then in the process of building Amherst College's first research telescope and soon to become the nation's premier telescope maker. Clark certified the optical quality of Thoreau's new tool using the star test for focal symmetry, a complex and fascinating process that Henry detailed in a highly technical *Journal* entry using the word "diaphragm" in three successive sentences.[7]

This Thoreau—the young man keenly interested in glaciology, climate change, and optics—is what we would today call a scientist. His scientific orientation explains why the main structure of *Walden*'s first, longest, and most tedious chapter, Economy, borrows from the textbook *Animal Chemistry* (1842) by Justus von Liebig.[8] It also explains why this otherwise philosophical chapter includes six tables of data on income and expenses that Thoreau collected during his two-year experiment in deliberate living at Walden Pond. Without quantifying his inputs and outputs, he could not have proven that a healthy, happy, self-reliant life was

possible at very little expense, and with minimal impact on the natural world.[9]

All but one of *Walden*'s eighteen chapters engage with outdoor field observations and interpretations involving physics, chemistry, astronomy, geology, hydrology, botany, zoology, ecology, meteorology, climatology, and limnology (the study of lakes).[10] Beneath the heavy *overlay* of aesthetic, philosophical, and historical nature writing in Thoreau's "most religious work" is an *underlay* of science writing.[11] And beneath that science writing is the science itself. In his introduction to Princeton University Press's scholarly edition, Pulitzer Prize winner John Updike correctly abstracted Thoreau's masterpiece as a "book-length, clear-eyed exaltation of Nature as a chemical and molecular and mathematical construct—Nature seized in the tightening grip of science."[12]

Thoreau's firm grip transformed an otherwise inauspicious lake into a powerful and globally famous symbol for humanity's rightful place in nature and our responsibility to it. Half a century ago, *Walden* raised my spirits higher than the Lutheran churches I was forced to attend as a child and the mind-altering substances I tried as a teenager. Since then it's become what is arguably the world's most potent global meme for earthly sustainability and sanity.

Right Time

Nearly four decades ago, another Pulitzer Prize–winning author, John McPhee, published *The Control of Nature*, a book that I've passed around in every classroom since 1989.[13] With irony, his title presciently predicted the *lack of control* we would have in New Orleans during Hurricane Katrina in 2005 and in southern California since 2018, when its hazardous trifecta of wildfire, flood, and mud became an accelerating concern. His key message was that the control of nature at this scale is an illusion. Our war against nature using engineering and management with such things as dikes and dams is associated with the *utilitarian* strand of the conservation movement, launched by wealthy diplomat and politician

George Perkins Marsh in 1865.[14] The alternative *aesthetic* strand of the environmental movement, launched eleven years earlier by the low-budget townsman Henry David Thoreau, is associated with deference and respect for such things as floodplains and eroding shorelines.[15] A broader adoption of Thoreau's aesthetic strand via adaptation to nature would have helped prevent and mitigate many of the environmental catastrophes streaming our way as daily news.[16]

In 2021, a third Pulitzer Prize–winning author, Elizabeth Kolbert, returned to several of McPhee's examples in her book about global change: *Under a White Sky*.[17] Her title asks us to imagine a persistently hazy stratosphere that's been geo-engineered with aerosols to reflect solar radiation—a temporary fix designed to cool the Earth after making it too hot with fossil fuel emissions. "The only solution to environmental degradation caused by humans," she concludes, is "not so much the control of nature as the *control of the control* of nature."[18] This is the snake biting its own tail. The management of previous mismanagement. The environmental engineering of previous engineering.

Two decades ago, in *Becoming Good Ancestors*, ecologist David Ehrenfeld chastened us for this circular reasoning: "We pretend that we can brainstorm and invent our way out of every fix without making fundamental adjustments in our lives. This is a fantasy."[19] Science writer David Quammen echoes: "Reality tends always to be vastly more complicated than initial impressions or assumptions would suggest."[20] Kolbert emphasizes that we are "more powerful than we ought to be and, at the same time, not as powerful as we might wish."

