The Changing Flora of Mount Desert Island

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I have a favorite piece of correspondence from the Edward Rand archives at Harvard's Grey Herbarium— a letter dated 1894.

> I have looked into the list of plants, and I am pleased to recognize so many old friends. Some of them are old White Mt. friends, and some I well remember in their nooks in Mt Desert itself. I have never had the opportunity, or perhaps the ability, for such a careful study as you have made, but I know just enough of flowers to enjoy and value your work, and I have love enough for Mt. Desert to give it special interest. Please accept my congratulations on the book.
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> — William Worcester, Champlain Society member and Harvard Class of 1881[1]

I combed through these archives during my first year as a Ph.D student in the Biology Department at Boston University, and I remember stopping at the letter, charmed and stunned by the sentiment. It seemed to capture my own gratitude, my own admiration, and my own feelings of intimate friendship for Rand—except that it had been written 116 years before I first read Rand's *Flora of Mount Desert Island, Maine*. During my field seasons researching plant ecology on Mount Desert Island, I have occasionally walked the Seaside Path from Jordan Pond to Seal Harbor and paused at the boulder that bears a plaque honoring Edward Rand. It's well hidden, tucked into the shade of spindly spruces, with an antiqued coppery green patina that lauds his "pioneer service and labor of love in making known the flora of Mount Desert." I stop here and pat the mossy granite mass of Rand's boulder and say, "Please accept my congratulations on the book."

For fourteen years, Rand dedicated his summers to cataloguing the island's flora, creating an herbarium of specimens, and publishing a book on the plants of Mount Desert Island. Rand was one of a handful of

Caitlin with Edward Rand's plaque. *Courtesy of Caitlin McDonough MacKenzie*

Harvard boys who in 1880 sailed to Mount Desert Island and camped on Somes Sound. They planned to study the natural history of the island—botany, geology, meteorology, and ornithology—and dubbed themselves the "Champlain Society" after the seventeenth-century French explorer who named the island. In 1880, Acadia National Park would not exist for another three decades and Bar Harbor's reputation as a summering place for the East Coast elite was in its infancy. The Champlain Society allowed Harvard gentlemen a chance to get out of Cambridge and into the wild. As his Harvard companions wandered away from the mission of natural history study—and towards the balls and ladies at Southwest Harbor hotels—Rand cleaved hard to his botanical mission. The legacy of Rand's commitment is his book, *Flora of Mount Desert Island, Maine.* This book is also the cornerstone of my own dissertation research on climate change in Acadia National Park.

Given a time machine and calligraphy lessons, I could have written William Worcester's letter to Edward Rand. "I have looked into the list of plants, and I am pleased to recognize so many old friends." Like Worcester, I came to the flora of MDI from the White Mountains of New Hampshire; I spent college summers working in the backcountry

huts of the Whites and studied the alpine plants on the Presidential and Franconia ridges for my master's project. The ridges and peaks of Mount Desert Island are studded with old White Mountain friends—mountain cranberries, crowberry, rhodora, trailing arbutus, and blueberries. The summits are smaller, and the tree line seems impossibly low after years in New Hampshire, but the flora is wonderfully familiar. When I first read Rand's *Flora of Mount Desert Island* these old friends shined through the pages.

The second—and third, and fourth—time that I read Rand, I noticed the plants that I did not know. The flora of Mount Desert Island has attracted botanists and flower lovers to Maine for nearly two centuries. But the flora that Rand observed and collected has changed as species have disappeared, declined, and appeared over the past 120 years. One hundred and seventeen of the plants listed in the *Flora of Mount Desert Island* —17 percent— can no longer be found here. Showy lady's slipper is gone, as is sweet pepperbush, wild mint, trout lily, white bog orchis, and northern sedge, among others. Another third of the flora (227 species) have declined in abundance. These changes in the flora are not unprecedented—many towns in New England have their own Edward Rands, their own nineteenth-century plant species lists, and their own recent re-surveys of the flora. In Concord, Massachusetts 27 percent of the flora has disappeared since Thoreau's time. In Worcester, Massachusetts 18 percent of the documented plant species from the nineteenth century no longer occur. Nantucket Island has lost 19 percent; Three-mile Island, New Hampshire 27 percent; Needham, Massachusetts 43.5 percent. However, none of these places is a national park. Development pressures are easy explanations for lost species in southern Massachusetts, but in Acadia, other stressors and threats may be in effect.

