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RESURRECTING THE PUBLIC TRUST DOCTRINE: HOW ROLLING EASEMENTS CAN ADAPT TO SEA LEVEL RISE AND PRESERVE THE UNITED STATES COASTLINE

ERICA NOVACK*

Abstract: The Atlantic coastline of the United States is experiencing sea level rise at a rate higher than the global average. Antiquated property laws and land use tools are unable to adequately assist state and local governments in managing coastal regions, in light of this threat. Rolling easements—prohibiting hard shoreline armoring and requiring the movement or abandonment of property once it becomes inundated by the sea—would allow for the natural inland migration of invaluable coastal resources such as beaches and wetlands. Further, enacting rolling easement polices would be a proactive step towards providing ocean-front property owners with notice of the necessarily finite nature of their property rights. In the long-term, such a policy would prevent future costs from emergency response needs, legal battles, and the loss of natural and economic benefits from coastal resources. Because the public already has a cognizable legal right in the coastline from the public trust doctrine, enacting a rolling easement policy to protect that legal right would not constitute a regulatory taking of private property. Sea level rise poses a particularly immediate threat to North Carolina and Virginia, therefore, this Note suggests that both states could benefit from enacting a rolling easement policy.

INTRODUCTION

The Atlantic coast of the United States is experiencing sea level rise at a higher rate than the global average.¹ Increases in global temperatures threaten ocean ecosystems by causing ocean acidification and coral bleaching.² Warmer waters increase the frequency and severity of hurricanes and

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¹ *Sea Level Rise and Coastal Regions*, U.S. GEOLOGICAL SURVEY [<http://perma.cc/2ALZ-D7ZG>] (original hyperlink no longer active) (“[C]urrent rates of sea level rise for the mid-Atlantic region from New York to North Carolina are considerably higher than the global average.”).

² *Climate Change and the Oceans*, NEW ENG. AQUARIUM, http://www.neaq.org/conservation_and_research/climate_change/climate_change_and_the_oceans.php [<http://perma.cc/5R5B-ENM4>]; see Michael P. Lesser, *Coral Reef Bleaching and Global Climate Change: Can Corals Survive the Next Century?*, 104 NAT’L ACAD. SCI. 5259, 5259 (Mar. 27, 2007), <http://www.pnas.org/content/>

other storms.³ As glaciers melt, subsidence causes land to bulge, increasing water levels.⁴ Finally, climate change is causing the ocean to rise through thermal expansion and ice melt.⁵

Sea level rise poses a threat to America's coastlines, and many of the affected coastal communities scramble to prepare planning policies when faced with disaster.⁶ The increased frequency of coastal storms and severity of storm surge threatens private properties along the coastlines.⁷ Naturally, property owners seek to protect their homes from these disasters, but unfortunately, not all homes can be saved, and not all methods of saving are desirable.⁸

Regional responses can be enacted to prevent or to adapt to climate change.⁹ Prevention involves creating laws to reduce or prevent greenhouse gases from entering the atmosphere.¹⁰ Prevention mechanisms include efforts to "prevent[] global warming by reducing [greenhouse gas] emissions

104/13/5259.full.pdf [http://perma.cc/6WEH-YW2J] ("For the last two decades, coral reef biologists have attributed much of the increase in coral mortality to coral bleaching subsequent to elevated seawater temperatures occurring on both regional and global spatial scales.").

³ *Climate Change Indicators in the United States*, U.S. ENVTL. PROT. AGENCY [http://perma.cc/7YDF-JCGF] (original hyperlink no longer active) ("Scientific studies indicate that extreme weather events such as heat waves and large storms are likely to become more frequent or more intense with human-induced climate change."); see Colleen R. Rush, Comment, *An Overflowing Global Tub: Why Rising Seas Are Spilling into the Streets and What the Government Can Do in Response*, 25 VILL. ENVTL. L.J. 275, 285 (2014).

⁴ Molly Mitchell et al., *Sea Level Rise: A Relentless Reality that Virginia Must Continue to Plan Carefully for*, 90 VA. NEWS LETTER 1, 2 (2014), <http://www.coopercenter.org/sites/default/files/publications/Virginia%20News%20Letter%202014%20Vol.%2090%20No%206.pdf> [http://perma.cc/5ULS-7QVU]; see JACK EGGLESTON & JASON POPE, U.S. GEOLOGICAL SURVEY, LAND SUBSIDENCE AND RELATIVE SEA-LEVEL RISE IN THE SOUTHERN CHESAPEAKE BAY REGION, CIRCULAR 1392, at 1, 4, 10 (2013), <http://pubs.usgs.gov/circ/1392/pdf/circ1392.pdf> [http://perma.cc/GNK9-ZK3H] (defining subsidence as the readjustment of the earth's crust as a result of glacial movement or subcutaneous extraction of groundwater or oil).

⁵ Rush, *supra* note 3, at 279.

⁶ See John R. Nolon, *Sea-Level Rise and the Legacy of Lucas: Planning for an Uncertain Future*, 66 PLAN. & ENVTL. L. 4, 4 (2014).

⁷ See *id.*; *Climate Change Indicators in the United States*, *supra* note 3.

⁸ See JAMES G. TITUS, U.S. ENVTL. PROT. AGENCY, ROLLING EASEMENTS, at iii, 4 (2011), <http://www2.epa.gov/sites/production/files/documents/rollingeasementsprimer.pdf> [http://perma.cc/WCJ4-MBLV].

⁹ See James L. Olmsted, *The Global Warming Crisis: An Analytical Framework to Regional Responses*, 23 J. ENVTL. L. & LITIG. 125, 156 (2008).

¹⁰ See *id.* at 128, 156.

and/or by sequestering and storing carbon.”¹¹ On the other hand, adaptation is the creation of legal mechanisms to deal with problems as they arise.¹²

In the past, coastal states have used adaptive strategies to combat sea level rise, such as setback regulations and flood protection structures.¹³ In 2011, an Environmental Protection Agency (EPA) report suggested the “rolling easement” as a new approach to managing coastal development.¹⁴ The EPA report provides a thorough discussion of various methods of implementing rolling easements as an adaptive policy.¹⁵

Rolling easements can solve problems regarding boundary delineation.¹⁶ Clearly defined boundaries protect the property owner’s rights, and are quite helpful when disputes arise between neighboring properties.¹⁷ Boundaries between non-coastal private properties are traditionally rigid, whereas the boundary of a coastal private residence moves with the coastline.¹⁸ Coastal property law is further complicated by the public trust doctrine and the public rights associated with it.”¹⁹

Part I of this Note discusses the current status of coastal management, and the cost of continuing the status quo without incorporating sea level rise

¹¹ *Id.* at 156; see *Massachusetts v. Envtl. Prot. Agency*, 549 U.S. 497, 499 (2007) (requiring the U.S. Environmental Protection Agency (EPA) to promulgate standards for fuel efficiency in motor vehicles because “[w]hile regulating motor-vehicle emissions may not by itself *reverse* global warming, it does not follow that the Court lacks jurisdiction to decide whether EPA has a duty to take steps to *slow* or *reduce* it”).

¹² Mary Jane Angelo, *Building a Sustainable and Resilient Agricultural System for a Changing Global Environment*, 43 ENVTL. L. REP. NEWS & ANALYSIS 11079, 11080 (2013).

¹³ *Adaptation Examples in the Southeast*, U.S. ENVTL. PROT. AGENCY, <http://www3.epa.gov/climatechange/impacts-adaptation-renamed/southeast-adaptation.html> [<http://perma.cc/9NYN-AZZY>].

¹⁴ See generally TITUS, *supra* note 8, at iii (“This document presents an alternative vision, in which future development of some low-lying coastal lands is based on the premise that eventually the land must give way to the rising sea. We provide a primer on more than a dozen approaches for ensuring that wetlands and beaches can migrate inland, as people remove buildings, roads, and other structures from land as it becomes submerged. Collectively, these approaches are known as *rolling easements*.”).

¹⁵ *Id.*

¹⁶ See *id.* at 122 (“[A] rolling easement policy can . . . be adopted as part of a government policy . . . that clarifies . . . the public access boundary . . .”).

¹⁷ See *Occupational Outlook Handbook: Surveyors*, BUREAU OF LABOR STATISTICS, U.S. DEP’T OF LABOR (Dec. 17, 2015), <http://www.bls.gov/ooh/architecture-and-engineering/surveyors.htm#tab-2> [<https://perma.cc/U4KM-84YA>] (“Surveyors update boundary lines . . . so that legal disputes are prevented.”).

¹⁸ See Rob L. Evans, *Rising Sea Levels and Moving Shorelines*, 43 OCEANUS MAG., 2004, at 2, https://www.whoi.edu/cms/files/dfino/2005/4/v43n1-evans_2388.pdf [<https://perma.cc/L7TF-9J3J>]; *Occupational Outlook Handbook: Surveyors*, *supra* note 17.

¹⁹ See generally Joseph L. Sax, *The Public Trust Doctrine in Natural Resource Law: Effective Judicial Intervention*, 68 MICH. L. REV. 471 (1970) (“The most common theory advanced in support of a special [public] trust obligation is a property notion; historically, it is said, certain resources were granted by government to the general public in the same sense that a tract of public land may be granted to a specific individual.”).

into state policy.²⁰ Part II introduces the concept of rolling easements as an attractive new means of evolving coastal management.²¹ Part III reviews the legal foundation of rolling easement policies, and potential Takings Clause challenges to them.²² Finally, Part IV reviews two state approaches—North Carolina and Virginia—to coastal management, and suggests the potential viability of a rolling easement policy as a method for addressing the reality of sea level rise in those states.²³

I. CRISIS WITHOUT ACTION: WHY STATES NEED TO CHANGE COURSE

Along the Atlantic coast, states like Virginia and North Carolina are experiencing local sea level rise two to three times the global average.²⁴ Because of this exacerbated and immediate threat, this Note focuses on the coastal management approaches of these two states—North Carolina and Virginia—and suggests that both states could greatly benefit from the implementation of a rolling easement policy.²⁵

A. Tools Currently in Use to Manage Coastlines

Coastal communities are attempting to use current property laws to manage their shorelines.²⁶ Unfortunately, impacts from sea level rise are “exacerbated by land use decisions made over a century ago—decisions to develop in floodplains and protect development from floodwaters using dikes and levees.”²⁷ As a result, these laws are not equipped to address the challenges presented by sea level rise.²⁸

²⁰ See *infra* notes 24–120 and accompanying text.

²¹ See *infra* notes 121–150 and accompanying text.

²² See *infra* notes 151–207 and accompanying text.

²³ See *infra* notes 208–250 and accompanying text.

²⁴ Larry P. Atkinson et al., *Sea Level Rise and Flooding Risk in Virginia*, 5 SEA GRANT L. & POL’Y J., no. 2, 2013, at 6–7 (describing how Hampton Roads, VA experiences sea level rise at a level that is twice the global average); Press Release, U.S. Geological Survey, *Sea Level Rise Accelerating in U.S. Atlantic Coast* (June 24, 2012), http://www.usgs.gov/newsroom/article.asp?ID=3256&from=rss_home#.VRpqbnF_Da [<http://perma.cc/6K7U-KSPA>] (announcing the publication of a report describing the “hot spot,” which includes North Carolina, as a region experiencing sea level rise at rates three to four times the global average).

²⁵ See JESSICA GRANNIS, GEORGETOWN CLIMATE CTR., *ADAPTATION TOOL KIT: SEA-LEVEL RISE AND COASTAL LAND USE 1* (2011), http://www.georgetownclimate.org/sites/www.georgetownclimate.org/files/Adaptation_Tool_Kit_SLR.pdf [<http://perma.cc/P4R6-XNS3>]; *supra* note 24 and accompanying text; *infra* notes 64–250 and accompanying text.