In *Tenacious Beasts*, Christopher Preston explored the "gnarly politics associated with environmental engineering and management" caused by an "endless whirlpool of uncertainty."[21] From one of his examples, I learned that my federal tax dollars were being spent in the Pacific Northwest to serenade and shotgun-kill barred owls in order to protect spotted owls. Yet, in the woods beyond my front door in the Northeast, the hooting of barred

owls in the predawn darkness is the most thrilling part of our residential soundscape. "I rejoice that there are owls," Thoreau tells us in *Walden*. "Let them do the idiotic and maniacal hooting for men."

The utilitarian-management strand is necessary. We need buildings and roads and timber and crops. And we also need to engineer our way out of some climate-related problems. But without due deference to nature, the utilitarian strand will continue to underperform, especially at large scales where complexity rules. Consider this example. In November 2025, tens of thousands of delegates and visitors burned untold quantities of jet fuel to fly deep into the Amazon interior and devote twelve days to the thirtieth international climate change conference: COP30. Such activity is what climate activist (and Thoreau devotee) Greta Thunberg refers to as the "blah blah blah" of diplomacy-speak and unkept promises.[22] Indeed, after thirty years of keeping up appearances and talking the talk, Earth's most important number at the biggest scale—the CO_2 concentration of a well-mixed sample of the Earth's atmosphere on the Keeling Curve—is still going up. This rising concentration of this greenhouse gas is what's giving us the hotter fires, stronger storms, lower reservoirs, and higher shorelines of the nightly news. All this was foretold nearly a half-century ago by the U.S. National Academy of Sciences in its 1979 report *Carbon Dioxide and Climate: A Scientific Assessment*.[23] This then-cutting-edge climate modeling and prognostication of consequences had been requested by President Jimmy Carter shortly before his successor, President Ronald Reagan, symbolically removed Carter's solar panels from the White House.

The godlike power of fossil fuels that has allowed humans to become the dominant geophysical and geochemical agency operating on the Earth's surface is the end result of a straightforward, stepwise process of channeling human cognition through science, then engineering, then technology, and then a capitalist market economy. In Thoreau's day, that power manifested as steam locomotives burning wood for fuel and factories damming rivers

for hydropower. Today, most of our power for transportation, manufacturing, electricity, and home heating still comes from carbon fuels, despite steady progress for solar, wind, geothermal, and nuclear sources. In the seventy-five years since ~1950 when the "Great Acceleration" of consumption began in earnest, we've used about 250 times more energy than during the preceding 11,700 years of the Holocene Epoch, which includes Britain's eighteenth-century industrial revolution and Thoreau's nineteenth century.[24]

Globally, we use this staggering power to mine and move excavated materials from one place to another at a rate about fifteen times faster than the average of all sediment transported by rivers and about five times faster than the average rate of glaciation.[25] We've transformed more than 75 percent of the land and 66 percent of the ocean. We make enough cement each year to encircle the Earth with a wall 88 feet high and wide.[26] We've become the ultimate keystone species and apex predator.[27] More than 680 vertebrate species have been driven to extinction since Thoreau's Puritan ancestors settled Concord in 1635, and more than a million species are threatened today. Harmful synthetic chemicals are ubiquitous. Junk plastic falls into the abyss of the Marianas Trench and rises through melting snow at the highest base camps on Mount Everest. Microplastics are everywhere. The global ocean has been described as "hot, sour, and breathless."[28] Glaciers are in full retreat. Sea level is rising a whopping 4-plus millimeters per year. We've even tweaked Earth's spin axis in response to our redistributions of mass.[29] Most of this so-called "Great Derangement"[30] has happened within my lifetime *after* the launch of the so-called environmental movement in the early 1960s.[31]

Thoreau's aesthetic strand has been widely and successfully embraced by thousands of nonprofit entities seeking *concord* between humans and everything else. This is especially true for the parks, preserves, and land trusts that Henry called for in his prophetic writings. Alas, these important efforts are pinpoints of light within the enormous shadow of an energy-hungry global consumer

society where utilitarian voices for private gain are increasingly bringing global *discord*. "The dream of managing the environment," wrote eco-critic Lawrence Buell thirty-five years ago, "opposes the dream of submission to it."[32] More recently, Ben Minteer reminded us that we have yet to learn that "Nature is the ultimate teacher of moral limits."[33]

