Conserving the Historic Stone Walls of New England

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ABSTRACT: Policies for conserving and interpreting historic sites in New England are well established. This is not the case for the region's most salient historic feature: the extensive and nearly ubiquitous latticework of drystone walls dating mainly from the eighteenth and nineteenth centuries. For these iconic structures, there is only a hodgepodge of extant laws, ordinances, zoning regulations, and management guides for public properties at the local, state, and federal levels. Regulations for private property are very limited. This article recommends a stepwise approach to the conservation and interpretation of New England's stone walls that considers their historic, archaeologic, ecologic, aesthetic, and geologic values while remaining respectful of the presence of Indigenous stonework.

KEY WORDS: stone wall, New England, drylands, stone domain, management

Introduction

The Euro-settlement of rural New England prior to the American Civil War created a nearly ubiquitous pattern of family farms, local roads, and hydro-powered villages inland from the maritime coast and below the rugged forested highlands.[1] When the rural economy declined in the nineteenth century, the archaeological consequence was the *stone domain*, a sprawling galaxy of undocumented stone ruins within reforested woodlands ranging from cellar holes to waste piles. Drystone walls composed of waste fieldstone are the most salient part of this domain (Figures 1, 2, 3). Although the bulk of these walls were built in between 1750 and 1850, the oldest known Euro-settlement wall was built in 1607 and predates the Pilgrim colony at Plymouth, and a few residents continue to build these walls

1 William Cronon, *Changes in the Land* (New York: McMillan, 1983); Christopher Pastore, *Between Land and Sea* (Cambridge, MA: Harvard University Press, 2014); Robert M. Thorson, "How Stone Walls Became a Signature Landform of New England," *Smithsonian Magazine,* November 14, 2023; Anna Kusmer, "New England is Crisscrossed with Thousands of Miles of Stone Walls," *Atlas Obscura,* May 4, 2018; Robert M. Thorson, *Stone by Stone: The Magnificent History in New England's Stone Walls* (New York: Walker-Bloomsbury, 2002); Susan Allport, *Sermons in Stone*, 2nd ed. (New York: Countryman Press Norton, 2012).

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Figure 1. The stones of New England's famed walls were quarried by the Laurentide Ice Sheet from rock outcrops before being: (1) milled into rounder shapes within the basal glacial shear zone; (2) scattered widely across the landscape; (3) buried by Holocene soil; and (4) exposed by frost heaving and surface erosion during the conversion from forest to farm. Shown is a thigh-high wall above its source material, a jointed rock outcrop in Kennebunkport, Maine. (Photo by author)

today, honoring this folk-art tradition. Stone features built by Indigenous peoples prior to Euro-settlement are present but are less evident on the landscape.[2]

The latticework of old drystone walls is so omnipresent along rural roads, in village centers, and in viewsheds that they have become dominant portals through which residents and tourists experience early American history in the Northeast, especially New England. Although most early walls were later removed from urban centers (for example the wall of Wall Street in New York City), dozens are usually available within easy walking distance of downtowns or a short drive from suburban and rural homes. Unlike the interiors of famous historic buildings, stone walls are open for viewing 24/7, all year long, with free admission.

Since launching the *Stone Wall Initiative* in 2002, I have advised countless federal, state, and town governments, nonprofit historical societies, conservation

2 Howard Russell, *A Long Furrow: Three Centuries of Farming in New England* (Hanover, NH: University Press of New England, 1976); Lucianne Lavin and Elaine Thomas, ed., *Our Hidden Landscapes: Indigenous Stone Ceremonial Sites in Eastern North America* (Tucson: The University of Arizona Press, 2023).

Figure 2. This typical segment of a partially collapsed, single wall in Hebron, Connecticut, shows a range of stone sizes, a variety of lithologies, a stacked degree of order, no mortar, and a single tier with no courses. These terms are part of the nomenclature for an emerging stone wall science that is undergirding stone wall inventory, management, and interpretation. (Photo by author)

groups, law practices, and private landowners. Culminating this early effort was a 2005 invited opinion column for the *New York Times* titled "Strip-mining History" and a 2008 article in *Yankee* magazine titled "The Stone Wall Defender."[3] But this article constitutes the first time I have broadened my scope to the issue of regional conservation with the target audience being public historians. Three recent developments prompted this swerve. First is the revolutionary success of LiDAR (Light Detection and Ranging) technology for facilitating the detection and mapping of stone walls for better and worse, that is, for enhanced management or targeted thefts.[4] Second is the availability, for the first time, of a peer-reviewed and

3 Jim Collins, "Stone Wall Defender Robert Thorson," *Yankee Magazine,* Febuary 6, 2009.

4 LiDAR technology is a remote sensing technique that uses aerial imaging to "see" the ground surface through the forest canopy by removing all but the lowest reflections. Katharine M. Johnson and William B. Ouimet, "Rediscovering the Lost Archaeological Landscape of Southern New England Using Airborne Light Detection and Ranging (LiDAR)," *Journal of Archaeological Science* 43 (2014), 9–20; Katharine M. Johnson and W. B. Ouimet, "Physical Properties and Spatial Controls of Stone Walls in the Northeastern USA: Implications for Anthropocene Studies of 17th to early 20th Century Agriculture," *Anthropocene* 15, September 2016, 22–36: New Hampshire Stone Wall Mapper, ArcGIS Online (NHGRANIT, New Hampshire Department of Environmental Services).

