

The Coastal Property Boundary in California: Recommendations to Improve Determination of the Mean High Tide Line in Light of Sea-Level Rise

*Jennifer Garlock**

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* UCLA School of Law, J.D. candidate, 2019; Washington University in St. Louis, M.S., 2006; Cornell University, B.S., 2004. The author would like to thank Professor Sean Hecht for his guidance and helpful comments; Jim Koepke of the California State Lands Commission for helping me understand the agency's survey procedures; and the editors of the UCLA Journal of Environmental Law & Policy.

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INTRODUCTION

With a highly developed coastline in California, the matter of where private property ends and State-owned tidelands begin is a critical one. The rate of sea-level rise due to climate change is accelerating, and disputes around the location of this boundary are likely to become more common.¹ Attempts to plan for sea-level rise and mitigate the resulting harm to both coastal properties and public beaches are proving to be highly controversial. The City of Del Mar has opposed the California Coastal Commission by rejecting any incorporation of “managed retreat” in its Local Coastal Program, instead saying the City will rely on sea walls and sand replenishment to protect structures and beaches.² The Commission and private property owners are increasingly waging court battles over the continued existence of protective sea walls; the Commission recently voted to require a Laguna Beach property owner to tear down its sea wall and also pay a one million dollar fine.³ Determinations of whether or how upland owners may develop their property⁴ will need to consider sea-level rise, and the location of the property boundary will play an important role in these decisions.

This Comment starts by defining the property boundary and identifying why sea-level rise presents a challenge. Part I explores the nature of how the property boundary is currently determined, while Part II identifies legal principles that apply to this determination. Part III identifies two main technical challenges in locating the property boundary in a world of increasing sea-level

1. CAL. COASTAL COMM'N, CAL. NAT'L RES. AGENCY, DRAFT RESIDENTIAL ADAPTATION POLICY GUIDANCE: INTERPRETIVE GUIDELINES FOR ADDRESSING SEA LEVEL RISE IN LOCAL COASTAL PROGRAMS 36, (Mar. 2018, Revised), <https://documents.coastal.ca.gov/assets/climate/slr/vulnerability/residential/RevisedDraftResidentialAdaptationGuidance.pdf> [<https://perma.cc/39CY-VRAU>] [hereinafter DRAFT RESIDENTIAL ADAPTATION POLICY GUIDANCE].

2. Phil Diehl, *Del Mar: Retreat from rising sea levels not an option*, THE SAN DIEGO UNION-TRIBUNE (Oct. 3, 2018), <https://www.sandiegouniontribune.com/communities/north-county/sd-no-delmar-retreat-20181002-story.html> [<https://perma.cc/M95B-B5JN>]. See also Anne C. Mulkern, *Calif. prepares policy for coastal “retreat,”* E&E NEWS CLIMATE WIRE (Dec. 7, 2018), <https://www.eenews.net/stories/1060109045> [<https://perma.cc/Q28T-KQG2>].

3. Rosanna Xia, *Coastal officials vote to tear down sea wall protecting Laguna Beach mansion*, L.A. TIMES (Aug. 9, 2018), <https://www.latimes.com/local/lanow/la-me-seawall-laguna-beach-20180809-story.html> [<https://perma.cc/X69A-6TPW>].

4. See CAL. COASTAL COMM'N, CAL. NAT'L RES. AGENCY, SEA LEVEL RISE POLICY GUIDANCE: INTERPRETIVE GUIDELINES FOR ADDRESSING SEA LEVEL RISE IN LOCAL COASTAL PROGRAMS AND COASTAL DEVELOPMENT PERMITS, 33 (Jul. 2018, Draft Science Update), https://documents.coastal.ca.gov/assets/climate/2018ScienceUpdate_website_720.18.pdf [<https://perma.cc/7FU6-3NMH>] [hereinafter SEA LEVEL RISE POLICY GUIDANCE].

rise: the outdated nature of tidal data used to determine the boundary, and how to locate the boundary when an armoring structure is present.⁵ Part IV argues that in order to comply with the law and enact sound coastal management policies, the mean high tide line (MHTL) should be determined using up-to-date tidal data and should be located without regard to armoring structures. Finally, the conclusion advances recommendations for developing this more technically and legally sound approach to determining the MHTL.

A. *Defining the Mean High Tide Line*

California law provides that the State owns all land below the “ordinary high water mark.”⁶ The “ordinary high water mark” is to be determined by the average height of all high tides at a given location over a period of 18.6 years.⁷ This is referred to as the mean high water mark, or MHTL.

The MHTL is an ambulatory boundary with two major causes of movement. First, the boundary moves as the shore changes, either due to erosion and accretion (horizontal changes) or due to vertical land movement.⁸ Second, the MHTL can move as the elevation of the water changes, as is the case with sea-level rise.⁹ The legal boundary is the point at which the MHTL intersects the shore, and can only be approximated, but not legally fixed, when drawn as a meander line on a survey map.¹⁰

The public trust doctrine provides that the sovereign holds certain natural resources in “trust” for current and future generations and may not transfer those resources to private parties or allow their injury or destruction.¹¹ Land below the MHTL (tideland) is held in the public trust, while land above the MHTL (upland) may be privately owned.¹² As the MHTL moves landward, due to subsidence of the land or erosion of the shore, the newly submerged

5. “Armoring structures” will be used in this Comment to describe all forms of armoring, including sea walls, riprap or rock revetments (loose stone or concrete piled along the shoreline), etc.

6. CAL. CIV. CODE § 670 (West 2007).

7. *Borax Consol., Ltd. v. City of Los Angeles*, 296 U.S. 10, 26–27 (1935).

8. SEA LEVEL RISE POLICY GUIDANCE, *supra* note 4, at 169; *see also* *Lechuza Villas W. v. Cal. Coastal Comm’n*, 70 Cal. Rptr. 2d 399, 411 (Ct. App. 1997).

9. *See* SEA LEVEL RISE POLICY GUIDANCE, *supra* note 4, at 169.

10. BRUCE S. FLUSHMAN, *WATER BOUNDARIES: DEMYSTIFYING LAND BOUNDARIES ADJACENT TO TIDAL OR NAVIGABLE WATERS* 90 (Roy Minnick ed., 2002); *see also* *Lechuza*, 70 Cal. Rptr. 2d at 414.

11. Richard M. Frank, *The Public Trust Doctrine: Assessing Its Recent Past & Charting Its Future*, 45 U.C. DAVIS L. REV. 665, 667 (2012).

12. CTR. FOR OCEAN SOLUTIONS, STANFORD WOODS INST. FOR THE ENV’T, *THE PUBLIC TRUST DOCTRINE: A GUIDING PRINCIPLE FOR GOVERNING CALIFORNIA’S COAST UNDER CLIMATE CHANGE* 16 (2017), https://www.centerforoceansolutions.org/sites/default/files/publications/The%20Public%20Trust%20Doctrine_A%20Guiding%20Principle%20for%20Governing%20California_Report.pdf [<https://perma.cc/KQ3B-7X3Z>] [hereinafter CTR. FOR OCEAN SOLUTIONS].

lands below the MHTL belong to the State.¹³ Similarly, if the MHTL moves seaward, due to uplift of the land or natural accretion on the shore, those newly uncovered lands belong to the upland property owner.¹⁴ The tension between coastal private property rights and the State's duty to protect tidelands held in the public trust will increase as sea level rises and moves the MHTL landward. The legal obligation caused by this landward migration will clash with the expectations of property owners about the extent of their property and what they may do with it.

B. *Challenges Due to Sea-Level Rise*

The coast has always been dynamic, with shorelines subject to change by wave action and storms. However, development has proceeded assuming some amount of stability in the land area.¹⁵ Going forward, the impacts of climate change on the coast will include not only sea-level rise, but also changes in the frequency and strength of storms battering the coast.¹⁶ Changing conditions call into question the expectations of coastal property owners about the extent of their property and its use.¹⁷ Property owners may increasingly attempt to construct coastal armoring structures to protect their property from sea-level rise, increased erosion, and more frequent flooding.¹⁸

Tide stations in central and southern California have observed sea-level rise of 1–2 millimeters per year,¹⁹ with projected rates increasing.²⁰ For context, on a relatively flat beach, one centimeter of sea-level rise will result in a forty-centimeter horizontal landward movement of the ocean/beach interface.²¹

13. See FLUSHMAN, *supra* note 10, at 126–28 (discussing fluctuations in the landform that affect the location of the MHTL).

14. *Id.*

15. See SEA LEVEL RISE POLICY GUIDANCE, *supra* note 4, at 33.

16. *Id.* at 33.

