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“Misremembering Risk in the Age of Hurricanes: The Rhode Island Coast in the 1930s-1950s”

Coastal Studies and Society (2021)

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Abstract:

This paper explores the lost history of New England hurricanes and how the “return” of hurricanes challenged understandings of the environmental vulnerabilities of coastal communities and weather. A series of severe New England hurricanes from 1938-1954 forced Rhode Islanders to reassess coastal vulnerabilities and protection strategies. Before the hurricane of '38, Rhode Islanders lived with the vulnerability of seasonal erosion and winter storms, but believed their state was, and would remain, safe from hurricanes. In a new era of the shore-at-risk, the Army Corps of Engineers re-wrote the forgotten history of coastal dangers. Dense development along Narragansett Bay and the economic incentives to safeguard Providence, Rhode Island's only large city, led state and federal authorities to address the environmental vulnerabilities wrought by hurricanes. The result was the U.S. Army Corps of Engineers' pathbreaking analysis of the tidal dynamics of Narragansett Bay. Investigating human responses to coastal environmental threats, this paper reveals the political and engineering histories that attempted to reconcile hurricanes, risk, and coastal vulnerability in the state at midcentury.

Keywords: Rhode Island, Hurricanes, Army Corps of Engineers, New England

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On September 21, 1938, the impossible happened: a hurricane hit southern New England.

At the time, most Rhode Islanders believed it was impossible for such a storm to occur in this northeastern corner of the United States. One resident recalled that she, a young woman at the time, had schooled her father, a Florida man, for suspecting the storm was a hurricane. She told

him “don’t be silly. In Rhode Island we don’t have hurricanes.”¹ As Santo Amato, another resident explained, “I don’t think two out of two hundred people actually believed or realized that it could happen. And it did.”² Underestimating the 1938 storm’s path and intensity, the U.S. Weather Bureau officially downgraded the hurricane to a tropical storm in its morning forecast on the 21st, and chose not to issue a warning on the possibility of a major weather threat.³ The storm, however, proved devastating and deadly for Rhode Island, neighboring Long Island, and the rest of New England. By afternoon, the storm ominously appeared on the horizon. Decades later a survivor recalled the odd feeling of its low barometric pressure and the color of the sky, a “frightening dark gray—an odd gray—like nothing that I had seen before.”⁴ Hurricanes alter landscapes in three ways: winds that can top 100 miles per hour rip trees from the ground and roofs from houses; torrential rain produces floods; and the sea, which rises before the wind, produces storm surges and floods that destroy buildings and infrastructure.⁵ The September ‘38 hurricane brought these dangers into stark relief; it proved to be one of the deadliest and most destructive storms ever to hit New England.

The two decades following the ‘38 storm fundamentally remade coastal history in Rhode Island. These decades marked the end of the era in which this region existed without hurricanes, a perspective based on a collective forgetting of local weather history. This article explores both this lost history and how the “return” of hurricanes to New England challenged understandings of the environmental vulnerabilities of coastal communities due to weather. The late 1930s ushered in a new era in which hurricanes became a fundamental part of coastal management. But as the Army Corps of Engineers, state and federal legislators, and residents grappled with a series of powerful hurricanes, governance and coastal management initiatives butted up against divergent understandings of the nature of Rhode Island’s littoral.

Fig. 1. The state of Rhode Island, in southeastern New England.
Adapted from Google Maps.

Rhode Island is nicknamed the Ocean State. No point in it is more than twenty-five miles from the shore. As the U.S.'s smallest state, Rhode Island is only thirty-seven miles wide and forty-eight miles long (Fig. 1). Its eastern side is U-shaped, filled with the 176 square-mile Narragansett Bay. The state has nearly 400 miles of shoreline, forty of which are ocean-fronting—the majority fronts the bay. The sea has long shaped life in Rhode Island. The naval base in Newport, the state's primary harbor to the south, existed due to Narragansett Bay's deep navigable mouth, while Providence, the state capital, influenced the economy as one of Rhode Island's two most important commercial ports at the northern end of the bay. Until 1938 Rhode Islanders had lived with the vulnerability of seasonal erosion and winter Nor'easters, but not hurricanes. In the early twentieth century, hurricane landfall in New England was relatively rare compared to landfalls in Florida and along the Gulf Coast. No significant hurricanes hit Rhode Island in the first three decades of the century. As a result, the state was unprepared in 1938 for the damage its coastal waters could inflict when magnified by a hurricane.

To examine how forgetting and remembering coastal risk shaped community and governmental responses to hurricanes in Rhode Island, this article brings together Army Corps of Engineers history with the complementary, and often intersecting, scholarship of coastal risk, disaster studies, and memory studies. In the mid-twentieth century, the U.S. government tasked the Corps with designing structural solutions to address hurricanes. The history of the Corps' work on Narragansett Bay reveals the complexity of the agency's approach to the coast: its ambitions, its attention to environmental dynamics—unusually comprehensive for the era—, and its predisposition to hard protective structures.⁶ The Corps' critics point to such structures as evidence of the agency's misguided, technocratic faith in its ability to control the environment. Disaster scholars have, in turn, investigated how structural responses, such as barriers designed to control storm surge, can generate a misguided sense of security among residents, leading to increased floodplain development.⁷ The Corps' mid-century Rhode Island work reveals how the agency advanced scientific understanding of littoral environments while also advancing the assumption that engineering feats could make even hurricane-prone coasts safe for development.

