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### Forced by Nature: Moving the Gay Head Lighthouse

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FORCED BY NATURE:  
ON MARTHA'S VINEYARD, A TOWN FIGHTS FOR THE LIGHTHOUSE IT'S  
ALWAYS KNOWN

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## FORCED BY NATURE

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On the island of Martha's Vineyard, the Gay Head Lighthouse stands 46 feet from the edge of cliffs that overlook the ocean. For as long as everyone can remember, the cliffs have been slowly receding. To protect the lighthouse, a historical monument beloved by all on the island, it is picked up and moved, in one piece, by professional lighthouse movers. As the story explains the technical process of moving the lighthouse, it explores the environmental factors that have necessitated such an extreme action, and muses on what it could mean for life on Martha's Vineyard—and beyond.

When you hear about the old days, about keeping glass clean and lamp lit in howling Nor'easters, about the keeper who lost six kids in ten years because this corner of Martha's Vineyard used to be a one or two day ride to the doctor—you assume the modern-day keeper of the Gay Head Lighthouse has a symbolic job. In the traditional way he does, but in many ways keeping the lighthouse is as difficult as ever.

Consider: As all lighthouses do, the Gay Head Lighthouse sits on an edge of land, over water. For years that edge had been moving closer. Aquinnah, the lighthouse's home town, hired movers to pick it up and move it – 52 feet tall and 400 tons heavy – in one piece. “The key to moving a lighthouse,” said one of the movers, “is to make it think it has not been moved.” And so on May 28, 2015, the Gay Head Lighthouse sat on a makeshift railway. Over the course of the month, a remarkable transformation had taken place below it.

First workers excavated a trough around the lighthouse, some six feet below its granite foundation. The trough extended around the lighthouse in a 30-foot radius and proceeded roughly 150 feet inland. As dirt disappeared from around the lighthouse, workers also tunneled underneath it, creating space to pass through long steel beams. As more dirt was cleared away, a total of four steel beams were passed through, spaced evenly below the foundation, forming a sort of flatbed rail car.

Under these beams, on the compacted dirt floor of the trough, a spec railway was built. 50-foot long beams were laid parallel to each other, starting under the lighthouse and pointing towards the other end of the trough, where a new concrete foundation had been poured. At their ends, another pair was bolted into place, adding an additional 50 feet of steel. These were rails.

In between the rails and the light's railcar, wheels were installed. Hilman rollers, to be precise—tank-like tracks of rolling steel cylinders, bolted to the underside of additional beams called main beams. On top of the main beams sat the lighthouse, on its car. Below were the wheels.

The goal was to move the lighthouse inland to safety. It is a historical landmark, 160 years old and counting, and more importantly, it is a symbol of the island, of – as everyone who lives there will tell you – “shared maritime heritage.” To find the lighthouse under siege by nature is an affront to the island's human community. And so at a time when man's assault of nature is a common trope, the people of Martha's Vineyard yield to the underlying reality: our environment is changing, and we must adapt. The key to moving a lighthouse is to make it think it has not been moved. The reason to move a lighthouse is the exact opposite.

The first Gay Head Lighthouse, a squat wooden octagon located atop the bluffs in Aquinnah, at the far western edge of Martha's Vineyard, an island of Massachusetts, was built in 1799. The waters of Vineyard Sound, between the island and the curling bicep of Cape Cod, were a superhighway of commerce. In 1857 the towns of that part of Massachusetts accounted for nearly half the world's whaling and more than half the value of the American catch. Warning ships of a formation called Devil's Bridge, just offshore of the Gay Head Cliffs, was a necessity. It was still so important in 1856 that the wooden lighthouse was demolished and a brick structure built in its place, stout enough to hold up a first order Fresnel lens, new technology that used precisely cut glass to vastly increase a light's strength.