17. See, e.g., Sean B. Hecht, *Taking Background Principles Seriously in the Context of Sea Level Rise*, 39 VT. L. REV. 781, 790 (2015); see also 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. 534, 576 (2007).

18. MOLLY LOUGHNEY MELIUS ET AL., STANFORD LAW SCH. ENV'T AND NAT. RES. LAW & POLICY PROGRAM, 2015 CALIFORNIA COASTAL ARMORING REPORT: MANAGING COASTAL ARMORING AND CLIMATE CHANGE ADAPTATION IN THE 21ST CENTURY 3 (2015), <https://law.stanford.edu/wp-content/uploads/2015/07/CalCoastArmor-FULL-REPORT-6.17.15.pdf> [<https://perma.cc/7N4L-9U9F>].

19. GARY GRIGGS ET AL., CAL. OCEAN PROTECTION COUNCIL SCI. ADVISORY TEAM WORKING GRP., RISING SEAS IN CALIFORNIA, AN UPDATE ON SEA-LEVEL RISE SCIENCE 23 (2017), <http://www.opc.ca.gov/webmaster/ftp/pdf/docs/rising-seas-in-california-an-update-on-sea-level-rise-science.pdf> [<https://perma.cc/8S6U-MWPR>].

20. *Id.* at 29, tbl.2(c) (illustrating projected rates of sea-level rise for southern California over the period of 2030–2050 ranging from 5.4 mm/year to 26 mm/year, depending on the projected greenhouse gas emission scenario).

21. CAL. COASTAL COMM'N, CAL. NAT'L RES. AGENCY, STAFF REPORT, App. No. 4-11-026 (Apr. 23, 2012), 13, <http://documents.coastal.ca.gov/reports/2012/5/W23b-5-2012.pdf> [<https://perma.cc/D6Q3-D7AT>] (assuming the beach has a slope of 40:1, horizontal:vertical).

Even under conservative estimates (assuming drastic reductions in global greenhouse gas emissions), sea-level rise and the resulting impacts on coastal property will be significant in the decades to come.²²

California courts have not directly applied the principle of an ambulatory boundary to changes in the MHTL due to sea-level rise, but the matter has been contemplated in dicta. In *Littoral Development Co. v. San Francisco Bay Conservation and Development Commission*, the court noted that if sea level does rise due to global warming, so will the MHTL, and with it, the jurisdiction of the local planning commission.²³ Such a finding would be a “logical extension” of the well-established principle that the boundary is ambulatory.²⁴

I. CURRENT METHODOLOGY FOR DETERMINING AND LOCATING THE MHTL

The National Oceanic and Atmospheric Administration (NOAA) provides the underlying data for the MHTL calculation from tidal stations on the Atlantic, Gulf, and Pacific coasts. While the data provided by NOAA is nationally uniform, procedures for identifying the MHTL boundary may vary by jurisdiction. This Comment is only representative of California’s procedures.

A. Tide Data Used to Determine the MHTL

NOAA provides tidal datums for each of the twelve active tide stations along the coast of California.²⁵ Tidal datums represent a sea level elevation calculated from tidal data over a nineteen-year period, and include the MHTL, Mean Sea Level, and Mean Low Water.²⁶ The tidal datums provided by NOAA are based on a vertical datum and tide measurements taken over the National Tidal Datum Epoch (NTDE) period. The same NTDE is used at tide stations throughout the United States for uniformity.²⁷

The current vertical datum, a reference point for elevations, is the North American Vertical Datum of 1988 (NAVD88).²⁸ The fixed base-elevation for a tide station is called the “station datum,” and all other tidal datums are

22. See CAL. OCEAN PROTECTION COUNCIL SCI. ADVISORY TEAM WORKING GRP., STATE OF CALIFORNIA SEA-LEVEL RISE GUIDANCE 7 (2018), http://www.opc.ca.gov/webmaster/ftp/pdf/agenda_items/20180314/Item3_Exhibit-A_OPC_SLR_Guidance-rd3.pdf [<https://perma.cc/44MR-4JCX>] [hereinafter OPC SLR GUIDANCE].

23. *Littoral Dev. Co. v. S.F. Bay Conservation & Dev. Comm’n*, 29 Cal. Rptr. 2d 518, 527 n.5 (Ct. App. 1994).

24. CTR. FOR OCEAN SOLUTIONS, *supra* note 12, at 17.

25. OPC SLR GUIDANCE, *supra* note 22, at 24.

26. FLUSHMAN, *supra* note 10, at 117–18.

27. *Notification of Updated Tidal Datums*, NAT’L OCEANIC & ATMOSPHERIC ADMIN., U.S. DEP’T OF COMMERCE, <https://tidesandcurrents.noaa.gov/press/tidaldatum.html> [<https://perma.cc/B6QG-RAZY>] [hereinafter *Notification of Updated Tidal Datums*].

28. *Tidal Datums*, NAT’L OCEANIC & ATMOSPHERIC ADMIN., U.S. DEP’T OF COMMERCE, https://tidesandcurrents.noaa.gov/datum_options.html [<https://perma.cc/9T2J-Z7SH>].

measured from this point.²⁹ The station datum using NAVD88 is based on surveys representative of elevations in 1988. Thus, NAVD88 does not account for any changes in land elevations due to uplift or subsidence since that time.

The NTDE is published by NOAA's National Ocean Service (NOS) and is based on tidal measurements over a nineteen-year time period, currently 1983–2001.³⁰ A nineteen-year time period is used to cover an 18.6-year astronomical cycle, which includes all significant variations in the tides based on the relative locations of the moon and sun to earth.³¹ Collectively, the tidal measurements over this period and the station datum provide the data necessary to calculate the tidal datums used in locating onshore boundaries, such as the MHTL.

The NTDE is updated every twenty to twenty-five years to capture changes in mean sea level (MSL) and vertical land movement.³² The basis for this frequency of NTDE update is to limit changes in MSL between nineteen-year epochs to 0.03 to 0.05 meters (approximately 0.10 to 0.16 feet) at most stations.³³ NOAA notes that, given predictions of accelerating rates of sea-level rise, updates more frequently than twenty to twenty-five years may be required.³⁴

B. *Procedure for Locating the MHTL on Land*

The MHTL is not a fixed geographic or physical location, and the point at which the plane of the MHTL intersects the land can only be approximated by surveying.³⁵ It is important to recall, however, that this surveyed meander line cannot fix the property boundary, and the “true property boundary remains the watercourse.”³⁶ The point at which the MHTL elevation intersects the shore depends on the slope and elevation of the beach and will vary by season.³⁷ Therefore, a survey of the MHTL location represents only a snapshot in time.

29. *Id.*

30. *Notification of Updated Tidal Datums*, *supra* note 27.

31. *Id.*; *see also* FLUSHMAN, *supra* note 10, at 110–14 (providing an explanation of the tides and the purpose of the 18.6-year cycle).

32. *Notification of Updated Tidal Datums*, *supra* note 27.

33. NAT'L OCEANIC & ATMOSPHERIC ADMIN., U.S. DEP'T OF COMMERCE, IMPLEMENTATION OF PROCEDURES FOR COMPUTATION OF TIDAL DATUMS IN AREAS WITH ANOMALOUS TRENDS IN RELATIVE MEAN SEA LEVEL, TECHNICAL REPORT NOS CO-OPS 068, at 5 (2014), https://tidesandcurrents.noaa.gov/publications/NOAA_Technical_Report_NOS_COOPS_68.pdf [<https://perma.cc/2HMC-MCLZ>] [hereinafter “NOAA Modified Procedure”].

34. *Id.*

35. FLUSHMAN, *supra* note 10, at 85.

36. *Id.* at 86.

37. *Id.* at 78–81 (discussion of the shoreline processes that affect the location of the MHTL); *see also* CTR. FOR OCEAN SOLUTIONS, *supra* note 12, at 16–17 (stating that the MHTL is comprised of the long-term average elevation of high tides, and the surveyed location of where that elevation intersects the shoreline; also discussing that surveying does not fix the boundary, which remains ambulatory in response to dynamic processes like erosion and

The State Lands Commission (SLC) has exclusive jurisdiction over tidal and submerged lands, and has the authority to determine the location of the MHTL.³⁸ Surveyors approximate the MHTL when required for consideration of a proposed development on coastal property.³⁹ The SLC does not regularly update the MHTL along the entire coast; instead, coastal development permit applications trigger the SLC to locate it.

