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Public Trust Doctrine Implications of Electricity Production

Lance Noel

University of Delaware, lnoel@udel.edu

Jeremy Firestone

University of Delaware, jf@udel.edu

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PUBLIC TRUST DOCTRINE IMPLICATIONS OF ELECTRICITY PRODUCTION

Lance Noel & Jeremy Firestone***

ABSTRACT

The public trust doctrine is a powerful legal tool in property law that requires the sovereign, as a trustee, to protect and manage natural resources. Historically, the public trust doctrine has been used in relationship to navigable waterways and wildlife management. Despite electricity production's impact on those two areas and the comparatively smaller impacts of renewable energy, electricity production has garnered very little public trust doctrine attention.

This Article examines how electricity production implicates the public trust doctrine, primarily through the lens of four states—California, Wisconsin, Hawaii, and New Jersey—and how it would potentially apply to each state's electricity planning and policies. As illustrated in the four case studies, the public trust doctrine can serve the following four purposes: (1) as a tool for citizens to force states to act on renewable electricity development; (2) as a legal defense for states to validate actions encouraging renewable electricity development; (3) as a means for courts to more closely scrutinize electricity decisions made by the state; and (4) as an opportunity for state agencies to supplement and guide imperfect statutes. Together, these four purposes of the public trust can ensure reasonable and timely development of renewable electricity as well as sufficient protection of trust resources.

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* PhD Candidate, Center for Carbon-Free Integration, University of Delaware. Email: lnoel@udel.edu. The author would like to thank Professor Benjamin Sovacool and Professor Hope Babcock for their helpful comments and feedback. The author also gratefully acknowledges the support received from the Magers Family Fund.

** Professor of Marine Policy and Legal Studies, Director, Center for Carbon-Free Power Integration, University of Delaware.

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INTRODUCTION

The public trust doctrine is a key aspect of property law that places natural resources in the hands of the sovereign, which holds such resources in trust on behalf of the public. As trustees, states have a fiduciary duty to conserve and maintain natural resources for future generations. The doctrine is a unique mechanism for environmental protection that both burdens

and empowers states to regulate these resources. Originally, the public trust doctrine was used to guarantee public title to submerged lands, but has since evolved to require states to properly manage and allocate natural resources, such as water and wildlife, in accordance with the public interest. While electricity production does not implicate title to submerged lands, it clearly affects water and wildlife resources.

Electricity production has a large impact on the environment and on public trust resources. While all types of electricity production damage the environment, conventional electricity, including coal, nuclear, and natural gas generation, has had a particularly large impact compared to renewable electricity, particularly solar and wind. Despite the environmental benefits of renewable energy, the shift from conventional electricity to the more environmentally benign renewable electricity has been slow and uneven.

This Article explores the application of the public trust doctrine to electricity production and considers how utilizing this theory might further incentivize state action promoting renewable energy implementation. We propose that applying the public trust doctrine on a state-by-state basis to protect water and wildlife resources impacted by electricity production presents a stronger legal argument than previous attempts to apply the public trust doctrine directly to climate change and electricity production.

The Article focuses on how the public trust doctrine could be operationalized in the context of electricity production in four states: California, Wisconsin, Hawaii, and New Jersey. First, we provide an overview of the Article's central argument. Then, we offer a general history of the public trust doctrine and a brief overview of the environmental impacts of electricity production. Finally, after presenting the four state case studies, the Article concludes by examining the broader role the public trust doctrine can play for citizens, courts, and state agencies in safeguarding natural resources from the harmful effects of electricity production.

I. APPLICATIONS OF THE PUBLIC TRUST DOCTRINE TO ELECTRICITY PRODUCTION

As discussed below, electricity production has clear impacts on public trust resources, such as water and wildlife.¹ Furthermore, it is evident that trustees, including states and potentially the federal government, have duties under the public trust doctrine that directly apply to the generation of electricity. Electricity production impacts do not concern questions of title—they only concern usufructuary rights subject to the public trust doc-

1. See *infra* Part IV.

trine.² Thus, in applying the doctrine, the question is whether the “use” of water and wildlife is acceptable within the parameters of the public trust doctrine according to the public interest, not whether the sovereign ownership of these resources is being infringed upon.³

In the context of electricity policy decisions, we argue that states must apply three principles emanating from the public trust doctrine to fulfill their duties as trustees of water and wildlife resources.⁴ First, states must develop a comprehensive, long-term plan regarding the allocation of wildlife and water to the electricity sector.⁵ Second, states must act on their affirmative public trust duties to minimize harm to wildlife⁶ and water resources to the maximum extent feasible.⁷ Finally, states must ensure that the use of wildlife and water does not substantially impair the public interest and is both reasonable and beneficial.⁸ If electricity producers unnecessarily harm trust resources, states have a fiduciary obligation to sue for remuneration for the loss of trust resources and to enjoin actions that continue to damage trust resources.⁹

Current electricity production policy fails to adhere to the basic requirements of the public trust doctrine in several ways. First, while the public trust doctrine requires consideration of wildlife interests irrespective of their economic merit, wildlife law, as it relates to electricity production, focuses primarily on the monetized benefits of commercially and recreationally important wildlife.¹⁰ Second, states allow conventional electricity pro-

2. There are different state responsibilities regarding the title to public trust resources and the regulation of the use of public trust resources. *See infra* Part III.

3. *See infra* Part III.

4. *See infra* Section II.A. It is important to note that while these duties are distilled from the implications of current public trust case law, none directly apply this framework to electricity production, and as such an application of these principles to state regulation of electricity production would be novel.

5. *See* *United Plainsman Assoc. v. N.D. State Water Conservation Comm'n*, 247 N.W.2d 457 (N.D. 1976); *see also In re Matters of Water Use Permit (Waiahole I)*, 9 P.3d 409, 455 (Haw. 2000).

6. It should be noted that the wildlife aspect of the public trust doctrine is not as universally accepted as the water aspect of the public trust. *See infra* Section III.B.

7. *See Nat'l Audubon Soc'y v. Superior Court*, 658 P.2d 709, 712 (Cal. 1983); *see also Waiahole I*, 9 P.3d at 456.

8. *See Waiahole I*, 9 P.3d at 450–51.

9. *See State Dep't of Fisheries v. Gillette*, 621 P.2d 764, 767 (Wash. Ct. App. 1980).

10. *See, e.g., U.S. ENVIL. PROT. AGENCY (EPA), DOC. NO. 821-R-14-001, ECONOMIC ANALYSIS FOR THE FINAL SECTION 316(B) EXISTING FACILITIES RULE 8-2 (2014)* (calculating the benefits of reducing fish deaths of a closed-cycle CWIS exclusively on the use and non-use value of commercially and recreationally harvested fish). Indeed, many of the federal laws governing wildlife impacts are validated by calculating the costs of the regulation and comparing that to the monetized benefits of commercially and recreationally important wildlife, and often ignoring wildlife that are non-commercial or non-recreational. *See infra* Part IV.B.

duction to use and harm both wildlife and water at practically no cost, disregarding their duty to seek remuneration for the diminution of wildlife resources.¹¹ Furthermore, states fail to adequately consider the relative benefits of renewable electricity production on trust resources in comparison to conventional electricity production. As a consequence of these failures, renewable sources are undervalued and under-implemented. By under-implementing renewable energy, states have been abdicating their fiduciary duties to protect public trust resources.

Recognition of public trust principles in the electricity sector could provide a means for states to advance wildlife and water mitigation policies. For example, states could require that thermal power plants retrofit their cooling water intake systems to minimize fish deaths.¹² They could also require entities to consider bat mortality mitigation policies at wind farms.¹³ Essentially, the public trust doctrine both allows and compels states to continually supervise and mitigate electricity production's impacts on state resources.¹⁴

States can also apply the public trust doctrine as a legal defense for both aggressive renewable electricity policies and requirements for conventional electricity wildlife and water mitigation policies.¹⁵ When conventional electricity producers object to the economic costs of compliance with state and federal regulations, the public trust doctrine can provide a legal basis for consideration of non-economic values.¹⁶ The fiduciary duty to prevent impairment to trust resources based on feasibility rather than cost effectiveness gives the states more leeway to justify regulatory intervention based on non-market environmental costs and benefits.¹⁷

Beyond the ability of states to infuse electricity policy and planning with trust principles, the public trust doctrine can provide private individuals with a tool to ensure that state agencies adhere to their duties and protect those wildlife and water resources that are currently unprotected and impacted by conventional electricity. In states that have public support for,

11. *Gillette*, 621 P.2d at 767.

12. *See infra* Subsection V.B.4.

13. Wind energy has non-trivial impacts on bats. Mitigation techniques are available but not legally required. *See infra* notes 184–200 and accompanying text.

14. *See Nat'l Audubon Soc'y v. Superior Court*, 658 P.2d 709, 727–28 (Cal. 1983).

15. *See infra* Subsection V.A.4.

16. *Compare Entergy, Corp. v. Riverkeeper, Inc.*, 556 U.S. 208 (2008) (upholding EPA's reliance on a cost-benefit analysis for regulations of cooling-water intake structures under the Clean Water Act, even though the cost-benefit analysis did not account for non-market values), *with Nat'l Audubon Soc'y*, 658 P.2d at 719 (finding that the public trust doctrine requires protection of recreational and ecological values, such as scenic views, air purity, and habitat).