I'm cautiously optimistic about the coming decades of our human epoch, the Anthropocene. I trust that *Homo sapiens*, meaning "wise man" in Latin, will eventually live up to its name as a species. For encouragement, I remind myself of the ozone hole scare of the 1980s and its quick international solution via the Montreal Protocol.[34] Its lesson for us today is that we didn't have to patch the ozone hole. All we had to do was decide to stop wrecking the stratosphere with synthetic chlorofluorocarbons so that the hole could fix itself. This same playbook can be used for the troposphere, the next atmospheric layer down, the one we're warming and enlarging with carbon emissions at a rate a hundred times faster than all the world's volcanoes combined. Let's just decide to stop wrecking it. I also know as a geologist that, in the big picture, Earth will abide no matter what we do. It's a conceit to think otherwise.

Getting our global act together may require that we enter a *post-secular* stage in which science and engineering can "embrace ethical projects of the sort usually associated with religion."[35] A world in which the intrinsic rights of nature become widely incorporated into law.[36] An animist world that takes Thoreau seriously as a "scientist guided by a humanistic ethos."[37]

Perhaps we've reached Earth's *kairos*: the right time to get things right.

Purpose

This brings me to my specific purpose. To bring readers, young and old, to *Walden*.[38] Thoreau's masterpiece is just a few clicks away for e-book and audio editions.[39] A hard copy is probably on the shelf of someone you know, and it is certainly in your local library. Bookstores sell inexpensive editions because its

copyright has long since expired. There's even a video game to help get you started—*Walden: A Game*—and college courses that play it.[40]

I target the present "third wave" of the sustainability movement, "which centers on environmental justice and global climate change."[41] I lived the first wave during the early 1970s when I was elected to student government, smashed glass for a crude recycling center, and targeted the chemical cleanup of water and air. During the much longer second wave, I taught environmental-themed courses at three land-grant universities, including the University of Connecticut's first course on global climate change in 2001. During the present third wave, I've joined student protests on "Fridays for Future" as well as the older cohort of "Third Act."[42] I've presented at symposia seeking a *Just Transition* to a better world. And, paralleling economist Thomas Piketty, I've concluded that global adaptation to climate change will bring the collateral benefit of a "drastic reduction in inequality."[43]

My Gen Z students brighten up when I tell them that Thoreau was cautioning his neighbors about climate change in the mid-nineteenth century. That he was an early adopter for energy conservation.[44] That he was concerned about roadkill before paved roads and automobiles. That he lamented the ongoing mass extinction while watching the passenger pigeon being shot for sport. That he scoffed at those who would build a water-supply pipeline from Walden Pond to the village for residents to "wash their dishes with!" That he prescribed the "tonic of wildness" before the medical and psychiatric benefits of "forest bathing" were clinically proven.[45]

Henry wrote the blatantly optimistic *Walden* during the impending doom of the Civil War. He personally witnessed the incremental crushing of Indigenous cultures, both within New England and on the edge of the prairie in Minnesota. He was chronically infected with tuberculosis before the germ theory and antibiotics. Nevertheless, he remained a stalwart optimist, proclaiming: "Surely joy, is the condition of life."[46] His attitude aligns

more with Jane Goodall's *Book of Hope* than the doomsday diatribe of David Wallace-Wells's *Uninhabitable Earth.* Despair goes nowhere. Scare tactics don't work, a point embedded in Aesop's fable "The Boy Who Cried Wolf" and the European folk tale "Chicken Little." The sky is not falling because gravity will not allow it.

One of my personal motives for writing this book is to challenge the intellectual apartheid in modern university life dividing the humanities and STEM. Where I work as a professor, the programs for Environmental Studies and Environmental Sciences try to work together. But administratively, they are different majors directed by different departments in different colleges on opposite sides of a university campus divided by a busy state highway.[47] For Thoreau, the "heart" behind environmental studies and the "head" behind environmental sciences worked together as motive and method. Returning to this approach will help repair the current sustainability crisis because we will only take care of things we care about and can only take care of those things if we know how.