It's a familiar pattern: our technological capacity for adaptation is formidable, but we humans become entrenched. The new lighthouse was still on Gay Head, where the cliffs have always been pretty, and they've always been trouble. In 1967, the late senator Ted Kennedy visited Aquinnah to speak out for preservation. "Three thousand years ago, the cliffs extended almost a mile farther out to sea than they do now," he said. "If they continue to disappear into the sea at their present rate of almost two feet a year, within 20 years these marvelous red, yellow, black, white and green cliffs will retain only a shadow of their present beauty."

In the five decades since, erosion has continued at much the same rate. The bluffs in Aquinnah are part of a particular geologic lineage. If a person had the inclination and keen enough eyesight, they could stand on the shoulder of New York State Route 27 in Montauk and see, perfectly aligned, Montauk Point at the end of Long Island, Block Island, Martha's Vineyard, the south shore of Cape Cod, and the city of Chatham, right at the cape's elbow. Today it is an axis of shoreline pocked with proud maritime villages and severe coastal erosion.

According to Byron Stone, a geologist from the United States Geological Survey who was consulted for the move, glaciers traced this line, their weight and motion plowing up an edge of land called a moraine and topping it with loose rubble called till. This till is not unlike the crusty lip of snow, dirt, and garbage raised at the edge of a road by a snowplow: it easily stands on its own, but trampled with enough snow boots, it won't last the winter. The southwestern corner of Martha's Vineyard, jutting into open ocean, is eternally trampled. Waves come in and beat against the cliffs, wearing them away. Complicating matters is Gay Head's hydrology. Studies by geologists, Byron included, suggest water from wetlands inland of the lighthouse seeps into the ground and travels to the sea, leaking out through the face of the cliffs, decreasing their fortitude.

Byron's job is to know the Massachusetts coast blind, and he is quick to point out that, in fact, Martha's Vineyard isn't the worst of it. Pull back 5,000 years, and the Outer Cape, from Chatham up north to Provincetown, would be three times its current width; today it's eroding at something close to six feet per year. Byron says on parts of the Outer Cape you could walk up to the bluffs and bury your finger in them. Easily. "There's no cement between the grains. It's loose sand. You could stick your finger in," he says. "You could stick your *little* finger in. You could stick your *tongue* in." The Highland Light, on the Cape Cod National Seashore, sits on a 160-foot pile of such loose glacial sand. In 1996, a company called International Chimney Corporation moved it 450 feet west.

Time is man's great blind spot: It is easy to ignore problems that run beyond the scope of a lifetime. The erosion that plagues the Vineyard; the sea level rise and climate change that are facts of life for the world at large—these are *force majeure*, acts of the gods, unmoved movers. We are in an era where things must be picked up, and moved, and it's not just lighthouses. Whole towns in Alaska are looking to be relocated as warmer seasons melt permafrost foundations and water chews up land. In the wake of Hurricane Sandy, houses on the Jersey Shore move like ants whose column got stepped on.

When Aquinnah realized the need to move the light, the town formed the Save the Gay Head Lighthouse Committee. Within that larger body a Relocation Committee was formed, headed by Len Butler, a contractor on the island. Len did a year in the merchant

marine; he's seen the light from the sea. Along with Richard Skidmore, he is the authority on the lighthouse move. Richard's early sightings of the light were from the beach, on acid, in the 1960s. Now he's co-keeper of the light with his wife, Joanie. They're different men, Richard and Len, but they both love this still-pastoral edge of the island – now a wealthy summer colony – and they both revere the light. When it comes to the lighthouse, they practically finish each other's sentences.

Richard: "Even for landlubbers, Len, when he comes, and if I come home at night, at some point, I'm going to see the flash of that light and think, yeah—"

Len: "I'm home."

They both understood the history of the bluffs well enough to know that moving the light to safety – such as can be found – was an exercise in geology. That's why they brought in Byron. The goal was to find a place where the light could be safe for 100 years.

Why 100 years?

"Well, that's three mortgages," says Byron.

"100 years gets it safely out of our purview," says Richard.

"100 years from now, maybe moving a lighthouse is no big deal," says Len. "You just put it through a matrix, *vroop!* We transport it."