17. *See infra* Subsection V.A.4.a.

yet limited development of, renewable electricity, citizens can also utilize the public trust doctrine to spur state action to implement renewable electricity technology.¹⁸

Despite the substantial environmental impacts of electricity production, and its importance in the context of climate change, there has been practically no application of the public trust doctrine to electricity production. The case closest resembling this application, *Alec L. v. Jackson*, along with a string of other decisions, comprise a recent effort to use the atmospheric aspect of the public trust doctrine to force the federal government and states to act on climate change.¹⁹ This movement is known as atmospheric trust litigation.²⁰ Because the atmosphere is incapable of private ownership, atmospheric resources seem most “susceptible of treatment as a foundational public trust resource.”²¹ However, these recent efforts to use the public trust doctrine to mitigate climate change have not made significant progress,²² due to uncertainty of whether the public trust doctrine includes the atmosphere in its *res* or even applies to the federal government.²³ Furthermore, these efforts neglect to consider the water and wildlife impacts of climate change.²⁴ Thus, no case has presented a comprehensive application

18. See *infra* Subsection V.B.4.

19. *Alec L. v. Jackson*, 863 F. Supp. 2d 11 (D.D.C. 2012), *aff'd sub nom. Alec L. ex rel. Looz v. McCarthy*, 561 Fed. Appx. 7 (D.C. Cir. 2014); see also MICHAEL C. BLUMM & MARY CHRISTINA WOOD, THE PUBLIC TRUST DOCTRINE IN ENVIRONMENTAL AND NATURAL RESOURCES LAW 376–78 (2013) (detailing some state cases attempting to use the public trust doctrine and the atmospheric trust to force states to act on climate change).

20. See generally Mary Christina Wood & Dan Galpern, *Atmospheric Recovery Litigation: Making the Fossil Fuel Industry Pay to Restore a Viable Climate System*, 45 ENVTL. L. 259, 263 (2015) (discussing “Atmospheric Trust Litigation” where plaintiffs seek “judicial orders requiring governments to develop climate recovery plans that reduce emissions within their jurisdictions”).

21. Richard M. Frank, *The Public Trust Doctrine: Assessing Its Recent Past & Charting Its Future*, 45 U.C. DAVIS L. REV. 665, 679 (2012).

22. Though the state versions of *Alec L.*, 863 F. Supp. 2d at 11, originally made some progress, they have not yet resulted in any significant changes in either the public trust doctrines of those states or in their climate change policies. See Caroline Cress, *It's Time to Let Go: Why the Atmospheric Trust Won't Help the World Breathe Easier*, 99 N.C. L. REV. 236, 261–64 (2013) (noting that many of the state cases have been dismissed, while the others are pending review).

23. See *infra* note 40 for a description of *res*. As discussed below in Section III.C, it is uncertain whether the federal government has any public trust responsibilities, and the current case law is conflicting on the issue.

24. From a different perspective, one could view *Alec L.*'s purpose as bringing attention to climate change exclusively, regardless of other public trust resources. So perhaps it is unsurprising that the plaintiffs in *Alec L.* focused exclusively on the “air resource” as their central strategy, rather than peripheral, albeit more concrete, trust resources. See 863 F. Supp. 2d at 13–14.

of the public trust doctrine that weaves together the water and wildlife impacts of all forms of electricity production.

This Article proposes that a better public trust argument would focus specifically on electricity production. Electricity production, while damaging air resources, also damages nearly every other public trust resource both during generation²⁵ and through the emission of conventional pollutants and greenhouse gases (GHGs).²⁶ Direct impacts from electricity production to water and wildlife are clear public trust violations of a state's responsibility as trustee of the public interest. Climate change mitigation could occur within state jurisdictions without addressing any questions regarding the existence of a federal trust doctrine. Applying a state's public trust doctrine to impacts of electricity production water and wildlife resources, therefore, presents a stronger legal argument than has been proposed to date in atmospheric trust litigation cases.

II. EVOLUTION OF THE PUBLIC TRUST DOCTRINE

A. Substance of the Public Trust Doctrine

The public trust doctrine places a fiduciary duty on states to act as trustees on behalf of the public to protect all public trust resources located within the state. The duties and rights the doctrine imposes on states are intrinsic to state sovereignty—they may only be alienated by the “destruction of the sovereign.”²⁷ The three major principles of the public trust doctrine, summarized by Joseph Sax, are:

- 1) Certain natural resources are too important to the public to be privately owned.
- 2) Public access to these resources must be guaranteed by the state.
- 3) The government is required to protect and manage these resources for the benefit of the general public, rather than a private minority.²⁸

The essence of a state's duty under the public trust doctrine is to affirmatively protect and control public natural resources,²⁹ promote reasona-

25. See *infra* Sections IV.A–B.

26. See *infra* Section IV.C.

27. United States v. 1.58 Acres of Land, 523 F. Supp. 120, 124 (D. Mass. 1981).

28. CATHERINE REDGWELL, INTERGENERATIONAL TRUSTS AND ENVIRONMENTAL PROTECTION 40 (1999) (citations omitted) (summarizing and analyzing Joseph Sax, *The Public Trust Doctrine in Natural Resource Law: Effective Judicial Intervention*, 68 MICH. L. REV. 471, 485 (1970)).

29. See N.J. Dep't of Env'tl. Prot. v. Jersey Cent. Power & Light Co., 336 A.2d 750, 758 (N.J. Super. Ct. App. Div. 1975), *rev'd on other grounds*, 351 A.2d 337 (N.J. 1976) (hold-

ble public access to these resources,³⁰ and “seek damages for injury to the object of its trust”³¹ from private individuals.

In addition to the state’s duty to preserve and protect public access and enjoyment of public trust resources, the state “cannot destroy or alienate the public’s right or abdicate its control of public trust resources” without a compelling purpose.³² Furthermore, the state has the responsibility to consider any action that will affect the public rights and uses of trust lands as a matter of general public interest, and should only permit such actions if the state has fully considered the public interest.³³

Beyond these considerations, the state can alienate control over a public trust resource only if doing so does not “substantially impair the public interest” in the trust resource.³⁴ The state is burdened with an inalienable duty to protect and preserve public resources and to prevent transfer or sale of resources that substantially impair the public’s interest.³⁵

B. *History of the Public Trust Doctrine*

The public trust doctrine first appeared in the Roman *Institutes of Justinian*,³⁶ which laid the foundation for the doctrine in England and subsequently, the United States. Under the Roman code, the doctrine granted the state trusteeship over all things that could not be owned by any individual, including “the air, running water, the sea, and consequently the sea shore.”³⁷ These environmental properties were classified as communally owned resources, or *res communis*.³⁸ The Roman code also discussed wildlife. Until capture, animals, including birds and fish, had no owner and were classified

ing that a state’s interest in protecting waterways gives rise to standing to challenge pollution to a waterway).

30. Charles Wilkinson, *The Headwaters of the Public Trust: Some Thoughts on the Source and Scope of the Traditional Doctrine*, 19 ENVTL. L. 425, 462 (1989) (concluding that “the right of the public to obtain access [to public trust waters and resources] . . . is the essence of the public trust doctrine”).

31. State Dep’t of Fisheries v. Gillette, 621 P.2d 764, 767 (Wash. Ct. App. 1980).

32. Gary D. Meyers, *Variation on a Theme: Expanding the Public Trust Doctrine to Include Protection of Wildlife*, 19 ENVTL. L. 723, 726 (1989).

33. See Sax, *supra* note 28, at 531.

34. See Ill. Cent. R.R. v. Illinois, 146 U.S. 387, 452 (1892).

35. *Id.* at 452–53. It is important to note that this does not prevent the state from alienation of public trust resources in cases that could damage environmental resources, so long as it promotes, or at least does not impair, the broadly-defined public interest. For example, California courts found that drilling for oil does not impair the public interest, but rather promotes the public interest, and thus does not violate the public trust doctrine. See *infra* notes 225–26 and associated text.

36. See INSTITUTES OF JUSTINIAN 35 (J.B. Moyle trans., Oxford 1913).

37. See *id.*

38. *Id.* at 35–36.

as *res nullius*.³⁹ Compared to many modern iterations, the public trust doctrine found in the *Institutes of Justinian* had an expansive *res*⁴⁰ and included many environmental resources now seen as controversial, such as air.⁴¹

When England incorporated the public trust doctrine into English common law, an important progression in the doctrine occurred—ownership of *res communis* was conferred upon the sovereign Crown rather than the general community.⁴² Counterintuitively, this transfer of ownership had the effect of limiting the Crown’s power by bounding the Crown to act only “for the benefit of the public.”⁴³ In addition, the scope of the English public trust doctrine was largely limited to tidal water resources.⁴⁴

When the United States became an independent nation, the English public trust doctrine was incorporated into United States law. The rights and duties granted to the Crown were transferred to the individual states.⁴⁵ Though American cases expanded the public trust doctrine beyond tidal waters into freshwater,⁴⁶ the scope of the American public trust doctrine was, for the most part, relatively narrow compared to the original Roman

39. See *id.* at 35–37 (distinguishing wildlife, which was individually owned, from water resources, which were communally owned).

40. *Res* is the corpus of resources protected by the public trust doctrine. Thus, a public trust doctrine with a more expansive *res* implies that that trust doctrine includes and protects more resources. BLUMM & WOOD, *supra* note 19, at 7, 376.