²⁶ See *infra* notes 24–96 and accompanying text (describing tools currently being used to manage coastal shorelines).

²⁷ J. Peter Byrne & Jessica Grannis, *Coastal Retreat Measures*, in *THE LAW OF ADAPTATION TO CLIMATE CHANGE: U.S AND INTERNATIONAL ASPECTS* 267, 267 (Michael B. Gerrard & Katrina Fischer Kuh eds., 2012); see WILLIAM A. STILES, JR., A “TOOLKIT” FOR SEA LEVEL RISE ADAPTATION IN VIRGINIA 5 (n.d.), <http://www.wetlandswatch.org/Portals/3/WW%20documents/>

1. Shoreline Armoring

Shoreline armoring is the building of a structure to defend against the sea, and can be in the form of a “hard” or “soft” structure.²⁹ A hard method of protection is a fixed structure, such as a seawall, revetment, or bulkhead.³⁰ Soft protections include beach renourishment projects and vegetation buffer zones, which counter coastal erosion.³¹ Frequently, coastal property owners wish to build protective structures along the border of their property to hold off rising tides and minimize flooding from storm surges.³² Seawalls can be quite helpful in protecting homes, but come at a major public cost.³³

As the sea comes to meet the wall, the seawall interferes with the natural migration of land.³⁴ In an untouched environment, coastal zone ecosystems such as wetlands, beaches, and barrier islands will migrate inland as the ocean level rises.³⁵ When a seawall stands in the path of that migration, these natural resources are lost to the sea.³⁶ These wetlands and estuaries provide critical habitat to fish and shorebirds.³⁷ Coastal zones provide a line of defense against violent storms.³⁸ Marshes and wetlands also naturally filter pollutants from runoff water.³⁹

sea-level-rise/ASCE%20Meeting%20Paper.pdf [http://perma.cc/G9QU-ZCB2] (arguing that adaptation strategies must be developed now).

²⁸ Stiles, *supra* note 27, at 6 (“Local land use and infrastructure decisions that ignore or defy climate change realities will complicate and make future adaptation strategies more expensive.”).

²⁹ *Shoreline Management Types: Definitions*, NAT’L OCEANIC & ATMOSPHERIC ADMIN., U.S. DEP’T OF COMMERCE [http://perma.cc/ZX4U-YUFF] (original hyperlink no longer active).

³⁰ TITUS, *supra* note 8, at 168.

³¹ *Id.*

³² Joseph L. Sax, *Some Unorthodox Thoughts About Rising Sea Levels, Beach Erosion, and Property Rights*, 11 VT. J. ENVTL. L. 641, 642–43 (2010).

³³ *See id.*; *infra* notes 34–44 and accompanying text.

³⁴ Sax, *supra* note 32, at 642–43.

³⁵ TITUS, *supra* note 8, at 5 (discussing how rolling easements allow ecosystems, such as “wetlands, beaches, or barrier islands” to migrate inland); Sax, *supra* note 32, at 642–43; *infra* note 38 and accompanying text.

³⁶ *See* STILES, *supra* note 27, at 2.

³⁷ *Oceans and Coasts*, NAT’L FISH & WILDLIFE FOUND., <http://www.nfwf.org/whatwedo/themes/Pages/oceans-coasts.aspx#.VLRXForF-gM> [http://perma.cc/8R3L-8539].

³⁸ Craig Anthony Arnold, *Legal Castles in the Sand: The Evolution of Property Law, Culture, and Ecology in Coastal Lands*, 61 SYRACUSE L. REV. 213, 229 (2011) (“Coastal zones—or the geographic areas of coastal ecosystems—consist of many different features, including beaches, dunes, upland barrier flats . . . bluffs, estuaries . . . tidal wetlands (e.g., saltwater marshes), barrier islands, sandbars, coral reefs, mangrove forests, kelp forests, seagrass and algae beds, and submerged foreshore lands.”).

³⁹ *Id.* at 230.

Hard shoreline structures literally drown beaches and other coastal ecosystems.⁴⁰ These beaches provide communities with important social resources as well as critical tourism revenue.⁴¹ In addition to causing a loss of natural resources, hard shoreline armoring also creates problems for nearby residents.⁴² Seawalls and revetments are designed to protect particular properties.⁴³ While those properties are protected, however, erosion is deflected to another nearby area, exacerbating erosion problems for neighboring properties.⁴⁴

“Soft” shore protections do not permanently prohibit inland migration of beaches and wetlands.⁴⁵ Beach renourishment and “living shorelines” are examples of soft protections that can slow coastline loss without compromising habitat.⁴⁶ These techniques also have a lower initial cost than hard engineering projects.⁴⁷ The drawback is that these soft structures are a temporary fix, and are often quite expensive, making them generally unreasonable as a long-term solution.⁴⁸ In particular, beach renourishment projects, which involve dredging of offshore sand and filling eroded beaches, can pose unreasonable maintenance costs.⁴⁹ The monetary costs ultimately out-

⁴⁰ See STILES, *supra* note 27, at 2 (“As the intertidal zone moves landward with sea level rise, the coastal ecosystem in that zone will move with it. When this shoreward movement encounters . . . hardened shoreline infrastructure, the wetlands will ‘drown’ in place, unable to stay in the intertidal zone as that zone moves.”); see also James F. O’Connell, *Shoreline Armoring Impacts and Management Along the Shores of Massachusetts and Kauai, Hawaii*, in PUGET SOUND SHORELINES AND THE IMPACTS OF ARMORING—PROCEEDINGS OF A STATE OF THE SCIENCE WORKSHOP, MAY 2009: U.S. GEOLOGICAL SURVEY SCIENTIFIC INVESTIGATION REPORT 2010-5254, at 65, 67 (2010), http://pubs.usgs.gov/sir/2010/5254/pdf/sir20105254_chap7.pdf [<http://perma.cc/SXB3-7DQW>] (describing how hard shoreline engineering has led to a complete loss of the beach in certain areas of the South Shore of Massachusetts).

⁴¹ See O’Connell, *supra* note 40, at 65 (“More than 60 percent of all jobs in Hawaii are related to tourism, which depends on the appeal of sandy beaches . . .”).

⁴² GRANNIS, *supra* note 25, at 6; *supra* notes 34–39 and accompanying text.

⁴³ See GRANNIS, *supra* note 25, at 6.

⁴⁴ See *id.*; *Resource Issues: Coastal Armoring and Erosion*, MONTEREY BAY NAT’L MARINE SANCTUARY, NAT’L OCEANIC & ATMOSPHERIC ADMIN., <http://montereybay.noaa.gov/resourcepro/resmanissues/coastal.html> [<http://perma.cc/MKZ8-EN28>] (“Armoring also causes deflection of wave energy, which can accelerate erosion of nearby sites, expanding the need for shoreline armoring structures.”).

⁴⁵ See *infra* notes 48–51 and accompanying text.

⁴⁶ GRANNIS, *supra* note 25, at 3, 39–40.

⁴⁷ See *id.* (“Soft armoring can be less expensive than hard armoring but requires regular maintenance and monitoring.”); SHORELINE STABILIZATION TECHNIQUES 1 (2010), http://www.dec.ny.gov/docs/permits_ej_operations_pdf/stabiltechguid.pdf [<http://perma.cc/R7Z9-3WAW>].

⁴⁸ Meg Caldwell & Craig Holt Segall, *No Day at the Beach: Sea Level Rise, Ecosystem Loss, and Public Access Along the California Coast*, 34 *ECOLOGY* L.Q. 533, 547 n.76 (2007) (“[Beach nourishment] is costly and not a permanent fix, as adding sand does not change the underlying forces that are eroding the beach.”).

⁴⁹ TITUS, *supra* note 8, at 30 (“Many geologists doubt that sand replenishment will be a sustainable response for most barrier islands if sea level rise accelerates.”); *supra* note 47 and accompanying text.

weigh the benefits in areas with high rates of erosion.⁵⁰ Also, the additional sand used in these projects is dredged from the sea bottom, which can have harmful environmental impacts on sea floor ecosystems.⁵¹

A “living shoreline” method employs an array of soft, nonstructural techniques to protect coastal property and natural resources using natural buffers.⁵² Instead of installing a rock revetment, a coastal community will plant a buffer zone of vegetation along the shoreline to protect against erosion.⁵³ These techniques seek to reinforce naturally occurring buffer zones and reduce erosion while protecting the shoreline and maintaining coastal habitats.⁵⁴ Living shoreline techniques are noninvasive and environmentally friendly, and are often successful in holding back the sea.⁵⁵ Notably, these techniques can be more cost-effective than other alternatives, and recently have been encouraged by local governments in lieu of hard structure engineering projects.⁵⁶

⁵⁰ Rush, *supra* note 3, at 303.

⁵¹ Roberto Vidal & Govert Van Oord, *Environmental Impacts in Beach Nourishment: A Comparison of Options*, 119 TERRA ET AQUA 14, 14 (2010), <https://www.iadc-dredging.com/ul/cms/terraetaqua/document/2/7/7/277/277/1/article-environmental-impacts-in-beach-nourishment-a-comparison-of-options-terre-et-aqua-119-2.pdf> [<https://perma.cc/3VFA-CCSA>] (“The process of beach nourishment through dredging—extraction from marine banks, sea transport, and final spreading on the beach—will have an effect on nature by changing water levels and currents, turbidity and by causing the disturbance of sediments and the destruction of natural habitats.”); *see* MANAGEMENT, POLICY, SCIENCE AND ENGINEERING OF NONSTRUCTURAL EROSION CONTROL IN THE CHESAPEAKE BAY: PROCEEDINGS OF THE 2006 LIVING SHORELINE SUMMIT 13 (Sandra Y. Erdle et al. eds., n.d.) [*hereinafter* MANAGEMENT, POLICY, SCIENCE], http://www.vims.edu/cbnerr/_docs/ctp_docs/ls_docs/06_LS_Full_Proceed.pdf [<http://perma.cc/9HT5-F2TG>]; TITUS, *supra* note 8, at 30 n.125 (discussing the need to consider environmental effects of dredging sand when analyzing the viability of a nourishment project).

⁵² MANAGEMENT, POLICY, SCIENCE, *supra* note 51, at 13.

⁵³ *See id.*

⁵⁴ *See id.*; *Living Shorelines*, NAT’L OCEANIC & ATMOSPHERIC ADMIN., <http://www.habitat.noaa.gov/restoration/techniques/livingshorelines.html> [<http://perma.cc/V67Z-VAES>].

⁵⁵ *See* MANAGEMENT, POLICY, SCIENCE, *supra* note 51, at 11 (“[L]iving shoreline approaches may not stop erosion altogether, but, if successful, will reduce erosion to an acceptable degree, enhance habitat, and may be substantially less expensive than [sic] high armored endeavors.”).

⁵⁶ *See* VA. CODE ANN. § 28.2-104.1 (2015) (“The Commission . . . shall establish and implement a general permit regulation that authorizes and encourages the use of living shorelines as the preferred alternative for stabilizing tidal shorelines in the Commonwealth [of Virginia.]”); *Living Shorelines Policy: The Integration of Shoreline Management and Planning*, 7 RIVERS & COAST, Spring 2012, at 1, http://ccrm.vims.edu/publications/pubs/rivers&coast/vol7_no1LSPolicy.pdf [<http://perma.cc/8N8A-JP9Z>] (“The preferred use of living shorelines and an integrated approach to shoreline management, will be promoted through actions of [Virginia] State agencies and local governments as specified in the law.”); *supra* note 47 and accompanying text (discussing the cost effective nature of soft armoring).