This book comes in the midst of a long-overdue cultural reckoning of gender, race, and ethnicity. In broad brush, Thoreau was a privileged male from an era of patriarchy and white racial entitlement. As an individual, however, he was an ardent abolitionist, the ethicist invited to speak in lieu of Frederick Douglass when the escaped slave, orator, and statesman was obliged to flee to Canada to avoid arrest.[48] In the twentieth century, Thoreau's gender and race didn't stop Emma Goldman, Mahatma Gandhi, and Dr. Martin Luther King Jr. from embracing his ideas. In our century, James Francis, J. Drew Lanham, and Lauret Savoy are bringing a modernized Thoreau to historically marginalized peoples.[49] Recently, I had the honor of presenting the 2025 Thoreau Medal to Bill McKibben, a climate change activist who was inspired by Thoreau's civil disobedience and whose groundbreaking 1989 book *The End of Nature* indexed Henry more times than anyone else, sixteen in all.[50] Hundreds of scholars who happen to be female promulgate Henry's ideas and have assumed leadership positions in Thoreau

scholarship and professional societies. His most esteemed biographer, Laura Dassow Walls, went so far as to dub *Walden* a "feminist manifesto."[51]

"I desire that there be as many different persons in the world as possible," wrote Thoreau in *Walden*, giving us an antidote to the factional diversity politics of today. He "felt no need to stigmatize any race," wrote Concord historian Robert Gross.[52] Yes, Henry had trouble finding his niche within the blandly conservative middle-class culture, perhaps because he was on the savant end of the autism spectrum.[53] Though not "neurotypical," he was never the hermit of popular misinformation. Otherwise, he would not have titled one of his chapters Visitors and said within it that "I had more visitors while I lived in the woods than at any other period in my life."[54]

Unavoidably, the Library of Congress will archive this book, *The Walden Experiments*, as literary criticism because it is a book about a book. But to the extent possible, I avoid this important genre as an academic pursuit best left for insiders. Hence, I sidestep tautologies like "mystical empiricism."[55] I leap over cryptic passages like Thoreau's plaintive search for a lost hound, bay horse, and turtledove, about which whole dissertations have been written.[56] I reserve comment on the claim that sounding the bottom of Walden Pond was a "homoerotic" impulse or that the thermal fracturing of its winter slab ice was a psychoanalytic "expression of the earth's own sexuality." Finally, I minimize use of the word "transcendentalism," which I've always struggled to understand. My sympathies in this regard are with historian Robert Richardson, who quipped, "Transcendentalism has not been a very useful label, but it has been impossible to get rid of."[57]

Thoreau's Experiments

In 1844, ten years before his train ride to Boston to deliver his *Walden* manuscript, Thoreau was an unemployed twentysomething facing an existential crisis. His 1837 graduation from college

was in the rearview mirror. None of his teaching jobs had worked out. His 1839 marriage proposal had been firmly rejected, and he remained unrequited in love. He was still grieving the 1842 death of his older brother. At age twenty-seven, he was still living with his parents and paying for his keep by manufacturing pencils and hiring himself out as a day laborer. Finally, he was feeling the scorn of his community for having carelessly ignited a large forest fire in 1844 that destroyed private property and threatened public safety. His dream of becoming a professional poet was dead because his main publication outlet, *The Dial*, sputtered to extinction that same year, and his mentor, Ralph Waldo Emerson, was privately concluding: "H will never be a writer."[58] Despite having found a potential publisher in New York, Thoreau's "barely nascent career as a writer" had stalled.[59] Demand for his lectures had fallen off a cliff. The private writings of his *Journal* and his correspondence were also waning.