The landmarks of Edward Rand's story are sturdy places—the granite of Sargent Mountain; the Asticou Inn in Northeast Harbor where the Champlain Society once dined; Harvard Yard, where Charles Eliot first proposed the trip to Mount Desert Island to Rand, Worcester, and other friends at a gathering in his dorm room. My freshman dorm sits kitty-corner to Eliot's; 122 years after the Champlain Society first met, I lived in a Harvard dorm that looked out on the same corner of the Yard. It is possible to visit the places where Rand studied, to hold his herbarium specimens in your hand, and to re-trace his steps across

Mount Desert Island. The Champlain Society kept detailed logbooks recording their summer adventures, and these are studded with descriptions of botanizing trips. On August 25, 1882:

> Soon after breakfast great energy seizes Bates, Jones, and Rand. They walked along the dusty road to Hadlock's Upper Pond, thence through the woods to the foot of the Sargent Mt. Gorge. At the logging camp the party separated. Rand roamed through the woods in search of new plants for sometime finally arriving at the waterfall where Bates and Jones had promised to meet him. As he found no trace of them there he climbed one of the peaks of Sargent, and feasted on blueberries. On the summit of the peak he fell in with Gardiner's famous trail, and attempted to follow it.[2]

My own fieldwork leads me across Sargent ridge twice a week in the spring and summer. I often think about Rand's field attire—the canvas and wool field clothes, the tin vasculum for carrying new specimens—as I race along in trail runners, synthetic wicking layers, polar fleece, and Primaloft insulation. In 1892, in a short essay titled "How I Botanize," Southwest Harbor summer resident Annie Sawyer Downs outlines her own packing list for botanical field work, and aside from the "plain skirt, short and full," it seems likely that Rand would have carried a similar kit. "The things I provide myself with when I go botanizing are a pocket-knife, a pair of scissors in a case, a little ball of soft string and a tin box, which is carried by a strap over my shoulder. I wear a plain skirt, short and full, a round hat with a rim wide enough for shade, a pair of strong gloves with gauntlets, and shoes of sensible thickness, with broad soles and low heels."[3]

Annie Sawyer Downs is remembered in Southwest Harbor as the founder of the town library. Mrs. Seth S. Thornton explains the library's beginnings in her history of Southwest Harbor and Somesville: "Mrs. Annie Sawyer Downs gathered a number of discarded books from the hotels, mostly paper covered volumes, and placed them on a shelf in one corner of Dr. R. J. Lemont's drug store."[4] But Downs was also an accomplished botanist from the Boston suburbs. She headlined an Appalachian Mountain Club meeting on Mount Desert Island in 1895,

Annie (Sawyer) Downs, Mrs. Samuel Morse Downs.
Photograph by The Vickery Art Studio, Number 5884 –
The Southwest Harbor Public Library Digital Reference Archive

described in their journal *Appalachia:* "On Saturday, July 6, Mrs. Annie Sawyer Downs . . . gave a paper on the Beauties and the Flora of Mount Desert, which was as charming a description of the varied attractions of the Island as the Club's explorations had been a realization of them. The peculiarities of the flora of the island, differing so much even from the mainland around it, were interestingly described."[5] By 1895 the *Flora of Mount Desert Island* had been published to great acclaim; Downs had contributed to Rand's project for at least six years. She is first noted in the 1887-1888 Champlain Society Report: "At Southwest Harbor, Mrs. Downs collected a number of specimens for the Herbarium, mostly orchid."[6]

Downs grew up in Concord, Massachusetts in the 1840s. As a child, she followed local botanists through the Concord woods; her mentors included Henry David Thoreau.[7] She became an Andover, Massachusetts school teacher and Southwest Harbor summer resident, and records of her specimens and writings from Massachusetts to Maine describe a capable and fervent botanist. She is listed as a botanist familiar with the orchids of Massachusetts in Henry Baldwin's 1884 *The Orchids of New England*[8] and in 1896 she wrote a short letter to the magazine *Garden and Forest* regarding orchids on Mount Desert Island:

> Sir, — I found two interesting Orchids abundant in woods and fields of Mount Desert in early October. The first is *Goodyera repens*, more commonly called the Rattlesnake Plantain, with curiously reticulated white-veined, blue-green, velvety leaves and slender greenish flower-spikes and dainty cream-colored, waxy flowers. The plants were thickly set among trailing Snowberries, shining *Mitchellas* and yellowing Ferns, and wearing that air of aloofness which distinguishes all Orchids from the cheerful familiarity of Asters and Golden-rods. The author of *Orchids in New England* says he seldom sees the Rattlesnake Plantain in flower, and cites an experienced botanist who had searched in many different places and never came across a flowering plant in three years; but I found them on the island flowering in great profusion. I was fortunate, too, in transplanting them not only into window boxes and baskets, but into the shady corners of a garden, where they have rewarded me by flowering bountifully.
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> The second autumnal Orchid, *Spiranthes cernua*, Nodding Ladies' Tresses, is much more conspicuous and more positively beautiful. In the meadows of eastern Massachusetts I have often seen it close to the exquisite blue-fringed Gentian. Although most common in damp meadows it sometimes grows on uplands among Pennyroyal and Sweet Fern, or makes a conspicuous setting for the purple cross-leaved Polygala. The very roadsides in some parts of Mount Desert are white with their flowers, and the honey bees find them delightful to the very last day of their existence and often follow them into a sunny room, where, in water, they last for a fortnight, and if set against a background of brilliant Maple-leaves, the gleaming berries of the Hobble-bush or Wild Mountain Ash, they are charming indeed.[9]

In the *Flora of Mount Desert Island* Rand describes the rattlesnake plantain as “frequent in deep woods” and the nodding ladies’ tresses as

"very common in damp ground." In 2010, the *Plants of Acadia* divided the abundance of every plant species in the Acadia National Park region among four categories: Common, Occasional, Uncommon, and Rare. Rattlesnake plantain is now considered rare; nodding ladies' tresses are uncommon. I worked with the authors of *Plants of Acadia* to limit my analysis of abundance changes to the Mount Desert Island unit of Acadia National Park, which matches the extent of the 1894 *Flora of Mount Desert Island.* The two species described by Downs are not outliers of the orchid family. Rand described twenty-one orchids in 1894; nine have disappeared from the island and eight have declined in abundance. I have never had the pleasure of witnessing the very roadsides in any part of Mount Desert white with the flowers of nodding ladies' tresses. If Downs were to visit Mount Desert Island today, it is unlikely that she would be able to find rattlesnake plantain "thickly set among trailing snowberries, shining *Mitchellas*, and yellowing Ferns" or flowering in great profusion. (For the record, creeping snowberry has declined a bit in abundance, from common to occasional, while partridgeberry (*Mitchella repens)* has not appreciably changed in abundance since 1894 and remains occasional.)

In his book, Rand credits Downs with discovering *Rhododendron rhodora* forma *albiflora*, a rhodora with white flowers. The rhodora that I knew from the White Mountains always boasted deep purple petals with indigo freckles. These Ericaceous shrubs—in the same family as blueberries and huckleberries—bloom before they leaf out, creating the illusion of a plant engulfed in violet. In mid-May their woody stems hold leaf buds curled tight beneath fat clusters of flower buds. The flower buds expand, deepen in color, and burst open all at once, while the leaf buds unfurl at a slower pace—my favorite week of the field season is "Rhodora Week," when the ridges from Cadillac to Sargent are aflame with tunnels of purple rhodora. After reading about Downs' white rhodora, I hunted down her specimen at Harvard University's Gray Herbarium. In tight neat script Downs records that this "flower pure white" was collected in 1888 in Southwest Harbor.[10]