Tidal datums from the closest NOAA tide station are used to perform the survey. If the nearest tide station is far away and potentially unrepresentative of the subject property, a second tide station may be used to interpolate the appropriate datums, depending on the tidal regime characteristics for that location.⁴⁰ The locations of points at which the land elevation is equal to the MHTL elevation (where the plane of the MHTL intersects the land) are identified using standard surveying procedures. SLC does not provide a written protocol for performing this MHTL survey.⁴¹

In the event that landowner-erected armoring structures may be located on State-owned tidelands, informal SLC policy is to figure out the best way to determine the MHTL without regard to the structure, and, if the structure is then found to be infringing on tidelands, to get the land on which the structure is located under lease from the State to the private property owner.⁴² This policy has not been documented or formalized in a written procedure, leaving it unclear both when and how to determine the location of the MHTL and whether any structures infringe on State tidelands. Again, these SLC determinations are not regularly performed, but are only made at the time of some triggering event.

accretion).

38. *Water Boundaries*, STATE LANDS COMM'N, http://www.slc.ca.gov/Info/Water_Boundaries.html [<https://perma.cc/WP5F-GAJU>]; see also CAL. PUB. RES. CODE § 6357 (West 2015).

39. Survey procedures for determining this property boundary are surely well-known within the professional survey community, but are not described in any written document (Standard Operating Procedure, guidance document, etc.) from the SLC. Interview with Jim Koepke, Lead Surveyor, State Lands Commission (Oct. 25, 2017) [hereinafter Koepke Interview].

40. STATE LANDS COMM'N, *supra* note 38.

41. Koepke Interview, *supra* note 39.

42. *Id.* Legally it is unclear whether structures that were lawfully built on private property, but due to landward movement of the MHTL are now on public trust tidelands, must be removed or put under lease. New structures permitted to be built on tidelands (subject to the limitation that they may not interfere with public trust purposes) must be leased from the State, and rent may be charged; if the structure is newly installed on tidelands but not permitted, the SLC may impose monetary penalties and require removal of the structure. The uncertainty lies with structures built lawfully on private property which is now below the MHTL. See MELIUS ET AL., *supra* note 18, at 17–18.

II. COMMON LAW PRINCIPLES AND STATUTORY PROVISIONS RELEVANT TO A RISING MHTL

Disputes over the location of the MHTL will draw on a number of common law doctrines and statutory provisions. An overview of the major legal issues that arise in this context is provided in this Part. Part III discusses technical challenges to locating the MHTL in the face of accelerating sea-level rise. Part IV argues that in order to comply with the law and enact sound coastal management policies, the MHTL should be determined using up-to-date tidal data and should be located without regard to armoring structures. Finally, the conclusion advances recommendations for developing this more technically and legally sound approach to determining the MHTL.

A. *Public Trust Doctrine*

The public trust doctrine provides that the sovereign holds certain natural resources in “trust” for current and future generations and may not transfer those resources to private parties or allow their injury or destruction.⁴³ This gives the government an affirmative duty to protect these resources for the general public.⁴⁴ A seminal case in public trust law is *Illinois Central Railroad Co. v. Illinois*,⁴⁵ in which the Supreme Court held that the Illinois Legislature could not sell submerged lands along Lake Michigan to a private railroad company. The Court explained that the legislature cannot deprive the public of resources held in the public trust, and that the public trust is an aspect of state sovereignty that cannot be given away.⁴⁶

It is well established in California that the State has a duty to protect tidelands and navigable waters under the public trust.⁴⁷ In *National Audubon Society v. Superior Court (Mono Lake)*, the Supreme Court of California declared that the State’s power under the public trust is absolute, and “extends to the revocation of previously granted rights or to the enforcement of the trust against lands long thought free of the trust.”⁴⁸ The Los Angeles Department of Water and Power (DWP) obtained permits to divert the entire flow of four out of the five streams flowing into Mono Lake.⁴⁹ As a result of the diversions, the level of Mono Lake fell, reducing its surface area and vastly changing the ecosystem.⁵⁰ The court held that even though the tributaries were not navigable waters, the diversions from the tributaries were impermissible because they

43. Frank, *supra* note 11, at 667.

44. *Id.*

45. 146 U.S. 387 (1892).

46. See Mary Christina Wood & Charles W. Woodward, *Atmospheric Trust Litigation and the Constitutional Right to a Healthy Climate System: Judicial Recognition at Last*, 6:2 WASH. J. OF ENVTL. LAW & POL’Y 633, 650 (2016).

47. See, e.g., *Nat’l Audubon Soc’y v. Super. Ct.*, 658 P.2d 709, 719 (Cal. 1983).

48. *Id.* at 440.

49. *Id.* at 424.

50. *Id.* at 424–25.

harm the downstream navigable waters of Mono Lake.⁵¹ The public trust outweighed Los Angeles' public need for water, despite DWP having obtained the necessary approvals and permits. In California, the public trust doctrine is sufficiently broad to encompass changing public needs, and one of the most important public uses is preservation of public lands in their natural state.⁵² As landward movement of the MHTL creates additional tidelands subject to the protection of the public trust, this doctrine will play a central role in the disputes that stem from sea-level rise.

B. *Constitutional Takings Doctrine*

One of the considerations for local agencies and governments in establishing the coastal property boundary is the potential for a "takings" claim under the Fifth Amendment of the U.S. Constitution. The Takings Clause states that private property may not be taken for public use without just compensation.⁵³ The Takings Clause applies *per se* to government actions that constitute a permanent physical occupation⁵⁴ or a complete wipeout of a property's economic value.⁵⁵ A regulatory taking may also be found where the action causes a diminution (though less than a complete wipeout) of property value.⁵⁶

The *Penn Central* test, used when the government action diminishes property value, weighs three factors to determine whether there has been a taking: the economic impact of the action on the claimant; the impact on the owner's "distinct investment-backed expectations"; and the character of the governmental action.⁵⁷ The character of the government action is less likely to be considered a taking when the "interference arises from some public program adjusting the benefits and burdens of economic life to promote the common good."⁵⁸

In *Loretto v. Teleprompter Manhattan CATV Corp.*, a New York statute required landlords to allow installation of cables for cable television on their buildings.⁵⁹ The Supreme Court found that even minor physical intrusions on property are of a different character than those that regulate an owner's use of his property. As such, permanent physical occupations are *per se* takings and are not subject to the *Penn Central* test.⁶⁰

51. *Id.* at 437.

52. *Id.* at 434.

53. U.S. CONST. amend. V.

54. *Loretto v. Teleprompter Manhattan CATV Corp.*, 458 U.S. 419, 426 (1982) (holding that permanent physical occupations, even when minor, are *per se* takings).

55. *Lucas v. S.C. Coastal Council*, 505 U.S. 1003 (1992).

56. *Penn Cent. Transp. Co. v. City of New York*, 438 U.S. 104 (1978).

57. *Id.* at 124.

58. *Id.*

59. *Loretto*, 458 U.S. at 423.

60. *Id.* at 426.

*Lucas v. South Carolina Coastal Council*⁶¹ held that regulations which cause a complete economic wipeout of a property's value are *per se* takings. However, *Lucas* also made clear that a taking is not compensable where the government action is a limitation on the property consistent with background principles of the state's property law, such as nuisance.⁶² While it has been argued that the public trust doctrine is a background principle of California property law,⁶³ the matter has not been settled by California courts. A *Lucas* taking would only arise in the case where relocation of the MHTL without regard to an armoring structure renders the entire buildable area of a property unusable. However, there is support for invocation of the public trust as a background principle to defeat such a claim.⁶⁴

C. Rule of Accretion

It is longstanding California law that artificial accretions—that is, accretions of land to the upland property which would not occur but for “works of man”—do not belong to the upland owner.⁶⁵ As stated in *Patton v. City of Los Angeles* in 1915:

Regarding this and other claims of accretions by and additions to the upland, or because of erections and embankments of others, it is sufficient to say that the point assumes that it was once tide land, and that this being so, it was reserved from sale, and was not alienable by any state officer under any law, during the time when the alleged accretions occurred, and, therefore, *no artificial embankment, made by third persons, or made or suffered by state officers or agents*, nor any accretion to the adjacent upland caused thereby, could operate to divest the state of its title to the tide land so reserved.⁶⁶

The underlying policy of this law, that artificial accretion does not move the property boundary, is that since the State has no control over nature, it may allow private parties to benefit from natural processes without harming the public trust.⁶⁷ However, allowing gains by artificial means does alienate the public trust.⁶⁸ A rule allowing private ownership of artificial accretions would allow the State to convey tidelands, which it has no right to do.⁶⁹ The rule against private ownership of artificial accretions is relevant in the context

61. 505 U.S. 1003, 1019 (1992).

62. *Id.* at 1029.