Memory and disaster studies illuminate how collective memories of flooding and hurricanes shape community preparedness for future disasters. Scholars of coastal risk underscore that disasters like the '38 hurricane have long histories.⁸ The scale and severity of hurricane damage is shaped by human decisions about where and how to build. Devastating storms, Andy Horowitz writes in his history of 2005's Hurricane Katrina, are discrete meteorological events, but "who is in harm's way is the product of political decisions and social arrangements."⁹ Scholars of community memory and disaster argue that resilient communities sustain collective or social memories that ensure such past decisions and social arrangements inform future preparation. Yet a robust social memory can be difficult to maintain, as geographer

Lindsey McEwen and her colleagues show, when events are not “actively remembered” but “actively forgotten.”¹⁰ French sociologist Maurice Halbwachs, who developed the theory of collective memory in the 1920s-1940s, contended that one reason memories survive is the extent to which they are indexed into architecture and physical space, particularly in concert with living memory, material records, monuments, and ruins.¹¹ In terms of disaster history, environmental historian Christof Mauch argues that

memory of natural disasters is, in contrast to the memory of war, markedly short-lived...There are no veterans’ associations and but few memorials to keep alive the memory of great natural disasters; similarly, catastrophes caused by nature frequently receive no mention whatsoever in history books. In this way acute disasters at any given time eclipse destructive natural phenomena that occurred in the past.¹²

Rhode Island’s lost hurricane memory lessened regional preparedness and resilience to storm damage in 1938. In the 1950s and 1960s the state, via the Corps, historicized this new era of the shore-at-risk as part of its attempt to protect Narragansett Bay from hurricanes.

This article explores the process of remembering New England hurricanes and the uses, as well as the limits, of those memories in mitigating coastal risk. At midcentury, the Corps rewrote the history of coastal dangers in Rhode Island via a hurricane protection plan. The 1930s through the 1950s ushered in a new era in which hurricane dangers became a fundamental part of Rhode Island coastal living, federal response to coastal hazards, and risk mitigation. The hurricane history the Corps unearthed and the hurricane barrier it ultimately completed in Providence in 1966 became repositories of social memory. The subsequent modest impact of remembered hurricane hazards on coastal land use suggest, however, the power of “active forgetting,” the choice to ignore coastal dynamics and residual risk, as the lure of the ocean and bay endured.

The Ocean State and New England Hurricanes

The September 21, 1938 hurricane hit in an unprepared Rhode Island at 4:00 p.m.. The storm made landfall twice—once on Long Island and once in Connecticut. The second landfall brought the storm's most damaging winds and storm surge to bear on western Rhode Island. The hurricane took 250 lives in Rhode Island and more than 600 across New England.¹³ Since it hit in late September, the Ocean State's seasonal residents had largely left its beach and bayfront summer colonies, or the death toll would have been significantly higher. The storm demolished homes, roads, piers, and fishing boats. In normal conditions, Narragansett Bay is characterized by lower wave energy and less erosion than the state's ocean-fronting coast, but the hurricane temporarily altered the nature of the bay while also magnifying Atlantic coast erosion. Storm surge roared up the bay. One Rhode Islander recalled that before the storm "there were thirty homes along the Potowoment Beach...[on the bay]—and they were completely washed way. There was nothing there but the stilts and some of the foundations...It's a fantastic sight. And that same condition existed going all the way down into South County."¹⁴ The damage was extreme. Morgan Garrett, working as a firefighter at the time of the storm, remembered "seeing the houses smashed to pieces. It just seemed impossible that such a thing could happen."¹⁵ On the state's southwestern Atlantic coast, the storm wiped Misquamicut Beach, Napatree Point, and Charlestown Beach clean of human habitation (Fig. 2).

Fig. 2. The destruction at Cole River (top), and Misquamicut Beach (bottom) after the 1938 Hurricane. Cole River is in Warren, a town near the mouth of the Providence River, at the top of Narragansett Bay. Storm-surge swept debris buried the buildings along the river. At Misquamicut Beach, in Westerly in the southwestern corner of the state, the stretch of bungalows that faced the Atlantic are simple gone. Source: Cole River in Warren, 1938 and Misquamicut Weekapaug Wreckage (Westerly), 1938, Department of Public Works Hurricane damage photography. Courtesy of the Rhode Island State Archives.

Rhode Islanders were unaware of and unprepared for the hurricane's potential damage.