As a form of purple rhodora and not a different species, the white rhodora is not included in my analysis of the changing flora on Mount Desert Island. *Rhodora canadense*, the regular rhodora, has remained common from Downs and Rand's time to today. I thought the white rhodora might have been lost to history until 2013 when I stumbled

across a plant with bright white petals in the middle of a patch of standard issue purple rhodora. The white rhodora sat in the saddle between Cedar Swamp Mountain and Sargent Mountain on the Sargent South Ridge Trail. It was my favorite spot that spring—capturing photographs of it made me feel a kinship with Downs. At the time, I was struggling to track down notebooks or records of Downs; she wrote so meticulously about botany in her magazine pieces that I was sure she must have kept field books full of detailed notes—and I was so disheartened to see that a notebook did not make her list of field essentials in "How I Botanize." My searching came up empty—I have only seen her handwriting on the descriptions of her herbarium specimens. So this incomplete picture of How Downs Botanized has been gathered from her published writing, her specimens, and second-hand accounts that mention her contributions and botanical prowess. Finding the white rhodora was like finding a piece of Annie Sawyer Downs alive on Mount Desert Island—there seemed to be a new connection between us. I searched again in the saddle between Cedar Swamp and Sargent in 2014, but the white rhodora is apparently an ephemeral phenomenon. That spring there were only purple rhodora petals.

Edward Lothrop Rand and Buckboard Party on High Head, September 1, 1890.
Photograph by Henry L. Rand,
Number 5317 - The Southwest Harbor Public Library Collection of Photographs

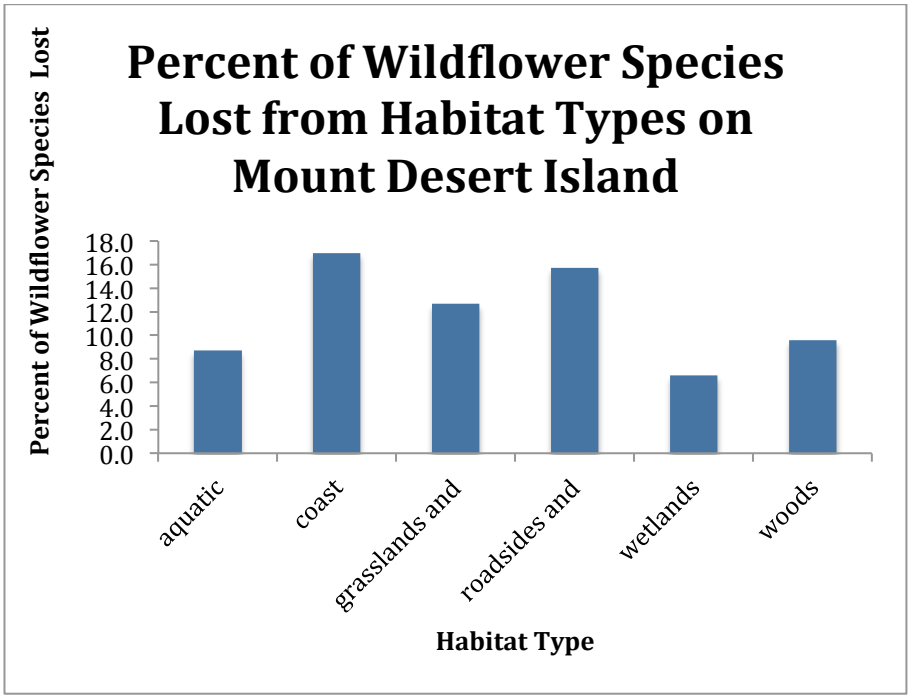
Rand was a collaborator, and Mount Desert Island in the late nineteenth century was rich with amateur botanists and flower lovers. In the winter of 1882, acting as the Champlain Society Secretary, he wrote in a formal letter to the President of the Society, "I would also suggest that we use every effort to interest every lover of Mt. Desert in our work, whether by correspondence or personal appeal."[11] The Champlain Society logbooks trace Rand's commitment to collaboration beyond his college chums. Downs was twenty-two years older than Rand, and Rand's *Flora of Mount Desert Island* co-author John H. Redfield was forty-four years older. In addition to Downs and Redfield, the New England Botanical Club lists seventeen other taxonomists and specialists who helped Rand during the compilation of his *Flora.*[12] I can appreciate the community of mentors and collaborators that Rand was able to create around his research and his book. The *Flora of Mount Desert Island* is a touchstone on the island; the description of Downs' summer cottage Edgecliff in *Images of America: Mount Desert Island, Somesville, Southwest Harbor, and Northeast Harbor* identifies Downs as "the founder of the local library and a writer who contributed to Edward Rand's *Flora of Mount Desert.*"[13]