Then luck intervened. On impulse, in October 1844, Emerson purchased fourteen acres of scrubby woodlot near Walden Pond within easy walking distance of town. He gave Thoreau permission to build a house on this land, allowing his protégé a chance to fulfill a long-held dream of living in the woods near a lake to reboot his life. Five months later, Thoreau borrowed an axe and was hewing young pines into timbers to frame a "tight shingled and plastered house ten feet wide by fifteen long" that he located on the sunny, southwest-facing slope of a wooded hollow with a distant view of Walden Pond. This house became the living laboratory from which he conducted his world-famous experiment in deliberate living that began on July 4, 1845, and lasted two years, two months, and two days.

His life in the woods easily meets the definition of an experiment as a planned experience for which the outcome is unknown.[60] *Walden*'s "ponderous" opening chapter is a report of that "experiment," a word he used nine times in that chapter alone.[61] Within it is a testable hypothesis, tables of numerical data, and synthetic conclusions. Much of it reads like a monograph.

On September 6, 1847, and with the results of his first experiment behind him, Thoreau left Walden Pond to live with the Emerson family, staying there for nearly a year. Later that month he responded to an alumni survey from Harvard College about his career status: "I am a Schoolmaster—a Private Tutor, a Surveyor—a Gardener, a Farmer—a Painter, I mean a House Painter, a Carpenter, a Mason, a Day-laborer, a Pencil-Maker, a Glass-paper Maker, a Writer, and sometimes a Poetaster."[62] Clearly, he had not yet found his groove. Within four months, his former house at Walden Pond would be sold by its owner Emerson, dragged off its foundation by an ox team, and hauled away to stand empty near the main road for almost two years before being rehauled to the north end of town to store grain on the Clark Farm. Eventually, Thoreau's one-room house was recycled for its materials. Meanwhile, back at Walden Pond, the foundation stones that had supported his dwelling were tumbling into its collapsing, hand-dug cellar to become archaeology.[63]

Five years later, Thoreau added a crucial sentence to his *Walden* manuscript: "The present was my next experiment of this kind." Unequivocally, this signals that he was extending the results of his first experiment at the pond into a second experiment being run out of the family home on Main Street, U.S.A. Explicitly, his present life was a test to see if he could also live deliberately in the midst of a culture barreling toward industrialization, urbanization, globalization, and indoor living. Under these circumstances, could he continue to do *his* thing, rather than *society's* thing?

Thoreau's answer, a resounding yes, came on September 7, 1851. Triumphantly, he declared: "My profession is to be always on the alert to find God in nature." From that moment forward, he would devote the bulk of his time to discovering the laws of the material world and extending those laws for spiritual rewards. Science had become his "agent" for accessing the "Universal Intelligence" he strove to sympathize with.[64] Thoreau's "swerve" toward science began in late 1850 when his voracious reading in this field overlapped with his accelerating habit of quantification associated with

land surveying.[65] It peaked in mid-June 1851 when Henry discovered a new role model, Charles Robert Darwin, to replace the older model of Ralph Waldo Emerson.[66] Darwin's first book, *Journal of Researches*, later retitled *Voyage of the Beagle*, would become Thoreau's favorite book in his favorite genre.[67] In deliberate contrast to the Englishman's global breadth, Thoreau—whose personality had strong oppositional tendencies—opted to explore locally and deeply, with a special focus on the lake at Walden Pond.[68] By September, Henry had finally found his lifelong groove. His second experiment was complete.

By January 1852, Thoreau was living out its results as a practicing field scientist. Referring to his present life, he confidently predicted: "It looks to me now as it will ten years hence."[69] This remained true for the rest of that year, his "Year of Observation," with its frenzy of 311 *Journal* entries, 233 of which were local scientific sojourns beyond the edge of the village to one or more of at least 580 named places in Concord and Lincoln among the total of 3,203 place names he eventually used.[70] The following spring, he considered re-naming his *Journal* "Field Notes."[71] This pattern also remained true for the final nine years of his active outdoor life, as revealed by the frequency of local sojourning days for the years 1852–1860 (233, 203, 243, 212, 226, 200, 236, 225, and 224).[72]

This mature Thoreau would live deliberately as an independent scholar in search of earthly meaning. His regular pattern on most days was to spend mornings writing, evenings reading, and afternoons on extended local excursions, during which he "walked like a field scientist, carried the equipment of a field scientist, read scientific articles and texts, and made important new discoveries based on field evidence."[73] To break up the routine, he occasionally took the train to Boston, Cambridge, or Worcester to collaborate with colleagues, examine specimens, visit libraries, and give lectures.