Residents only remembered the absence of storms in their lifetimes, rather than the longer weather history that predated their experiential knowledge of the coast. Perris Dove claimed “on

the radio we had heard the word ‘hurricane’ mentioned. But being as in the New England Area we had never had a hurricane, we just figured they were all to the south.”¹⁶ Leona McElroy Kelley further explained “we...had no idea even then what a hurricane could be...But I don’t think we were aware enough of what nature could do and things had been status quo for years, and we just figured it was going to go on.”¹⁷ Scholars of memory and resiliency define “social memory” as a collection of traumatic experiences of disruptive events. In the aftermath of a disaster, social memory is a community resource “that draw[s] on reservoirs of practices, knowledge, values and worldviews” that can sustain public awareness of risk (like floods or hurricanes), enhance future responses to them, and mitigate future damage.¹⁸ Rhode Islanders who experienced the storm of September 1938 lacked such a social memory to prepare them the destruction.

Ocean State residents expressed awe at how unprepared they were for the devastation of the ‘38 hurricane; their regret was, in a way, a lament for a missing social memory. Marilyn Fogel Schlossberg, who weathered the storm in Providence, recalled that when her father saw water in the street, he thought it was a broken water main. The 1938 had storm caught the city unawares; “no one,” according to a contemporary report, “appeared to have any idea that the city was about to be literally torn up by the roots in spots and that Narragansett Bay was to roll up the streets of downtown Providence.”¹⁹ Four decades later in the late 1970s, oral history interviewees expressed still-fresh amazement that New England could be so unprepared. As another survivor explained “our generation had never seen or heard of one [a hurricane]. It just came as a complete surprise.”²⁰ Interviewees also often expressed a sense of remorse or failure about Rhode Islanders’ lack of knowledge. “Even Quonset Point Naval Air Base, with its weathermen and everything else,” Ted Metcalf regretfully recalled, “We never heard a word

about it. Wasn't in the weather. Wasn't in the news. Nothing. We could have boarded up. We could have been prepared.”²¹ Metcalf regretted that Rhode Island lacked the memories with which to better weather hurricanes.

The meteorological conditions of the summer and fall of 1954 proved the '38 hurricane was not a once in a lifetime event. Seventeen years after the '38 storm, three hurricanes hit the Atlantic Coast, including the Ocean State, in summer and fall of 1954: Carol in August, Edna in September, and Hazel in October. Like the 1938 storm, Carol hit nearly coincident with gravitational high tide, causing significantly more severe flooding than Edna and Hazel. Both storms produced flood levels of fifteen to sixteen feet above mean sea level at Providence.²² After Hurricane Carol in August, Providence's downtown district was declared a disaster area: water inundated approximately 500 acres of the city's industrial and commercial core. Twelve feet of water covered a quarter of downtown. Of the total flood damage suffered around Narragansett Bay, Providence shouldered nearly a third of it. If the hurricane floods of the 1930s-1950s were to reoccur, Providence would suffer damages totaling approximately \$220 million.²³ The return of hurricanes inspired a reassessment of coastal environmental hazards. The storm physically reshaped the Rhode Island shoreline, but it also transformed the state's coast into a landscape of far greater vulnerability, although this new reality unfolded across nearly two decades.

The destructive storms of 1954 forced Americans to build a new social memory of New England hurricanes. Hurricanes no longer hit only the still-comparatively-undeveloped shores of the south, of Florida, Texas, and South Carolina, but the center of the nation's power and populations, the urbanized Atlantic coast. A mid-1950s Yale University City Planning Survey designated the entire 600-mile area of the eastern seaboard from Portland, Maine, to Norfolk,

Virginia, as a single, linear city containing one-fifth of the Nation's population.”²⁴ In density of population at midcentury, Rhode Island ranked first in the nation. By the 1950s the rate of urbanization in the bay’s coastal zone and the reappearance of hurricanes brought to light the environmental hazards inherent to Rhode Island’s coast.

The Army Corps and Recovered Hurricane Risk in Rhode Island

No longer omitted from local memories, the potential danger of New England hurricanes became starkly apparent. The 1938 storm spurred Congress to authorize an Army Corps study to historicize and protect against hurricanes; the hurricanes of 1954 additionally moved the U.S. Weather Bureau to study hurricanes and provide guidance on risk reduction. While the Corps had studied coastal engineering since the 1930s, hurricanes officially became part of its protection program in 1955 with the passage the Bush Hurricane Survey Act, an act that specified the storms of ‘54 as its inspiration.²⁵ In the same year, 1955, congressmen from New England sponsored a bill that funded the Weather Bureau’s new National Hurricane Research Project (NHRP) to advance scientific understanding of hurricane formation, improve forecasting, and coordinate hurricane studies across various offices and agencies within the bureau.²⁶ While the NHRP focused primarily on weather science, like the Corps it also endeavored to assess community exposure to hurricane dangers and maximize community hurricane preparedness—it even drafted a model coastal community hurricane plan.²⁷ The NHRP ran parallel to the Corps’ hurricane protection research.²⁸ NHRP researchers acknowledged that the infrequency of damaging hurricanes inhibited social memories of such threats. Both the NHRP and the Corps’ work were a means by which the government hoped to booster hurricane preparedness in coastal communities.