The implication being, of course, that the lighthouse will have to move again. Time – erosion – marches on. Moving a lighthouse may neither be as sexy nor distressing as moving a whole village, but it is more symbolic. Or ironic: Lighthouses represent our mastery over nature. For millennia people have been building them to facilitate our increasing dominance of the natural world.

"With a lighthouse, the matter – the fact – is that it has to be on the edge, because it's not going to be seen otherwise," says Richard. A moment later: "You *want* to put the thing in danger. You know it's going to erode, but the thing can't function unless it's on the edge."

So Byron examined core samples of dirt on the bluffs to find a suitable location. Looking at the bluffs from the water, the most extensive point of land is red, with white sandy eroded faces receding on both sides. Of the soil components – red clay, white sand, green sediments, mixed to such vibrant effect as to earn the place its name, Gay Head – the clay, it seems, best resists erosion, perhaps because it is impervious to the groundwater infiltration that so weakens other parts of the soil. The lighthouse was moved to a resting place on this vein of clay, which in 100 years will be, perhaps, a red buttress between brick, candle, and sea.

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In February Len could hardly get his truck up his driveway. The ground was so frozen no one could even think about digging out the kind of trough you need to move a lighthouse. But aside from a little rain, May 28 is a beautiful spring day.

"It was awesome!," Len will say, before the day is over. It's been too long corralling contractors, sweating the small stuff. "At times I've felt like I was moving a lighthouse. I *literally* was this time."

Richard is here too. He is the guy who went to the Aquinnah selectmen in 2012 and said, "It's gotta be moved in 2015 if we're going to keep ahead of the erosion, it's

going to cost \$3 million, and International Chimney is going to be the people who can move it.”

Looking at the lighthouse up in the air – his handiwork – he says, “It’s like a Greek vase sitting on a plate, you know? It’s an object. Before, you never thought of it as an object. It was the Gay Head Light, and it was rooted to the ground. You didn’t think of it as a thing, you know? But there it is, a thing, a human made thing.”

Not all human made things get such sympathy. In 2013, a similar operation took place on the opposite side of Martha’s Vineyard. On the sometime-island of Chappaquiddick – its connection to the rest of Martha’s Vineyard is a narrow bit of sand that comes and goes with storms – a massive private estate was moved after losing well over 100 feet of shoreline in one year. Compared to the Gay Head light, the estate was bigger, heavier, and in more imminent peril. But ask around and that move is seen as a vanity project, almost an embarrassment. When it comes to the Gay Head Lighthouse and shared maritime heritage, nary a dissenting voice can be found.

It’s not too far to the concrete plinth where the lighthouse will be safe, at least for now. The plinth is designed to keep it at height, so ships will know they are seeing the same light they’ve been seeing since it was built in 1856. Continuity is a lighthouse’s most important quality. Sailors navigate the open sea by pinpricks in the black night, but near land? Give them steadfast, glowing, human made things.

In the spirit of continuity the move is attended not just by construction crews, lighthouse keepers, and reporters, but also by the next generation: second and third graders from Chilmark, Aquinnah’s neighboring town. They ask some questions: How tall is the lighthouse? How much does it weigh? How far is it being moved?

And then a pesky kid in Red Sox gear asks the three million dollar question. “In the future, do you think you’ll, like, have to move the lighthouse again?”

“Very good question,” says Len. “Very good question.”

“You know when you say ‘the future,’ that’s a very big word,” says Richard.

“It’s moving!” someone yells, and a whoop rises from the crowd. This is the moment the island has been waiting for. Except—well, is it moving? The spectators can’t really tell.

By this point the lighthouse is a hulking monolith, brick on top of beams on top of rollers on top of tracks on top of hard earth. The light itself has been fortified for the move. The doorways and open windows are bricked up with concrete masonry units. A compression collar wraps the upper reaches like a weightlifter’s belt. Two massive steel beams have been driven through the bottom of the light to support the center column that hangs its spiral staircase.

None of these are things you want to move too quickly.