2. Setback Requirements to Regulate Development in Coastal Areas

Setback laws, requiring a certain distance between any property boundary and a structure, are common in land use regulations.⁵⁷ For example, homes and other buildings must be constructed a certain distance from the street.⁵⁸ The same is true for coastal properties.⁵⁹ Forward-looking legislators can enact setback laws, keeping in mind potential future sea level rise.⁶⁰ If these decision-makers utilize sea level rise science when creating erosion-based setback policies, they might be inclined to set a greater distance, knowing that the mean high tide line will change in the near future.⁶¹ Alternatively, a municipality might establish setback regulations by reference to the changing rate of erosion in that area.⁶² This would ensure that setback policies would take into account contemplated sea level rise.⁶³

B. Current Status of the Coastal Policies of Virginia and North Carolina

Both Virginia and North Carolina are facing major problems in connection with sea level rise and coastal flooding, particularly because the entire mid-Atlantic coast is experiencing sea level rise at a rate higher than the global average.⁶⁴ Although both states are working to plan for the future, neither state has successfully implemented a viable coastal management plan to adapt to sea level rise.⁶⁵

⁵⁷ *Setback*, BLACK'S LAW DICTIONARY (10th ed. 2014) ("Typically contained in zoning ordinances or deed restrictions, setbacks are designed to ensure that enough light and ventilation reach the property and to keep buildings from being erected too close to property lines.").

⁵⁸ *See id.*

⁵⁹ *See* TITUS, *supra* note 8, at 4.

⁶⁰ *See id.* at 65–66 ("For example, new construction may have to be located inland . . . a distance of at least 40 times the annual erosion rate. These policies clearly contemplate that shores will erode for the next few decades . . .").

⁶¹ *See id.*

⁶² *See Oceanfront Construction Setback Factors*, N.C. DIV. COASTAL MGMT. [<http://perma.cc/S2AM-ADMS>] (original hyperlink no longer active) ("North Carolina's oceanfront construction setback factors are calculated using the long-term . . . average annual shoreline change rates . . .").

⁶³ *See id.*

⁶⁴ *Sea Level Rise and Coastal Regions*, *supra* note 1 ("[C]urrent rates of sea level rise for the mid-Atlantic region from New York to North Carolina are considerably higher than the global average."); *supra* note 24 and accompanying text.

⁶⁵ *See* JOSEPH J. KALO ET AL., DEVELOPING A MANAGEMENT STRATEGY FOR NORTH CAROLINA'S COASTAL OCEAN 2 (2009), https://ncseagrant.ncsu.edu/ncseagrant_docs/products/2000s/developing_mgmt_strategy.pdf [<https://perma.cc/T5D4-PH5Q>] (discussing North Carolina's need to address protection of its shoreline areas); Mitchell et al., *supra* note 4, at 6 (describing Virginia's shoreline protection problem); *infra* notes 66–96 and accompanying text (describing how North Carolina and Virginia's current combative tools are insufficient to address the rising sea level).

1. Virginia's Armoring Permit Program and Living Shorelines Initiatives

In 2012, the Virginia Institute of Marine Studies ("VIMS") published a report (the "Report") predicting that the sea will rise along the Virginia coast by approximately one and a half feet in the next twenty to fifty years.⁶⁶ According to the Report, and a study prepared by the Virginia Recurrent Flooding Sub-Panel for the Secure Commonwealth Panel, coastal flooding will accelerate in the future, and poses a major problem for the entire coastline of Virginia.⁶⁷

As a result, coastal Virginia will continue to experience "road closures [and] the loss of homes, property and life" from storms and flooding.⁶⁸ A single storm can cost hundreds of millions of dollars in damage.⁶⁹ For example, the Hampton Roads region of Virginia is home to 1.6 million people.⁷⁰ According to one study, the amount necessary to elevate or purchase and demolish 3000 homes in the flood zone of Hampton Roads would cost an estimated \$431 million.⁷¹

In response to the dangers of flooding and storm surge, Virginia coastal communities are utilizing traditional land use tools to protect their homes.⁷² It is common practice in Virginia to elevate homes to reduce flood damage.⁷³ This adaptive method is useful in protecting homes from anticipated storm surges and flooding, however it is not "future-proof."⁷⁴ As the sea rises, it will encroach upon those elevated homes.⁷⁵

⁶⁶ MOLLY MITCHELL ET AL., VA. INST. OF MARINE SCI., CTR. FOR COASTAL RES. MGMT., RECURRENT FLOODING STUDY FOR TIDEWATER VIRGINIA 13 (2013), http://ccrm.vims.edu/recurrent_flooding/Recurrent_Flooding_Study_web.pdf [<http://perma.cc/XCL6-6D3L>].

⁶⁷ See *id.* at 4 ("In coastal Virginia . . . recurrent flooding . . . [is] predicted to get worse, resulting in more frequent or large scale flood events."); RECURRENT FLOODING SUB-PANEL, RECOMMENDATIONS TO THE SECURE COMMONWEALTH PANEL ON THE ISSUE OF SEA LEVEL RISE AND RECURRENT FLOODING IN COASTAL VIRGINIA 74 (2014) [hereinafter RECURRENT FLOODING SUB-PANEL], http://ccrm.vims.edu/SCPRecommendationsReport_Sept2014.pdf [<http://perma.cc/DJL5-ZJ8J>] ("Models and projections suggest [Recurrent Flooding and Sea Level Rise] will continue to worsen . . .").

⁶⁸ MITCHELL ET AL., *supra* note 66, at 4.

⁶⁹ *Id.* ("In coastal Virginia, the cost of large storm damage can range from millions to hundreds of millions of dollars per storm . . .").

⁷⁰ *Hampton Roads*, HAMPTON RDS. CHAMBER OF COMMERCE, <http://www.hamptonroadschamber.com/page/hampton-roads/> [<http://perma.cc/S99U-6BS5>] (discussing the Hampton Roads region's population as of 2014).

⁷¹ Aaron Applegate, *Report: The Fix for Flood-Prone Homes? About \$431M*, PILOT ONLINE.COM (Dec. 1, 2014), <http://hamptonroads.com/2014/11/report-fix-floodprone-homes-about-431m#>.

⁷² See *infra* notes 73–83 and accompanying text.

⁷³ MITCHELL ET AL., *supra* note 66, at 23.

⁷⁴ *Id.*

⁷⁵ See *id.* ("[Elevation is] [n]ot future-proof, when sea level rises[,] the relative gain in elevation declines.").

Recently, Virginia has adopted living shorelines as the preferred coastal management tool to combat erosion.⁷⁶ The commonwealth also allows hard shoreline armoring through a permitting program.⁷⁷ Floodwalls, a form of hard shoreline armoring, are common in Virginia.⁷⁸ At two regional meetings, VIMS sent out a survey asking local emergency managers to answer questions regarding flooding in their localities.⁷⁹ According to the responses of the “Emergency Manager Survey Response,” the localities within the heavily populated Hampton Roads region were dealing with frequent flooding, and were considering “a wide variety of adaptations, including (in order of popularity): raising structures, relocating people, elevating road surfaces and sea walls, and pumping stations/dams/levees.”⁸⁰ In the face of frequent flooding, Virginia’s municipalities are clearly seeking out new ways to handle sea level rise.⁸¹

In the past year, multiple symposia have been held with scientists, local, state, and federal decision-makers to decide how the state will address changes in the future.⁸² Virginia has “begun to take a serious look at how it can plan and adapt for the future” in light of the “wicked policy problem” created by flooding and sea level rise.⁸³

2. North Carolina Legislation Prohibits All Permanent Shoreline Protection Structures

In North Carolina, citizens are being forced to address sea level rise because storms and increased flooding have already occurred.⁸⁴ The Outer Banks region of coastal North Carolina is experiencing especially dire con-

⁷⁶ *Living Shorelines: Why a Living Shoreline?*, CTR. FOR COASTAL RES. MGMT. [hereinafter *Living Shorelines*], <http://ccrm.vims.edu/livingshorelines/> [<http://perma.cc/46EY-ZVVY>]; *supra* note 56 and accompanying text.

⁷⁷ *Regulatory Branch—Joint Permit Application*, U.S. ARMY CORPS OF ENG’RS, <http://www.nao.usace.army.mil/Missions/Regulatory/JPA.aspx> [<http://perma.cc/5WRH-JKZJ>] (“Activities eligible to use the Tidewater [Permit] include . . . revetments, bulkheads, marsh toe stabilizations, breakwaters, [and] beach nourishment . . .”).

⁷⁸ MITCHELL ET AL., *supra* note 66, at 29 (“[I]n Virginia, there are floodwalls in most of the large coastal cities, including Richmond.”).

⁷⁹ *Id.* at 7.

⁸⁰ *Id.*

⁸¹ *See id.*; Mitchell et al., *supra* note 4, at 4, 6.

⁸² Mitchell et al., *supra* note 4, at 4.

⁸³ *Id.* at 6.

⁸⁴ Sara Peach, *Rising Seas: Will the Outer Banks Survive?*, NAT’L GEOGRAPHIC (July 24, 2014), <http://news.nationalgeographic.com/news/special-features/2014/07/140725-outer-banks-north-carolina-sea-level-rise-climate/> [<http://perma.cc/UT8G-KC84>] (quoting Stanley Riggs, coastal geologist at East Carolina University, and member of North Carolina’s Science Panel) (“[T]he coast as we know it is already vanishing. ‘Sea-level rise and storms are taking out eastern North Carolina today—not a hundred years from now.’”).

ditions as numerous storms endanger its intricate system of barrier islands.⁸⁵ The area is home to thousands of permanent residents, a number that increases twentyfold in the summer months, when it generates hundreds of millions of dollars in tourism revenue each year.⁸⁶ With every hurricane, however, the only road to the Outer Banks is compromised, and the barrier islands become more and more unstable.⁸⁷

Despite incentives to armor the coastline, North Carolina has prohibited all permanent shoreline structures along the Atlantic Ocean since 1979.⁸⁸ In 1999, the Court of Appeals of North Carolina upheld the validity of this “hardened structure rule.”⁸⁹ In 2003, the North Carolina General Assembly codified this rule by enacting § 113A-115.1 of the North Carolina General Laws.⁹⁰ Pursuant to § 113A-115.1, construction of any armoring device—a sea wall, bulkhead, groin, jetty, or revetment—along the North Carolina shoreline is prohibited.⁹¹ This law protects sensitive environmental resources and ensures public access to North Carolina beaches.⁹² Landowners may apply for a variance for temporary sandbag barriers.⁹³

In lieu of hard erosion control protections, local governments use alternative methods of protection against flooding and storms, including beach nourishment and setback regulations.⁹⁴ The current policies are insufficient to protect their residents from sea level rise.⁹⁵ In response, various

⁸⁵ *Id.*

⁸⁶ *See id.* (“In 2012, according to the U.S. Travel Association, tourism generated \$926 million just in Dare County . . . Summer visitors swell the population . . . from 3,000 to 60,000.”).

⁸⁷ *See id.* (“State Highway 12, the only road to Hatteras Island, repeatedly has bucked and washed out during storms.”).

⁸⁸ *See* 15A N.C. ADMIN. CODE § 7H.0308 (2015) (“Permanent erosion control structures may cause significant adverse impacts on the value and enjoyment of adjacent properties or public access to and use of the ocean beach, and, therefore, are prohibited. Such structures include bulkheads, seawalls, revetments, jetties, groins and breakwaters.”).

⁸⁹ *See* *Shell Island Homeowners Ass’n, Inc. v. Tomlinson*, 517 S.E.2d 406, 409 (N.C. Ct. App. 1999).

⁹⁰ N.C. GEN. STAT. § 113A-115.1 (2015) (“No person shall construct a permanent erosion control structure in an ocean shoreline.”).