The Bush Hurricane Survey Act of 1954 marked the culmination of more than two decades of the Corps' growing influence in coastal issues. Congress had first empowered the Corps to address coastal erosion in 1930 with the establishment of its Shore Protection Board and Beach Erosion Board.²⁹ The agency's research in erosion and storm surge effects, which required work in the sciences of oceanography, meteorology, fluid mechanics, electronics, and structural mechanics, helped establish the field of coastal engineering.³⁰ An agency history of the Beach Erosion Board's work between 1930 and 1960 claimed that the research spurred a "new interpretation of the shore:" "[i]t was not the physical factors operating upon the coastline which had undergone a dramatic change but rather man's perception of them...Increasingly, the ocean generally, and the waves in particular, became depicted as 'enemies'—threats which had to be controlled to the greatest extent possible."³¹ That this reframing aligned with the seventeen-year period of severe hurricanes between 1938 and 1954 may have been a coincidence, but the storms must have seemed to validate the Corp's expanded work.

The Bush Hurricane Survey Act expanded the Corps' influence over the water-land system of Narragansett Bay. At the time Congress passed the act, the Corps was already investigating local proposals for harbor improvements and barriers on the bay under various congressional resolutions. Existing projects included a feasibility study for deepening the waterfront channel of Newport Harbor, and the possibility of small-boat harbors at Greenwich Cove.³² The Corps also maintained navigation channels in Providence and Taunton, Massachusetts, on the east side of the bay, and had authored navigation reports necessary for the construction of various breakwaters and jetties. In 1955, the New England-New York Inter-Agency Committee's *The Resources of the New England-New York Region* identified the coast as a public utility and the location of substantial economic investment in need of protection. This

conclusion aligned with the Corps' new directives. The New England Division organized a Hurricane Protection Unit to investigate how hurricanes heightened the flood dynamics of the bay. In the fall of 1955, survey teams set out to "make damage surveys based on the devastation caused by recent hurricanes, economic studies to determined [sic] the feasibility of various barrier proposals."³³ The survey stood apart from the Corps' earlier work on Narragansett Bay. Rather than look at a specific protective structure, the report took the ambitious perspective that the entire twenty-six mile-long and nearly seven-mile wide bay was a single unit that could have a comprehensive protective infrastructure on a much larger scale. It was remarkable in that it was based on an ecological understanding of the entire bay, a step towards conceptualizing it as a large-scale environmental system. The survey, but one piece of the Corp's late-1950s Narragansett Bay hurricane protection studies, was the most extensive study of the bay undertaken, and the largest coastal study ever undertaken by the Corps up to that point.

The Corps based its 1950s work on both scientific modeling and historical research that unearthed forgotten New England weather dangers. This research had begun in the aftermath of the '38 storm. In a 1939 survey, the Corps had uncovered a record of New England hurricanes by combing through colonial histories and archival materials. Evidence of these storms, Corps researchers had discovered, dated back to the August 1635 journal entries of William Bradford, governor of Plymouth Colony. Three years later John Winthrop, governor of the Massachusetts Bay Company, had also recorded a hurricane on Narragansett Bay.³⁴ Researchers found evidence of tropical storms and gales of less intensity throughout the eighteenth and nineteenth centuries. And as evidence multiplied in the nineteenth century, the corps rediscovered an 1815 hurricane and two in September 1821 alone. The extensive records of mid-nineteenth century storms revealed that the hurricanes that reached New England between 1869 and 1938 diminished in

intensity before landfall. Reconstructing a historical record of New England hurricanes had led the Corps to conclude in 1939 that “during the period from 1635 to 1900 hurricane flooding of damaging proportions occurred nine times;” damaging hurricanes occurred at least every twenty-years, and severe storms every seventy-five.³⁵ Hurricanes had in fact always been there in New England’s historical record; it was just that forgetting was also a fundamental part of the region’s weather history. With this unearthed history, the potential danger of development at Rhode Island’s water-land interface came into sharp relief.

By the 1950s the Corps looked to incorporate its research concerning historic New England hurricanes into a comprehensive plan to mitigate storm effects on Narragansett Bay. Researchers began by charting tidal patterns and volume and undertook a hydrographic survey to measure and describe the bay’s physical features and predict change over time. The 1950s study also included a damage survey. Corps members described the work as “essentially...a door-to-door inspection of the hundreds of industrial, commercial, residential and other properties affected by the flood.” Analysis included property descriptions, extent and depth of flooding, the nature and amount of damage, and relationships to prior flood levels. This damage survey was a way to formalize local community memories into the new governmental records of hurricanes. Corps researchers also calculated estimated costs that could be avoided if barriers were built to prevent damage during a “standard project” hurricane. This recapitulation of past hurricane meteorological and hydrological records inscribed memory of past damage into economic justifications for protective structures.³⁶

Geographer Craig E. Colten argues that such coastal engineering research, development policies, urban planning, and construction codes can all maintain memories of coastal risk.³⁷ In addition to its historical survey and cost-benefits analysis, the Corps reestablished Rhode Island

hurricane memories at midcentury through its research at the U.S. Waterways Experiment Station (WES) in Vicksburg, Mississippi, where it built a model of Narragansett Bay. The scale model, stretching 100 feet wide and 250 feet long and covering 15,000 square feet, reproduced the contours and elevation of the bay floor and the 256-mile shoreline, as well as the streams entering the 176 square-mile bay (Fig. 3).³⁸ The model let the Corps reinscribe hurricane floods on Narragansett Bay. This project of “active remembering” reflected the agency’s belief that hurricane and flood projections required awareness of the past so that neither the bay’s water, nor memory, were mismanaged in a way that exacerbated coastal risk due to damaging storm surge.