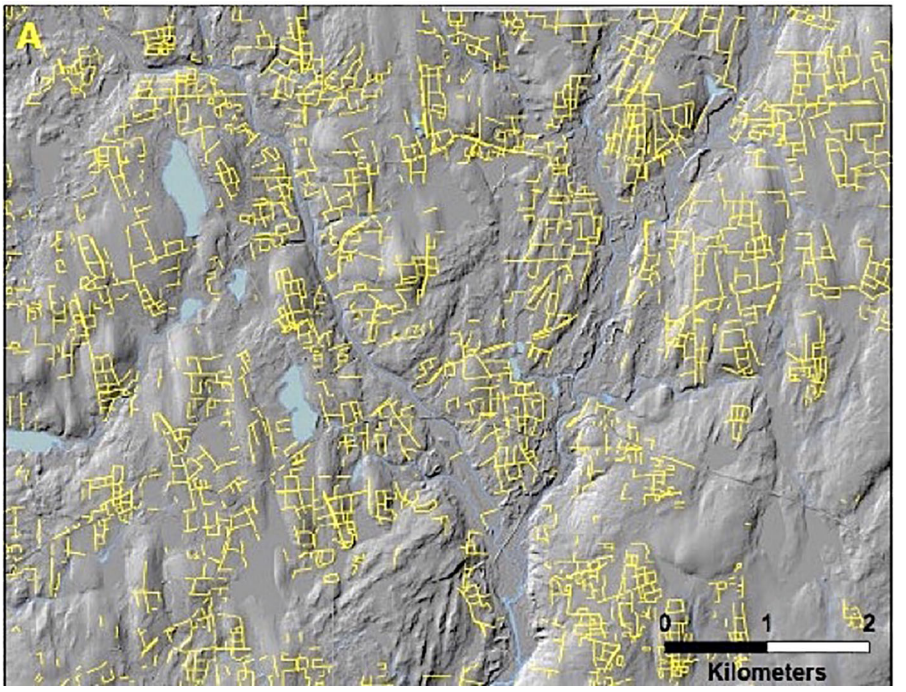

Figure 3. GIS (Geographic Information System) map of stone walls in northeastern Connecticut centered on Ashford based on LiDAR (Light Detection and Ranging) imagery. The overall pattern involves connected clusters of local grids from separate farms. The total length for New England walls was originally estimated to be ~240,000 miles, enough to circle the Earth ten times. Compare pattern with Figure 7. (Image courtesy William Ouimet)

monographic "Taxonomy and Nomenclature for the Stone Domain in New England," a resource written to define, classify, describe, and interpret stone walls and related features.[5] Third is a rising realization that a scientific focus is needed to ethically differentiate ancient Indigenous stone structures deemed Ceremonial Stone Landscapes (CSLs) from those built since the onset of Euro-settlement.[6]

In the future, I envision a protocol for stone wall conservation that would serve as a regional model for national and international comparisons, possibly through a coalition of New England's land grant universities. New England's walls are regionally distinctive relative to those elsewhere in the United States and other nations, generally being more primitive, most extensive in regrown woodlands, and more home-grown, meaning sui generis with a dearth of imported cultural styles. Although there are pockets of stone walls elsewhere in the United States, only in New England are they the default condition for former agricultural land.[7]

5 Robert M. Thorson, "Taxonomy and Nomenclature for the Stone Domain in New England," *Historical Archaeology* 57, no. 10 (October 2023).

6 Timothy H. Ives, *Stones of Contention* (Nashville, TN: New English Review Press, 2021).

7 I provide a brief review of international comparisons in "Taxonomy and Nomenclature for the Stone Domain in New England."

Figure 4. Ecologically, stone walls are elevated, dry, rocky, and porous volumes, surface areas, and lines within an otherwise moist woodland, providing novel habitats, exposures, boundaries, and corridors. By retaining moist sediment, the uphill side of this wall supports luxuriant ferns in the background. The drier downhill side supports grass and herbs in the foreground. Holyoke State Forest, Massachusetts. (Photo by author)

The professional interpreters and tour guides I have worked with in public parks and historical museums are keen to learn more about stone walls and share this knowledge with the public. Training opportunities in this area, however, remain limited. Learning how to interpret stone walls involves linking their salient visual attributes (physical dimensions, segmentation and gaps, links with other walls to form polygons, tiers and courses, the degree of order from dumped linear piles to carefully patterned) with the salient attributes of the stones from which walls were built (size, shape, lithology, source, and tool marks). Visual clues are diagnostic of historic purpose, for example, a highly variable single wall indicates an early farm fence-line; a broad wall indicates waste disposal; low walls on steep and rocky terrain suggest a boundary marker; and a carefully laid wall indicates architectural aesthetics. My manual *Exploring Stone Walls* provides a good start for learning how to read these walls. It contends that wall-watching is as easily learned as birdwatching.[8]

Stone wall interpretation provides new opportunities to thread together historical, archaeological, aesthetic, geological, and ecological interests. Historically, the walls are important adjuncts to the thousands of historic houses and buildings, cemeteries, battlegrounds, and monuments throughout the region. Archaeologically, they are above-ground ruins. Aesthetically, they convey essential themes in literature and art. Psychologically, they provide boundaries in space and time. Geologically, they are signature landforms for the Anthropocene epoch, the counterpart to the babbling brooks, inland wetlands, coastal dunes, kettle ponds, and bedrock ledges of the postglacial Holocene Epoch. Ecologically, they create drylands as porous, elevated, and elongate volumes of surface stone that drain quickly (Figure 4). Although walls transcend these disciplinary boundaries, the main