63. See *CTR. FOR OCEAN SOLUTIONS*, *supra* note 12, at 22. For a more thorough discussion of the public trust doctrine as a background principle of property law, see Hecht, *supra* note 17, at 784–88.

64. See *HECHT*, *supra* note 17, at 784.

65. *Carpenter v. City of Santa Monica*, 147 P.2d 964, 975 (Cal. Dist. Ct. App. 1944).

66. 147 P. 141, 142 (Cal. 1915) (emphasis added).

67. *State of Cal. ex rel. State Lands Com. v. Super. Ct.*, 900 P.2d 648, 661–62 (Cal. 1995).

68. *Id.*

69. See *Carpenter*, 147 P.2d at 975; see also *City of Berkeley v. Super. Ct.*, 606 P.2d 362, 366–67 (Cal. 1980).

of where to locate the MHTL in relation to armoring structures because of the way in which those structures alter natural erosion and accretion.

D. *Public Nuisance*

A public nuisance is one that affects a considerable number of people, even if some of those people are more affected than others.⁷⁰ The government has the power to declare something a nuisance and then abate that nuisance after providing the property owner reasonable notice and a meaningful opportunity to be heard.⁷¹ The California Legislature has declared nuisance generally to include anything that obstructs the use of a public right-of-way.⁷²

In *Scott v. City of Del Mar*, a California appellate court held that property owners' seawalls, riprap, and patios were abatable nuisances because they obstructed access to a public sidewalk.⁷³ In addition to the statutory authority found in California Civil Code Sections 3479 and 3480, the armoring structures met the definition of "nonconforming structures" declared to be a nuisance *per se* by the City of Del Mar's Beach Overlay Zone ordinance.⁷⁴ The court also held that declaring the structures a nuisance was not a compensable taking, even if the property owners had obtained the proper permits to construct them,⁷⁵ finding that "Del Mar's abatement of the encroachments on public land was a reasonable exercise of its police power, which does not give rise to an inverse condemnation action."⁷⁶ Thus, where armoring structures are found to be a nuisance, the government may abate the nuisance regardless of whether the structures were properly permitted at the time of construction.

The effect of a seawall or other armoring structure on an eroding beach is to narrow the beach in front of the wall. When the landward side of the beach is so fixed, the beach cannot naturally migrate inland. The result is a narrowing of the beach, and eventually its disappearance altogether.⁷⁷ It can be argued that the seawall caused an obstruction to the public right of access to the beach⁷⁸ and is therefore a nuisance *per se*. This argument can be used affirmatively to support an action to abate the nuisance,⁷⁹ and also defensively against any takings claim resulting from determination of the MHTL landward of the

70. CAL. CIV. CODE § 3480 (West 2016).

71. *Scott v. City of Del Mar*, 58 Cal. App. 4th 1296, 1305 (1997).

72. CIV. CODE § 3479; *see also Scott*, 58 Cal. App. 4th at 1306.

73. *Scott*, 58 Cal. App. 4th at 1306.

74. *Id.*

75. *Id.*

76. *Id.* at 1307.

77. Todd T. Cardiff, *Conflict in the California Coastal Act: Sand and Seawalls*, 38 CAL. W. L. REV. 255, 259 (2001); *see also* OPC SLR GUIDANCE, *supra* note 22, at 30.

78. *See* CALIFORNIA COASTAL ACT OF 1976, CAL. PUB. RES. CODE § 30211 (West 2018) ("Development shall not interfere with the public's right of access to the sea . . .").

79. Abatement could take the form of requiring the owner to remove the seawall, or requiring a lease to provide compensation for damage to the public trust.

seawall. As set out by *Lucas*, no compensable taking can be found where the injury complained of is characterized as the abatement of a nuisance.⁸⁰

E. *California Coastal Act*

The California Coastal Act (Coastal Act) was promulgated in 1976 to regulate coastal resources planning and management, with a primary goal to “[p]rotect, maintain, and where feasible, enhance and restore the overall quality of the coastal zone environment and its natural and artificial resources.”⁸¹ The Coastal Act sets forth statutory requirements related to public access, recreation, the marine environment, land resources, new development, and industrial facilities.⁸²

With respect to coastal armoring, Section 30253 of the Coastal Act prohibits new development from creating or contributing to any erosion that would necessitate the construction of protective devices.⁸³ Since the late-1990s, new developments have been approved by the California Coastal Commission with provisions that include a permanent deed restriction putting future owners on notice that no new armoring or expansion of existing armoring will be allowed.⁸⁴

On the other hand, Section 30235 provides that coastal armoring “shall be permitted when required to serve coastal-dependent uses or to protect existing structures or public beaches in danger from erosion.”⁸⁵ The meaning of “existing structures” has been much debated, with argument over whether it should only apply to structures existing when the Coastal Act was passed in 1976, or instead to any structure existing at the time of application for a coastal development permit for an armoring structure.⁸⁶ The latter interpretation makes little sense, as this would mean new owners of developments permitted after promulgation of the Coastal Act need only wait and file a separate permit application for the armoring structure to avoid the prohibition

80. *Lucas v. S.C. Coastal Council*, 505 U.S. 1003, 1029 (1992).

81. PUB. RES. § 30001.5(a).

82. B.E. WITKIN ET AL., SUMMARY OF CALIFORNIA LAW § 935 DEVELOPMENT OF CALIFORNIA COASTAL ACT (11th ed. 2018).

83. CALIFORNIA COASTAL ACT OF 1976, CAL. PUB. RES. CODE § 30253(b) (West 2018).

84. See Megan M. Herzog & Sean B. Hecht, *Combating Sea-Level Rise in Southern California: How Local Governments Can Seize Adaptation Opportunities While Minimizing Legal Risk*, 19 HASTINGS W. NW. J. ENVTL. L. & POL'Y 463, 511 (2013). These provisions are commonly referred to as “no future armoring” provisions.

85. PUB. RES. § 30235(b).

86. See Caldwell & Segall, *supra* note 17, at 558–64. The authors discuss statutory interpretations of the Coastal Act and conclude that even if read narrowly to apply only to structures existing prior to 1976, the provision should nevertheless be superseded by the public trust doctrine: “[i]ndeed, it may be illegal for the Commission to confer armoring privileges even when the conditions of section 30235 are met. This is because where armoring the coast prevents inward migration of the public trust lands—as could be the case under sea level rise—neither the Commission nor the legislature acting through statute has the power to simply cede the state’s trust rights.” *Id.* at 563.

on armoring for new developments.⁸⁷ Additionally, analysis of the California Coastal Plan of 1975 (the predecessor to the Coastal Act), the legislative history of the Coastal Act, and a textual analysis of the Coastal Act collectively lend support for interpreting “existing” as limited to structures in existence when the Coastal Act took effect, on January 1, 1977.⁸⁸ The California Coastal Commission has taken this position, though the debate has not been resolved in the courts.⁸⁹

The availability of emergency permits for armoring structures under Section 30624(a) remains a significant loophole in the Coastal Act.⁹⁰ The California Coastal Commission issues these permits without considering the structure’s impacts, and while the permits generally include provisions disclaiming permanent authorization, in practice it is difficult to deny such authorization or require removal once the structure has been built.⁹¹

Rights afforded by the Coastal Act may still be limited by the public trust doctrine. Statutes intending to transfer lands out of the public trust must do so very clearly, and if the courts can find an interpretation of a statute that prevents such a transfer, they will.⁹² Section 30007.5 of the Coastal Act states that conflicts between provisions should “be resolved in a manner which on balance is the most protective of significant coastal resources.”⁹³ If there is any ambiguity in whether the legislators intended the Coastal Act to cause a transfer of land from the public trust to private owners, this provision indicates that the ambiguity should be resolved in favor of the public trust.

III. CHALLENGES WITH THE CURRENT MHTL DETERMINATION

The current method for determining the MHTL has not been modified since it was set out in the *Borax Consolidated v. City of Los Angeles* Supreme Court decision in 1935, well before there was any understanding of climate

87. See MELIUS ET AL., *supra* note 18, at 21. This work-around would apply to developments built after promulgation of the Coastal Act and prior to the late-1990s when the Coastal Commission began including “no future armoring” provisions in all development approvals.

88. See Cardiff, *supra* note 77, at 264–69 (providing statutory interpretation of “existing structures”); see also *id.* at 275–80 (suggesting three ways in which the matter could be clarified: legislative changes to the Coastal Act, reinterpretation of the Coastal Act by the Coastal Commission, and litigation against the Coastal Commission demanding the “correct” interpretation of the Coastal Act).