⁹¹ *Id.* *But see* Trista Talton, *North Topsail Beach Groins for a Solution*, COASTAL REV. ONLINE (Jan. 20, 2015), <http://www.coastalreview.org/2015/01/north-topsail-beach-groins-solution/> [<http://perma.cc/B72N-2NYV>] (describing how in 2011, this law was amended to allow for the N.C. Coastal Resources Commission to issue four permits for construction of terminal groins).

⁹² *See* *Shell Island Homeowners Ass’n, Inc.*, 517 S.E.2d at 417 (case affirming the prohibition of coastal armoring structures as a legitimate government interest).

⁹³ 15A N.C. ADMIN. CODE § 7H.0308(a)(2)(A)–(B) (“Permittable temporary erosion control structures shall be limited to sandbags placed landward of mean high water and parallel to the shore.”).

⁹⁴ *See* KALO ET AL., *supra* note 65, at 64 (“North Carolina does not currently have a comprehensive, overarching ocean management plan in place . . .”).

⁹⁵ *See id.* at 2 (“[A] fundamental question North Carolina will need to address is whether it will be economically and practically feasible to provide adequate protection to all shoreline areas,

North Carolina agencies and institutions are seeking more adequate methods of preparing and protecting the state's coastline.⁹⁶

C. Shortcomings and Costs of Continuing the Status Quo: Why Change?

Because current tools do not include a plan for future problems associated with sea level rise, they are not well equipped to handle them.⁹⁷ This will ultimately lead to costly litigation, increased costs in emergency response, and immeasurable loss in environmental resources.⁹⁸ Rolling easement statutes are attractive because they can be used by a local government to avoid some of the costs associated with current land use law, in light of future sea level rise.⁹⁹

1. Threat of Litigation to Local Governments

As the sea continues to rise, coastal property owners will likely fight to stay in their homes.¹⁰⁰ For example, in North Carolina, where shoreline armoring is prohibited, a property owner can request a variance for temporary sandbags to protect property from imminent erosion threats.¹⁰¹ These “temporary” protections often remain for decades, and when a municipality seeks to order their removal, property owners often bring lawsuits seeking an injunction against the government.¹⁰²

Once the sea has damaged a home—usually through a storm event—property owners will seek to repair their property, while local governments

or whether some portions of the North Carolina shoreline must be left to the effects of climate change and coastal storms.”).

⁹⁶ See *id.* at ix–x.

⁹⁷ See *supra* notes 26–96 and accompanying text.

⁹⁸ See *infra* notes 100–120 and accompanying text.

⁹⁹ See *infra* notes 121–150 and accompanying text.

¹⁰⁰ See *Sansotta v. Town of Nags Head*, 724 F.3d 533, 544 n.16 (4th Cir. 2013); *Town of Nags Head v. Toloczko*, No. 2:11–CV–1–D, 2014 WL 4219516, at *1 (E.D. N.C. Aug. 18, 2014); *Town of Nags Head v. Cherry, Inc.*, 723 S.E.2d 156, 162–63 (N.C. Ct. App. 2012); see, e.g., GRANNIS, *supra* note 25, at 5 (“In Florida, after being battered by Dennis, a category 3 hurricane, landowners demanded the right to protect themselves from the sea.”).

¹⁰¹ 15A N.C. ADMIN. CODE § 7H.0308 (2015).

¹⁰² See *id.*; *Riggings Homeowners, Inc. v. Coastal Res. Comm’n*, 747 S.E.2d 301, 314–15 (N.C. Ct. App. 2013), *review on additional issues allowed*, 753 S.E.2d 665 (N.C. 2014), *review allowed*, 753 S.E.2d 666 (N.C. 2014), *aff’d*, 766 S.E.2d 320 (N.C. 2014) (case illustrating a property owner’s challenge to the government’s attempt to order the removal of sandbags); see also Jackson Mabry, *Sandbags: Temporary or Permanent? The Riggings Case Study*, LEGAL TIDES, Summer 2009, at 1, http://ncseagrant.ncsu.edu/ncseagrant_docs/coastallaw/LT/l_t_summer_09.pdf [<http://perma.cc/S9HH-LXBH>] (“A protective wall of ‘temporary’ sandbags has sheltered many beachfront houses for decades despite the fact that, under Coastal Area Management Act (CAMA) rules, these sandbags should have been removed years ago.”).

may wish to remove the property to prevent future hazard.¹⁰³ In 1988, the town of Nags Head, North Carolina (the “Town”) enacted a nuisance ordinance (the “Ordinance”) to handle such a situation.¹⁰⁴ Pursuant to the Ordinance, when erosion or a storm event cause a structure to be in danger of collapse or likely to cause personal or property injury, or cause the structure to become located on public trust area, that structure will be categorized as a public nuisance.¹⁰⁵ As a result, the Town is authorized to order its removal.¹⁰⁶

In 2009, a hurricane damaged several cottages along the beach in Nags Head, and caused these cottages to be situated directly on the public beach due to extensive tideland erosion.¹⁰⁷ Pursuant to the Ordinance, the Town ordered the destruction of these homes.¹⁰⁸ As a result of this action, three separate lawsuits ensued.¹⁰⁹ The Town of Nags Head was unable to remove any of the three cottages, and ultimately settled with some of the landowners.¹¹⁰

When a government entity acts in a way that interferes with private property rights, takings liability may ensue.¹¹¹ As discussed below, a state-

¹⁰³ See *Sansotta*, 724 F.3d at 544 n.16 (case involving property owners’ challenge to the Town’s order of removal of property damaged by the sea); *Toloczko*, 2014 WL 4219516, at *1 (case involving the Town’s denial of a homeowner’s request to repair property damaged by storm); *Cherry, Inc.*, 723 S.E.2d at 162–63 (case involving the denial of a property owner’s request for a permit to repair home damaged by storm); *infra* notes 104–110 and accompanying text.

¹⁰⁴ See NAGS HEAD, N.C. CODE § 16–31(6) (2007).

¹⁰⁵ *Id.*

¹⁰⁶ *Id.* § 16–33(b) (“Abatement of a public nuisance shall consist of taking whatever appropriate steps are reasonably necessary to remove the condition or conditions which result in the declaration of a public nuisance.”).

¹⁰⁷ See *Sansotta*, 724 F.3d at 537–38; *Toloczko*, 2014 WL 4219516, at *1; *Cherry, Inc.*, 723 S.E.2d at 157, 163.

¹⁰⁸ See *Sansotta*, 724 F.3d at 537–38; *Toloczko*, 2014 WL 4219516, at *1, 3; *Cherry, Inc.*, 723 S.E.2d at 157–58.

¹⁰⁹ See *Sansotta*, 724 F.3d at 537–50; *Toloczko*, 2014 WL 4219516, at *1–19; *Cherry, Inc.*, 723 S.E.2d at 157–64; J. David Breemer, *Town Settles One PLF Beach Takings Case; Dragged to Trial in Another*, PAC. LEGAL FOUND. LIBERTY BLOG (Nov. 11, 2014) <http://blog.pacificlegal.org/2014/town-settles-one-beach-takings-case-dragged-to-trial-in-another/> [<http://perma.cc/4YBR-3THK>] (suggesting that the expense associated with the *Sansotta* and *Toloczko* cases will be substantial).

¹¹⁰ See *Sansotta*, 724 F.3d at 541 (citing *Cherry, Inc.*, 723 S.E.2d 156, for the proposition that the Town cannot enforce public trust rights, and is therefore unable to order removal of property); *Toloczko*, 2014 WL 4219516, at *2 (citing *Cherry, Inc.* for proposition that the Town cannot enforce public trust rights, and is therefore unable to order removal of property); *Cherry, Inc.*, 723 S.E.2d at 161 (holding that the Town cannot enforce public trust rights, and is therefore unable to order removal of property); Breemer, *supra* note 109 (“[T]he Town recently settled with the Toloczkos . . . [for] two hundred thousand dollars and . . . an adjacent parcel of beachfront property owned by the Town.”).

¹¹¹ Robin Kundis Craig, *Public Trust and Public Necessity Defenses to Takings Liability for Sea Level Rise Responses on the Gulf Coast*, 26 J. LAND USE & ENV’T L. 395, 398 (2011).

level rolling easement policy rooted in the public trust doctrine can insulate local governments from takings liability.¹¹²

2. Costs to Emergency Responders

Without restraint on the development of the changing shoreline, and further protection of it, emergency responders will continue to spend a large amount of time evacuating able-bodied residents who live in unsafe regions.¹¹³ The more developed a sensitive coastal region, the higher the cost in emergency response time and resources.¹¹⁴ Current coastal management tools do not adequately alleviate these issues because they usually encourage development in coastal communities, and discourage safe retreat.¹¹⁵

3. The Environmental Costs of Continuing with Current Sea Level Rise Management Tools

Coastal ecosystems must be protected, both for their inherent environmental value and for their natural resource benefits.¹¹⁶ Shoreline armoring harms, and sometimes even eliminates altogether, these ecosystems.¹¹⁷ Private property rights cannot usurp the public's right to enjoy these natural resources.¹¹⁸ Setback regulations limit development, but only provide a

¹¹² See *infra* 171–193 and accompanying text.

¹¹³ See John Rudolf et al., *Hurricane Sandy Damage Amplified by Breakneck Development of Coast*, HUFFINGTON POST (Nov. 15, 2012), http://www.huffingtonpost.com/2012/11/12/hurricane-sandy-damage_n_2114525.html [<http://perma.cc/DM7S-TBBL>]. New York City Mayor Michael Bloomberg warns, “If you refuse to evacuate, you’re not only putting yourself at risk, but also the first responders who will have to assist you in an emergency.” *Id.* Rudolf explains further:

Some of the damage along low-lying coastal areas was the result of years of poor land-use decisions and the more immediate neglect of emergency preparations as [Hurricane] Sandy gathered force Authorities in New York and New Jersey simply allowed heavy development of at-risk coastal areas to continue largely unabated in recent decades.

Id.

¹¹⁴ See Byrne & Grannis, *supra* note 27, at 267 (“With expanding coastal development, governments are economically exposed to impacts from natural hazards. In the face of rising seas, governments increasingly will be forced to spend more to respond to emergencies, rebuild flooded infrastructure, and pay insurance claims.”); Rudolf et al., *supra* note 113.

¹¹⁵ See Byrne & Grannis, *supra* note 27, at 267 (“Armoring . . . induces additional development. People build behind armoring with a false sense of safety and as a result, when storms hit and levees fail, people and properties are in harms way.”); *supra* notes 26–96, 114 and accompanying text.

¹¹⁶ See *Climate Impacts on Coastal Areas*, U.S. ENVTL. PROT. AGENCY, <http://www3.epa.gov/climatechange/impacts/coasts.html> [<https://perma.cc/3M4W-BGE3>] (“Coastal areas are also home to species and habitats that provide many benefits to society and natural ecosystems.”).

¹¹⁷ See STILES, *supra* note 27, at 2.