8 Robert M. Thorson, *Exploring Stone Walls* (New York: Walker & Company, 2005).

Figure 5. Single wall consisting of stacked slabs and boulders in Concord, Massachusetts, with the famed Old North Bridge in the background. This humble wall divides Minuteman National Historic Park in the background with the famed Old Manse behind the camera. Both venues have active, year-round public history programs and historic re-enactors. (Photo by author)

audiences for stone wall interpretation, based on my four decades of public speaking and writing for non-scholarly groups, comes from local historical societies and museums, closely followed by those of local conservation and environmental organizations, particularly land trusts.

Despite their importance and abundance, the preservation and conservation of stone walls in the region remains plagued with challenges. As petroleum-powered automobiles took over transportation in the early twentieth century, countless thousands of historic walls were mined for stone and crushed for roadbeds.[9] On farms that survived into the twentieth century, many walls were buried to create drains or excavated to fill wetlands.

This began to change in the mid-twentieth century with the strengthening of the historic preservation and environmental movements, the increasing importance of walls in scholarship about the region, and the rise of cultural resource management as a profession. Although initially seen as mere adjuncts to historic properties, preservationists now treat walls as discrete features with their own stories to tell.[10] Once seen as barriers between fields and farms, they have since become the binding threads of the region's rural social fabric. More than simple stacks of stone, they are now understood to be collections of artifacts providing independent tests of historical interpretations based on written documents.

One good example illustrating the importance of walls in New England is the humble wall dividing the Old North Bridge in Concord, Massachusetts, part of Minuteman National Historic Park, and the backyard of the Old Manse, a world-famous historic house managed by the Trustees of Reservations (Figure 5). This wall is my candidate for New England's most important because it served, in sequence, as the base of an expedient fence for colonial farmers in the seventeenth century; military cover for Minutemen soldiers in 1775; and a partial inspiration for *Nature,* Ralph Waldo Emerson's 1836 transcendentalist manifesto.[11] Another example is my candidate for the region's most famous wall, Robert Frost's "Mending Wall" in

9 "Turning Stone Walls into Roads," Stamford Historical Society, September, 2002, https://www.stamfordhistory.org/ph_0902.htm.

10 Robert M. Thorson, "Strip-Mining History," *New York Times*, October 8, 2006.

11 Robert M. Thorson, "A Revolutionary Wall," *Special Places* 17, no. 3 (Fall, 2009), 11.

Derry, New Hampshire. His 1914 poem is a literary conflation of two separate walls on opposite sides of the poet's orchard. In both cases, staff interpreters incorporate observations of walls into their public programs.

Walls along designated scenic roads have already gained some protection, especially in New Hampshire.[12] Those on land trusts and other conservation properties are now treated as integral parts of those properties, although management guidelines are seldom in place. Walls on federal, state, county, and town lands are being noticed, mapped, and conserved on an *ad hoc* basis. Preserving structures on private property remains the main challenge owing to fierce defenses of private landholder rights in New England laws and customs, and because walls on remote, unguarded, private properties are frequently subject to theft. Regulating on private property usually requires town ordinances, with some allowing walls to be strip-mined for profit whereas others treat them as precious legacies. State agencies often provide guidance and incentives for preserving the stone domain on private lands. Vermont's *Stonewalls and Cellarholes* provides a good example of illustrating why wall conservation is a public good.[13]

Below, I begin with *Definitions* clear enough to withstand legal scrutiny. Next, I move to *Contexts*, a review of key ideas and guiding principles lurking beneath present and future preservation decisions. In *Conservation,* I suggest a stepwise method for their mapping, inventory, contextualization, and public sharing that sidesteps (for now) the pitfalls of local politics and the nitty gritty of legal administration.[14]

Definitions

Although stone walls are the dominant artifact of New England's historic agricultural landscape, they occur amidst a variety of related stone features including piles, cellar holes, cairns, abutments, chambers, slab bridges, circles, standing stones, and so forth. I refer to this sprawling, lichen-covered component of outdoor historical material culture as the Stone Domain. Left undefined are three other domains that have since largely rotted and rusted away: wood used as the main construction material for the historic built environment; metal for the structural supports, chains, fasteners, and tools; and fabric for the rope, cloth, and leather.

A rigorous classification of stone walls requires extracting them from the more inclusive stone domain with an objective definition.[15] Hence, a stone wall is a material object meeting five objective criteria: composed of stone, meaning some

12 New Hampshire Department of Transportation, "2017 Stone Wall Policy Guidelines" (2017), https://mm.nh.gov/files/uploads/dot/remote-docs/2017-stonewall-policy-guidelines.pdf.

13 Robert Sanford, *Stonewalls & Cellarholes: A Guide for Landowners on Historic Features and Landscapes in Vermont's Forests* (Vermont Agency of Natural Resources, 1995).