89. DRAFT RESIDENTIAL ADAPTATION POLICY GUIDANCE, *supra* note 1, at 32; see also SEA LEVEL RISE POLICY GUIDANCE, *supra* note 4, at 165.

90. CALIFORNIA COASTAL ACT OF 1976, CAL. PUB. RES. CODE § 30624(a) (West 2018).

91. MELIUS ET AL., *supra* note 18, at 22; see also *Application for Emergency Permit*, CAL. COASTAL COMM’N, CAL. NAT. RES. AGENCY, <https://documents.coastal.ca.gov/assets/cdp/emergency-cdp-appl.pdf> [<https://perma.cc/L85Z-9SDY>] (the application is a mere two pages and requires very little documentation from the applicant).

92. See Caldwell & Segall, *supra* note 17, at 554.

93. PUB. RES. § 30007.5.

change and the resulting sea-level rise.⁹⁴ Scientists, academics, and government officials are concerned that continued use of this methodology will lead to inadequate planning for climate change impacts along the coast and result in harm to public tidelands.⁹⁵ Inadequacies of the methodology include its utilization of backward-looking tidal data and the fact that the methodology is not regularly updated. These issues are of particular concern because of the predicted acceleration in rates of sea-level rise.

A. *Tidal Datums are Backward-Looking and Outdated*

As discussed in Part I.A, tidal datums used to locate the MHTL are calculated by NOAA for a nineteen-year period called the NTDE, with the most recent NTDE spanning 1983–2001. Use of observed data naturally means the data set will be backward-looking. *Borax* requires a value determined by “observation or calculation,”⁹⁶ which may allow forward-looking calculations of sea level to be incorporated into the MHTL. The legal question of whether predictions could be used to determine a property boundary is not addressed in this Comment.

In addition to being backward-looking, NTDE data is static and updated infrequently. The NOS updates the NTDE every twenty to twenty-five years to account for changes in sea level and vertical land movement. But the long periods between NTDE updates create uncertainty around the present-day location of the MHTL, particularly given the accelerating rate of sea-level rise.⁹⁷

As an example of the consequences of this delay, consider a flat beach as discussed in Part I.B, where 1 centimeter of sea-level rise will result in 40 centimeters of landward movement of the MHTL. In Southern California, average observed sea-level rise in recent decades has been 1–2 millimeters per year.⁹⁸ Based on this rate of change, from the midpoint⁹⁹ of the current NTDE in 1992 to the publication of a new NTDE in 2023,¹⁰⁰ the mean sea level will have risen

94. *Borax Consol. v. City of Los Angeles*, 296 U.S. 10, 26–27 (1935) (holding that the “ordinary high water mark” should be calculated as the 18.6 year average of all high tides).

95. See *MELIUS ET AL.*, *supra* note 18, at 30 (stating that the current methodology will miscalculate the extent of public trust property, underestimate the appropriate setbacks for development of coastal property, and may result in SLC inadequately regulating armoring structures); see also *CTR. FOR OCEAN SOLUTIONS*, *supra* note 12, at 7 (stating that the current methodology is difficult to apply, creates uncertainty around the location of the boundary, and may undermine public interests).

96. *Borax*, 296 U.S. at 15 (1935).

97. See *CTR. FOR OCEAN SOLUTIONS*, *supra* note 12, at 19.

98. See *GRIGGS ET AL.*, *supra* note 19, at 23.

99. See *FLUSHMAN*, *supra* note 10, at 212, n.84 (stating that since the NTDE is a long-term average, it is appropriate to assume the MHTL datum is representative of a mid-epoch year).

100. This is a conservative best-case scenario assuming the new data will be published 20 years after the last NTDE. The NOS policy is to revise the NTDE every 20 to 25 years. The previous NTDE (based on 1960–1978 data) was published in 1981. See *WALTER G. ROBILLARD & DONALD A. WILSON, EVIDENCE AND PROCEDURES FOR BOUNDARY LOCATION 215*

31–62 millimeters. On this relatively flat beach, the accompanying horizontal movement of the MHTL will be forty times the elevation rise, or 1,240–2,480 millimeters.¹⁰¹ This equates to a landward movement of the property boundary of 1.24–2.48 meters, or 4.07–8.13 feet.¹⁰² The effect of this temporal disconnect between published tidal data and current conditions means that by the time a new NTDE is published, a surveyed property boundary on a flat beach will lie approximately four-to-eight feet seaward of the actual boundary. This discrepancy works to the benefit of the upland property owner and to the detriment of the public trust.

B. *Sea-Level Rise is Accelerating*

Given that recent observed rates of sea-level rise are sufficient to cause inaccurate estimates of present-day MHTL locations under current methodology, an accelerating rate of sea-level rise will only worsen the problem. Globally, the average rate of mean sea-level rise since 1990 is already more than double the rate observed over the entire twentieth century.¹⁰³

Predicted rates of relative sea-level rise (those observed in a given location, rather than globally averaged) depend on the interaction of a number of factors, including (1) the extent of ocean thermal expansion (which will be driven by global temperature rise, which is in turn dependent on greenhouse gas emission rates); (2) the rate at which ice sheets melt and where the melting occurs; and (3) how the local land surface is moving.¹⁰⁴ These factors require brief explanation in order to understand what underlies the predicted sea-level rise for California's coast.

Ocean thermal expansion occurs when the ocean absorbs excess heat in the atmosphere, causing seawater to expand.¹⁰⁵ The ocean absorbs more than 90 percent of the excess heat caused by the greenhouse effect.¹⁰⁶ The quantity of greenhouse gas emissions directly relates to the amount of excess heat in the atmosphere, and therefore to how much heat is absorbed by the ocean (causing thermal expansion). Since actual future emission rates are unknown, estimates of the effects of climate change are determined for a range of emission scenarios. The Intergovernmental Panel on Climate Change (IPCC) uses scenarios called “representative concentration pathways” (RCPs).¹⁰⁷ RCP 8.5 is based

(6th ed., 2011). The 1983–2001 data was published in 2003, 22 years after the previous data set. See *Notification of Updated Tidal Datums*, *supra* note 27.

101. This assumes that the MHTL changes proportionately to the mean sea level.

102. Even the most conservative calculation, assuming the currently published MHTL is representative of actual conditions at the end of the NTDE averaging period rather than the midpoint, would estimate a landward movement of the boundary of 2.9–5.8 feet.

103. GRIGGS, *supra* note 19, at 10–11.

104. *Id.* at 11.

105. *Id.* at 47.

106. *Id.* at 14.

107. OPC SLR GUIDANCE, *supra* note 22, at 13 (stating that the RCPs are labeled for the additional radiative forcing present in the emission scenario; for instance, in RCP 8.5, the atmosphere is trapping 8.5 watts per square meter above and beyond pre-industrial values).

on a scenario in which there are no global efforts to reduce emissions. RCP 2.6 is closely related to the emission reduction goals of the 2015 Paris Agreement.¹⁰⁸ Additionally, the IPCC created projections for RCP 4.5 and 6.0. Each of these RCPs has an associated projection for sea-level rise resulting from its projected level of global emissions.

The location of ice melt affects relative sea-level rise because of the gravitational interaction between ice sheets and ocean water. As an ice sheet melts, it has less mass and exerts less gravitational pull on the ocean water around it; as a result, sea level in the vicinity (out to about 1,000 miles) will drop, even though the melting has increased the overall volume of water.¹⁰⁹ Beyond about 4,000 miles from the ice sheet, however, the rise in sea level is greater than what would be expected from the additional volume of water.¹¹⁰ Because of this gravitational effect on the distribution of water from melting ice sheets, sea level in California will be most affected by melting of the West Antarctic Ice Sheet.¹¹¹

The effect of vertical land movement on relative sea level varies even within California. The coast north of Cape Mendocino is rising due to uplift, while the coast south of that point is sinking due to subsidence.¹¹² As a result, most tide stations north of Cape Mendocino show relative sea level falling, while tide stations south of that point show relative sea level rising.¹¹³

Predictions of the rates of California sea-level rise by the OPC Science Advisory Team Working Group, which incorporate all of these variables, show a continuation of the observed accelerating rate of sea-level rise since 1990.¹¹⁴ Predictions were made for twelve tide stations along the coast of California; predictions for Crescent City, San Francisco, and La Jolla are presented here. Table 1 lists the median predictions of rates of sea-level rise at each tide station for high- and low-emission RCP scenarios, as well as for an extreme scenario, across three different timeframes. In light of such increasing rates of sea-level rise, even in the most optimistic emissions scenario (RCP 2.6), continuing to calculate the MHTL datum using decades-old tide data will result in gross miscalculations of coastal property boundaries. A new methodology should be adopted.