Fig. 3: U.S. Waterways Experiment Station Model of Narragansett Bay. United States Army Corps of Engineers, *Hurricane Survey, Interim Report, Narragansett Bay Area: Rhode Island, Massachusetts*. Boston: The Division, 1957.

Once WES engineers successfully modeled typical conditions of the bay system, they began investigating how climate events augmented the destructive power of Narragansett Bay waters.

The model was of fixed-bed construction, meaning bank materials did not erode and no sediment deposition occurred. It included a tide generator and a separate hurricane tide generator. To analyze potential hurricane flood levels, the Corps reproduce the bay's typical stream current and tidal actions as well as the impact of historic storms on these patterns with the model. Using its 1939 historic survey of hurricanes, the Corps collected data on the twenty-nine storms that had caused high tides in Providence. The Corps understood that the energy reaching the coast via typical wind and wave patterns could increase during storms, and such high energies made coastal zones vulnerable to storm surge.

The WES study revealed that the southern New England shore was not hurricane-free but in fact the nation's most hurricane-vulnerable coastline. Model tests and historic storm analysis led the Corps to conclude that Narragansett Bay's exposed location in the path of hurricanes and its particular physical features were the cause of "devastating tidal floods."³⁹ This condition, the Corps realized, was the result of both the nature of northern hurricanes and the unique geographic, geologic, and oceanographic characteristics of Rhode Island, which amplified storm damage. Northern hurricanes move two to three times faster than southern hurricanes and have enlarged wind fields. Additionally, hurricanes follow a mostly coast-normal track that carries their more devastating right side across New England. The right side, or east side, of hurricanes create the strongest weather. It is the side that moves most frequently across Rhode Island and the rest of New England. The Corps determined that the topography of the bay compounded the destructive potential of such storms. Since the bay opens directly to the south, hurricane waters are able to funnel directly north. The bay, which tapers as it stretches inland, acts as a natural funnel for hurricane storm surge, with Providence sitting straight in the path of this flood. In '38 and '54, storm surges between twelve and sixteen feet inundated the downtown business district.

WES engineers concluded that a future flood could exceed recent floods by three feet and reach elevations up to nineteen feet above mean sea level in Providence.⁴⁰ In its third phase of study, the WES engineers built a variety of hurricane dams to scale in the model. Station engineers tested the barriers with a tidal design flood of a twenty-knot speed storm due to such a storm's “higher elevation and greater volume at the mouth of the bay,” which created a design flood capable of producing “a more severe test of barrier structures.”⁴¹

Fig. 4: Protection of Narragansett Bay from hurricane surge—the proposed barriers for the bay. United States Army Corps of Engineers, *Hurricane Survey, Interim Report, Narragansett Bay Area: Rhode Island, Massachusetts*. Boston: The Division, 1957.

Combining recent memories of the devastation of 1938 and 1954, historic records of hurricanes, cost-benefit analysis, and hurricane flood modeling, the Corps built a scientific understanding of hurricane impact on Rhode Island that it used to propose a series of hard defenses for Narragansett Bay. The Corps concluded “[t]he only practical means of protecting” Rhode Island’s coastal zone was through the construction of an ambitious network of tidal flood barriers. The Corps recommended a series of Lower Bay barriers, with navigation openings, across the three entrances to the bay (Fig. 4). The Corps estimated that bay barriers would prevent more than 90% of the design flood damages of \$126 million on the Bay (not including Providence, which a separate barrier would protect).⁴² The proposed Lower Bay barriers were nevertheless secondary in importance to the need to protect the state capital. The Corps requested authorization for the immediate construction of a Fox Point Barrier in downtown Providence across the Providence River. The Corps declared the 2,800 foot wide storm surge barrier was “urgently needed,” and that “[o]ne great flood would pay for the Fox Point project cost several times over.”

The Lower Bay barriers presented the most difficult engineering challenges of the Corps’ Rhode Island protection proposal. The plan called for rock-filled dams with navigation openings across the bay’s West and East Passages. Combined, the two barriers would require more than thirteen million tons of stone. Gates would need to be built to close these navigation channels before a hurricane. Since the Lower Bay was as deep as 160 feet, a gate large enough to fit the Navy’s required 1,500 foot navigation opening was unprecedented.⁴³ The nearest comparable installation was the dike built across Galveston Harbor, Texas, following the hurricane and storm surge of September 1900.⁴⁴

Providence's concrete Fox Point Barrier, completed in 1966, was a pioneering example of the hurricane protective works that the Corps successfully lobbied for in the mid-twentieth century (Fig. 5).⁴⁵ The more ambitious Lower Bay barrier system, however, was never built. Additional research concluded these barriers would not adversely affect fish and wildlife, tidal flush, navigation, or naval requirements—an unusually comprehensive environmental study for this pre-environmental impact statement era—but the fiscal and engineering challenges of the project, protests from wealthy and politically-connected yachtsmen in Newport, and opposition from state representatives, including Governor John H. Chafee, blocked the project.⁴⁶