¹¹⁸ *Ill. Cent. R.R. Co. v. Illinois*, 146 U.S. 387, 452 (1892) (“[The public trust doctrine] is a title held in trust for the people of the state, that they may enjoy the navigation of the waters, carry

short-term solution, because setbacks “will be less effective over the long term as [sea level rise] inundates broad areas of low-lying land.”¹¹⁹ Finally, local governments can be restricted in their coastal management efforts, when the state fails to enact legislation to deal with sea level rise.¹²⁰

II. CAN ROLLING EASEMENTS SOLVE THE PROBLEM OF SEA LEVEL RISE ON THE ATLANTIC COAST?

The term “rolling easement” encompasses several land use policies designed to allow for the natural inland migration of shoreline ecosystems.¹²¹ Rolling easements are beneficial because they “allow development with the conscious recognition that land will be abandoned if and when the sea rises enough to submerge it.”¹²² In simple terms, a rolling easement policy would: (1) prohibit hard shoreline armoring; and (2) require movement or abandonment of any structure once the shoreline migrates inland and reaches it.¹²³ Rolling easements provide a way of defining the boundary between private and public land, and are grounded in the public trust doctrine.¹²⁴

The public trust doctrine is recognized in some capacity at both the state and federal levels.¹²⁵ Pursuant to the public trust doctrine, a state owns the tidelands in trust for the benefit of the public.¹²⁶ States vary in their def-

on commerce over them, and have liberty of fishing therein, freed from the obstruction or interference of private parties.”).

¹¹⁹ See GRANNIS, *supra* note 25, at 28.

¹²⁰ See *Sansotta v. Town of Nags Head*, 724 F.3d 533, 541 (4th Cir. 2013) (“The Town’s actions to abate a nuisance were reasonable—if mistaken—uses of its police power . . . the North Carolina Court of Appeals has since made clear, the Town does not have the authority When the town issued the nuisance declaration, however, North Carolina Courts had not definitively addressed this issue.”); *Town of Nags Head v. Toloczko*, No. 2:11–CV–1–D, 2014 WL 4219516, at *8 (E.D. N.C. Aug. 18, 2014) (describing how the Town of Nags Head cannot enforce a provision of its Nuisance Ordinance because “only the State . . . has the authority to enforce public trust rights Thus, the Town did not have the authority to declare the Cottage a public nuisance”); *Town of Nags Head v. Cherry, Inc.*, 723 S.E.2d 156, 158–62 (N.C. Ct. App. 2012) (holding against the Town of Nags Head, in favor of the property owner, because the Town acted outside its authority, and “only the State . . . has standing to bring an action to enforce the State’s public trust rights”).

¹²¹ TITUS, *supra* note 8, at iii; see also Richard J. McLaughlin, *Rolling Easements as a Response to Sea Level Rise in Coastal Texas: Current Status of the Law After Severance v. Patterson*, 26 J. LAND USE & ENVT’L L. 365, 369 (2011) (“In broad terms, a rolling easement allows publicly owned tidelands to migrate inland as a result of sea level rise or other natural forces at the expense of existing structures, thereby protecting ecosystem structure and function.”).

¹²² TITUS, *supra* note 8, at 4.

¹²³ See Caldwell & Segall, *supra* note 48, at 550–51 (describing how a rolling easement would require a property owner to refrain from building an armoring structure, and to abandon or move his or her property once the sea level reaches it).

¹²⁴ Margaret E. Peloso & Margaret R. Caldwell, *Dynamic Property Rights: The Public Trust Doctrine and Takings in a Changing Climate*, 30 STAN. ENVTL. L.J. 51, 61 (2011).

¹²⁵ *Id.* at 57.

¹²⁶ GRANNIS, *supra* note 25, at 41.

inition of “tidelands,” which are subject to the public trust.¹²⁷ In Virginia, the commonwealth holds the land below the mean low water mark in trust for the public.¹²⁸ In North Carolina, the state owns the wet beach below the mean high water mark.¹²⁹ Regardless of where the line is drawn, however, these public trust lands are protected for uses such as fishing and navigation.¹³⁰ The public trust doctrine provides a foundation for a rolling easement policy.¹³¹

In 1998, James Titus, the Project Manager for Sea Level Rise at the U.S. Environmental Protection Agency (EPA), published an article discussing sea level rise.¹³² In the article, Titus first introduced the idea of rolling easements, a concept borrowed from the Texas Open Beaches Act of 1959.¹³³ Recently, James Titus released a detailed report discussing rolling easements and their potential utility for coastal states.¹³⁴

A rolling easement can be utilized in one of three ways.¹³⁵ First, a state can enact a statute granting rolling public easements.¹³⁶ Second, conservation easements can be used.¹³⁷ Third, municipalities can employ rolling

¹²⁷ TITUS, *supra* note 8, at 18–19.

¹²⁸ VA. CODE ANN. § 28.2-1202 (2015) (“[T]he limits or bounds of the tracts of land lying on the bays, rivers, creeks, and shores within the jurisdiction of the Commonwealth, and the rights and privileges of the owners of such lands, shall extend to the mean low[]water mark”); see *Palmer v. Commonwealth Marine Res. Comm’n*, 628 S.E.2d 84, 88 (Va. Ct. App. 2006) (citation omitted) (defining the mean low water mark as “the average elevation of low water observed over a specific 19 year period”).

¹²⁹ N.C. GEN. STAT. § 77-20 (2015) (“The seaward boundary of all property within the State of North Carolina, not owned by the State, which adjoins the ocean, is the mean high water mark.”).

¹³⁰ See Sax, *supra* note 19, at 475; *supra* notes 128–129 and accompanying text.

¹³¹ See Peloso & Caldwell, *supra* note 124, at 57–62 (“For rolling easements to effectively avoid excess coastal development, the state must be able to use its future interest in submerged public trust lands to prevent development of them today.”).

¹³² See TITUS, *supra* note 8, at iii (“This document presents an alternative vision, in which future development of some low-lying coastal lands is based on the premise that eventually the land must give way to the sea[,] . . . [through] *rolling easements*.”); *supra* notes 14–15 and accompanying text.

¹³³ Peloso & Caldwell, *supra* note 124, at 61 (“The concept of a public trust that moves with rising sea levels was first thoroughly discussed by James G. Titus, who borrowed the term ‘rolling easements’ from the Texas Open Beaches Act to explain the phenomenon.”).

¹³⁴ *Integrating Climate Change Adaptation and Hazard Mitigation in Delaware*, 14 COASTAL SERVS., Sept./Oct. 2011, at 6–7, [<https://perma.cc/2AS7-YP52>] (original hyperlink no longer active).

¹³⁵ TITUS, *supra* note 8, at 50.

¹³⁶ GRANNIS, *supra* note 25, at 41 (“[R]olling coastal management statutes typically include a combination of policies, including limitations on new development in at-risk coastal areas, limitations on construction of hard armoring . . . removal requirements for structures that come to encroach on public lands, and/or real estate disclosure requirements.”); TITUS, *supra* note 8, at 50.

¹³⁷ TITUS, *supra* note 8, at 50. This Note focuses on rolling easement policies implemented through legislative and regulatory methods, and a discussion of voluntary grants of conservation easements falls outside its scope.

easements through defeasible estates and future interests in land.¹³⁸ In each category, the rolling easement program seeks to ensure the inland migration of coastal ecosystems, at the cost of pre-existing structures.¹³⁹

Because coastal armoring is at odds with this goal, a key feature of a rolling easement is some form of prohibition against permanent shoreline protections.¹⁴⁰ If a coastal property owner cannot build a seawall or revetment, the beach (or wetland) will be allowed to shift inland.¹⁴¹ This also ensures that the public continues to enjoy its rights to the beach and the natural resources.¹⁴² Accordingly, the boundary between public and private land is established as a migratory line, safeguarding public access to the beach, and clarifying the right of the private property owner.¹⁴³

Under a rolling easement policy, coastal properties can be used productively, with the recognition that coastal property may need to be abandoned in the future.¹⁴⁴ This provides a creative new mechanism for building sea level rise into the public trust doctrine as it appears in current property law.¹⁴⁵ By establishing a rolling easement policy today, a state can plan for future problems by abandoning coastal properties that are at high risk due to sea level rise.¹⁴⁶ A rolling easement policy would clarify the rights of coastal property owners, reducing ultimate costs for the state or local government (litigation, emergency response, and environmental resource costs), and reducing the harm to the public (taxpayer dollars, environmental resources, and access to the beach).¹⁴⁷

Some states have enacted statutes to limit or prohibit coastal armoring, or to require landowners to remove any structures that come onto public

¹³⁸ *Id.*

¹³⁹ McLaughlin, *supra* note 121, at 369.

¹⁴⁰ See TITUS, *supra* note 8, at 5 (“A rolling easement would generally prohibit shore protection and require removal of pre-existing structures seaward of a specific migrating shoreline such as the dune vegetation line, mean high water or the upper boundary of tidal wetlands.”); McLaughlin, *supra* note 121, at 369.

¹⁴¹ TITUS, *supra* note 8, at 13.

¹⁴² *Id.*

¹⁴³ See *id.* at 122 (“[A] rolling easement policy can . . . be adopted as part of a government policy or private transaction that clarifies or modifies the public access boundary . . .”).

¹⁴⁴ *Id.* at 4–5; *supra* note 122 and accompanying text.

¹⁴⁵ See Hyo (Charlene) Kim & Caroline A. Karp, *When Retreat Is the Better Part of Valor: A Legal Analysis of Strategies to Motivate Retreat from the Shore*, 5 SEA GRANT L. & POL’Y J. 169, 206 (2012) (describing the public trust doctrine as a “background principle of property law”); *supra* note 131 and accompanying text (discussing the public trust doctrine as a foundation for the establishment of rolling easements).

¹⁴⁶ See TITUS, *supra* note 8, at 10 (“If some lands must give way to the rising sea, the economic, environmental, and human consequences could be much less if the abandonment occurs according to a [rolling easement] plan rather than unexpectedly.”).

¹⁴⁷ See *infra* notes 208–250 and accompanying text.

land.¹⁴⁸ For example, in North Carolina, coastal property owners are forbidden from building seawalls, bulkheads, etc., and may only use sandbags temporarily to protect their homes from the encroaching sea.¹⁴⁹ Virginia, on the other hand, has officially adopted “living shoreline” methods as the preferred shoreline management approach over hard shoreline protections, but still allows hard shoreline protections through a permitting program.¹⁵⁰

III. LEGAL IMPLICATIONS OF ROLLING EASEMENTS

The fear of litigation might impact a municipality’s decision-making process when considering new legislation.¹⁵¹ Property law in particular has a long, complicated history in the courts in connection with the Takings Clause of the United States Constitution.¹⁵²

A. Takings Jurisprudence: Will Rolling Easements Require Just Compensation?

If a municipality wishes to pass a law that prohibits all development in certain coastal areas, it would risk liability for a takings claim.¹⁵³ The Fifth Amendment of the United States Constitution makes it unlawful for the government to take private property for public use “without just compensation.”¹⁵⁴ In *Lucas v. South Carolina Coastal Council*, the United States Supreme Court interpreted the Fifth Amendment to require compensation when a regulation deprives a property owner of all economic value of his property.¹⁵⁵

¹⁴⁸ See N.C. GEN. STAT. ANN. § 113A-115.1 (2015) (North Carolina prohibits shoreline armoring); TEX. NAT. RES. CODE ANN. § 61.011 (2015) (Texas requires its land commissioner to “strictly and vigorously enforce the prohibition against encroachments on and interferences with the public beach easement . . .”).

¹⁴⁹ N.C. GEN. STAT. ANN. § 113A-115.1; *supra* notes 101–102 and accompanying text.

¹⁵⁰ *Living Shorelines*, *supra* note 76; *Regulatory Branch—Joint Permit Application*, *supra* note 77.

¹⁵¹ See Byrne & Grannis, *supra* note 27, at 274 (“Governments dread regulatory takings litigation, which can be uncertain, lengthy, expensive, and, fairly or not, stigmatizing. Thus, any retreat strategy must be implemented with regard to the courts’ ever-evolving regulatory takings precedent.”); see, e.g., ANITA R. BROWN-GRAHAM, UNIV. CHAPEL HILL SCH. OF GOV’T, CIVIL LIABILITY OF THE LOCAL GOVERNMENT AND ITS OFFICIALS AND EMPLOYEES 13 (2007) (discussing how local governments may be hesitant to act for fear of liability).