International Chimney Corporation developed the plan for moving the lighthouse, but a company called Expert House Movers are the ones who actually move it, lead by a force of personality named Jerry Matyiko. A few minutes after the kids leave the site, he wanders over, short, burly, cigar clenched in teeth, bandana on head. “It’s like sex,” he said. “If it doesn’t stay up, you’re in trouble.”

Jerry has sixteen jacks rigged up under the light, in a triangle: groups of five on the left and right, and a group of six in the front. The jacks in each zone are locked together at a constant overall pressure, so that if one lowers, another raises. The three

zones define the plane the lighthouse sits on, and any point of the triangle can be adjusted to keep it level.

Then there's a pair of jacks set up behind the lighthouse. They are long extending arms, one cylinder that slides out of the other like the actuator on a storm door. Blasted with compressed air, they push the metal the lighthouse rests on, and it slides along the rails, which have been greased with Ivory soap.

This push moves so slow that Len has to try and give the spectators a visual reference, so their whoops and hollers are not in vain. He gets an orange cone and puts it on the rail, in front of the lighthouse's platform. The lighthouse moves forward, pushes it—and the cone slides, barely, still too slow to see.

Then Len gets another idea. He wedges the cone against the lighthouse platform. He finds a bit of scrap wood and balances it against the tip of the cone. The rail, the cone, the wood form a delicate triangle. As the lighthouse moves forward, it pushes on one corner, the cone pushes the wood—and the wood falls, with a minor *clack*. Len sets it again. *clack*.

The jacks push, telescoping until they've extended 65 inches. That's as far as they go. When they get there, Jerry turns off the air compressor that powers them, and his team sets about resetting: Tucking the extending cylinders back inside the push jacks. Moving them up the rails. Bolting them into their new positions.

Eventually, everything reset, the compressor is restarted and the pushing continues. It's slow going, mundane even—and entirely necessary.

Despite Aquinnah's best efforts, Byron Stone says the giant gorilla in the room is climate change. What happens as the sea level rises? As Jerry's team resets their jacks, 1,200 miles south, President Barack Obama is at the National Hurricane Center in Miami, talking about such questions. Delivering the Annual Hurricane Season Outlook and Preparedness briefing, he speaks of the consensus among climate scientists that climate change is likely to supercharge storms, that rising seas are presenting new challenges. He emphasizes resilience and technology, mentioning the hundreds of millions of dollars Miami spent to safeguard its water against encroaching oceans. "The truth is," he says, "we're better prepared than ever for the storms of today."

Two days later, the lighthouse reaches the end of its railway. Richard and Len celebrate in their own ways: Richard, alone, meditative; Len, exuberant in a hard hat. The thing about them is that neither is actually from the island. In local parlance, they're "wash-ashores." They've both been here a long time – long enough that in a small town like Aquinnah their memories of the place are long and rich and exhaustive – but the light, their light, is an adopted love. Perhaps for that reason, they've bought wholeheartedly into resilience, the notion that the lighthouse is something people of the future – vague, nameless folk they know will exist, like them – deserve to see, the way they first saw it.

When the kids from Chilmark were at the light, Len told them about the beginning and the ending of the move process. "The first thing we did is we took all the grass, and all the little shrubs, all the trees and everything, and we plucked them out of the ground," he said. "And we put them across the street to save them, so that after we move them we can put everything back, so that when you come back up here after it's all moved, it'll look just like it always did."



And so it will. The island will age. The school kids from Chilmark will get older, and, in all likelihood, they will leave. The island is a small and quiet place, getting smaller. Len and Richard will pass away. The people who helped move the light will, too. Those who remember seeing it happen—their memories will fade. Soon it will be hard to discern the lighthouse moved at all. Anticipating this, the Save the Gay Head Lighthouse Committee plans to leave a circle of rocks to mark the old foundation. But one day, that too will fall into the sea. The site, slowly but surely, will become what it always has been: a place of matchless beauty, a bit of history. A red brick, candle-topped chimney in a field of green, sentinel over harlequin cliffs, white-red beacon sweeping over people, who spend whole lifetimes believing we have not been moved.