That the proposed Lower Bay barriers were never built is somewhat misrepresentative of mid-century shore protection trends. In this era, as historian Andrew Kahrl has shown, coastal communities frequently demanded, “and state and federal officials (with rare exceptions) readily agreed to,” large-scale coastal engineering protections.⁴⁷ In the 1950s hard structures like jetties,

groins, breakwaters, and seawalls were accepted as the best means to protect coasts from storm damage and erosion. But, as would become clear in the following decades, they also had the potential to negatively impact coastlines they were meant to protect by interfering with littoral processes, sometimes worsening flooding and erosion. The Corps' critics often point to structures like the proposed Lower Bay barriers as proof of the organization's hubristic belief that it could re-engineer any coastal environment.⁴⁸ At the same time, however, the Corps' plan also represented the agency's efforts to reinscribe hurricane memory in coastal Rhode Island. The Corps unearthed a history of New England hurricanes and built the Fox Point barrier as a structural reminder of the risks of hurricane floods.

The Corps' focus on storm surge drove the agency's new approach to the relationship between land and water on Narragansett Bay. From its establishment in the nineteenth century, the agency had focused on navigation and had favored working with water over land—its expertise was largely vested in flood projects.⁴⁹ And the Bush Hurricane Survey Act of 1954 had authorized the Corps to focus its tools and financial resources on flooding. Despite this narrow focus, however, the agency's approach was not hubristic in regards to other environmental processes. The Corps made the first careful scientific study of the bay's tides, channel depths and hydrography, in other words the first comprehensive study of the water half of the land-water interface, as part of this hurricane project. Corps scientists and engineers were aware that they lacked a total understanding of how coastlines evolved naturally, never mind the effect of humans on this long-term process. Their projects were attempts to not only understand coastal processes and build a robust collective memory of the threat of hurricanes but to build memories of how storms interacted with Rhode Island's coasts into protective structures.

While the Corps reports on Rhode Island hurricane hazards emphasized the bay's tidal dynamism, this view of the movement of water was not matched by the inclusion of coastal change in the agency's hazard mitigation plans. Due to the mechanics of littoral drift, coastlines regularly shift. Waves and winds along the coast erode rock and deposit sediment on a continuous basis, although rates of erosion and deposition vary considerably daily, seasonally, and annually. Hurricane storm surge could also reshape the shore: the storm '38 cut Napatree Point, on the southern side of Watch Hill Harbor, into three small islands.⁵⁰ Yet the Corps' study of Narragansett Bay focused only on flood tide dynamics. The environment of sand, dunes, and salt marshes did not exist in the Corps' report; neither did the ecological processes that maintained these dynamic environments. WES engineers modeled the bay, New England's largest estuary, as an impervious landscape made of concrete. This reduction of the littoral to a hard surface reflected a blind spot in the Corps' perception of the nature of the bay. The model's hard shores did not acknowledge natural littoral movement, and WES reports did not address this omission. Focused on but one aspect of the bay, water as flood tide, the Corps defined its water as invading a space where it did not belong (Fig. 6). At mid-century Rhode Island "positioned the sea as the enemy, aiming to construct projects that would keep water out, forming a hard line between water and land."⁵¹ This framing ignored the fact that periodic flooding was inherent to Rhode Island's environment.⁵²

Fig. 6: Government officials framed the Atlantic Ocean, and its weather, as Rhode Island's enemy. Rhode Island Development Council, *The Governor's Study Committee's Interim Report: R.I. vs. Hurricanes* (1954). Report Courtesy of the RI State Archives, RI Development Council Records. This report is a reprint of a previously published report circulated by the Providence Journal Bulletin in 1954.

As the Corps' proposal for Narragansett Bay suggests, by 1960s the federal government increasingly saw hurricanes as hazards that could be managed, no matter the scale of engineering required, to protect against coastal flooding. And in this decade, another destructive hurricane again pushed the federal government to ameliorate coastal risk, this time through flood insurance. In the wake of 1965's Betsy, the nation's first billion-dollar hurricane, Congress created the National Flood Insurance Program (NFIP) in 1968 to offer low-cost insurance to property owners in flood-prone areas, reduce federal disaster and flood control spending, and, hopefully, discourage development in hazard zones.⁵³ While the NFIP's flood insurance risk maps (FIRMs) inscribing hurricane memory into real estate markets by demarcating hazardous

zones, the program did not reign in coastal development. As subsidized flood insurance lowered the risk of owning coastal property, the economic benefits of development proved stronger than risk mitigation.⁵⁴ Environmental scholars have framed the NFIP as an example of a “moral hazard,” the lack of an incentive to avoid risk when a person has protection from the consequences of that risk.⁵⁵ In 1977 the chairman of the Rhode Island Coastal Resources Management Council John Lyons, a survivor of the ‘38 hurricane, expressed his frustration with the program. “The intent ... was to try to prevent people from building homes in highly hazardous areas. But it’s had a direct opposite effect...by the nature of having insurance to insure any kind of building on it, it’s made it possible for many people to build in this highly hazardous area that wouldn’t be there if it wasn’t for the insurance.”⁵⁶ While Geographer Craig E. Colten contends that the NFIP’s maps, based as they are on historical flooding and meteorological data, “represent one form of flood memory,” geographer Susan Cutter points to the limits of the maps’ social memory.⁵⁷ Lyon’s 1977 observation speaks to Cutter’s argument that the government spreads financial risk away from the coast via nationally-pooled insurance premiums, federal disaster relief, and subsidy programs, coastal property owners are not asked to face the full cost of their water views.⁵⁸