41. This is especially true due to litigation associated with public trust doctrine’s application to climate change. See *Alec L. v. Jackson*, 863 F. Supp. 2d 11, 17 (D.D.C. 2012), *aff’d sub nom. Alec L. ex rel. Looz v. McCarthy*, 561 Fed. Appx. 7 (D.C. Cir. 2014) (denying applications of the public trust doctrine to the federal government in respect to climate change mitigation). Other courts have been more hesitant to apply the public trust doctrine to the air. See, e.g., *Bosner-Lain v. Texas Comm’n on Env’tl. Quality*, 438 S.W.3d 887, 890 (Tex. Ct. App. 2014).

42. For a description of the public trust doctrine in England, see MATTHEW HALE, *A TREATISE RELATIVE TO THE MARITIME LAW OF ENGLAND* (London, 1787). See also Jan Stevens, *The Public Trust: A Sovereign’s Ancient Prerogative Becomes the People’s Environmental Right*, 14 U.C. DAVIS L. REV. 195, 196 (1980). Though the public trust doctrine in England was relatively limited in practice, it was theoretically more expansive than implied. For example, Stevens argues that, despite American interpretation of the English public trust doctrine, the King’s ownership expanded beyond *tidal* waters. *Id.* at 201; see also BLUMM & WOOD, *supra* note 19, at 195 (discussing the King’s ownership of various types of wildlife).

43. *Martin v. Waddell’s Lessee*, 41 U.S. 367, 412–13 (1842) (finding that the Crown’s sovereignty over natural resources was limited by the Magna Carta); see also *Arnold v. Mundy*, 6 N.J.L. 1, 3 (1821) (concluding that “the king . . . is restrained by Magna Charta” in his power to grant a fishery to a private individual).

44. See Ill. Cent. R.R. v. Illinois, 146 U.S. 387, 435, 458 (1892).

45. *Arnold*, 6 N.J.L. at 2.

46. See Stevens, *supra* note 42, at 201. Navigability based on the ebb and flows of the tide “was early rejected in states with large navigable freshwater rivers and lakes where it simply made no sense, especially as steamboats capable of passage upriver were developed.” *Id.*

public trust doctrine. Most cases limited application of the doctrine to submerged lands, rivers, and game wildlife.⁴⁷

The seminal case in early public trust doctrine jurisprudence was *Illinois Central Railroad v. Illinois*.⁴⁸ Decided in 1892, the case considered whether the bed of Lake Michigan fell within the purview of the public trust doctrine.⁴⁹ The Illinois legislature granted and subsequently revoked a substantial portion of the Chicago harbor to a private company, Illinois Central Railroad Company.⁵⁰ The Supreme Court held that the state did not have the authority to alienate these lands, a public trust resource, to a private company because “trusts connected with public property, or property of a special character, . . . cannot be placed entirely beyond the direction and control of the State.”⁵¹ The Court added that public trust resources can only be alienated from the state if such alienation either promotes or does not substantially impair the public’s interest in the resource.⁵² This two-part “substantial impairment” test became a hallmark of public trust doctrine cases.⁵³

In the decades after *Illinois Central*, there was little evolution of the public trust doctrine. In 1970, the public trust doctrine returned to the spotlight when Joseph Sax wrote an influential article arguing that the doctrine was a powerful tool that could be used by environmental policy makers.⁵⁴

The revival of the public trust doctrine has resulted in a *res* that has rapidly expanded beyond the traditional American corpus. Applications of the public trust doctrine have increased in the decades since Sax’s article.

47. See, e.g., *Waddell’s Lessee*, 41 U.S. at 413–14 (holding that public navigable lands cannot be conferred to private individuals); *Ill. Cent.*, 146 U.S. at 458 (invalidating under the public trust doctrine a state’s land grant of submerged lands to a private company); *Geer v. Connecticut*, 161 U.S. 519, 528 (1896) (holding that the state, as a trustee, has the right to regulate the common right to hunt wildlife for the benefit of the people); *Arnold*, 6 N.J.L. at 3 (holding that public submerged lands could not be converted into private property); *Carson v. Blazer*, 2 Binn. 475, 494–95 (Pa. 1810) (holding that the State owns the Susquehanna River and the associated fisheries; private owners of the banks have no claim to ownership of the fisheries).

48. *Ill. Cent.*, 146 U.S. at 452; see also Sax, *supra* note 28, at 489 (discussing *Illinois Central* as the lodestar American public trust doctrine case).

49. *Ill. Cent.*, 146 U.S. at 433–37.

50. *Id.* at 389–90.

51. *Id.* at 453–54.

52. *Id.* at 453.

53. See *Shively v. Bowlby*, 152 U.S. 1, 47 (1894); see also Stevens, *supra* note 42, at 212.

54. Sax, *supra* note 28, at 474. In many ways, Joseph Sax revived the public trust doctrine in 1970 with his seminal article. Since its publication, Sax’s article “is perhaps the most heavily-cited law review article” and has “had a catalytic effect among courts and environmental policymakers throughout the country.” See Frank, *supra* note 21, at 667.

Depending on the state, the doctrine has been applied to groundwater,⁵⁵ non-game wildlife,⁵⁶ air quality,⁵⁷ and general ecosystem benefits.⁵⁸ Furthermore, recent scholarship has considered the application of the public trust doctrine in novel areas, including the U.S. Exclusive Economic Zone (EEZ)⁵⁹ and the atmosphere.⁶⁰

III. THE SCOPE OF THE PUBLIC TRUST DOCTRINE AND ELECTRICITY PRODUCTION

The public trust doctrine varies both in scope and in character across different ecosystems, landforms, and legal jurisdictions. As it applies to electricity production, the doctrine principally implicates three protected resources: state waters, wildlife, and federal waters. Similarly, prevalent forms of electricity production vary across different ecosystems and jurisdictions. Each distinct type of energy production, given its unique impacts on trust resources, will be subject to different applications of the public trust doctrine. Conventional electricity production, including generation from coal, nuclear and natural gas, is commonly found adjacent to state-controlled navigable water bodies such as rivers, estuaries, or the open ocean for cooling.⁶¹ In contrast, onshore wind and solar energy production is rarely located next to water.⁶² Thus, while conventional electricity production implicates public trust water resources, land-based renewable elec-

55. See *Waiahole I*, 9 P.3d 409, 447 (Haw. 2000).

56. See *Ctr. for Biological Diversity v. FPL Grp.*, 83 Cal. Rptr. 3d 588, 596–97 (Ct. App. 2008).

57. See *Nat'l Audubon Soc'y v. Superior Court*, 658 P.2d 709, 718–19 (Cal. 1983).

58. See *Marks v. Whitney*, 491 P.2d 374, 380 (Cal. 1971).

59. See, e.g., Mary Turnipseed et al., *The Silver Anniversary of the United States' Exclusive Economic Zone: Twenty-Five Years of Ocean Use and Abuse and the Possibility of a Blue Water Public Trust Doctrine*, 36 *ECOLOGY L.Q.* 1 (2009). The EEZ is a maritime zone, ranging from the end of the territorial sea (12 nautical miles from the shore of sovereign territory) out to 200 nautical miles, where the federal government has exclusive sovereign rights to resources. See *id.* at 5. The federal government also generally controls the territorial sea beyond three nautical miles of the shoreline (with states generally controlling sea up to three miles). *Id.* Any future reference in this Article to the EEZ includes federal territorial sea waters. While the EEZ applies to all coastal states, this Article is concerned with the EEZ's jurisdictional implications within the United States. See *Submerged Lands Act*, 43 U.S.C. §§ 1301–1303, 1311–1315, 1331–1356a; *Exclusive Economic Zone of the United States of America*, Presidential Proclamation No. 5030, 48 Fed. Reg. 10,605 (Mar. 14, 1983).

60. See, e.g., Wood & Galpern, *supra* note 20.

61. Energy Info. Admin. (EIA), U.S. Dep't of Energy, *U.S. Energy Mapping System*, U.S. STATES: STATE PROFILES AND ENERGY ESTIMATES, <http://www.eia.gov/state/maps.cfm> (last visited Nov. 11, 2015).

62. *Id.* Because wind and solar do not require cooling water, there is no operational reason to locate these technologies adjacent to water resources.

tricity (i.e., onshore wind and solar) generally implicates only the wildlife aspects of the public trust doctrine.⁶³ Finally, offshore wind is often installed on the continental shelf in areas beyond state jurisdictional waters.⁶⁴ Thus, to the extent the public trust doctrine applies to offshore wind, it would either be based on the existence of a federal public trust or the extension of state jurisdiction into federal waters and the wildlife that exist therein, including the EEZ.⁶⁵

A. State Waters

State waters, including tidal waters and navigable rivers, were the original focus of the public trust doctrine,⁶⁶ as these resources were highly valued for commercial transportation and sustenance from fisheries.⁶⁷ Early cases principally concerned title ownership of navigable rivers because people sought to privatize these resources.⁶⁸ In these early cases, American courts rejected both private and federal claims to the title ownership of submerged lands.⁶⁹ Instead, the courts ruled that ownership rights to rivers must be held by the State “in trust for the people of the State.”⁷⁰ Beyond

63. See *infra* Section IV.B.

64. MARC SCHWARTZ ET AL., NAT'L RENEWABLE ENERGY LAB, ASSESSMENT OF OFFSHORE WIND ENERGY RESOURCES FOR THE UNITED STATES 10–12 (2010), <http://www.nrel.gov/docs/fy10osti/45889.pdf>. Offshore wind could be installed within 3 miles of the coastline, and thus remain in state jurisdiction. However, this Article will focus on wind located within the EEZ, given its substantially higher potential capacity.