¹⁵² See *infra* notes 153–169 and accompanying text.

¹⁵³ See Nolon, *supra* note 6, at 3 (“Where local governments severely regulate coastal development . . . they face a formidable obstacle in the total-taking doctrine . . . State and local regulations that prohibit building on coastal lands raise complicated Fifth Amendment issues.”).

¹⁵⁴ U.S. CONST. amend. V.

¹⁵⁵ 505 U.S. 1003, 1016 (1992) (“[T]he Fifth Amendment is violated when land-use regulation . . . ‘denies an owner economically viable use of his land.’”).

In *Lucas*, the South Carolina Legislature passed the Beachfront Management Act (the “Act”), which “had the direct effect of barring petitioner from erecting any permanent habitable structures” on his property.¹⁵⁶ The Act prohibited development within a certain distance from dune areas, because construction in those areas “contributes to the erosion and destruction of this public resource.”¹⁵⁷ The South Carolina lower court found that the Act constituted a taking, requiring “just compensation.”¹⁵⁸ The Supreme Court of South Carolina reversed, however, holding that the Act constituted a valid exercise of the state’s police powers.¹⁵⁹

The Supreme Court reversed this decision, finding that a regulation that results in a denial of “all economically beneficial or productive use of land” constitutes a categorical taking requiring just compensation.¹⁶⁰ Compensation is not required, however, when the regulation “takes” something that is not within the owner’s property rights.¹⁶¹ If the state could show that the Act prohibited a use that could be unlawful under “background principles of nuisance and property law,” South Carolina could avoid compensating a property owner because it is “taking nothing.”¹⁶²

Background principles in relation to the public trust doctrine have not been thoroughly defined by the Court.¹⁶³ *Lucas* suggests, however, that pursuant to background principles of law, an interested party may challenge his or her neighbor’s use of property.¹⁶⁴ For example, if building of a home on one’s property would give rise to a nuisance action by a neighboring landowner, a state law prohibiting such a nuisance in the first place cannot be an unconstitutional taking.¹⁶⁵

If legislative action does not constitute a categorical taking under *Lucas*, it may implicate a partial taking under the doctrine established in *Penn Central Transportation Co. v. City of New York*.¹⁶⁶ In *Penn Central*, the Su-

¹⁵⁶ *Id.* at 1007.

¹⁵⁷ *Id.* at 1007, 1022.

¹⁵⁸ *Id.* at 1009.

¹⁵⁹ *Id.* at 1009, 1020–21.

¹⁶⁰ *Id.* at 1015, 1032 (“[C]ategorical treatment [is] appropriate . . . where regulation denies all economically beneficial or productive use of land.”).

¹⁶¹ *Id.* at 1029; see *infra* notes 162–165 and accompanying text.

¹⁶² *Lucas*, 505 U.S. at 1031–32.

¹⁶³ John D. Echeverria, *The Public Trust Doctrine as a Background Principles Defense in Takings Litigation*, 45 U.C. DAVIS L. REV. 931, 933 (2012).

¹⁶⁴ See *Lucas*, 505 U.S. at 1029–31; *infra* note 165 and accompanying text.

¹⁶⁵ Cf. *Lucas*, 505 U.S. at 1029 (“[T]he owner of a lake-bed, for example, would not be entitled to compensation [under the Fifth Amendment] when he is denied the requisite permit to engage in a landfilling operation that would have the effect of flooding others’ land[, thus creating a nuisance].”).

¹⁶⁶ *Id.* at 1015, 1032; *Penn Cent. Transp. Co. v. City of New York*, 438 U.S. 104, 124 (1978); see *Palazzolo v. Rhode Island*, 533 U.S. 606, 633 (2001) (discussing *Penn Central* as governing partial regulatory takings).

preme Court established a three-prong test for a legislative taking of property without just compensation.¹⁶⁷ The Court considered the following factors to be particularly important when determining whether a regulation violated the Takings Clause: (1) “economic impacts of the regulation”; (2) “the extent to which the regulation has interfered with distinct investment-backed expectations”; and (3) “the character of the governmental action.”¹⁶⁸ The result is an *ad hoc* approach to partial takings claims.¹⁶⁹ The Court will weigh these three factors to determine whether just compensation is due to the private property owner.¹⁷⁰

B. The Public Trust Doctrine as a Defense to Takings Liability

Theoretically, the public trust doctrine should be able to maintain natural ecosystems and protect public access, because the state has the obligation to protect the public property interest in public trust resources.¹⁷¹ This public right cannot be extinguished by private landowners, and it is the responsibility of the state to assure that those private actors do not burden the public trust.¹⁷² In practice, however, states have not upheld this responsibility because states do not yet hold title to the lands that will become subject to the public trust as a result of sea level rise.¹⁷³ The public trust doctrine, when coupled with rolling easement legislation, can achieve these goals while also supplying a defense against takings claims.¹⁷⁴

¹⁶⁷ *Penn Cent. Transp. Co.*, 438 U.S. at 124.

¹⁶⁸ *Id.*

¹⁶⁹ See *Palazzolo*, 533 U.S. at 633 (discussing *Penn Central* as governing partial regulatory takings); *Penn Cent. Transp. Co.*, 438 U.S. at 124.

¹⁷⁰ *Penn Cent. Transp. Co.*, 438 U.S. at 124; see *Palazzolo*, 533 U.S. at 634 (“*Penn Central* does not supply mathematically precise variables, but instead provides important guideposts that lead to the ultimate determination whether just compensation is required.”).

¹⁷¹ See Peloso & Caldwell, *supra* note 124, at 58 (“[T]he state may not abdicate interest in the public trust [I]n the face of rising sea levels, which stand to greatly expand the scope of public trust lands, state actions [which allow erosion control structures] may unlawfully abdicate the state’s duty as trustee”); see also Melissa Kwaterski Scanlon, Comment, *The Evolution of the Public Trust Doctrine and the Degradation of Trust Resources: Courts, Trustees and Political Power in Wisconsin*, 27 *ECOLOGY L.Q.* 135, 137 (2000) (“The expansion of the public trust doctrine has been a focal point for hopes that the doctrine will be used to curb the degradation of water resources and wildlife.”).

¹⁷² *Ill. Cent. R.R. Co. v. Illinois*, 146 U.S. 387, 452 (1892).

¹⁷³ See Peloso & Caldwell, *supra* note 124, at 58–59 (“[T]he massive expansion of the public trust due to inundation by rising sea levels is unlike anything that we have seen under the common law . . . the public trust interest we consider is a wholly future interest involving land over which the state does not yet hold title.”).

¹⁷⁴ See *infra* notes 182–193 and accompanying text.

1. General Overview of the Public Trust Doctrine

Pursuant to English common law, the king holds tidelands in trust for the benefit of the public, and may not convey such property to private owners.¹⁷⁵ The public has the right to navigate, fish, and trade on the waters.¹⁷⁶ The United States adopted this English common law doctrine, and during colonization, ownership of the tidelands passed to the state upon statehood.¹⁷⁷

In 1892, the Supreme Court of the United States decided *Illinois Central Railroad v. Illinois*, the seminal public trust doctrine case.¹⁷⁸ In *Illinois Central Railroad*, Illinois attempted to convey title to a portion of the Chicago harbor to a private company, Illinois Central Railroad.¹⁷⁹ The Court held that the state may not grant title to land held in trust for the public to a private party.¹⁸⁰ The title held by the state was a “different” type of title, and the public’s right to the public trust land could not be extinguished by a private purchaser.¹⁸¹

2. The Public Trust Doctrine as a Background Principle of Law under *Lucas*

Property rights are often described as a “bundle” of rights, including, among other things, the right to possession, the right to quiet enjoyment of property, and the right to exclude others.¹⁸² “[T]he Public Trust Doctrine[, however,] . . . constrain[s] what government officials and private property owners may do” with land that is subject to the public trust.¹⁸³

Scholars have suggested that the public trust doctrine provides ample support for rolling easement policies, and have described rolling easements as the “concept of a public trust that moves with rising sea levels.”¹⁸⁴ A rolling easement statute can provide an enforcement mechanism for the public

¹⁷⁵ *Ill. Cent. R.R. Co.*, 146 U.S. at 458.

¹⁷⁶ *Id.* at 452.

¹⁷⁷ See Robin Kundis Craig, *A Comparative Guide to the Eastern Public Trust Doctrines: Classifications of States, Property Rights, and State Summaries*, 16 PENN ST. ENVTL. L. REV. 1, 6–7 (2007) (citing *Phillips Petroleum Co. v. Mississippi*, 484 U.S. 469, 476–81 (1988) (“It is the settled law of this country that the ownership of and dominion and sovereignty over lands covered by tide waters . . . belong to the respective states within which they are found . . .”)); *supra* notes 175–176 and accompanying text.

¹⁷⁸ *Ill. Cent. R.R. Co.*, 146 U.S. at 462–64; see Craig, *supra* note 177, at 9.

¹⁷⁹ *Ill. Cent. R.R. Co.*, 146 U.S. at 438–39.

¹⁸⁰ *Id.* at 453.

¹⁸¹ *Id.* at 452.

¹⁸² Denise R. Johnson, Lecture, *Reflections on the Bundle of Rights*, 32 VT. L. REV. 247, 251, 253, 255 (2007).

¹⁸³ See David Takacs, Student Essay, *The Public Trust Doctrine, Environmental Human Rights, and the Future of Private Property*, 16 N.Y.U. ENVTL L. J. 711, 712 (2008).

¹⁸⁴ See Peloso & Caldwell, *supra* note 124, at 61 (“The rolling easements concept assumes that as sea levels rise and the mean high tide line moves inland, public trust title will follow this line.”).

trust doctrine without interfering with private property rights.¹⁸⁵ Because the public trust doctrine is a background principle under *Lucas*, a rolling easement policy “should not pose takings problems.”¹⁸⁶

3. A Rolling Easement Policy Founded in the Public Trust Doctrine Provides Notice to Private Landowners, Reducing Investment-Backed Expectations under the *Penn Central* Doctrine

Current property laws of many states do not adequately inform prospective property owners of the true risks of owning property along the coast.¹⁸⁷ The Commonwealth of Virginia does not require a seller to disclose flood risks to potential buyers of coastal property.¹⁸⁸ The national flood insurance plan subsidizes coastal flood insurance, creating artificially low insurance premiums, and requiring taxpayers to absorb the monetary damage when disaster strikes.¹⁸⁹ Most concerning, shoreline armoring (where allowed) actually encourages development in flood-hazard areas.¹⁹⁰

Rolling easement statutes put property owners on notice of the realities of sea level rise.¹⁹¹ As a result, it will no longer be a reasonable expectation

¹⁸⁵ See *Palazzolo v. Rhode Island*, 533 U.S. 606, 629 (2001) (describing “background principles” as restrictions that the laws of property or nuisance already place on land ownership); Kim & Karp, *supra* note 145, at 206 (describing the public trust doctrine as a “background principle of property law”); Peloso & Caldwell, *supra* note 124, at 61 (discussing a rolling easement as “[t]he concept of a public trust that moves with rising sea levels”).

¹⁸⁶ See Peloso & Caldwell, *supra* note 124, at 61.

¹⁸⁷ Thomas Ruppert, *Reasonable Investment-Backed Expectations: Should Notice of Rising Seas Lead to Falling Expectations for Coastal Property Purchasers?*, 26 J. LAND USE & ENVTL. L. 239, 266 (2011) (“As so few states’ disclosure laws contain any mention of coastal hazards in notice requirements, it comes as little surprise that few cases related to coastal hazards mention disclosure or notice requirements. In fact, research revealed only two cases that directly reference a statutory notice requirement for coastal properties.”).