The late 1960s and early a 1970s ultimately marked a legislative turn to coastal zone management at the federal level via the NFIP and the Coastal Zone Management Program (CZMP). Yet the program shifted the focus in the coastal zone away from the physical attributes of the dynamic coastal system—landscape receding inland from the shore, the waters of the bay, and the submerged bay and ocean floor—to focus on governance mechanisms, like the NFIP, that had limited success in lessening residents’ exposure to coastal risk. The physical environment was largely absent from the CZMP, beyond general statements on the importance of

preserving sensitive ecosystems and public beaches. The CZMC, like NFIP and the Corps' Narragansett Bay hurricane study, shared a common goal in Rhode Island (and across the nation): to protect coastal property. Yes hurricane barriers inscribed memories of past floods into a landscape and FIRMS memorialized hurricane risks in real estate. But just as social memory can be formalized into physical barriers or flood insurance regulations, nonenforcement or the gradual dismantling of policies can erode resilience. And protective structures, while reminders of hurricanes past, can also create a false sense of security, allow, as Colten and Amy Sumpter argue, "social awareness of extreme and unsafe situations to fade, and diminish "individual involvement in hazards preparation."⁵⁹

The Limits of Hurricane Social Memory

Even after the mid-twentieth century forced Rhode Islanders to register hurricanes as part of local community memory, this remembering did not necessarily reshape communities' relationships to their environment. In the wake of the '38 hurricane a few Rhode Island localities issued construction bans in the communities that had sustained the worst damage. For example, the Westerly Town Council banned all building on Napatree Point, where the hurricane destroyed more than 100 houses and storm surge had turned the barrier beach into a series of islands. But in other communities, coastal property owners rejected redevelopment restrictions.⁶⁰

Rhode Islanders who in the 1970s recounted the trauma of the '38 hurricane, having also lived through the three hurricanes of '54, split as to whether the state's shores should continue to be developed. Those who said the coast should not be developed pointed to the danger to human life, the cost of government-backed insurance, and the complications of having to rescue coastal residents in storms. Nancy Allen Holst recounted the grim work of looking for bodies in

Charlestown Pond, the smell of the morgue, and the total destruction of East Greenwich's Frenchtown section, noting "the power of the water driven by tide and hurricane winds is absolutely tremendous." But when asked in the 1970s, if she would invest in waterfront property she, like a number of interviewees, said, "Sure...If the people wanted to take a chance, it's up to them."⁶¹ Rhode Islanders struggled to reconcile their state's reconstructed history of environmental risk with traditional property rights associated with long-standing, if misremembered, understanding of a hurricane-free shore.

The collective understanding of the '38 hurricane that emerges from oral histories is self-conscious of the community's tendency to misremember or forget the power of hurricanes. Following the 1635 hurricane William Bradford wrote of a "mighty storm of wind and rain as none living in these parts, either English or Indians ever saw. Being like to those Hauricanes and Tuffons [sic] that writers make mention of in ye Ineas [sic]."⁶² It is impossible to know if the storm was an unprecedented as Bradford claimed, particularly given the Corps' conclusion that severe storms occurred at least once, if not twice a century, between 1635-1900. Bradford maintained, just as Rhode Islanders would in 1938, the newness of an environmental event that in all likelihood had a history that predated his experience. Hurricanes, it turned out, had disappeared from local collective memory since Europeans first settled New England.

In the mid-twentieth century, Ted Metcalf captured the forgetting underway: "for a while, people who had it wanted to rebuild, but nobody wanted to buy it. But then people forgot. After a few years they forget this was a desert, that 200 people died here, that 50 cars were buried in Weekapaug Pond with people in them."⁶³ Metcalf's "desert" analogy seems important to memory production surrounding the disaster of 1938. A powerful hurricane can completely erase a coastline, removing any physical reminders of flood lines that might assist communities in

recalling past dangers.⁶⁴ On Rhode Island's Atlantic beaches, bustling with summer colonies suddenly appeared "desert-" like: uninhabited, unpeopled, undeveloped, vacant space. Perhaps the extreme extent of destruction in '38 and lack of subsequent memorials to mark the erasure enabled the misremembering of dangers inherent to the coast.