65. Hope M. Babcock, *Grotius, Ocean Fish Ranching, and the Public Trust Doctrine: Ride 'em Charlie Tuna*, 26 STAN. ENVTL. L.J. 3, 6 (2007); see also *infra* Section III.C.

66. Ordinance of 1787: The Northwest Territorial Government, art. IV, 1 Stat. 50 (1789), reprinted in 1 U.S.C. LI, LV (2012) [hereinafter Northwest Ordinance]; see, e.g., Matthew J. Festa, *Property and Republicanism in the Northwest Ordinance*, 45 ARIZ. ST. L.J. 409, 461 (2013) (crediting the Northwest Ordinance with helping to establish the public trust doctrine).

67. See Festa, *supra* note 66, at 461–62.

68. See, e.g., *Martin v. Waddell's Lessee*, 41 U.S. 367, 408 (1842) (saying the defendants claimed exclusive rights to harvest oysters); *Arnold v. Mundy*, 6 N.J.L. 1, 10 (1821) (saying the plaintiffs claimed exclusive rights to harvest oysters); *Carson v. Blazer*, 2 Binn. 475, 483 (Pa. 1810) (saying the plaintiffs have exclusive rights to the fisheries in the Susquehanna River opposite their property).

69. See, e.g., *Pollard v. Hagan*, 44 U.S. 212, 230 (1845) (holding that the right over the shores and soils of navigable resources belongs exclusively to the states, not the federal government); *Arnold*, 6 N.J.L. at 30 (concluding that the rights to fisheries are vested in the state). In *Shively v. Bowlby*, the U.S. Supreme Court clarified that the federal government does have the authority to dispose of territorial submerged lands in limited situations (to promote commerce and navigation between states and nations or to fulfill international obligations) but has constrained this power by the equal footing doctrine. 152 U.S. 1, 47–50 (1894).

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

authorizing the state's title to these resources, the courts qualified this ownership with an inalienable duty to the public to maintain and prevent impairment of the public's interest in the waters held under trust.⁷¹

The extent of the "public interest," and state's obligations with respect to that interest, are much more vague and depend on the use of public trust waters. The scope of a state's duty to protect such public interests was first addressed in a 1976 case out of North Dakota, *United Plainsmen Association*.⁷² In that case, the plaintiffs filed a complaint against the State Water Conservation Commission and the State Engineer in an attempt to prevent the issuance of a water allocation permit to a coal fired plant.⁷³ The court found that while there were no mandatory planning responsibilities under statutory law, the public trust doctrine requires, at a minimum, the state to determine the potential effects of water allocations on both present water supply and future water needs.⁷⁴ Thus, the power of the state to alienate public trust resources is burdened by some proof of consideration of the public trust implications.

The import of a state's duties under the public trust doctrine was further elucidated by the California Supreme Court in the 1983 *National Audubon Society* case.⁷⁵ The National Audubon Society sought to enjoin the diversions of water from the rivers that feed Mono Lake, which had caused a nearly 30% decrease in the surface area of the lake and concomitant significant declines in local and migratory wildlife populations due to new access by predators.⁷⁶ The plaintiffs claimed the diversions were impairing the public interest in Mono Lake, particularly its recreational and ecological value.⁷⁷ While recreational and ecological values were not considered traditional aspects of the public trust doctrine, the California Supreme Court agreed that the public trust doctrine protects "the scenic views of the lake and its shore, the purity of the air, and the use of the lake for nesting and feeding by birds."⁷⁸ Furthermore, the public trust doctrine places not only a sovereign authority in the hands of the state, but also burdens the state with

71. See *id.*; see also *supra* notes 51–52 and associated text. Moreover, in Justice Fields' broadly written opinion in *Illinois Central*, he was careful to maintain the trust's applicability to any property of a special character, and not just lands under navigable waters. See 146 U.S. at 454.

72. *United Plainsman Assoc. v. N.D. State Water Conservation Comm'n*, 247 N.W.2d 457 (N.D. 1976).

73. *Id.* at 459.

74. *Id.* at 462.

75. *Nat'l Audubon Soc'y v. Superior Court*, 658 P.2d 709 (Cal. 1983).

76. *Id.* at 714–15.

77. *Id.* at 711–12.

78. *Id.* at 719. In fact, the Court went on to include local air quality as part of the trust resources that must be considered in this decision (since dropping water levels exposed silt

an affirmative duty to “attempt, so far as feasible, to avoid or minimize any harm to those interests.”⁷⁹ The court held that the state must include public trust values in its planning and allocation of water resources, show the costs and benefits of any decision regarding trust resources, and continually supervise water allocations.⁸⁰ As a result, the court ruled that the state had failed to properly consider the impact of the water diversions on the public’s interest in Mono Lake.⁸¹

Finally, in 2000, the Supreme Court of Hawaii explained the role of long-term planning in meeting a state’s public trust responsibilities when it adjudicated a controversy over water allocation permits within the Waiahole Ditch System on the Hawaiian island of Oahu.⁸² In 1992, the Hawaiian Commission on Water Resources Management (CWRM) designated five aquifer systems as ground water management areas that required all existing users to apply for use permits within a year.⁸³ The CWRM allocated available water mostly favoring agricultural uses over in-stream flow restoration.⁸⁴ The court held that the public trust doctrine gives the state both the “authority and duty to preserve the rights of present and future generations in the waters of the state”⁸⁵ and “also requires planning and decisionmaking from a global, long-term perspective.”⁸⁶ As a result, the state is compelled “to consider the cumulative impact of existing and proposed diversions on trust purposes and to implement reasonable measures to mitigate this impact, including use of alternative sources.”⁸⁷ Moreover, the Commission *must* designate the in-stream flow protection standards *before* it authorizes off-stream diversions—otherwise it would be impossible to know if diver-

from the lake bottom, which raised respiratory and other health concerns when the silt became airborne). *Id.* at 716, 719.

79. *Id.* at 712. The court rejected the Water Board’s argument that it lacked authority to adjust previously permitted water allocations and that it was required to grant the domestic use request. *Id.* at 714, 723.

80. *Id.* at 722–28. Moreover, *National Audubon Society* implies that water allocation decisions are continually ripe for review under the public trust doctrine. *Id.* at 722, 728 (noting that the state is burdened with a duty to *continually* supervise the taking and use of water, even when the use has been long thought to be free of the trust, and a duty to take action to feasibly protect trust resources if necessary).

81. *Id.* at 728–29.

82. *Waiahole I*, 9 P.3d 409 (Haw. 2000).

83. *Id.* at 423.

84. *Id.* at 428–30.

85. *Id.* at 453.

86. *Id.* at 455.

87. *Id.*; *see also id.* at 501–02 (highlighting the importance of alternative water sources and directing the two parties to show that there was no practical alternative to their proposed diversion).

sions are detrimental to public in-stream uses.⁸⁸ In addition, the court also incorporated a reasonable-beneficial use test as an aspect of the public trust doctrine, stating that any proposed use of water must be consistent with the public interest in these waters and must not be wasteful or unnecessary.⁸⁹

Over the last forty years, the public usufructuary right and associated duty of the state to protect the public interest in the public trust waters has been slowly evolving towards three key ideas. First, the state must plan water trust resource allocation in a way that is comprehensive, intergenerational, and global.⁹⁰ Second, as the trustee for the public, the state has an affirmative duty to continually look for ways to minimize harm to water resources.⁹¹ Lastly, for permitted uses of water resources, the state must ensure that each use is reasonable and beneficial, i.e., not wasteful.⁹²

The application of these three ideas to the effects of electricity production on water resources⁹³ is clear—states must have a comprehensive plan regarding allocation of water for electricity production. For example, states should continually look for feasible ways to minimize the harm caused by electricity production and ensure that water allocated to electricity production plants does not substantially impair the water's beneficial use to society and does not unreasonably waste water. This comprehensive planning responsibility falls within the jurisdiction of a state's public trust doctrine powers and duties, not as a matter of title or sovereign ownership, but rather as the part of a state's duty to protect the public interest in the usufructuary rights of state waters.

B. State Wildlife Resources

Electricity production also significantly impacts wildlife. Today, there is considerable overlap between the water and wildlife applications of the public trust doctrine. However, the trust doctrine governing state wildlife resources evolved as a separate doctrine. Like title ownership of submerged lands, early application of the public trust doctrine to wildlife can be traced to England. Several English cases decreed royal ownership of various forms of wildlife, including oysters, salmon, swans, and whales.⁹⁴ Likewise, the

88. *See id.* at 460.

89. *See id.* at 472–73 (discussing the definition of a reasonable use, including the purpose of the use, its economic value, the potential damages to society, and potential mitigation of waste or harm).

90. *United Plainsmen Ass'n v. State Water Conservation Comm'n*, 247 N.W.2d 457, 462 (N.D. 1976); *see also Waiahole I*, 9 P.3d at 455.

91. *Nat'l Audubon Soc'y v. Superior Court*, 658 P.2d 709, 712 (Cal. 1983).

92. *Waiahole I*, 9 P.3d at 472–73.

93. *See sources cited infra* note 160 and associated text.

94. *BLUMM & WOOD, supra* note 19, at 195.

right to use wildlife, namely fish and oysters, was integral to the earliest American public trust cases,⁹⁵ although these early controversies focused on the public's right to commerce rather than wildlife per se.