14 Elizabeth Maker, "Now You See Them . . . " *New York Times,* March 26, 2006.

15 Thorson, "Taxonomy and Nomenclature for the Stone Domain in New England."

Figure 6. Side view of early twentieth-century architectural wall at Hill-Stead Museum in Farmington, Connecticut, provides an example of how the in situ interpretation of stone walls can enrich the viewer experience. The central stone of volcanic basalt was "painted" red with the mineral jasper (microcrystalline quartz) by geothermal springs about 200 million years ago. Its prominent placement in the wall manifests a folk art choice by the builder. The brown stone in upper left is the famous architectural "brownstone," a Jurassic rift-basin sandstone, shipped throughout the world. The rounded, gray stones to bottom and right are glacially milled fragments of granite and gneiss, signifying ancient climate change. The recessed locations of the green lichen reveal contrasts in microclimate. Each wall is analogous to a library of earthen books or to a natural history museum of specimens. None of this information is available from historic documents, yet it is easily accessed with limited training. (Photo by author)

combination of natural and synthetic; granular, meaning it consists of particles, rather than a single large slab; elongated with a length-to-width ratio of four or greater; continuous along the line of the wall, without gaps; and meeting a minimum height requirement, either by having some stones rest on others or by having large single stones abutting one another. A simpler definition is an elongated and continuous accumulation of stones that either support or abut one another to form a barrier at least knee-high. An even simpler definition is a linear, continuous, accumulation of stones. The matrix between the stones may be air (drystone), mortar (mortared), water (submerged), or soil (buried).

Taxonomically, stone walls are a class within the stone domain. Other classes include "line," which fails either the continuity or height requirement; "concentration," which fails the elongation requirement, and "notable stone," which fails the granularity requirement. The class "wall" comprises five families: free-standing, flanking, supporting, enclosing, and blocking.

Context

This section frames an overview of stone walls from a variety of perspectives presented in no particular order. Whether explicitly stated or not, these general principles, concepts, ideas, approaches, and assumptions underlie the specific language of laws and regulations related to the conservation of stone walls.

Visual Aesthetic: Humans have a reverence for architectural and monumental stone that transcends its utilitarian value and which is communicated visually. One goal of stone wall conservation is to maintain or improve the amount of stone in human viewsheds. Historic stone walls are critical to New England's visual sense of place. Blending classical and romantic forms, they provide the straight, hard, stony edges that frame the larger, rounder, softer, more patchy landscape elements of forest, farm, field, and garden.

Every stone in every segment of every wall is visually unique. But they can be categorized by geographic differences in the appearance of rural historic walls that fall into "provinces" defined more by geology than by cultural tradition.[16] For example, the historic walls from Aquidneck Island, Rhode Island (generally carefully fitted, fence-high, tablet-shaped, slate and sandstone) contrast strongly with those of highland New Hampshire (crudely stacked, knee-high, rounded granite boulders). Provinces are defined by three main variables: the geology of the local bedrock in governing stone shape and size; the mechanical role of ice-sheet glaciation in concentrating, breaking, and milling stones to modified shapes and sizes; and the character of colonial and later settlement as defined by population, duration, and land laws. Provinces are subdivided into terrains based on altitude (such as a soil catena) and they aggregate into subregions the size of counties. The key idea for stone wall conservation is to preserve the local landscape aesthetic, meaning that the construction of new walls and the rebuilding of existing walls should blend in with those of the terrain and province.

Process Cascade: Although traditionally seen as products of human history, the building of historic stone walls was the penultimate act in a much longer series of processes that continue to the present day. These processes include: the creation and fracturing of rock within the Earth's crust; the glacial entrainment, crushing, rounding, and dispersal of that fractured rock over the surface; the shallow burial of that stone by Holocene soil processes; the deforestation of that land for semi-

16 Thorson, *Exploring Stone Walls*.

subsistence agriculture; the appearance of stone in fields and pastures because of soil physics; the scuttling and dumping of that waste stone to wooden fence lines; the stacking of that stone into crude walls maximizing arable space, marking property boundaries, and helping with fencing; and the abandonment and afforestation of former farms and the consequent partial disintegration of walls.

Superficially, the presence or absence of a wall in any particular place and its material appearance is the result of past human choices. But at a deeper level, those human choices were semi-autonomous responses to coping with a surfeit of stone as part of the farm effort. Walls were the logical choice for an agricultural society working stony upland soils and dividing land into small fields and pastures, given the constraints of time, labor, and available energy, meaning they were fundamentally an emergent phenomenon, with conscious human choices being made mostly at the level of details. That is, the decision was not whether to build a wall, but how?[17]

Individual humans are members of social systems, which are part of ecosystems, which are part of a global system. The traditional binary between history and prehistory, or between culture and nature, is untenable now that that the collective activities of *Homo sapiens* has become the dominant agency shaping the Earth's surface and controlling its ecosystems in the current Anthropocene epoch. In this context, the historic transport of field stones and their placement into walls is a manifestation of the human social system within an agro-ecosystem within the Earth System.

Indigenous Stonework: Indigenous peoples occupied New England for at least 12,000 years prior to the settler colonialism of the early seventeenth century. The website *Native Land Digital* captures the present and historic geography of Indigenous groups usurped during the process.[18] During these twelve millennia, cultures changed in situ and people migrated into and out of specific territories. Based on ethnographic and archaeological evidence, neither ownership of land nor extensive stonework was part of known Indigenous lifeways. Some stone features—mainly memorial piles and animal totems—are Indigenous in origin and are commonly referred to as ceremonial stone landscapes (CSL), some of which are millennia old. During Euro-settlement, Indigenous individuals and small groups became part of the largely undocumented labor pool that built New England's stonework, a pool that included slaves, indentured servants, hired hands, and day laborers.[19] In southeastern New England, the Narragansetts developed a tradition of stone masonry as a business.