108. This scenario of course includes the United States' contribution to the Agreement, which is seriously in question since President Trump announced his plans to withdraw from the Agreement. See Michael D. Shear, *Trump Will Withdraw U.S. From Paris Climate Agreement*, N.Y. TIMES (June 1, 2017), <https://www.nytimes.com/2017/06/01/climate/trump-paris-climate-agreement.html> [https://perma.cc/QQ5M-JFQ2].

109. GRIGGS, *supra* note 19, at 12.

110. *Id.* at 12–13.

111. *Id.* at 13.

112. NAT'L RES. COUNCIL OF THE NAT'L ACADS., *SEA-LEVEL RISE FOR THE COASTS OF CALIFORNIA, OREGON, AND WASHINGTON: PAST, PRESENT, AND FUTURE 3* (2012), <https://www.nap.edu/read/13389/chapter/2> [https://perma.cc/K4KM-PCFB].

113. *Id.*

114. See generally OPC SLR GUIDANCE, *supra* note 22, at 45–80.

Table 1: Median Predicted Rate of Sea-Level Rise (50 percent probability) [mm/yr]

Year / Scenario	Crescent City	San Francisco	La Jolla
2030–2050 (RCP 8.5)	3.8	6.7	7.2
2030–2050 (H++)	23	26	26
2060–2080 (RCP 2.6)	2.5	5.3	5.7
2060–2080 (RCP 8.5)	6.6	9.5	9.9
2060–2080 (H++)	40	42	43
2080–2100 (RCP 2.6)	2.6	5.2	5.3
2080–2100 (RCP 8.5)	7.7	11	11
2080–2100 (H++)	51	55	54

Notes:

1. Data is taken from OPC SLR Guidance, *supra* note 22, tbls. 3, 15, & 33.
2. RCP 8.5 is included to represent a “high emissions scenario,” and RCP 2.6 is included to represent a “low emissions” scenario. See OPC SLR Guidance, *supra* note 22, at 17.
3. H++ represents an estimate of extreme sea-level rise under conditions of rapid Antarctic ice loss. The probability of its occurrence is not known. See OPC SLR Guidance, *supra* note 22, at 16.

IV. COMPLIANCE WITH THE LAW AND SOUND COASTAL MANAGEMENT POLICY REQUIRES DETERMINATION OF THE MHTL USING CURRENT DATA AND WITHOUT REGARD TO ARMORING STRUCTURES

Sea-level rise along California’s coast is a certainty, along with an increase in erosion, flooding, and large storms.¹¹⁵ If not addressed preemptively, the loss of shoreline and recreational areas due to sea-level rise will conflict with the public access requirement of the Coastal Act, harm the public trust tidelands, and create environmental justice issues if only coastal residents have access to beaches.¹¹⁶ Legal doctrine, case law, and sound coastal management practices dictate that, going forward, the MHTL should be determined using current data, and that armoring structures, where present, should not affect MHTL location.

Legal precedent demands improvement to the way the MHTL is calculated in California. The foundational case establishing the parameters of the MHTL, *Borax*, held that in determining the MHTL, “an average for 18.6 years should be determined *as near as possible* by observation or calculation.”¹¹⁷ Nothing in the decision or subsequent case law requires that the 18.6-year

115. See SEA LEVEL RISE POLICY GUIDANCE, *supra* note 4, at 14.

116. See DRAFT RESIDENTIAL ADAPTATION POLICY GUIDANCE, *supra* note 1, at 1.

117. See *Borax Consol. v. City of Los Angeles*, 296 U.S. 10, 14–15 (1935) (emphasis added).

period should be held constant. Further, with rising seas observed over the last century and projected to increase, it can hardly be said that use of several decades-old data estimates the MHTL “as near as possible.”

Coastal armoring structures prevent migration of the beach due to erosion (limiting public beach access), increase erosion of neighboring properties (encouraging further armoring), and harm ecosystems in the area.¹¹⁸ State policy for addressing sea-level rise at local and state levels demands that the planning process prioritize the protection of coastal habitats and public access.¹¹⁹ Better determination of the MHTL in general, and especially in the proximity of coastal armoring structures, is required to comply with state coastal management policies.

A. *The Determination Should be Based on Current Tidal Data*

As shown in Part III.A, current rates of sea-level rise render the outdated tidal datums insufficient for establishing a property boundary “as near as possible,” and these rates will only increase in the future due to climate change. The policy of updating the NTDE only every twenty to twenty-five years to capture sea-level rises of 0.10 to 0.16 feet¹²⁰ is inadequate; on a relatively flat beach the horizontal movement of the MHTL in response to 0.16 feet of sea-level rise will be 6.4 feet.¹²¹ Use of outdated data erroneously estimates the MHTL seaward of its true location. This harms the public trust by potentially allowing private development on public tidelands, or near enough that the development will be inundated in its expected lifetime. According to a Review Letter by the General Counsel of Ocean Services, “While NOAA/COOPS is supported by its statutory authority in the use of a nineteen-year NTDE in the production of most applicable data and products, CO-OPS may also use an alternative time frame, based on NOAA’s expert opinion that such an alternate time frame is appropriate.”¹²²

NOS has demonstrated the feasibility of calculating more recent tidal datums and updating them regularly. Due to vertical land movement, regions of the western Gulf Coast, southeast Alaska, and southern Cook Inlet have exhibited an anomalously high rate of relative sea-level rise, and for these stations NOS has adopted a modified procedure for calculating tidal datums.¹²³ NOS assesses stations in these areas approximately every five years to determine whether the rate of sea-level change exceeds a threshold of 9.0 millimeters

118. See MELIUS ET AL., *supra* note 18, at 3 (for more detailed discussion of physical and other effects of coastal armoring, *see id.* at 8–11).

119. See OPC SLR GUIDANCE, *supra* note 22, at 29–30.

120. See NOAA MODIFIED PROCEDURE, *supra* note 33, at 5.

121. This figure is based on a beach with a slope of 40 to 1, where 0.16 feet of rise multiplied by a slope of 40 is equal to 6.4 feet of horizontal change.

122. See NOAA MODIFIED PROCEDURE, *supra* note 33, at D-3.

123. See *Notification of Updated Tidal Datums*, *supra* note 27.

per year, or if MSL has changed by more than 0.05 meters.¹²⁴ If either parameter is met, tidal datums at the station are calculated using tidal ranges based on the most recent nineteen-year NTDE (currently 1983–2001) and MSL data from the most recent five-year time period.¹²⁵ In this way, the observed range of tides over the prescribed nineteen-year period is adjusted to reflect changes in MSL over the most recent five years.¹²⁶ The purpose of this modified procedure is to mitigate “the large changes in datums that would normally occur between nineteen-year NTDE’s and keep[] tidal datum elevations up-to-date to reflect ongoing relative sea level change.”¹²⁷

Active tidal stations along the California coast are continuously recording data, much of which is available to the public.¹²⁸ With the availability of current data and NOAA’s authority to determine that a more accurate method of calculating tidal datums is appropriate, NOS’s modified procedure described above should be applied to all tide stations, without the limitation of requiring a rate of sea-level rise of 9.0 millimeters per year or a change in MSL of 0.05 meters. Rates of change less than that arbitrary threshold can render MHTL determinations inadequate for coastal planning in California under the current method, as demonstrated in Part III.B. Use of the modified procedure at all stations—or adoption of an alternative procedure (for instance, one that automatically calculates tidal datums annually rather than in five-year intervals, or a procedure by which SLC calculates the MHTL for California tide stations using the raw data)—is required in order to protect the public trust and meet the *Borax* standard of calculating the MHTL “as near as possible.”

It has been suggested that a forward-looking calculation should be used in determining the MHTL.¹²⁹ The *Borax* decision seems to allow for use of calculations to determine the MHTL, in addition to observations, but it is not clear whether predicted values can be used. One downside of using a predicted MHTL is its inflexibility: if predictions of sea-level rise are incorporated into the MHTL directly, it locks that predicted MHTL into the same assumptions used in the sea-level rise predictions, such as global emissions, ice melt, and rates of sea-level rise, none of which are certain. Incorporating those assumptions in the predicted MHTL precludes assessing a range of potential sea-level

124. See NOAA MODIFIED PROCEDURE, *supra* note 33, at 17.

125. *Id.*

126. *Id.* at 8 (stating that it is helpful to think of the NTDE providing the range of tides relative to mean sea-level, and then adjusting the mean sea-level for current conditions, shifting the other tidal datums).