Edgecliff itself still stands in Southwest Harbor. And Downs' white Rhodora specimen is in the Harvard herbarium, along with most of Rand's collection, bequeathed to the New England Botanical Club after his death in 1924. I have found a photograph of Downs, decidedly not in her botanizing attire; it is a formal studio portrait on file among the Southwest Harbor Public Library's historic photographs. There are photographs of Edward Rand in this file, too; in one he stands among a party of trampers, with a tin vasculum in hand, ready to botanize.

But while many of the landmarks of Rand's Mount Desert Island remain, the flora has shifted under our feet. Rand might recognize Downs' house on Clark's Point, he might know the stretch from Sargent's summit to Sargent Mountain Pond on sight, but the plant communities of Mount Desert Island today are not the same plant communities that he spent fourteen years cataloguing in the nineteenth century.

Perhaps this is due to changes in habitat. The creation of a national park in 1916 protected an ever-increasing area of Mount Desert Island from development. But it also protected open meadows from mowing,

and young forest stands from cutting. Natural processes of succession have shifted the distribution of habitats as trees encroached on open grasslands, and young hardwood stands matured with shade-tolerant conifers ascending into the canopy. The open fields where Rand explored and the Champlain Society camped in the nineteenth century are less prevalent today, and perhaps this has led to a loss of meadow and grassland species, while forest species have increased in abundance with the expanding area of forest habitats. However, when I divided the wildflower species into habitat categories—species from wetlands vs. woods vs. grasslands, etc.—there was no significant difference in species loss between habitats. *All* habitats on Mount Desert Island have lost plant species, even those that appear to be increasing in area.



A comparison of wildflowers found by Rand and Redfield (1894) with those found by Mittelhauser et al, authors of *The Plants of Acadia National Park* (2010), shows the percent of species lost in various habitats. *Courtesy of Caitlin McDonough MacKenzie*

So if habitat type and development pressures aren't driving the species loss on Mount Desert Island, why have so many species disappeared since the publication of *Flora of Mount Desert Island*? This is the core question of my dissertation research. I plan to assign each

species in the flora to "Northern" or "Southern" categories based on their ranges and, as in the habitat analysis, I'll compare loss and decline between Northern and Southern species. I hypothesize that Northern species will be more likely to have disappeared or declined; the last two decades in Acadia were 1.0 and 0.8°F warmer than the 1901-2000 average temperature.[14] I am also exploring the connection between flowering times and abundance. On July 3, 1881 the Champlain Society Logbook remarks: "The Botanical department affirms that the season is late and we doubt not that the meteorological department would agree to it, for the trip down was remarkably cool, and but one day was without a shower." In general, climate and flowering are closely tied—plants bloom earlier in warmer springs. However, the magnitude of the response, and in some cases even the direction of change, to warm springs varies between species. In Concord, Massachusetts weak responses to warming—species that had not dramatically shifted the timing of their blooming in warm years—have been correlated with declining abundance.[15] Over the past few years I have recorded the flowering times of thirty native plant species across Cadillac, Pemetic, and Sargent ridges. From this data, I will compare the flowering response of plants on Mount Desert Island with patterns of species loss and decline.

My research builds on the baseline data that Rand's *Flora of Mount Desert Island* provides, but it is also in debt to the dedicated botanists of more recent times. Craig Greene, Glen Mittelhauser, Jill Weber, Linda Gregory, and Sal Rooney published a complete survey titled "Vascular Flora of the Acadia National Parks Region, Maine" in 2005.[16] It is worth noting that they published this catalogue in *Rhodora,* the journal of the New England Botanical Club. In the years after the Champlain Society disbanded—its members having grown up and graduated—Rand was among the founding members of this Club. In his obituary in *Rhodora,* the New England Botanical Club wrote:

> [Rand's work with the Champlain Society] shows an extraordinary continuity of purpose. It gives a striking illustration of carefully matured and highly creditable work accomplished by an amateur in scattered intervals of limited leisure. It wonderfully explains the training which Mr. Rand brought to his later work as secretary of our