Sadly, Thoreau's unusual lifestyle choice was deemed a waste of time and talent by much of his local culture, which wanted him to be more conformist, practical, and useful. Sadly, Emerson's 1862

funeral eulogy for Thoreau rebuked his former disciple's life choice sarcastically and egregiously: "I cannot help counting it a fault in him that he had no ambition. Wanting this, instead of engineering for all America, he was the captain of a huckleberry party."[74] Ouch!

But Thoreau refused to cave to societal expectations. Instead, he devoted the bulk of his days to unpaid scientific sojourning interrupted only by travel, illness, and abolitionist activism. He succeeded in his lifestyle choice by keeping his expenses to a minimum and working only part-time to cover his costs. For the rest of his life, he would live in a large clapboard house occupied by many people, ruled by women, and attended to by live-in female servants.[75] Within that house, he would climb a narrow stairway to a spartan third-floor garret where he stashed his samples, worked up his results, and wrote his reports as *Journal* entries. Instead of writing what would sell, as did his friend Louisa May Alcott in her early career, he would write for himself in a private journal.[76] "Says I to myself," he mused privately, "should be the motto of my journal."[77] This enormous document of about two million words would become his "central literary enterprise," his *magnum opus*, his life's work.[78] Metaphorically, it became the prism he used to refract the components of his world into particulars using deduction before refracting them back together using induction.[79]

Thoreau's declaration of his profession in September 1851 at the conclusion of his second experiment coincided with an uncanny foreshadow: "I feel myself uncommonly prepared for *some* literary work, but I can select no work." Within a few months, he decided what that work would be. Instead of starting a *new* writing project, he would return to an *old* one, his comatose early version of *Walden* that had been gathering dust in his garret for nearly three years.[80] During the next three years, Thoreau resuscitated and revitalized that work with scientific observations, interpretations, and inductions about Lake Walden, the body of water at the place called Walden Pond.[81] During this interval, he became a born-again

materialist in the service of Earth system holism. A materialist who "worked diligently to find meaning within the physicality of nature itself,"[82] a nature that included human nature: "I keep out of doors for the sake of the mineral, vegetable, and animal in me."[83] A materialist who understood that "enchantment is no delusion" but comes from the hard work of science.[84] A materialist whose place-based approach created *Walden*, a model for all subsequent American nature writing[85] and a fountainhead for American environmentalism.[86]

Walden's resuscitation by science isn't speculation. It's proven circumstantially by the statistics of Thoreau's visits to Walden Pond. The frequency of his day trips there more than tripled, from 13 visits before the upgrade in 1851 to 45 visits after it in 1852. Simultaneously, his reciprocal commitment to land surveying dropped from a career high of 27 jobs in 1851 to a minimum of 7 in 1852. Walden visits remained high in 1853 and 1854 during the next two years of field research to support the book, before dropping to less than half that in 1855, the year after publication.[87]

Thus, the *Walden* we know today was the result of Thoreau's second experiment, an extension of his first. This is the way scientists work. One experiment leads to another, and another, and so forth until a final solution is found, one always open to challenge.

After *Walden*, Thoreau stayed in his groove all the way to the final sentence of his final *Journal* entry on November 3, 1861. Though now fatally ill and resigned to death, he ended his *magnum opus* with his science serving his search for meaning: specifically, deductive field observations leading to interpretations leading to law-making inductions.[88] His "observant eye" had seen parallel furrows at a scale of a tenth of an inch on the railroad causeway that appeared "stratified like some slate rocks, on their edges." These he interpreted to have been created by rain-splash erosion during a strong storm the previous night. With a final leap of inductive generalization, Thoreau wrote "Thus each wind is self-registering," a concept geologists today call paleocurrent analysis.