Looking back to the present from some imagined future, our distant descendants might ask us: "Were we good ancestors?"[20] Being good ancestors requires honoring

17 Thorson, *Stone by Stone*, 215–09 and 155–63.

18 Native Land Digital, https://native-land.ca/.

19 Margaret E. Newell, *Brethren by Nature: New England Indians, Colonists, and the Origins of American Slavery* (Ithaca, New York: Cornell University Press, 2015).

20 David Ehrenfeld, *Becoming Good Ancestors: How We Balance Nature, Community, and Technology* (New York: Oxford University Press, 2008).

the human ecology of New England's early stone wall landscapes relative to the modern, energy-intensive material culture of concrete, plastic, and electronics. Saving old walls helps stabilize and decelerate a frenetic present on the tipping point of great change.

Legal Considerations: In his groundbreaking 1836 essay *Nature,* Ralph W. Emerson wrote that no one "owns the landscape . . . This is the best part of these men's farms, yet to this their warranty-deeds give no title."[21] Except for on large land holdings in sparsely settled areas, nobody owns the larger landscape on which smaller stone-rimmed parcels of individual ownership occur. Thus, the gain or loss of any stone wall is a gain or loss for the commons.

Stone wall management takes place in political/legal/administrative contexts that are constrained by ownership classes and land designations. For example, the National Park Service has broad authority over walls within its jurisdictions, subject to laws passed by Congress. At the other extreme, individual private landowners also have authority over their walls, subject to ordinances, covenants, and regulations at the neighborhood, town, county, state, and federal level. One example from New Hampshire is a 2009 amendment to a 1791 law to discourage theft of stone walls on private property.[22] Indigenous nations have authority over walls on reservation lands.

History & Archaeology: A small portion of stone domain is still in use today on long-established farms as fences, boundary markers, and waste piles. The vast bulk of the domain, however, is archaeological, with its objects being artifacts dating to the earlier agricultural phase peaking in the mid- to late-nineteenth century and ending prior to widespread use of the automobile in the early twentieth century. Components of the stone domain can be dated in various ways, using land records, finding cross-cutting relationships linked to dated features, examining the patinas on the surface, searching for the presence of synthetic materials, and applying selected geo-chronologic techniques. Although walls are frequently mentioned in primary historic documents such as land deeds and surveyor plans, descriptions are usually absent, and, if present, are usually very general.

Most archaeological sites are discovered accidentally and are damaged before we know they exist. To mitigate this issue for stone walls, I suggest adopting the precautionary principle of cultural resource management (CRM) archaeology, the idea that the existence or non-existence of sites be determined before development proceeds. Many components of the stone domain fall below the 1-meter detection threshold for LiDAR surveys (cairns, piles, lines, veneers), meaning that ground truthing by reconnaissance is essential.

21 Ralph W. Emerson, *Nature* (1836, reis. New York: Penguin, 2003).

22 James Garvin, "1791 Law Amended to Protect Stone Walls" (New Hampshire: New Hampshire Division of Historical Resources, 2009).

Individually, very few stone walls meet the first Merriam-Webster definition of the word historic: "famous or important in history." Nearly all, however, meet the first definition of relict, "a thing which has survived from an earlier period or in a primitive form." The word relict is technically more useful for stone wall conservation than historic because it connotes the idea of ruins. Stone walls satisfy us via what the landscape historian J. Brinkerhoff Jackson called a "necessity for ruins."[23] When properly inventoried, described, mapped, and scientifically dated, walls can also provide an independent source of information to cross-check the documentary evidence of town records and histories. They are the weather-beaten outdoor counterparts to written indoor records kept in archive vaults. A practical protocol for management of stone walls could serve as a model for other outdoor landscape features of historic interest, such as quarries, borrow pits, charcoal kilns, trail cairns, wells, and others.

Scenic Roads: Scenic roads and stone walls are enmeshed by originating processes and by regulations. Many New England roads are the final outcome of a long-term chain of contingent processes that began with a footpath. Heavy use, especially by livestock and wheeled vehicles, compacted the soil, which deepened and intensified frost heaving and enhanced runoff erosion. These processes concentrated stone in the travel zone, creating obstacles that were moved aside, either to be stacked above grade or to be used as cut-and-fill retaining walls. Long-term use resulted in the simultaneous deepening of the roadbed through erosion and the upward growth of adjacent flanking walls to create what in Britain is a landform called a holloway, derived from the Old English "hola weg," or sunken road. Other scenic roads were created as straight lines along the edges of pre-existing walled properties and (or) were "laid out" with parallel stone walls, often with a specified width of two-rods or four-rods.

Dryland Ecology: In closed canopy woodlands, the underbrush is shaded out, making walls visually conspicuous. There, trees are the main wreckers of walls, not frost heave. When growing on or against walls, large roots pry walls apart and push them sideways. When blown down against walls during storms, the trunks knock big bites out of walls, and the upper branches whisk stones to the ground. De facto wall conservation in the deep woods is typically laissez faire. At sunlit edges along fields and road right-of-ways, however, trees play a lesser role. There, herbaceous vegetation, vines and brush will quickly cover the wall and begin to tear it apart. There, conservation usually requires some active maintenance, often the cutting back of vegetation and the return of fallen stone. Historically, nearly all deep-woods walls were once the edges of sunlit fields and properties.