127. See NOAA MODIFIED PROCEDURE, *supra* note 33, at 11.

128. See *CO-OPS MAP*, NAT’L OCEANIC & ATMOSPHERIC ADMIN., U.S. DEP’T OF COMMERCE, <https://tidesandcurrents.noaa.gov/map> [<https://perma.cc/2AUJ-LJB4>]. Users may reposition the map to show their area of interest and select which types of tide stations they would like displayed. By clicking on an active tide station, users can access real-time tidal data, a chart of mean sea-level trends at that station (currently plotted from 1906 through 2016), and much more.

129. See MELIUS ET AL., *supra* note 18, at 36.

rise scenarios in the coastal planning process. A more defensible and flexible method would be to use a current MHTL (based on up-to-date tidal datums) combined with consideration of sea-level rise, including the possible ranges of variables such as emissions, in the planning process and review of coastal development permits. The foundation of a current MHTL elevation could be used by local agencies as a starting point for consideration of future changes in sea level under different emission scenarios or at varying time scales, as recommended by state guidance.¹³⁰

B. *The MHTL Should Be Located Without Regard to Armoring Structures*

Using current data to accurately calculate MHTL elevation is the first step in improving MHTL determinations in light of sea-level rise. The next step is to determine the MHTL in the presence of armoring structures. While unofficial SLC policy is to try to calculate the MHTL without regard to existing armoring structures,¹³¹ California courts have not addressed the question of whether armoring structures may fix the property boundary.¹³² The Ninth Circuit Court of Appeals held in *United States v. Milner* that an armoring structure cannot fix the property boundary and thereby deprive the tidelands owner of gains from erosion of the shoreline.¹³³ The case involved private property adjacent to tidelands granted to the Lummi Nation by the federal government.¹³⁴ Because the land is held in trust for the Lummi Nation by the United States, federal common law governed the dispute.¹³⁵ The action was one of trespass against the private property owners whose armoring structures are now seaward of the MHTL and thus on the Lummi Nation tidelands.¹³⁶ The homeowners' organization had leased the lands on which the structures sit from the Lummi Nation from 1963–1988, but once the lease expired the homeowners declined to renew it.¹³⁷ When asked to either remove the structures or renew the lease, the homeowners refused, at which point the United States brought an action for trespass.¹³⁸

The court found that because the property boundary is ambulatory, and both the tideland and upland owners have a vested right to gains from the movement of that boundary, it cannot be permanently fixed by an armoring structure.¹³⁹ State common law and statutory provisions dictate that the same

130. See OPC SLR GUIDANCE, *supra* note 22, at 23.

131. See *supra* Part I.B.

132. See CTR. FOR OCEAN SOLUTIONS, *supra* note 12, at 19; see also SEA LEVEL RISE POLICY GUIDANCE, *supra* note 4.

133. *United States v. Milner*, 583 F.3d 1174, 1187 (9th Cir. 2009).

134. *Id.* at 1181.

135. *Id.* at 1182.

136. *Id.* at 1180. The case also involved a claim under the River and Harbors Appropriation Act of 1899, which will not be addressed here.

137. *Id.* at 1181.

138. *Id.*

139. *Id.* at 1187. Since the court found that the property boundary could not be fixed

result should be reached in California: namely, that the MHTL should be calculated without regard to armoring structures. This Part will set out the legal arguments for reaching this conclusion.¹⁴⁰

1. The Coastal Property Boundary May Not Be Fixed

The rule that the coastal property boundary is ambulatory, moving landward with erosion and seaward with accretion, has been well settled in California since at least 1916.¹⁴¹ In *Lechuza Villas West v. California Coastal Commission*, the court refused to fix the boundary in accordance with a survey map as the plaintiff desired, stating that, “because [the property] is bordered by the ocean and is subject to seasonal accretion and erosion, [it] belongs sometimes to the state and sometimes to Lechuza.”¹⁴²

In California, both the tideland and upland owner are entitled to gains from natural shoreline processes; by the rule of accretion, if armoring structures cause artificial accretion to an upland property, that land remains subject to the public trust and is owned by the State. It stands to reason that where the shoreline would naturally move landward due to natural processes like erosion or sea-level rise, allowing a property owner to fix the property boundary using an armoring structure would be no different than allowing artificial accretions to accrue to the upland owner. A prevention of natural erosion is not meaningfully different than artificial accretion. Allowing the property boundary to remain fixed would allow the private owner to benefit from the “works of man,” and improperly allow the State to convey public tidelands into private ownership. California state law supports the proposition that the MHTL should be located without regard to armoring structures.

Private property owners may argue that this rule should not hold where the boundary is moving in only one direction. Under accelerating sea-level rise, it is unlikely that any gains from accretion will be realized, and therefore private owners may argue that they should not lose from erosion or rising seas.¹⁴³ However, the court in *Milner* noted that while it is unfortunate that the boundary increasingly moves in one direction (landward), this does not permit

and Homeowners refused to remove the structures or renew the lease, it affirmed the trial court’s finding that the Homeowners were liable for trespass. *Id.* at 1191.

140. There are myriad issues surrounding sea-level rise, coastal planning, and private property rights. The legal footing for government agencies to take actions such as passing ordinances that prohibit or limit armoring, require setbacks, implement rolling easements, etc. are well researched and discussed elsewhere. See, e.g., Herzog & Hecht, *supra* note 84; Caldwell & Segall, *supra* note 17. Here I will focus my analysis on the question of whether the State may locate the MHTL without regard to armoring structures, and what arguments are likely to be made on either side of the dispute.

141. See *Strand Imp. Co. v. City of Long Beach*, 173 Cal. 765, 773 (1916); see also *City of Oakland v. Buteau*, 180 Cal. 83, 87 (1919).

142. *Lechuza Villas W. v. Cal. Coastal Comm’n*, 70 Cal. Rptr. 2d 399, 416 (Ct. App. 1997).

143. See J. Peter Byrne, *Rising Seas and Common Law Baselines: A Comment on Regulatory Takings Discourse Concerning Climate Change*, 11 Vt.J.ENVTL. L. 625, 633 (2010).

the upland owners to permanently fix the boundary.¹⁴⁴ Part of the State's police power is the authority to weigh public and private interests and decide to save one class of property over another.¹⁴⁵ This authority, combined with the State's obligation to protect the public trust, requires a decision to locate the MHTL without regard to armoring structures.

In California, existing law makes it even more plain that the unidirectional nature of sea-level rise does not change the premise of an ambulatory boundary. California law is asymmetrical when it comes to artificial effects on the property boundary, which works to the benefit of the public trust. The fact that artificial accretions do *not* move the property boundary seaward (which benefits the public trust) has already been discussed. Conversely, the property boundary *does* move in response to artificial erosion, to the detriment of the upland owner and again to the benefit of the public trust.¹⁴⁶ In *Miramar Co. v. City of Santa Barbara*, the City constructed a breakwater approximately three miles west of plaintiff's property, which reduced the amount of sand available to replenish plaintiff's beach, eroding the shoreline.¹⁴⁷ The court held that the City had a right to construct the breakwater to aid in public navigation, and that the plaintiff had no vested right against the City to continued accretions of sand.¹⁴⁸ Thus there is precedent in California property law for preferring the public trust when it opposes private property rights, and the asymmetry in MHTL movement due to sea-level rise fits within this precedent.

2. Locating the MHTL Landward of an Armoring Structure Will Not Lead to a Constitutional Takings Claim

The tide line has always been ambulatory, moving to the benefit of one party and the detriment of the other. As noted above, property owners may argue that the premise of this principle—that the boundary ebbs and flows in either direction—no longer holds in a climate change regime. They may argue that because of these changed circumstances, the boundary should be fixed, and that if the government determines the MHTL has moved landward of an armoring structure, property owners should be compensated. In this case, where the government has not imposed any new regulations or ordinances affecting property rights, the government can persuasively argue that because

144. *United States v. Milner*, 583 F.3d 1174, 1189 (9th Cir. 2009).

145. See Nathan Jacobsen, *Sand or Concrete at the Beach? Private Property Rights on Eroding Oceanfront Land*, 31-SPG ENVIRONS ENVTL. L. & POL'Y J. 217, 232 (2008) (citing *Miller v. Schoene*, 276 U.S. 272, 279 (1928)). (The author also draws a comparison between the *Mono Lake* case and this use of the public trust, stating "If Los Angeles could not satisfy its public interest obligation by asserting its need for an urban water supply, it is difficult to see how a small number of private property owners can do so by asserting an overriding need for oceanfront homes." *Id.* at 238.).

146. See FLUSHMAN, *supra* note 10, at 132.

147. *Miramar Co. v. City of Santa Barbara*, 23 Cal. 2d 170, 171 (1943). In this case, the harm was not insignificant. The erosion effectively destroyed the plaintiff's resort beach.