¹⁸⁸ RECURRENT FLOODING SUB-PANEL, *supra* note 67, at 73 (“The Virginia Residential Property Disclosure Act does not require that sellers disclose a property’s location in the floodplain/flood zone or the potential risk of flooding.”).

¹⁸⁹ Kristan Uhlenbrock, *Despite Hazard of Sea Level Rise, Senate Halts Flood Insurance Reforms*, THINKPROGRESS (Jan. 31, 2014, 10:37 AM), <http://thinkprogress.org/climate/2014/01/31/3230141/senate-flood-insurance/> [<http://perma.cc/Y3AR-2JZN>].

¹⁹⁰ See TITUS, *supra* note 8, at iii; *supra* note 115 and accompanying text (describing how armoring “induces additional development”).

¹⁹¹ See ANDREW C. SILTON & JESSICA GRANNIS, GEORGETOWN CLIMATE CTR., VIRGINIA CASE STUDY: STEMMING THE TIDE: HOW LOCAL GOVERNMENTS CAN MANAGE RISING FLOOD RISKS: REVIEW DRAFT 2-APRIL 2011, at 20 (2010), <http://www.law.unc.edu/documents/clear/workshops/vacasestudy.pdf> [<https://perma.cc/K6SD-UMN2>] (review draft, cited with permission from author) (“For landowners, [rolling easements] set expectations that structures will need to be removed in the future due to rising water levels . . . [B]y providing advance notice to coastal property owners, governments can avoid potential litigation”); TITUS, *supra* note 8, at iii (“[R]esidents believe that they (and their heirs) can own the land forever if they choose . . . [b]ut permanent coastal development might not be economically or environmentally feasible everywhere.”).

for coastal property owners to believe that their right to freely enjoy their “bundle” of property rights will last unaltered through the coming changes from sea level rise.¹⁹² The government can defend a rolling easement policy against a takings claim by “challeng[ing] the reasonableness of the investor’s expectations under [a] *Penn Central* [analysis].”¹⁹³ If a rolling easement policy provides a property owner with notice as to the limits of his or her rights, then that owner cannot reasonably expect their property rights to be unchanged by sea level rise.¹⁹⁴

C. State-Specific Public Trust Doctrines Will Provide Support for Rolling Easement Policies

1. Virginia’s Public Trust Doctrine

In Virginia, the public owns the tidelands to the mean low water mark pursuant to the public trust doctrine.¹⁹⁵ According to the Code of Virginia, “[t]he limits or bounds of the tracts of land lying on the bays, river, creeks, and shores within the jurisdiction of the Commonwealth [of Virginia], and the rights and privileges of the owners of such lands, shall extend to the mean low[]water mark.”¹⁹⁶ The Constitution of the Commonwealth of Virginia also codifies the public trust doctrine: “[I]t shall be the Commonwealth’s policy to protect its atmosphere, lands, and waters from pollution, impairment, or destruction, for the benefit, enjoyment, and general welfare of the people of the Commonwealth.”¹⁹⁷ Virginia must exercise its authority over the commonwealth-owned bottomlands in a manner that is consistent with the public trust doctrine.¹⁹⁸ Additionally, it is critical for the commonwealth to ensure that current or future public use of this natural resource is not threatened.¹⁹⁹

¹⁹² See SILTON & GRANNIS, *supra* note, 191, at 20; TITUS, *supra* note 8, at iii; Johnson, *supra* note 182, at 256.

¹⁹³ Peloso & Caldwell, *supra* note 124, at 66–67.

¹⁹⁴ See *supra* notes 191–193 and accompanying text.

¹⁹⁵ VA. CODE ANN. § 28.2-1202 (2015); *supra* note 128 and accompanying text.

¹⁹⁶ VA. CODE ANN. § 28.2-1202.

¹⁹⁷ VA. CONST. art. XI, § 1.

¹⁹⁸ *Palmer v. Commonwealth Marine Res. Comm’n*, 628 S.E.2d 84, 89 (Va. Ct. App. 2006) (quoting VA. CODE ANN. § 28.2-1205(A)).

¹⁹⁹ See *id.* at 89–90 ([T]he state holds the land lying beneath public waters as trustee for the benefit of all citizens. As trustee, the state is responsible for proper management of the resource to ensure the preservation and protection of all appropriate current and potential future uses, including potentially conflicting uses, by the public.”).

2. North Carolina's Public Trust Doctrine

North Carolina holds the shore up to the mean high water mark in trust for the public.²⁰⁰ The North Carolina Code (the “Code”) reads:

The public having made frequent, uninterrupted, and unobstructed use of the full width and breadth of the ocean beaches of this State from time immemorial, this section shall not be construed to impair the right of the people to the customary free use and enjoyment of the ocean beaches, which rights remain reserved to the people of this State under the common law and are a part of the common heritage of the State recognized by Article XIV, Section 5 of the Constitution of North Carolina. These public trust rights in the ocean beaches are established in the common law as interpreted and applied by the courts of this State.²⁰¹

As referenced in the Code, the Constitution of North Carolina supports the public trust doctrine: “It shall be the policy of this State to conserve and protect its lands and waters for the benefit of all its citizenry . . . as a part of the common heritage of this State its forests, wetlands, estuaries, beaches, historical sites, openlands, and places of beauty.”²⁰² Therefore, North Carolina has the authority to enforce the public trust doctrine for the benefit of its citizens.²⁰³

In *Town of Nags Head v. Cherry, Inc.*, the North Carolina Court of Appeals held that only the state has the authority to bring an action to enforce the public trust doctrine.²⁰⁴ As a result, the Town of Nags Head (the “Town”) was unable to enforce certain provisions of its “Nuisance Ordinance” (the “Ordinance”).²⁰⁵ Several other neighbors challenged the enforcement of the Ordinance in separate actions, and the precedent of *Cherry, Inc.* precluded the Town from successfully managing its shoreline through enforcing its Ordinance.²⁰⁶ These cases illustrate how confusion

²⁰⁰ N.C. GEN. STAT. § 77-20 (2015); *supra* note 129 and accompanying text.

²⁰¹ N.C. GEN. STAT. § 77-20(d).

²⁰² N.C. CONST. art. XIV, § 5.

²⁰³ *Id.*; N.C. GEN. STAT. § 77-20(d).

²⁰⁴ *Town of Nags Head v. Cherry, Inc.*, 723 S.E.2d 156, 161 (N.C. Ct. App. 2012) (“Because only the *State*, acting through the Attorney General, has standing to bring an action to enforce the *State’s* public trust rights . . .”).

²⁰⁵ *See id.* at 158–62 (describing how the reviewing court reversed the trial court’s demolition order of the property owner’s dwelling, thereby preventing the Town from enforcing the Ordinance).

²⁰⁶ *See Sansotta v. Town of Nags Head*, 724 F.3d 533, 536, 541 (4th Cir. 2013) (citing *Cherry, Inc.*, 723 S.E.2d at 158–62) (“[A]s the North Carolina Court of Appeals has since made clear, the Town does not have the authority to enforce the public trust doctrine; that power that lies exclusively with the state.”); *Town of Nags Head v. Toloczko*, No. 2:11-CV-1-D, 2014 WL 4219516, at *1, 10 (E.D. N.C. Aug. 18, 2014) (citing *Cherry, Inc.*, 723 S.E.2d at 160–61) (“The Town con-

between state and local policy can lead to difficulty for local enforcement of coastal management; a state-level rolling easement policy could alleviate this local problem.²⁰⁷

IV. ROLLING EASEMENT POLICY AS A VIABLE APPROACH FOR COASTAL VIRGINIA AND NORTH CAROLINA

By rooting a rolling easement policy in the public trust doctrine, a state can avoid takings liability because the public trust doctrine is a “background principle” of law under *Lucas v. South Carolina Coastal Council*.²⁰⁸ The public trust doctrine embodies the public’s interest in coastal land.²⁰⁹ The state owns those lands and holds them in trust for the benefit of the public.²¹⁰ Statutes grounded in the public trust “limit coastal development [by private property owners in order] to protect the public’s interest in these lands.”²¹¹ Such a statute would allow a state to uphold its responsibilities as trustee for its citizens.²¹²

In *Lucas*, the United States Supreme Court introduced “background principles” of law as an exception to takings claims.²¹³ “[B]ackground principles represent inherent limitations on the scope of private property interests that defeat takings claims by barring plaintiffs from claiming ownership of ‘property’ that could potentially support takings claims.”²¹⁴ The term “rolling easement” encompasses several land use policies designed to allow for the

cedes that, in light of *Cherry*, the Toloczkos are entitled to summary judgment on [the public trust enforcement claim]”); *Cherry, Inc.*, 723 S.E.2d at 158–62.

²⁰⁷ See Kevin Michael Emmerich, *Town of Nags Head v. Toloczko*, PUB. LAND & RES. L. REV., Fall 2013, at 1, <http://scholarship.law.umt.edu/cgi/viewcontent.cgi?article=1356&context=plrlr> [<https://perma.cc/6H28-JDKY>] (“Homeowners sought relief and damages in federal court for the condemnation of their ocean front cottage amid the vacillating doctrines of state and municipal law.”); *supra* notes 121–150, 204–206 and accompanying text.

²⁰⁸ See *Lucas v. S.C. Coastal Council*, 505 U.S. 1003, 1029–31 (1992) (discussing “background principles”); Caldwell & Segall, *supra* note 48, at 551–52 (“Expressly grounding rolling easements in the longstanding background principles of the common law [as articulated in *Lucas*] and within the principles of property law helps to immunize the state from potential constitutional takings challenges because articulating such background principles does not change the existence of fundamental property rights enjoyed by a private owner but merely clarifies that owner’s existing rights.”); see also Peloso & Caldwell, *supra* note 124, at 61 (“One of the attractive aspects of rolling easements is that they allow states to reclaim title to property without incurring liability for a regulatory taking under *Lucas*. Caldwell & Segall argue that the public trust and other common law principles that underlie rolling easements are background principles under *Lucas*,[] and therefore, rolling easements should not pose takings problems.”).

²⁰⁹ See GRANNIS, *supra* note 25, at 41.

²¹⁰ See *id.*

²¹¹ *Id.*

²¹² See *supra* notes 171 and 199 and accompanying text; *infra* note 223 and accompanying text.

²¹³ See *Lucas*, 505 U.S. at 1029–31.

²¹⁴ Echeverria, *supra* note 163, at 933.

natural inland migration of shoreline ecosystems.²¹⁵ Rolling easements provide a way of defining the boundary between private and public land, and are grounded in the public trust doctrine.²¹⁶

When a rolling easement statute is clearly grounded in the public trust doctrine, rolling easements will not constitute a taking because coastal property owners do not have an inherent right to extinguish the public trust.²¹⁷ A rolling easement policy can also provide notice to property owners of the enforceability of the public trust doctrine, thereby lowering their reasonable investment-backed expectations.²¹⁸ As a result, a rolling easement statute enforcing the public trust doctrine may survive a takings claim under the analysis laid out in *Penn Central Transportation Co. v. City of New York*.²¹⁹

A. Legal Support for a Rolling Easement Policy in Virginia

The public trust doctrine supports a rolling easement policy in Virginia.²²⁰ The commonwealth has codified the public trust doctrine in its Constitution and in its state code.²²¹ Virginia explicitly requires that the Marine Coastal Commission align its permitting decisions with the public trust doctrine.²²² In theory, this should be sufficient to prohibit coastal armoring and any other activity that interferes with public access to the public tidelands.²²³

²¹⁵ See *supra* note 121 and accompanying text.

²¹⁶ See *supra* note 124 and accompanying text.