Wildlife was not explicitly incorporated into the American public trust doctrine until *Geer v. Connecticut* in 1896.⁹⁶ In that case, the plaintiff was charged with violating a state statute that made transport of wild game birds beyond state lines unlawful, even though he had killed the birds legally.⁹⁷ The plaintiff sued Connecticut, claiming that the statute violated the Commerce Clause of the U.S. Constitution.⁹⁸ The U.S. Supreme Court disagreed, affirming that the right to take wild animals has always been "subject to the control of the law-giving power [of the state]."⁹⁹ The Court held that wild game belongs to the people in their collective sovereign capacity and that this ownership of wildlife is held by the state as a trustee for the benefit of the people.¹⁰⁰ As a result, the right of a private individual to take wildlife is qualified by the power and duty of the state to protect and conserve wildlife for the common benefit.¹⁰¹

Typical of early cases, *Geer* describes the authority of the state to regulate trust resources. Yet, although the Court anchored *Geer* on the "sovereign ownership" theory of wildlife, the wildlife trust at that time was disconnected from the other aspects of the public trust doctrine.¹⁰² In fact, though *Geer* is one of the cornerstones of establishing the wildlife aspect of the public trust doctrine and was decided only four years after *Illinois Central*, it does not cite that seminal case.¹⁰³

95. See *Martin v. Waddell's Lessee*, 41 U.S. 367 (1842); *Arnold v. Mundy*, 6 N.J.L. 1 (1821); *Carson v. Blazer*, 2 Binn. 475 (Pa. 1810).

96. *Geer v. Connecticut*, 161 U.S. 519, 534–35 (1896).

97. This law, along with similar statutes in other states, was enacted in response to the decimation of game birds by market hunters. See Michael Blumm & Lucus Ritchie, *The Pioneer Spirit and the Public Trust: American Rule of Capture and State Ownership of Wildlife*, 35 ENVTL. L. 673, 696 (2005).

98. *Geer*, 161 U.S. at 521–22.

99. *Id.* at 522.

100. *Id.* at 529.

101. *Id.* at 529–30.

102. See *supra* notes 66–71 and associated text. The "sovereign ownership" of wildlife closely mirrors the language in public trust doctrine cases holding that the state owns title to navigable waters as an aspect of its sovereignty. See *Martin v. Waddell's Lessee*, 41 U.S. 367, 410–11 (1842) (connecting sovereign ownership to the public trust). As such, it is conceivable that the *Geer* court could have made the same connection to the public trust doctrine.

103. While the court in *Geer* did not cite *Illinois Central*, the language of *Geer* parallels *Illinois Central*, especially regarding the inherent sovereignty of the state to regulate common trust resources as an exercise of its police power. Compare *Ill. Cent. R.R. v. Illinois*, 146 U.S. 387, 459 (1892) ("The soil under navigable waters being held by the people of the state in trust for the common use and as a portion of their inherent sovereignty, any act of legislation concerning their use affects the public welfare. It is therefore appropriately within the exer-

Despite *Geer's* importance, its "sovereign ownership" theory was questioned starting with *Missouri v. Holland*¹⁰⁴ and eventually abandoned in *Hughes v. Oklahoma*.¹⁰⁵ First, a series of early cases "destroyed the argument that state ownership of wildlife superseded federal species legislation."¹⁰⁶ In *Missouri v. Holland*, the Supreme Court held that a state's authority to regulate wildlife was subject to the paramount federal treaty power.¹⁰⁷ Subsequently, in *Hunt v. United States*, the Supreme Court considered a state challenge to a federal program of killing and removing excess deer on federal lands.¹⁰⁸ The Court held that the federal power to protect its land was paramount to all state statutes.¹⁰⁹ Finally, the Supreme Court constrained state authority to discriminate in the issuance of fishing licenses under the Equal Protection Clause in *Takahashi v. Fish and Game Commission*.¹¹⁰ While none of these cases explicitly overturned *Geer*, they paved the way for *Geer's* Commerce Clause rationale to be overruled.¹¹¹

This would occur in *Hughes v. Oklahoma*.¹¹² Under similar facts to *Geer*, the Court in *Hughes* held that state power to regulate the possession of wildlife is subject to the paramount powers of the federal government, including under the Commerce Clause of the U.S. Constitution.¹¹³ The Court was careful to reaffirm the state's power to conserve and protect wild animals, insofar as such actions do not interfere with interstate commerce.¹¹⁴

Importantly, the *Hughes* Court also characterized the sovereign ownership theory as "no more than a 19th-century legal fiction 'expressing the

cise of the police power of the state."), with *Geer*, 161 U.S. at 534 ("It is, perhaps, accurate to say that the ownership of the sovereign authority is in trust for all the people of the state; and hence, by implication, it is the duty of the legislature to enact such laws as will best preserve the subject of the trust, and secure its beneficial use in the future to the people of the state.").

104. *Missouri v. Holland*, 252 U.S. 416, 432–34 (1920).

105. *Hughes v. Oklahoma*, 441 U.S. 322, 325 (1979).

106. Blumm & Ritchie, *supra* note 97, at 703.

107. *Holland*, 252 U.S. at 434–35. The court also questioned the state's sovereign ownership over migratory birds because no one truly possesses wild animals, and "possession is the beginning of ownership." *Id.* at 432–34.

108. *Hunt v. United States*, 278 U.S. 96 (1928).

109. *Id.* at 100.

110. *Takahashi v. Fish & Game Comm'n*, 334 U.S. 410 (1948).

111. Blumm & Ritchie, *supra* note 97, at 703–04. As further examples of the U.S. Supreme Court undermining the ownership theory, the authors also cite *Toomer v. Witsell*, 334 U.S. 385 (1948) (holding that state ownership of wildlife is subject to the Privileges and Immunities Clause of the U.S. Constitution) and *Kleppe v. New Mexico*, 426 U.S. 529 (1976) (holding that state ownership of wildlife is subject to the power under the Property Clause to protect wildlife on federal lands). *Id.* at 702–03.

112. *Hughes v. Oklahoma*, 441 U.S. 322, 325 (1979).

113. *Id.* at 335–36.

114. *Id.*

importance to its people that a State have a power to preserve and regulate the exploitation of an important resource.’¹¹⁵ While states clearly have broad powers and discretion to conserve wildlife,¹¹⁶ the nature of the wildlife trust is distinct from the trust in submerged lands and their waters. Wildlife is an example of *res nullius*, implying the impossibility of true ownership.¹¹⁷ Because a state does not own title to wild animals, it can only regulate the usufruct rights in wildlife.¹¹⁸

Perhaps due to the difficult characteristics of the property aspects of wildlife, few cases directly address the state’s duties and obligations with respect to wildlife under the public trust doctrine.¹¹⁹ Despite nearly universal statutory claims of public trust ownership of wildlife,¹²⁰ few states have declared any corresponding, affirmative duties in their statutes.¹²¹ However, as the public interest in wildlife has evolved, case law has frequently focused on the state’s ability and duty to seek remuneration for the diminution of wildlife resources.¹²²

Remuneration based on trust principles was first developed in *New Jersey Department of Environmental Protection v. Jersey Central Power & Light Co.*¹²³ In that case, a nuclear power plant operator had found a potentially hazardous leak, resulting in a relatively sudden shutdown and interruption in the discharge of hot water into a nearby creek.¹²⁴ The resulting decrease in the water temperature killed over 500,000 menhaden fish.¹²⁵ The state

115. *Id.* at 335 (quoting *Douglas v. Seacoast Products, Inc.*, 431 U.S. 265, 284 (1977) (citing *Toomer v. Witsell*, 334 U.S. 385, 402 (1948))).

116. Blumm & Ritchie, *supra* note 97, at 711.

117. See INSTITUTES OF JUSTINIAN, *supra* note 36, at 35–37.

118. Blumm & Ritchie, *supra* note 97, at 711.

119. *Id.* at 714.

120. Michael Blumm & Aurora Paulsen, *The Public Trust in Wildlife*, 6 UTAH L. REV. 1437, 1462 (2013). The only exceptions are Delaware and Nebraska. *Id.* Indeed, in spite of *Hughes v. Oklahoma*, 441 U.S. 322, 325 (1979), most state courts have embraced states’ authority and duty to protect wildlife resources as trustees of the public while still relying on the sovereign ownership theory by either distinguishing *Hughes*, due to an absence of federal controversy, or simply ignoring *Hughes* entirely. See Blumm & Ritchie, *supra* note 97, at 707–08. Blumm and Ritchie also note that “[r]ecent scholarly commentary overwhelmingly confirms this interpretation.” *Id.* at 706. Moreover, a recent U.S. Supreme Court case breathed new life into the state’s ownership of *ferae naturae* wildlife, possibly reopening the sovereign ownership theory. See *Horne v. U.S. Dep’t of Agric.*, 135 S. Ct. 2419, 2431 (2015).

121. Blumm & Paulsen, *supra* note 120, at 1465.

122. Blumm & Ritchie, *supra* note 97, at 715.

123. *N.J. Dep’t of Env’tl. Prot. v. Jersey Cent. Power & Light Co.*, 336 A.2d 750 (N.J. Super. Ct. App. Div. 1975), *rev’d on other grounds*, 351 A.2d 337 (N.J. 1976) (holding that the plaintiffs had failed to show proximate causation and a federal statute preempted public trust doctrine claims).

124. *Id.* at 753.