> Club, for it makes clear how he had personally acquired experience in collecting, in floristic record, in correlating the results of cooperative work and finally how in the preparation of his Flora he had acquired extended acquaintance with contemporary specialists and had learned how to value their aid. It had also given him practice in seeing technical matter carefully through press. Indeed, is it possible to think of a more favorable preparation for the duties which he [as New England Botanical Club secretary] was . . . called upon to assume?[17]

The legacy of Rand's botanical work is two-fold. His *Flora of Mount Desert Island* remains an important resource for individual researchers, and his efforts to create communities of botanists through correspondence and personal appeal continue to resonate on Mount Desert Island and throughout New England. He set a precedent for collaborative botanical work on this island. His service as the Secretary first of the Champlain Society and later the New England Botanical Club underscores his devotion to the social experience of conducting research. Despite the fact that neither the Chaplain Society nor the New England Botanical Club of the late nineteenth century admitted women into their ranks, I feel as though Rand has invited me into these organizations. When I read the *Flora of Mount Desert Island* or the logbooks of the Champlain Society, it's as though I am peering over Edward Rand's shoulder as he presses botanical specimens in the evening and adds annotations to his growing species list. His spirit of botanical collaboration has extended far beyond the publication of his book, and continues to contribute to research on Mount Desert Island today.

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[1] Edward Lothrop Rand Papers (Harvard University, Library of the Gray Herbarium).
[2] The journals, camp logs, yacht logs, and meeting records of the Champlain Society are held by the Mount Desert Island Historical Society.
[3] *Wide Awake* magazine, August 1892, 244-45.
[4] Mrs. Seth S. Thornton, *Traditions and Records: Southwest Harbor and Somesville* (Bar Harbor: Acadia Publishing Company, 1938).
[5] *Appalachia: The Journal of the Appalachian Mountain Club* 8 1896-1898 (Cambridge, MA: Riverside Press, 1898).
[6] E.L. Rand, "Report of the Botanical Department 1887-1888" (Harvard University, Gray Herbarium Archives, 1888).

[7] Walter Harding, "The Adventures of A Literary Detective In Search of Thoreau" in *The Virginia Quarterly Review* 68, No. 2 (Spring 1992).
[8] Henry Baldwin, *The Orchids of New England* (New York: J Wiley & sons, 1884).
[9] Charles Sprague Sargent, ed., *Garden and Forest: A Journal of Horticulture, Landscape Art, and Forestry* 9 (New York: The Garden and Forest Publishing Co, 1896), 439.
[10] Herbarium sheet HUH 00022302, New England Botanical Club Herbarium, Harvard University Herbaria, Cambridge, MA.
[11] E.L. Rand, "Report of the Botanical Department 1882" (Harvard University, Gray Herbarium Archives, 1882).
[12] B. L. Robinson and Edward Lothrop Rand, *Rhodora* 27 (Boston: Preston and Rounds, Co., February 1925), 17-27.
[13] Earle G. Shettleworth Jr., Lydia B. Vandenbergh *Mount Desert Island: Somesville, Southwest Harbor, and Northeast Harbor* (Mount Pleasant, SC: Arcadia Publishing, 2001).
[14] S. Saunders and T. Easley, *Acadia National Park In Peril* (Louisville, CO: The Rocky Mountain Climate Organization and National Resources Defense Council, 2010).
[15] See C. G. Willis, et al., "Phylogenetic patterns of species loss in Thoreau's woods are driven by climate change," *Proceedings of the National Academy of Sciences* (2008) and R. B. Primack and A. J. Miller-Rushing, "Uncovering, collecting, and analyzing records to investigate the ecological impacts of climate change: a template from Thoreau's Concord," *BioScience* (2012).
[16] C. W. Greene, L. L. Gregory, G. H. Mittelhauser, S. C. Rooney and J. E. Weber, "Vascular flora of the Acadia National Park region, Maine," *Rhodora* 107 (2005), 117–85.
[17] B. L. Robinson and Edward Lothrop Rand, *Rhodora* 27 (Boston: Preston and Rounds, Co, February 1925), 17-27.