²¹⁷ See *supra* notes 208–216 and accompanying text.

²¹⁸ See GRANNIS, *supra* note 25, at 44 (“[Through rolling easement statutes that provide] advance notice to coastal property owners, governments can set private expectations that structures will need to be removed in the future if sea-level rise inundates coastal lands.”); Peloso & Caldwell, *supra* note 124, at 81 (“In order to find that the investment-backed expectations of the property owner are unreasonable, it is necessary to establish that the property owner has constructive notice of the limited tenure of his title and then show that he cannot recover the value of his investment in this time frame Under the common law, we accept as background principles the doctrines of the public trust, accretion, and erosion. Therefore, we can assume that the property owner has at least constructive notice that the seaward limit of his title is dynamic.”).

²¹⁹ See *Penn Cent. Transp. Co. v. City of New York*, 438 U.S. 104, 124 (1978) (introducing investment-backed expectations as a key factor in takings analysis); Peloso & Caldwell, *supra* note 124, at 81; *supra* notes 208–218 and accompanying text.

²²⁰ See *infra* notes 221–227 and accompanying text.

²²¹ VA. CONST. art. XI, § 1; VA. CODE ANN. § 28.2-1202 (2015); see *supra* notes 195–197 and accompanying text.

²²² VA. CODE ANN. § 28.2-1205 (“[T]he [Marine Coastal] Commission shall also consider the public and private benefits of the proposed project and shall exercise its authority . . . consistent with the public trust doctrine . . . in order to protect and safeguard the public right to the use and enjoyment of the subaqueous lands of the Commonwealth [of Virginia] held in trust by it for the benefit of the people as conferred by the public trust doctrine and the Constitution of Virginia.”).

²²³ See *id.*; TITUS, *supra* note 8, at 3 (“[Shoreline armoring] can increase the loss of wetlands and beaches. It can also eliminate public access along the shore.”); Peloso & Caldwell, *supra* note 124, at 58 (“[S]tate actions that permit property owners to hold back the advance of the dynamic property line [such as shoreline armoring] may unlawfully abdicate the state’s duty as trustee, as defined under *Illinois Central*.”).

In Virginia, however, the public trust doctrine has never been enforced in this manner.²²⁴ Using the public trust doctrine as a foundation for rolling easement legislation, therewith prohibiting hard shoreline armoring, the Commonwealth of Virginia would be able to better protect its natural resources because it would possess an enforceable means through which to protect the public coastal land.²²⁵

Virginia might choose to enact a statute similar to that of North Carolina prohibiting hard erosion-control armoring, coupled with a legal mechanism to require that structures are moved or abandoned when sea level rises to the property.²²⁶ In doing so, Virginia would better uphold its constitutional obligation to “protect its atmosphere, lands, and waters from pollution, impairment, or destruction, for the benefit, enjoyment, and general welfare of the people of the Commonwealth.”²²⁷

B. Legal Support for Rolling Easement Policy in North Carolina

In *Shell Island Homeowners Ass’n, Inc. v. Tomlinson*, the Court of Appeals of North Carolina found the hardened structure rules to be a valid exercise of the state legislature’s power.²²⁸ The rule limiting coastal erosion devices withstood petitioner’s takings claim because the state’s regulation did not cause the erosion of plaintiff’s property.²²⁹ Instead, the court stressed that plaintiff’s injury resulted from “naturally occurring phenomena.”²³⁰ Furthermore, North Carolina’s regulation was “consistent with its

²²⁴ See *supra* notes 77–78 and accompanying text (describing Virginia’s allowance of hard shoreline armoring), 223 and accompanying text (discussing the notion that the public trust doctrine should prohibit hard shoreline armoring).

²²⁵ See *supra* notes 121–124, 135–147 and accompanying text (introducing rolling easements as an effective alternative to current coastal management tools that is a viable means for protecting natural resources), 208–219 and accompanying text (discussing the viability of a rolling easement statute with a foundation in public trust doctrine), 220–223 and accompanying text (establishing that the public trust doctrine may be a means through which to prohibit hard shoreline armoring).

²²⁶ See N.C. GEN. STAT. § 113A-115.1 (2015) (prohibiting all permanent hard shoreline armoring structures); TEX. NAT. RES. CODE § 61.011 (2015) (recognizing rolling public easement).

²²⁷ VA. CONST. art. XI, § 1; Caldwell & Segall, *supra* note 48, at 550–51 (describing how a rolling easement would require a property owner to refrain from building an armoring structure, and to abandon or move his or her property once the sea level reaches it).

²²⁸ See 517 S.E.2d 406, 415 (N.C. Ct. App. 1999).

²²⁹ *Id.* (“[P]laintiff’s complaint does not allege that the migration of [the] Inlet and the resulting erosion of plaintiff’s property have been caused by any regulatory action taken by defendants, and these naturally occurring phenomena are the primary causes of any loss sustained by plaintiffs.”).

²³⁰ *Id.* at 414–15 (“The invasion of property and reduction in value which plaintiffs allege clearly stems from the natural migration of [the] Inlet . . .”).

statutory powers,” and was based on a “legitimate government interest.”²³¹ Notably, the court held that the plaintiff’s claim that “[t]he protection of property from erosion is an essential right of property owners” had “no support in the law.”²³² Therefore, the court recognized that the law did not support an inherent private property right to hold back the sea.²³³

The goal of a rolling easement policy is to prevent hard shoreline armoring, thereby allowing for the inland migration of natural resources.²³⁴ North Carolina’s erosion control statute has been characterized as a “rolling coastal management statute,” because by preventing hard armoring, the state is effectively allowing coastal features to “roll” inland, and fluctuate with natural processes.²³⁵ Because North Carolina’s statute furthers this preventative goal, the statute embodies the spirit of a rolling easement policy.²³⁶

In furtherance of its express constitutional provision “to conserve and protect its lands and waters for the benefits of all its citizenry,” North Carolina could expand its erosion control statute by providing a mechanism to remove pre-existing structures.²³⁷ For example, the Texas Open Beaches Act prohibits structures from preventing public access to public beaches.²³⁸ This means that any structure, pre-existing or otherwise, must be removed once it encroaches on public tidelands as a result of sea level rise.²³⁹

C. Benefits of a Rolling Easement Policy

Rolling easements allow for coastal communities to preserve crucial natural resources.²⁴⁰ Beaches are of paramount importance to tourism indus-

²³¹ *Id.* at 415, 417 (“[T]he protection of lands of environmental concern is a conceivable and legitimate government interest, as is the preservation of . . . the need for the public to have access and use of the State’s open beaches.”).

²³² *Id.* at 414 (“The allegations in plaintiffs’ complaint have no support in the law, and plaintiffs have failed to cite to this Court any persuasive authority for the proposition that a littoral or riparian landowner has a right to erect hardened structures . . . to protect their property from erosion and migration.”).

²³³ *See id.*

²³⁴ TITUS, *supra* note 8, at 28 n.107.

²³⁵ N.C. GEN. STAT. § 113A-115.1 (2015); *see* Byrne & Grannis, *supra* note 27, at 278–79.

²³⁶ *See* N.C. GEN. STAT. § 113A-115.1; *supra* notes 234–235 and accompanying text.

²³⁷ *See* N.C. CONST. art. XIV, § 5; N.C. GEN. STAT. § 113A-115.1; TITUS, *supra* note 8, at 5 (“A rolling easement would generally prohibit shore protection and require removal of pre-existing structures seaward of a specific migrating shoreline such as the dune vegetation line, mean high water, or the upper boundary of tidal wetlands.”).

²³⁸ TEX. NAT. RES. CODE § 61.0183 (2015) (“The commissioner may order the removal of a structure, improvement, obstruction, barrier, or hazard from a public beach if the commissioner finds the structure . . . to be on the public beach . . .”).

²³⁹ *See id.* § 61.025 (“Owners of structures erected seaward of the vegetation line . . . or that become seaward of the vegetation line as a result of processes such as shoreline erosion are subject to a lawsuit by the state of Texas to remove the structures.”) (alteration in original).

²⁴⁰ *See* TITUS, *supra* note 8, at 13–14.

tries.²⁴¹ The coastline plays a critical role in the functioning of both natural ecosystems and economic activity.²⁴² The shoreline is home to many forms of life and allows for the natural filtration of water, preserving water quality.²⁴³ Beaches and dunes provide a buffer zone for storm surges, protecting human welfare.²⁴⁴

Additionally, rolling easements are extremely beneficial because: “[T]hey impose no costs until sea levels actually rise, [and] they have plenty of time to be incorporated into reasonable investment-backed expectations.”²⁴⁵ This in turn could “foster consensus on coastal development policies because developers will be forced to admit the existence of sea level rise before they can argue that they should not be subjected to rolling easements.”²⁴⁶ A rolling easement policy is also more economically desirable than development-discouraging land use regulations.²⁴⁷

Finally, enacting a state-level rolling easement policy, in lieu of continuing with current coastal management practices, can prevent future costly takings litigation.²⁴⁸ Because the public trust doctrine should be considered a “background principle” under *Lucas*, a rolling easement policy would not be considered a “taking” of a private property right.²⁴⁹ Additionally, because a state-level statute would put property owners on notice, it is likely that a local government could avoid partial takings liability under *Penn Central*.²⁵⁰

²⁴¹ See, e.g., O’Connell, *supra* note 40, at 65 (“More than 60 percent of all jobs in Hawaii are related to tourism, which depends on the appeal of sandy beaches”); Caldwell & Segall, *supra* note 48, at 573 (noting that South Carolina’s coastal beaches generate “approximately two-thirds of [the state’s] annual tourism industry revenue”).

²⁴² See *The Benefits of Healthy Coastal Habitats*, NAT’L OCEANIC & ATMOSPHERIC ADMIN., <http://www.noaa.gov/features/resources/rae.html> [<http://perma.cc/RUD8-XFL7>] (“Healthy coastal areas are one of the most important sources of economic activity, providing food, energy production, commerce, recreation, as well as community resiliency from storm surges.”).

²⁴³ See SHORELINE STABILIZATION TECHNIQUES, *supra* note 47, at 4.

²⁴⁴ See *Beaches and Dunes in Virginia*, VA. INST. MARINE SCI., <http://www.vims.edu/research/departments/physical/programs/ssp/beaches/index.php> [<http://perma.cc/GT7R-SHGR>].

²⁴⁵ Peloso & Caldwell, *supra* note 124, at 61.

²⁴⁶ *Id.*

²⁴⁷ See TITUS, *supra* note 8, at 151 (“A key economic and policy justification for rolling easements is that they cost less than either preventing development or failing to plan.”).

²⁴⁸ See *id.* at 90 (“One of the primary reasons for obtaining a recorded rolling easement is that the legal uncertainty surrounding a possible regulatory takings claim can be avoided.”); *supra* notes 171–193 and accompanying text (discussing the public trust doctrine as a defense to takings liability).

²⁴⁹ See Peloso & Caldwell, *supra* note 124, at 61; *supra* notes 182–186 and accompanying text.

²⁵⁰ See *supra* notes 187–193 and accompanying text.

CONCLUSION

Sea level rise is a global problem being felt acutely by the Atlantic coast of the United States. Coastal management tools that Mid-Atlantic states are currently using are insufficient to address this critical issue. At the state level, rolling easement policies that utilize protective coastal management can minimize future lawsuits. Rolling easements allow private citizens the benefit of present use, while preserving the public's right to future use of wetlands, coastal beaches, and barrier islands. Both North Carolina and Virginia have the legal authority to enact policies that take advantage of the rolling easement. Doing so will save these states millions of dollars in the coming decades as sea levels continue to rise and adaptation becomes not only an environmentally prudent land use tool, but a critical necessity.