148. *Id.* at 175.

rising seas, not the government, are causing the change, the regulatory takings doctrine does not apply.¹⁴⁹ After all, under current doctrine, it is highly unusual to find that the government effects a taking where it takes no affirmative action beyond applying the well-established parameters of the coastal boundary.

If California courts hold that the property boundary cannot be fixed by an armoring structure, the courts would foreclose takings claims premised upon relocation of the MHTL. A legal finding that the property boundary is where the unobstructed MHTL intersects the shore means that the disputed land (between where the property owner believed the MHTL to be and its actual location) is public tidelands, not the property owner's. There would therefore be no basis for a takings claim. The government would merely be asserting its right to land that it properly owns.¹⁵⁰

3. There is No Absolute Right to Protect One's Property

All property is subject to limitations on usage, and no property owner has a right to cause substantial harm to neighboring properties.¹⁵¹ In the coastal context, this means that one owner may not harm a neighbor's vested right to an ambulatory property boundary by prohibiting such movement.¹⁵² The nature of an ambulatory boundary as a vested property right was set out by the Supreme Court in *St. Clair County v. Lovington* in 1874: "[t]he riparian right to future alluvion is a vested right. It is an inherent and essential attribute of the original property If there be a gradual loss, [the owner] must bear it; if, a gradual gain, it is his."¹⁵³ This was not a new concept even at the time of this decision, and the court quoted Sir William Blackstone's observation that an upland owner's right to natural accretion is "a reciprocal consideration for such possible charge or loss [erosion]."¹⁵⁴ The principle that coastal property ownership includes the right to an ambulatory boundary, with the risk of loss by erosion and the benefit of gain by accretion, has been consistently recognized in California state courts.¹⁵⁵ This vested right may not be violated by neighboring properties, regardless of whether the owner is the State or a private party.

California coastal property owners may argue that they have the right to build armoring structures to prevent the destruction of their property from

149. J. Peter Byrne & Jessica Grannis, *Coastal Retreat Measures*, in *THE LAW OF ADAPTATION TO CLIMATE CHANGE* 267, at 275 (Michael B. Gerrard & Katrina Fischer Kuh, eds., 2012).

150. See John D. Echeverria, *Managing Lands Behind Shore Protection Structures in the Era of Climate Change*, 28 *J. LAND USE & ENVTL. L.* 71, 87 (2012).

151. *United States v. Milner*, 583 F.3d 1174, 1189–90 (9th Cir. 2009).

152. *Id.*

153. *St. Clair County v. Lovington*, 90 U.S. 46, 68–69 (1874).

154. *Id.* at 67.

155. See, e.g., *State ex rel. State Lands Comm'n. v. Super. Ct.*, 11 Cal. 4th 50, 65 (1995); *Strand Imp. Co. v. City of Long Beach*, 173 Cal. 765, 771 (1916); *Lechuza Villas W. v. Cal. Coastal Comm'n.*, 70 Cal. Rptr. 2d 399, 411, n.13 (Ct. App. 1997).

erosion, and that this right is supported by the Coastal Act. Section 30235 provides for armoring to protect “existing structures” in danger from erosion. The Commission’s position that “existing structures” refers to those built prior to passage of the Coastal Act in 1976 is discussed in Part II.E. There are two potential issues that property owners could raise: 1) whether new armoring may be built to protect structures existing before 1976, and 2) whether existing armoring structures may be maintained and serve to fix the property boundary. I will address only the latter here. The crux of this argument is that since the property owners were lawfully permitted to build a structure to protect their property from erosion, with the understanding that the purpose of doing so was to stabilize or fix the property boundary, the MHTL should thus not be located landward of the armoring structure.

Unlike in *Scott*,¹⁵⁶ property owners in such a scenario will have built the structure with the belief that they could protect their property from erosion and that they were complying with all appropriate regulations. Now that sea-level rise heightens the threat of erosion, telling property owners that they must either remove the structure or pay the State to maintain it on public tidelands will be terribly unpopular. However, property owners never had the right to fix the coastal property boundary. There is no absolute right to maintain an armoring structure that, because of changed conditions, has become a nuisance to public lands. *Scott’s* holding—that even with all appropriate permits, property owners have no right to maintain a structure that was determined a *per se* nuisance by the City—provides support for the government’s use of the police power to require abatement of armoring structures.¹⁵⁷ Further support comes from *Mono Lake*, in which the court determined that the State’s power under the public trust “extends to the revocation of previously granted rights.”¹⁵⁸ This supports the proposition that even lawfully obtained permits for armoring structures do not supersede the State’s authority under the public trust to protect tidelands.

While the invocation of the public trust doctrine to establish a more landward boundary and the use of nuisance law to require abatement of armoring structures would likely be legally defensible, Caldwell and Segall note that “[f]ew judges, if any, will initially be comfortable with allowing structures built under one understanding of the law to yield to the sea, even if the public trust doctrine would appear to require this result.”¹⁵⁹ There are strong arguments

156. *Scott v. City of Del Mar*, 58 Cal. App. 4th 1296 (1997).

157. *Id.* at 1306.

158. *Nat’l Audubon Soc’y v. Super. Ct.*, 33 Cal. 3d 419, 440 (1983).

159. Caldwell & Segall, *supra* note 17, at 567; *see also* Echeverria, *supra* note 150, at 87 (“Putting legal principles aside, however, this type of assertion of public ownership rights might well generate considerable political opposition.”); Herzog & Hecht, *supra* note 84, at 515 (stating that courts may be reluctant to enforce “no further armoring” ordinances where owners purchased the property prior to enactment expecting they could use armoring for protection).

to be made that the public trust doctrine trumps ambiguous statutory provisions, and that the Coastal Act itself requires conflicts to be resolved in favor of preserving public resources. But there are also strong expectations on the part of coastal property owners that they may protect their property. Given the scientific understanding of climate change and various agencies' ongoing efforts to address the issue in coastal planning, either the Coastal Commission or the Legislature, rather than the courts, should determine whether the MHTL should be located without regard to armoring structures.¹⁶⁰ This would allow for public involvement in the decisionmaking process, and would put coastal property owners on notice that if—or more likely, when—the MHTL moves past their armoring structures, the boundary will not remain fixed.

CONCLUSIONS AND RECOMMENDATIONS

Sea-level rise due to climate change is accelerating, and the current methodology for determining the coastal property boundary between State-owned tidelands and private property uplands is inadequate. Data used to determine the elevation of the MHTL is several decades old, causing surveys of the MHTL to inaccurately place the boundary seaward of its true location. On a relatively flat beach, this error could be significant enough (approximately four-to-eight feet) to allow coastal development on or very near to public trust tidelands. The SLC should work with NOAA to obtain current elevations of the MHTL. This could be achieved either by lobbying NOAA to adopt an updated procedure for all tide stations or by SLC obtaining the raw data to calculate the current tidal datums for California tide stations.

It is unsettled law in California whether the location of the MHTL should be fixed at the location of an armoring structure installed by private property owners, or whether it should be determined without regard to any such artificial structures. The public trust doctrine, California's rule of accretion, nuisance law, and the Coastal Act all militate toward a finding that California should follow the *Milner* court by not allowing the property boundary to be fixed. The strongest argument for property owners wishing to fix the property boundary with an armoring structure is one of reliance: that the owners lawfully built the structures on private property in accordance with the Coastal Act, with the understanding that they could protect their property from erosion.

However, it has been argued here that the courts can and should find that the coastal property boundary may not be fixed by armoring structures. By the strict letter of the law, this seems to be the winning argument, especially in the face of public trust obligations; however, courts may be hesitant to take a heavy-handed approach toward private property owners. For this reason, if the State wishes to ensure that the coastal property boundary remains ambulatory, and that it retains recourse (either via removal or lease payment) when an armoring structure interferes with this boundary, a regulatory or statutory

160. See Byrne, *supra* note 143, at 633.

solution should be adopted to reinforce the strength of the public trust doctrine and the State's obligations under it.

Even the adoption of current tidal data and a judicial determination that the property boundary may not be fixed by armoring structures will have little state-wide impact under current conditions. The MHTL is not regularly surveyed, and is only determined for a specific property when proposed coastal development triggers the survey. As the sea level rises, the MHTL will move landward of existing armoring structures, but the consequent legal change in ownership from private to public trust tidelands will go unnoticed and unclaimed. The State should implement a policy to survey coastal properties on a regular interval, such as every five years. An approach such as this is the only way that the SLC can ensure that armoring structures now on tidelands will be abated, by either removal or becoming subject to a lease with the State.