125. *Id.*

sued the power plant under the public trust doctrine, seeking compensatory damages for the deaths of the menhaden,¹²⁶ while the nuclear plant operators objected, saying that “the State does not have a proprietary right to fish in its waters sufficient to support an action for compensatory damages.”¹²⁷ The New Jersey court found that “the State had the right and the fiduciary duty to seek damages of all wild life which are part of the public trust [I]t is questionable whether anyone but the State can be considered the proper party to sue for recovery of damages.”¹²⁸ Not only does the state have the authority to sue for compensation, but its sole proprietary interest in wildlife burdens it with a duty to do so under the public trust doctrine.

The state’s responsibilities to seek remuneration under the public trust doctrine was also distinguished from the “sovereign ownership” theory in *In re Steuart Transportation Co.*¹²⁹ Steuart had caused a significant oil spill, resulting in the death of approximately 30,000 migratory birds.¹³⁰ Steuart filed a motion for summary judgment, alleging that, because the state of Virginia did not own the migratory waterfowl, it could not recover damages for their loss.¹³¹ While the district court agreed that Virginia did not own the migratory birds, under the public trust doctrine, it concluded that Virginia had the “right and the duty to protect and preserve the public’s interest in natural wildlife resources” that derive not “from ownership of the resources but from a duty owing to the people.”¹³² Thus, regardless of any state claim to “sovereign ownership,” each state has a separate duty to the people to protect the public interest in wildlife.

Although case law is scant on the issue of whether a state’s fiduciary duties go beyond remuneration,¹³³ much of the academic commentary suggests that the scope of the fiduciary duty under the wildlife trust is the same as under the public trust in water resources.¹³⁴ It follows that a state

126. *Id.* at 758–59.

127. *Id.*

128. *Id.*

129. 495 F. Supp. 38 (E.D. Va. 1980).

130. *Id.* at 39.

131. *Id.* at 39.

132. *Id.* at 39–40.

133. *Owsichek v. State*, 763 P.2d 488, 496 (Alaska 1988) (describing the state’s duty as requiring it to prohibit monopolization of wildlife resources); *see also* *Ctr. for Biological Diversity v. FPL Grp.*, 83 Cal. Rptr. 3d 588, 601–02 (Ct. App. 2008).

134. Because wildlife, like water, has no owner in its natural state and ownership is an aspect of sovereignty, “the common interest in wildlife is sufficiently like the common interest in water to justify similar public trust doctrine protection for wildlife.” Meyers, *supra* note 32, at 728–29. Indeed, Blumm and Paulsen recently argued that “the public trust in wildlife has a solid historical foundation and therefore [is] likely to be . . . employed by an increasing number of courts in the coming years.” Blumm & Paulsen, *supra* note 120, at 1466. The authors based their argument on the states’ nearly unanimous assertion of ownership of

must: (1) comprehensively plan the “allocation” of wildlife; (2) minimize harm to wildlife resources when feasible; and (3) ensure that “uses” of wildlife are reasonable, beneficial, and do not substantially impair the public interest.¹³⁵ Specifically, before any further allocation of wildlife, a state must first have an intergenerational, comprehensive plan that specifically addresses how to minimize impacts to wildlife from electricity production. A state must also continually ensure that any actions that impact wildlife are both reasonable and beneficial, implying that electricity production cannot needlessly kill wildlife.

C. Federal Waters and Wildlife Resources

The last potential application of the public trust doctrine to electricity production relates to federal jurisdiction over public waters and wildlife. Unlike state governments, however, it is uncertain whether the federal government has any common law trust duties to protect water and wildlife beyond statutory requirements.

To the extent there is a federal public trust doctrine, it could impact electricity production in three ways—impacts from offshore wind turbine installations in federal jurisdictional waters, including the EEZ; climate change impacts from conventional electricity production; and the co-trusteeship of water and wildlife resources that concurrently fall under both state and federal jurisdiction.¹³⁶ While the public trust doctrine is usually associated with state common law, there are currently two bases for public trust doctrine application to the EEZ (and thus to wildlife): “(1) the public domain nature of the EEZ to which the federal common law might apply and (2) the potential extension of state common law beyond state waters.”¹³⁷

The source of federal public trust doctrine jurisprudence can be traced to *Illinois Central*.¹³⁸ Although *Illinois Central* concerned waters held in trust by a state, the opinion’s language suggests that the Supreme Court was basing the rule on “federal law universally applicable to all state legisla-

wildlife, the historic connection of early public trust doctrine cases to fishery resources and public access thereto, and the increasing public interest in wildlife. *Id.*

135. It should be noted that none of these tests have been explicitly applied to wildlife, but there is also no reason to think that these duties could not or should not apply to wildlife. In fact, the cases that developed these tests, such as *Waiahole I*, 9 P.3d 409 (Haw. 2000), and *National Audubon Society. Superior Court*, 658 P.2d 709 (Cal. 1983), discuss wildlife as a trust resource peripherally, and do not distinguish wildlife resources from other public trust resources to which these tests do apply.

136. See Frank, *supra* note 21, at 680.

137. Babcock, *supra* note 65, at 6.

138. *Ill. Cent. R.R. v. Illinois*, 146 U.S. 387, 435, 458 (1892).

tures.”¹³⁹ Furthermore, beyond binding state actions, “the Court made it clear that the trust *derives* from federal law,”¹⁴⁰ implying that public trust doctrine duties are a matter of federal law.

Any such federal public trust doctrine is markedly different and the federal government’s responsibilities much more ambiguous than those of its state counterparts. Scholarly commentary suggests that the federal public trust doctrine serves as a baseline of sorts, guaranteeing basic public interests such as public access to trust resources and preventing states from abrogating the public trust entirely.¹⁴¹ It is then up to each state individually to define the scope of its public trust doctrine.¹⁴²

The federal public trust is most likely to be implicated when “uniquely federal interests” are present, such as where the authority and duties of the federal government “as a sovereign are intimately involved.”¹⁴³ While federal courts have not directly relied upon the public trust doctrine, from about 1888 through 1970, there are eighteen opinions in federal public land law that use trust language when describing the role of the federal government.¹⁴⁴

Many early public trust cases embraced a theory of co-trusteeship, in which states and the federal government share in “the right and the duty to protect and preserve the public’s interest in natural wildlife resources.”¹⁴⁵ These cases did not distinguish between the rights and duties of state and federal governments but instead emphasized that *all* sovereigns are endowed with and burdened by the public trust.¹⁴⁶ Further, the District Court of

139. Richard J. Lazarus, *Changing Conceptions of Property and Sovereignty in Natural Resources Law: Questioning the Public Trust Doctrine*, 71 IOWA L. REV. 631, 639 & n.37 (1986) (noting the lack of any limiting principle and the court’s general references to a “state,” rather than Illinois specifically, throughout the opinion).

140. Wilkinson, *supra* note 30, at 454 (emphasis added) (citing *Ill. Cent.*, 146 U.S. at 435).

141. *Id.* at 462–64 (noting that states have regularly operated on the assumption that they are bound to keep navigable waters open to the public “as a matter of national law”); see also Gerald Torres & Nathan Bellinger, *The Public Trust: The Law’s DNA*, 4 WAKE FOREST J.L. & POL’Y 281, 303 (2014) (arguing that the public trust doctrine has constitutional force, and that the U.S. Supreme Court would not allow states to abdicate the public trust entirely).

142. Wilkinson, *supra* note 30. For example, while the federal government held land in trust for new states under the equal footing doctrine, it was up to each state to develop the usufructuary and title rights associated with these lands according to each state’s view of justice. See *Shively v. Bowlby*, 152 U.S. 1, 26 (1894).

143. Babcock, *supra* note 65, at 58 (citations omitted).

144. Charles Wilkinson, *The Public Trust in Public Land Law*, 14 U.C. DAVIS L. REV. 278, 281 (1980–1981).

145. *In re Steuart Transp. Co.*, 495 F. Supp. 38, 40 (E.D. Va. 1980); see also *United States v. 1.58 Acres of Land*, 523 F. Supp. 120, 124 (D. Mass. 1981).

146. *Id.* at 39. The court did reference two potential distinctions: (1) state rights and duties might be preempted by federal powers, and (2) states have additional duties under the

Massachusetts found that the federal government implements its public trust duties through Congress in its capacity as trustee.¹⁴⁷ The court reasoned that, based on the dual sovereignty of state and federal governments, the trust over the property “is administered jointly by the state and federal governments,” and “neither sovereign may alienate this land free and clear of the public trust.”¹⁴⁸ Therefore, the court dictated the strongest language considering the existence of a federal public trust doctrine, indicating that as an aspect of sovereignty the only way for the federal government to not have a public trust duty is “by the destruction of the sovereign.”¹⁴⁹

More recently, courts have rejected the proposition that the federal government has public trust powers and duties similar to states. First, in *PPL Montana, LLC v. Montana*, a case regarding a state’s claim to title under the equal footing doctrine to riverbeds to which the federal government also claimed title, the U.S. Supreme Court stated that “the public trust doctrine remains a matter of state law [T]he contours of that public trust do not depend upon the Constitution.”¹⁵⁰ In *Alec L. v. Jackson*, a federal district court considered a claim that the federal government was violating its fiduciary duty under the public trust doctrine by failing to take action to mitigate climate change, thus damaging the atmosphere, which the plaintiffs claimed was a public trust resource.¹⁵¹ The court denied the application of the public trust doctrine to the federal government, relying on the Supreme Court’s reasoning that the public trust doctrine is a matter of state law that does not depend on the U.S. Constitution.¹⁵² Though the plaintiffs argued that this was merely a dictum, the court rejected this claim and found that even if it were not a holding, U.S. Supreme Court dicta are generally treated as authoritative.¹⁵³ Furthermore, the *Alec L.* court cited language from a D.C. Circuit court case that also suggested that the public trust doctrine was a creature of state law.¹⁵⁴ The *Alec L.* court held that even

parens patriae doctrine. *Id.* at 39–40. Other than these distinctions, the court concluded that both governments had the same responsibilities under the public trust doctrine. *Id.*

147. *1.58 Acres of Land*, 523 F. Supp. at 123.