Neglected memories of New England hurricanes reveal the power inherent in forgetting. "I think it was a good ten years before anybody even thought of building down there," Harold Browning explained. But he went on: "[i]t was only after pretty near a generation when people forget and start all over again. I notice its being built up now [1977]."⁶⁵ Such redevelopment is a reminder that recovered hurricane memories did not necessarily change local traditions of coastal living. The desire to live on the beach, the U.S.'s devotion to private property rights, and economic incentives of real estate development all contribute to active forgetting.⁶⁶ Robert W. Kates, a geographer who specialized in coastal hazards wrote in the 1960s, described the typical coastal resident, even individuals who had weathered a damaging hurricane, as exhibiting

a desire to deny hazard...coastal users are relatively well educated and well-to-do. They have come to the shore to partake of the attractions found at the interface of land and sea or to serve those who are so attracted. They are, by and large, knowing and well-informed about the general nature of the hazard they face, and as to the details, they are little worse off than the technical-scientific community. A high proportion of coastal dwellers take minimal steps to reduce their hazard, but many of them elect to live at considerable risk rather than reduce their seaward amenities.⁶⁷

Kates's study of fifteen Eastern coastal communities—which included Point Judith in Rhode Island—revealed that "despite the fact that ninety percent of...respondents experienced storms, only two-thirds expect[ed] storms in the future. And although half of them suffered some damage in the past, only a third expect[ed] a future storm to entail damage for themselves."⁶⁸ The comment of one survivor of the '38 hurricane potently underscored that the social memory of hurricanes does not lead inevitably to community resiliency and respect of environmental

limits: “We’re still a pretty complacent bunch of people, you know. We have to be kicked hard sometimes before we’ll move.”⁶⁹

Since geographer Gilbert F. White’s influential mid-twentieth century work on flood risk, hazard scholars have written of the false sense of security that rigid flood protection systems offer coastal communities. When asked to describe the government’s response to storm risks survivors of the ‘38 hurricane pointed approvingly to protective structures of seawalls and the Fox Point barrier as evidence that the government had “dealt” with storm threats.⁷⁰ Americans have embraced technological solutions to coastal risk but proven far less eager to change development habits along shore. Past calamities appear safely contained by engineering structures, leading to increased urbanization in flood-prone areas.⁷¹ Even with historic flood data embedded in NFIP’s maps, these memories are, Colten points out frequented contested at the local level as threats to development and economic growth.⁷² Protests erupted in 2012, for example, when Congress attempted to raise NFIP rates and update FIRMS. Protestors feared new information on flooding risk would affect property owners’ pocket books and municipal tax bases. In 2020 science writer Cornelia Dean summarized the problem: “for too long coastal communities have bet everything on a combination of federal largess and engineering know-how that was never sustainable... America’s biggest coastal mistake was creating federal subsidies that enabled developers to escape the realities of nature and the market.”⁷³

Conclusion: The Future of Coastal Hazards

In the 1950s, the Army Corps of Engineers recommended protections for Narragansett Bay based on a static model of the bay; yet coastlines are inherently dynamic, and the accelerating climate crisis is magnifying this quality. In the twentieth-first century, Rhode

Island's coastal risks are evolving. Warming surface water temperatures are fostering rising sea levels and stronger hurricanes. Future hurricane damage will increase as state's coastal flood zone, both on Narragansett Bay and on the Atlantic, migrates inland. Sea level rise will also reduce the protections offered by coastal defenses. Between 1930 and 1970, sea level rise in Rhode Island increased at an average of one inch per decade. In the 1970s, however, the rate started to accelerate, and in the ensuing four decades the mean high tide line rose six inches. Not only is sea level rise accelerating in the Ocean State, at a rate three to four times faster than the global average, this acceleration is projected to further increase.⁷⁴ The Coastal Resources Management Council (CRMC) projects sea levels will rise between three and five feet in Rhode Island by 2100.⁷⁵

Critics of coastal armoring, the construction of physical structures meant to protect coastlines and riparian structures from erosion or sea level rise, question whether inflexible structures like the Fox Point barrier will successfully check future storm surges.⁷⁶ Engineering works are designed on historic flood data; scholars of memory and environment disaster frame such projects as evidence of social memory.⁷⁷ Yet the climate crisis will most likely render even such active remembering and hazard mitigation plans, usually seen as a font of community resilience, moot.⁷⁸ That neither existing Corps projects and FIRMs incorporate sea level rise projections suggests the potential limitations of "active remembering" in informing resilient coastal management in the face of the climate crisis.

The climate crisis will exacerbate hurricane risk for Rhode Island's economy, essential infrastructure, and residents in the coming century. By the early twenty-first century, Narragansett Bay's "Metro Bay region," the area around greater Providence, housed a third of the state's 1.1 million residents. Populated at a density eight times greater than the remainder of

the state, the region is home to residents and businesses as well as storage and distribution sites of coal, oil, natural and liquefied gas, electricity, transportation and port infrastructure, medical and education institutions, and sewage treatment plants.⁷⁹ The region also straddles Rhode Island's 100-year coastal zone floodplain, which both the '38 Hurricane and 1954's Carol inundated. Sea-level rise, erosion, storm events, and extended flood zones are the central hazards threatening the Metro Bay region and the state at large. As the state Sea Grant and CRMC jointly warned residents in 2014, "the ocean isn't always the best neighbor."⁸⁰ Yet whether public support and political will exists to change coastal land use policies to reduce hurricane vulnerability as climate change raises the stakes of coastal risk in the Ocean State remains to be seen.⁸¹

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