23 J. Brinkerhoff Jackson, *The Necessity For Ruins and Other Topics* (Amherst: University of Massachusetts Press, 1980).

Like natural talus slopes or mountain scree, stone walls are dry, granular, linear, rocky landscape elements in an otherwise moister, soil-covered, vegetated landscape. The lichens, moss, and microbial mats on walls exist nowhere else except for bedrock exposures and large boulders. The higher thermal heat capacity and conductivity of stone cause walls to retain the cold of night and the warmth of day longer than the adjacent soils, creating novel ecological opportunities. During winter and summer, they conduct heat more efficiently into and out of the ground, creating seasonal bulbs of frozen ground and thawed soil. As porous volumes, walls and concentrations provide homes for creatures needing protected places. Insects, rodents, and snakes are common, and the dens of larger burrowing animals are frequently beneath basal stones. As geographic areas, walls are small, but as an aerial gridwork, they broadly pixelate the land surface. As lines, walls are borders between adjacent habitats and corridors connecting distant habitats.

The ecological effects of walls extend well beyond the dryland edges. As stable ridges, their opposite sides are sunny vs. shaded, windward vs. leeward, and upslope vs downslope. This changes the local seasonal phenology of dry vs. wet sides, snow-covered vs. snow-free, accumulation of soil vs. erosion of soil. All of these differences greatly increase the details of habitat texture, enhancing biodiversity. A loss of walls is a loss of biodiversity.

Walls are the dryland counterpart of inland wetlands. These impermeable, exposed, ventilated habitats contrast with the saturated soils of nearby wetlands on the same land parcels.[24] Prior to the early 1990s, and except for by early ecologists and conservationists, inland wetlands were usually considered blights on the landscape. Cultural incentives and land regulations fostered destruction via drainage and filling. Only after the hidden values of wetlands were clearly connected to the lives of ordinary citizens were they protected. This same narrative applies to stone wall drylands. Prior to having their hidden values recognized, many of New England's walls were strip-mined and crushed for road gravel, buried to enhance drainage, or quarried for fill or building stone.

Counterintuitively, stone walls and inland wetlands were often created by the same agricultural transformation. Sediment eroded from hillsides concentrated the upland stone that became walls. When deposited at lower elevation, that same sediment occluded drainages and aggraded floodplains to create and enhance many wetlands.[25] The nineteenth century gain of many riparian wetlands mitigated against their earlier eighteenth century loss due to the extirpation of the beaver (*Castor canadensis).*[26]

24 Elaina Hancock, "Establishing the Science of Stone Walls," *UConn Today*, November 6, 2023.

25 Robert M. Thorson, A. G. Harris, S. L. Harris, R. Gradie III, and M. W. Lefor, "Colonial Impacts to Wetlands in Lebanon, Connecticut," in *A Paradox of Power,* ed. Charles W. Welby and M. E. Gowan (Geological Society of America Reviews in Engineering Geology 12: 1998).

26 Christopher L. Pastore, *Between Land and Sea: The Atlantic Coast and the Transformation of New England* (Cambridge, MA: Harvard University Press, 2014).

CONSERVATION

With the definitions and context behind us, I now suggest a plausible narrative for stone wall conservation to be implemented by those with duties and expertise in law, management, and policy. The administrative agencies of federal, state, and local governments are differentiated by purpose, for example environmental protection, historic preservation, agriculture, transportation, education, commerce, tourism, etc. Stone wall conservation could fall under any of these headings. For focus and brevity, I target parcels of land at the scale of towns, state parks, and land trusts, ranging in size from one to one hundred square miles. I envision the decision-making process to involve a committee, board, or panel drawn from entities such as government agencies, town offices, local experts, and community members.

Step 1—Background Information: Before proceeding, everyone involved must have some understanding of stone walls and their local importance. There is a wealth of literature on the topic, and many of the key sources are cited in this article's footnotes. One good, albeit dated, example is the agency report "Stones that Speak: Forgotten Features of the Landscape."[27] Its main headings include: Identifying Stone Features; Basic Research Methods; Threats and Protections; Public Engagements; and Debunking Myths. This report's primary disadvantage is that it deals only with public or quasi-public properties, thereby omitting the more difficult challenges of town planning and zoning associated with private-vs-public rights.

Step 2—Identification and Location: To manage any outdoor facility or resource, discrete elements must first be identified and mapped. Good examples include town parks, state boat docks, land zoning, and protected wetlands. Managing such elements at the landscape scale always involves some combination of an accurate survey, aerial imagery (satellite, aircraft, drone, etc.), and on-the-ground investigations. Each landscape or planning element usually has its own layer within an organization's Geographic Information System (GIS) system.

The most critical early step for stone wall management is to create a stone domain layer within GIS that can accommodate the features and nomenclature, beginning with walls, cellar holes, and prominent notable stones, and ending with whatever degree of descriptive detail is warranted. Once in place, such a website could be made available for top-down and bottom-up entry.

For top-down entry, the responsible entity (town, state, nation, trust, landowner, etc.) might initiate (or upgrade) a project to identify and map the major elements of the stone domain in a GIS layer. This will likely involve LiDAR (Light Detection and Ranging) technology. This synoptic approach is analogous to doing

27 Massachusetts Department of Conservation and Recreation, "Stones that Speak: Forgotten Features of the Landscape," *Terra Firma,* 2007; Massachusetts Department of Conservation and Recreation, "Best Management Practices: Stone Walls."

a parcel-by-parcel town-wide assessment for tax purposes. Identification and mapping based on aerial imagery must be considered tentative until ground-verified by field reconnaissance.