148. *Id.* at 124. The joint responsibility language insinuates that the federal government, based on its public trust duty, must also protect the public interests in these lands.

149. *Id.*

150. *PPL Mont., LLC v. Montana*, 132 S. Ct. 1215, 1235 (2012).

151. *Alec L. v. Jackson*, 863 F. Supp. 2d 11, 12 (D.D.C. 2012), *aff’d sub nom. Alec L. ex rel. Loorz v. McCarthy*, 561 Fed. Appx. 7 (D.C. Cir. 2014). The D.C. Circuit briefly affirmed the district court’s opinion on largely the same grounds, without providing much further analysis.

152. *Id.* at 15 (citing *PPL Mont.*, 132 S. Ct. at 1235).

153. *Id.*

154. *Id.* (citing *District of Columbia v. Air Florida*, 750 F.2d 1077, 1084 (D.C. Cir. 1984)). It should be noted that citing *Air Florida* is questionable since the D.C. Circuit

if there was some type of federal public trust doctrine, it has since been subsumed by the Clean Air Act, or other applicable federal regulations.¹⁵⁵

There are still unresolved inconsistencies regarding the federal trust obligations under the public trust doctrine described in the early case law and the rejection of any federal responsibility in *Alec L.* The court in *Alec L.* did not address any of the federal court opinions finding applications of the public trust doctrine to the federal government due to the system of dual sovereignty. Consequently, the reasoning in *Alec L.* remains in conflict with the co-trusteeship theory found in earlier cases.

In sum, public trust theory has regarded a trustee's duties and responsibilities as an aspect of sovereignty, implying that the federal government has public trust obligations as part of its sovereignty. Case law suggests that at best, the federal government is a co-trustee of wildlife and water resources and has an obligation to protect uniquely federal interests in these resources. On the other hand, a cogent argument could be made that the common law responsibilities of the federal government have been subsumed by statutory law. In this Article, we assume that the federal government has only basic public trust responsibilities that are shared with states and that the federal trust protects only the most basic public interests in federal water and wildlife resources.

IV. ELECTRICITY PRODUCTION AND THE ENVIRONMENT

Electricity production, in all of its potential forms, has a myriad of environmental impacts, including direct impacts to water ecosystems, wildlife mortality, and climate change. Conventional electricity production (i.e., electricity produced from coal, nuclear, and natural gas) accounted for 86% of the electricity generated in the United States in 2014.¹⁵⁶ This Article

explicitly refrained from ruling on the application of the public trust doctrine to the federal government: "We emphasize that we imply no opinion regarding . . . the applicability of the public trust doctrine to the federal government." *Air Florida*, 750 F.2d at 1084.

155. *Alec L.*, 863 F. Supp. 2d at 17. However, this ignores other case law suggesting that the public trust doctrine can never be subsumed, see *Waiahole I*, 9 P.3d 409, 442 (Haw. 2000), and scholarship examining the relationship between common law and statutory law, see Hope Babcock, *The Public Trust Doctrine: What a Tall Tale They Tell*, 61 S.C. L. REV. 393, 405 (2009) ("One function of common law in a statutory legal regime is to fill gaps left in the legal framework."). Because the court refused to apply the public trust doctrine to the federal government, it did not directly decide whether the atmosphere is a trust resource. However, the court decided that the determinations of appropriate levels of atmospheric carbon dioxide "are best left to the federal agencies that are better equipped" than the courts to make these determinations. *Alec L.*, 863 F. Supp. 2d at 17.

156. Energy Info. Admin. (EIA), U.S. Dep't of Energy, *Net Generation from Electricity Plants for All Sectors, Annual*, ELECTRICITYDATA BROWSER, <http://www.eia.gov/electricity/data/browser> (last visited Nov. 11, 2015) (use the bottom right "Annual" button to retrieve annual

restricts its discussion of renewable electricity to onshore and offshore wind and solar photovoltaic.¹⁵⁷ We chose these three because they are currently among the most prevalent forms of renewable electricity production¹⁵⁸ as well as the focus of future large-scale renewable energy implementation.¹⁵⁹ Conventional electricity poses a substantial threat to the environment, which renewable electricity can mitigate. On the other hand, renewable electricity has separate impacts to the environment as well, which put different environmental values in conflict.

A. *Water Ecosystem Impacts*

Conventional electricity generation's first impact to the environment is to water body quality and health. Since conventional electricity creates electricity by heating water and then passing steam through a turbine, cooling

data for electricity generation by sector) (reporting that in 2014, total generation was 4.093 billion megawatt hours, with 1.586 billion from coal, 1.112 billion from natural gas, and 0.797 billion from nuclear). As an aside, many of the same arguments in this Article can be made regarding hydroelectric power. Though hydroelectric power was left out of this summary since it contributes substantially less electricity than other conventional electricity sources, *see id.* (providing data demonstrating that conventional hydroelectricity accounted for 6% of 2014 generation), hydroelectricity substantially impairs trust resources, especially fish and large scale ecosystem modification, *see* Dan Tarlock, *Hydro Law and the Future of Hydroelectric Power Generation in the United States*, 65 VAND. L. REV. 1723, 1735–45 (2012). The public trust doctrine could be applied to hydroelectricity during Federal Energy Regulatory Commission (FERC) relicensing decisions. *Id.* at 1752, 1757.

157. In addition to these sources, another potential renewable electricity technology is hydrokinetic energy, including wave, tidal and current electricity projects. Generally, these projects would be placed on the seafloor, within state jurisdiction, and would have the potential to cause negative environmental impacts. Consequently, an application of the public trust doctrine to hydrokinetic renewable electricity sources is appropriate. However, these technologies were not considered in this Article as they are not yet commercially viable and have limited national maximum capacity. *See* Jeffrey Thaler & Patrick Lyons, *The Seas Are Changing: It's Time to Use Ocean-Based Renewable Energy, the Public Trust Doctrine, and a Green Thumb to Protect Seas from Our Changing Climate*, 19 OCEAN & COASTAL L.J. 241, 277 (2014) (reporting that ocean hydrokinetic projects might achieve up to 80 to 90 GW of maximum capacity); PETER ASMUS & CLINT WHEELLOCK, PIKE RESEARCH, EXECUTIVE SUMMARY: HYDROKINETIC AND OCEAN ENERGY 2 (2012), <http://www.navigantresearch.com/wp-assets/uploads/2012/02/HYDRO-12-Executive-Summary.pdf> ("To make an analogy to the wind industry, [marine and hydrokinetic power] is where wind was in the mid-1970s.").

158. Onshore wind currently is the largest renewable electricity provider in the U.S., with 4.3% of overall 2015 electricity production, through August. *See* Energy Info. Admin. (EIA), U.S. Dep't of Energy, *Net Generation from Electricity Plants for All Sectors, Monthly*, ELECTRICITY DATA BROWSER, <http://www.eia.gov/electricity/data/browser> (last visited Nov. 11, 2015) (calculated by adding together all generation values for "Wind" and "All fuels" from January to August 2015, then converting to a percentage).

159. *See, e.g.,* Cory Budischak et al., *Cost-Minimized Combinations of Wind Power, Solar Power and Electrochemical Storage, Power the Grid Up to 99.9% of the Time*, 225 J. POWER SOURCES 60 (2013).

water is required to prevent extra heat from interfering with the plant's operations. Cooling water intake systems (CWIS) are used to implement the required cooling and fall into two categories: open-cycle and closed-cycle.¹⁶⁰ Open-cycle CWIS withdraws significant amounts of water per kilowatt-hour (kWh),¹⁶¹ consumes a portion of that water, and returns the remainder at a lower water quality, due to higher temperature, lower dissolved oxygen content, and presence of biocides such as chlorine.¹⁶² Closed-cycle CWIS, the less common and more expensive technique, greatly reduces these water-quality impacts but consumes greater quantities of water.¹⁶³ As of 2014, of the conventional power plants surveyed, 27% employed closed-cycle CWIS and 63% open-cycle CWIS.¹⁶⁴

Conventional electricity also can impact water quality through catastrophic fuel spills.¹⁶⁵ Additionally, water quality is also routinely degraded during the other stages of the life cycle of conventional fuel. The life cycle

160. Olivia Odom Green, *Energy v. Water*, 37 *ECOLOGY L.Q.* 353, 358–59 (2010).

161. KRISTEN AYERT ET AL., UNION OF CONCERNED SCIENTISTS, *FRESHWATER USE BY U.S. POWER PLANTS: ELECTRICITY'S THIRST FOR A PRECIOUS RESOURCE* 13 (2011), <http://www.ucsusa.org/sites/default/files/attach/2014/08/ew3-freshwater-use-by-us-power-plants-exec-sum.pdf>; see also Regina McCormack & Lance Noel, *Mitigation of Electricity Production Externalities Imposed on Water Resources and Fishing Industries in the Delaware River Estuary and Implications for Offshore Wind Energy Policy* 13–14 (2015) (unpublished manuscript), <http://www.udel.edu/MAST/873/AP%20Proposals/Regina%20McCormack%20-AP%20Final%20Paper.pdf>. Open-cycle CWIS can withdraw anywhere from 57 to 839 gallons per kWh. *Id.* at 14.