Reading This Book

Thoreau divided *Walden* into eighteen unnumbered chapters. For each, I offer several mini-essays that update his nineteenth-century science with twenty-first-century understandings. Each of my chapters stands alone, meaning they can be read in any order, as with an anthology. In each of *my* chapters I quote enough of *his* chapters to give you a feel for what they're about and to showcase his literary prose style. Though you don't need to read his book to understand mine, my hope is that you will be inspired to do so.

I make no attempt to be comprehensive. Instead, I explore selected topics from his chapters that caught my attention as a card-carrying scientist. I claim no credentialed expertise beyond the natural sciences. My direct experience includes five decades of reading *Walden* and four decades of observing Walden Pond. My sources include an even mix of primary and secondary literature from scholarly and trade publications.

Chapter openings follow an identical pattern. Thoreau's chapter *titles* and my *subtitles* are in large plain text separated by an em dash. These are prefixed with chapter *integers* from 1 to 18 to provide sequential tags. Below these three elements is a drawing by Thoreau from his *Journal* that is relevant to the chapter topic. Below each drawing is a *quote* in italics from Thoreau's chapter that is featured in the chapter essay and serves as a chapter epigraph. Each chapter heading ends with a short list of *key words* in UPPER CASE that provide topical entry points into the book.

For example, my essay on Thoreau's fifth chapter, "5. Solitude—Glacial Sinkhole," explains why living in the hollow of a glacial kettle contributed to the solitude he sought and presents his correct interpretation of this landform's geological origin. The key words "ICELAND—GLACIATION—KETTLE POND—WALDEN WOODS—NEUROSCIENCE" tag topics in the order they are encountered, a common nineteenth-century publishing practice.

The epigraph "Why should I feel lonely? is not our planet in the Milky Way?" beautifully reminds us that solitude and loneliness are not the same thing. The drawing of a half-moon at night surrounded by rings of light complements my epigraph about his stargazing.

The text of most chapters opens with a pressing environmental issue from the twenty-first century. After each opening, I segue back to Thoreau's nineteenth-century text to explore his take on what concerns us today. Alas, some topics of great modern importance, notably AI (artificial intelligence) and genetic engineering, are only briefly touched on because he gives us so little to work with. Emulating Thoreau's style, I write in the first person and digress here and there with anecdotes from my own life to help carry the human connection between author and reader forward. Also emulating his style, I pull no punches. Some of my sentences are deliberately feisty. Others are written to make you laugh.

I prioritize readability over scholarly documentation. This means I shunt as much detail to the notes as reasonable, including the names of specialist scholars being quoted and the titles of their works. Except for highlighted "words," all unreferenced quotes are from *Walden.* All websites referenced in the notes were rechecked during copy-edit. In a departure from press style, I identify Thoreau's chapter titles using underline rather than "quotation marks," for example Visitors rather than "Visitors." This prevents confusion between his chapter titles and my short quotes from those chapters. Two words and two names require special handling. *Negro* is replaced with *African American* or *Black,* except in direct quotes.[89] *Indian* is replaced with the word *Indigenous* in upper case when referring to human populations; lower case is used for Thoreau's direct quotes and when referring to other-than-human organisms. *Thoreau* and *Henry* are used interchangeably to prevent overuse. My final chapter, Conclusion, closes with pithy takeaways for all preceding chapters.

Where to begin? For the philosophically minded, there's Solitude, which opens with a funeral for a glacier in Iceland. For

those who like natural history essays, I suggest Sounds, in which a pastoral soundscape is intruded by the clattering railroad as an avatar of industrial progress, the proverbial machine in the garden. For the scientifically inclined, there's The Pond in Winter for analytical rigor and The Ponds for science writing. For those who enjoy classical literature or who are curious about Thoreau's genres, there's Reading. For animal behavior, try Brute Neighbors. For climate change, House-Warming. For paleoecology, Visitors. For ethology, The Village. And for descriptions from Thoreau's Little Ice Age climate, Winter Animals. If your first chapter plunge doesn't resonate, try another. Good luck!

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