For bottom-up entry, any object (or GIS shapefile, or polygon) can be inserted into the map and data base at any time to incorporate information as it emerges. For example, a historical society might have information about old graveyards, or a land trust may want to merge its maps into a town database.

A third type of entry involves the "citizen science" approach being used by the New Hampshire Geological Survey's Stone Wall Mapper.[28] This allows individual volunteers to locate stone wall segments using hand-held GPS trackers and enter the data into this GIS platform. The data is then subsequently verified and ground-truthed by agency staff. Experiments are underway to automate the process of identifying and mapping stone walls using machine learning, that is, artificial intelligence or AI.[29]

Step 3—Inventory: Having identified and mapped stone walls, they must be classified and described by structure, material, and age. The current standard is "Taxonomy and Nomenclature for the Stone Domain in New England." Its first three levels are represented below in the following way: CLASS in caps, *Family* in italics, and Type in plain text.

WALLS
- *Freestanding*, Band, Single, Double, Broad, Abutting, Hybrid
- *Flanking*, Retaining, Armoring
- *Supporting*, Small, Large
- *Enclosing*, Square, Circular
- *Blocking,* Perpendicular, Parallel

LINES, *Low, High*
CONCENTRATIONS, *Built, Dumped*
NOTABLE STONES, *Outsized, Modified*

The age of a stone wall is difficult to classify because overlaps are common. But in New England, they generally fall into four subjective overlapping categories, which vary by location. Each project will warrant its own chronology of wall stages.

- *Pre-Euro*—Although there are very few stone features predating New England settler colonialism in 1607, we must allow for their inventory within the stone domain.

28 New Hampshire Stone Wall Mapper, ArcGIS Online (NHGRANIT, New Hampshire Department of Environmental Services).

29 Ji Won Suh and W. Ouimet, "Mapping Stone Walls in the Northeastern USA Using Deep Learning and LiDAR Data," Geoscience & Remote Sensing 60, no. 1 (2023).

- *Relict*—These features are associated with the initial wave of settlement and gradual abandonment before the nadir of population census records. This nadir generally ranges from the 1830s to the 1930s, depending on location. The exact date doesn't matter. What matters is that they are part of the main wave of rural agricultural settlement, one without access to petroleum.
- *Later*—This category is dichotomous with relict because many of these walls are still in use and maintained. The current state of these walls are generally post-agricultural, having been built, re-built, or maintained during the ongoing re-occupation of rural New England since easy automobile transport. Walls within this age category are usually visible on early aerial photography (often from the 1930s).
- *Recent*—A newer group of walls is associated with real estate development in the last half-century, the work of professional stone masons, and wall building as a hobby akin to outdoor chess. These are usually not older walls being maintained, but new walls, often built after the disassembly of older walls in the same place.

Step 4—Contextualization: Following inventory, description, and dating, the map pattern of walls and features will likely reveal spatial patterns and trends, for example variations in wall concentration, taxa, attributes, and chronology. Such patterns will reveal a history not available from any other data set. One good example is the difference in the aggregate pattern of wall layout in Connecticut (Figure 3), which follow an early town settlement pattern, and in southern New Hampshire (Figure 7), which follows a later pattern of range and lot lines. At this stage, those with expertise in stone walls interpretation can share outward to public historians.

Step 5—Property Issues: Next, ascertain how stone walls relate to property ownership, land use, and intersecting boundaries. There are three mutually exclusive conditions.

- *Interior:* These are the spatial areas within properties that are not on roads or property boundaries. No other party other than the owner need be involved in decisions.
- *Edges:* These are lines between spatial areas separating the land of different parties. In many cases a property line runs down the middle of the wall. Public roads and easements can be thought of as thicker lines between properties.
- *Intersections:* These are points where three or more interested parties are involved.

The parties involved may be any mix of public, private, or quasi-public, as in the case of a land trust. Private lands are subject to town, state, and federal laws. Governments have only limited control over private land.

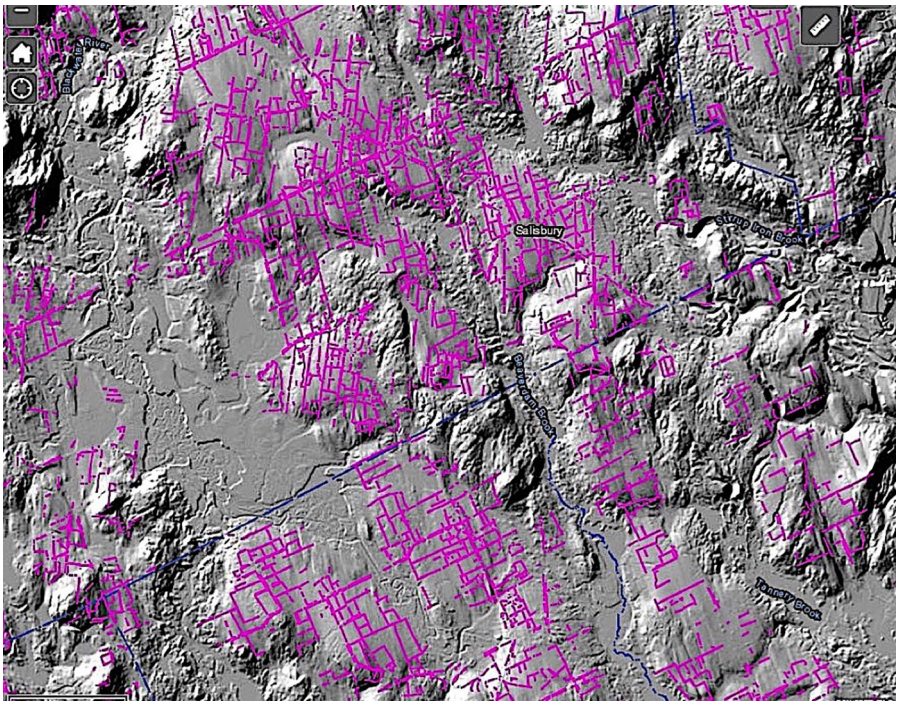

Figure 7. Map of stone walls in central New Hampshire centered on Salisbury. The overall pattern is one of conformity between the original range and lot lines and the subsequent layout of stone walls, both of which follow the grain of topography caused by ice sheet flow from northwest to southeast. (Compare with Figure 3.) (Image credit: NH Stonewall mapper)

There are three overlapping land-use situations that warrant special considerations.

- *Extant Farm*: Regulation of walls on active farms are likely to be less restrictive because they are part of the modern farm economy, rather than its archaeology.
- *Woodland*: This is a catch-all phrase for the large majority of walls present beneath a closed woodland canopy on former agricultural land. The walls are truly relict, busy being archeology and ecology.
- *Heritage:* This is a catch-all phrase for walls currently linked to historic sites, districts, cemeteries, designated scenic roads, other settings. These are best considered as historic architecture, rather than archaeology, because they are usually maintained. A maintained cemetery wall in a woodland would be considered a heritage wall.

Some areas within private or public land are limited by the presence of regulated areas, for example mapped wetlands, archaeological sites, waste sites, riparian corridors, transmission lines, and so forth.

Step 6—Management: This article merely sets the stage for subsequent management, rather than recommending how it is to be done. In all cases, there will be plans, protocols, procedures, policies, incentives, rules, and penalties designed to conserve the cultural and ecological values of the stone domain and maximize its use for the benefit of the local community. This may take many forms, for example, ordinances, codes, laws, permits, tax breaks, conservation easements, fines, etc.

For the construction of new walls, it makes sense to incentivize or require the types and styles that would blend in best with the ambient relict (historic) walls of the province. This process requires a previous inventory.

Step 7—Interpretation: Understanding the historic, cultural, ecologic, tourist, and recreational values of the stone domain will lead to community sharing via schools, websites, programs, publications, and calendar events. Towns such as Eastford, Connecticut, and Little Compton, Rhode Island, are highlighting their walls as billboards to local history. Living history museums such as Old Sturbridge Village in Massachusetts incorporate wall interpretation into their programs. Art Museums such as Florence Griswold Museum of Old Lyme, Connecticut, link indoor stone wall art with outdoor stone wall architecture. K-12 school curricula increasingly involve field trips to relict walls. These examples above are just a few of hundreds translating the knowledge gleaned from stone walls into public history.

Summary

The stone walls of New England provide a great opportunity to share local history with the community at large for several reasons: the public is keenly interested, the resource is nearly ubiquitous, the interpretation straightforward, and the subject is linked to many related activities such as environmental conservation, natural science, landscape art, and American culture. This article explained the significance of the stone domain, defined the fieldstone wall as its salient object, reviewed the context lurking beneath the nitty gritty of their management, and suggested a seven-step narrative for bringing stone domain conservation into fruition.

Following the successful analogy with wetlands conservation, stone wall conservation by government offices, nonprofits, and landowners will likely involve multi-year efforts to identify, map, inventory, and describe, and interpret the resource so that it can be conserved for future generations. Public historians will play a key role in translating this growing body of knowledge for the benefit of society.

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Historian as a venue for this article. Thanks to the Town of Union, Connecticut, which prompted me to pull this article together. William Ouimet and Kristine Thorson have long been sounding boards for these ideas. I gratefully acknowledge the improvements recommended by three anonymous reviewers.

Robert Thorson has been active in public history since the 1998 publication of *Stone Wall Secrets,* a Smithsonian Notable Book for Children. In 2002 he published the authoritative *Stone by Stone: The Magnificent History in New England's Stone Walls*. In a 2023 *Smithsonian* essay he linked their history to literature, ecology, climate change, and geoscience, an article selected by the History News Network for the "Best History Writing of 2023." At the University of Connecticut, he coordinates the *Stone Wall Initiative* as scholarly engagement within the *Connecticut State Museum of Natural History*. For three decades he's been a stump evangelist for the preservation of New England's historic landscapes, giving more than a thousand public lectures, mostly to historical societies, museums, public parks, land trusts, and conservation organizations. His work also includes consultancies for Minuteman National Historic Park, the Nature Conservancy, various state agencies, and private landowners as an expert witness. In 2018 he was elected to membership of the American Antiquarian Society. His expertise and scholarly engagement extends to the environmental history associated with Henry D. Thoreau, who had much to say about stone walls. Thorson's first-ever *Guide to Walden Pond* targets public history.