162. U.S. ENV'L. PROT. AGENCY, DOC. NO. 821-R-11-002, *ENVIRONMENTAL AND ECONOMIC BENEFITS ANALYSIS FOR PROPOSED SECTION 316(B) EXISTING FACILITIES RULE 2–5* (2011). The EPA details that CWIS can lead to hypoxia, decreasing distribution, growth rates, and nutrition cycles of fish and macroinvertebrates. *Id.* In addition, “toxic pollutants, such as metals, polycyclic aromatic hydrocarbons (PAHs), pesticides, biofouling chemicals, or chlorine” are routinely found in CWIS effluents, which have “greatly altered biological communities due to chronic impacts on viability, growth reproduction, and resistance to other stressors.” *Id.*

163. See ELEC. POWER RESEARCH INST., *CLOSED-CYCLE SYSTEM RETROFIT STUDY: CAPITAL AND PERFORMANCE COST ESTIMATES 7–30* (2011) (“While once-through [CWIS] . . . withdraw large quantities of water, they return all of the withdrawn water back to the source (or at least to nearby natural waterbodies). A recirculated cooling system, while withdrawing far less water, is designed to cool by evaporating . . . [up to] 50 to 80% of the intake flow . . .”). Reducing water withdrawals will also decrease CWIS's impacts to water quality by reducing dissolved oxygen impacts and chlorine emissions. See Odom, *supra* note 160, at 371.

164. U.S. ENV'L. PROT. AGENCY, *supra* note 10, at 2A-15, 2A-16. It should be noted that this analysis only focused on certain facilities, which represented less than half of the nation's electricity capacity and 9% of total facilities. *Id.* at 1-2 to 1-3. The overall CWIS mix of all the nation's conventional electricity plants may differ from the reported numbers. See JOAN F. BARBER ET AL., U.S. DEP'T OF INTERIOR, *ESTIMATED USE OF WATER IN THE UNITED STATES IN 2005* 38 (2005) (noting that of all power plants, 8% employed closed-cycle CWIS, and 93% used open-cycle CWIS).

165. Laura Ruhl, et al., *Environmental Impacts of Coal Ash Spill in Kingston Tennessee: An 18-Month Survey*, 44 *ENV'L. SCI. TECHNOL.* 9272 (2010); see also J.D. Peles et al., *Ecological*

impacts of coal, for example, include water quality degradation from acid mine drainage¹⁶⁶ and mountaintop mining.¹⁶⁷ Uranium mining and milling for nuclear power plants consumes a significant amount of water.¹⁶⁸ Natural gas extraction by hydraulic fracturing can contaminate local ground and surface waters with unsafe levels of heavy metals such as arsenic, selenium, strontium, and barium.¹⁶⁹

In contrast, renewable electricity production has very limited impacts on water. Other than the minimal water required to manufacture the steel, silicon, and concrete used in wind turbines and solar panels, the lifecycle water consumption is orders of magnitude less than for conventional fuel sources.¹⁷⁰ Thus, switching from conventional electricity sources to renewable electricity would significantly benefit water body health.

B. *Wildlife Mortality*

The wildlife impacts of electricity production are widespread and substantial, impacting fish and aquatic organisms as well as birds and bats. Both conventional and renewable electricity have direct impacts on wildlife, including fatalities from CWIS, collision mortality, and mercury bioaccumulation. While comparisons of wildlife impacts across electricity types are appropriate and necessary, the intrinsic inequality of weighing the death of one species against the death of another species complicates such comparisons. Differences in lifetime and reproduction rates imply that one fatality can have different population impacts across various types of wildlife. Nevertheless, the scientific literature attests that renewable energy is substantially less detrimental to wildlife.

Half-Life of ¹³⁷Cs in Fish from a Stream Contaminated by Nuclear Reactor Effluents, 263 SCI. TOTAL ENV'T 255, 256 (2000).

166. D. Barrie Johnson & Kevin B. Halberg, *Acid Mine Drainage Reduction Remediation Options: A Review*, 338 SCI. TOTAL ENV'T 3 (2005), <http://pubs.usgs.gov/circ/circ1204/pdf/circular1204.pdf>.

167. KATHERINE PAYBINS ET AL., U.S. GEOLOGICAL SURVEY, *WATER QUALITY IN THE KANAWHA-NEW RIVER BASIN: WEST VIRGINIA, VIRGINIA, AND NORTH CAROLINA 1996–1998*, at 21 (2005), <http://pubs.usgs.gov/circ/circ1204/pdf/circular1204.pdf>.

168. Gavin Mudd & Mark Diesendorf, *Sustainability of Uranium Mining and Milling: Toward Quantifying Resources and Eco-Efficiency*, 42 ENVTL. SCI. TECHNOL. 2624, 2628 (2007). These processes can consume 12,000 to 760,000 gallons per ton of usable uranium. *Id.* at 2628 tbl.1 (reporting water consumption ranging from 46.2 kL/ton to 8207 kL/ton for various mining projects).

169. Brian E. Fontenot et al., *An Evaluation of Water Quality in Private Drinking Water Wells Near Natural Gas Extraction Sites in the Barnett Shale Formation*, 47 ENVTL. SCI. TECHNOL. 10,032, 10,034–36 (2013).

170. Vasilis Fthenakis & Hyung Chul Kim, *Life-Cycle Uses of Water in U.S. Electricity Generation*, 14 RENEWABLE & SUSTAINABLE ENERGY REV. 2039, 2045 (2010).

The most direct impacts of conventional electricity production include fatalities from the water cooling process and mercury bioaccumulation. First, water withdrawals for CWIS operations cause the impingement and entrainment (I&E) of aquatic organisms, with each power plant's CWIS killing at least hundreds of thousands of fish per gigawatt-hour (GWh).¹⁷¹ Due the lack of effective rulemaking by the U.S. Environmental Protection Agency (EPA),¹⁷² I&E remains prevalent, and as one commentator has noted, thermoelectric power plants and their CWIS "are the largest single predator of our nation's waters."¹⁷³

Second, conventional electricity production impacts birds, fish, and other aquatic organisms through mercury emissions and bioaccumulation. Of particular concern is the mercury bioaccumulation from coal generation, which emits over half of all the mercury in the United States.¹⁷⁴ In 2005, the average freshwater fish had a mercury concentration of 0.23 µg/g,¹⁷⁵ and over 30% of the locations studied had fish tissue mercury concentrations over the EPA advisory level for protection of human health of 0.30 µg/g.¹⁷⁶ Fishery consumption advisories, 80% of which were issued due to

171. McCormack & Noel, *supra* note 161, at 14. Impingement refers to the mortality of fish that are caught against the cooling water intake screen, whereas entrainment refers to the mortality of fish and their eggs as a result of passing through the intake screen, often as a result of exposure to extreme heat. *Id.* at 2.

172. See Green, *supra* note 160, at 367; see generally Cronin v. Browner, 898 F. Supp. 1052 (S.D.N.Y. 1995); ConocoPhillips v. U.S. Env'tl. Prot. Agency, 612 F.3d 822, 825 (5th Cir. 2010) (suggesting that "effective rulemaking . . . has been elusive" with regard to I&E).

173. Green, *supra* note 160, at 368 (citation omitted). Furthermore, the current regulation of I&E ignores non-commercial and non-recreational important species, essentially disregarding 98.2% of fish species impacted. See *id.* at 369.

174. David Schmeltz et al., *MercNet: A National Monitoring Network to Assess Responses to Changing Mercury Emissions in the United States*, 20 *ECOTOXICOLOGY* 1713, 1716 (2011) (suggesting a national-scale monitoring program of mercury emissions). In the United States, coal-fired power plants are currently the largest single source of mercury emissions. *Id.* at 1714; see also National Emission Standards for Hazardous Air Pollutants from Coal- and Oil-Fired Electric Utility Steam Generating Units and Standards of Performance for Fossil-Fuel-Fired Electricity Utility, Industrial-Commercial-Institutional, and Small Industrial-Commercial-Institutional Steam Generating Units ("MATS rule"), 77 Fed. Reg. 9304, 9359 (Feb. 16, 2012) (codified at 40 C.F.R. §§ 60, 63) (determining that the rule requiring mercury reductions only considered technology costs and health co-benefits, not impacts to wildlife). But see MARC HOUYOUX & MADELEINE STRUM, U.S. ENV'L. PROT. AGENCY, NO. EPA-HQ-OAR-2009-0234, MEMORANDUM: EMISSIONS OVERVIEW: HAZARDOUS AIR POLLUTANTS IN SUPPORT OF THE FINAL MERCURY AND AIR TOXICS STANDARD 13 (2011) (detailing the plans to reduce coal and oil power plants' portion of overall mercury emissions from 42% down to 17%).

175. Ann Chalmers et al., *Mercury Trends in Fish from Rivers and Lakes in the United States, 1969–2005*, 175 *ENV'L. MONITORASSESSMENT* 175, 177 (2011).

176. *Id.* at 183.

mercury contamination,¹⁷⁷ limit humans' use of natural resources by causing people to eat other types of fish that are safe or forego eating fish at all.¹⁷⁸

Various species of songbirds across the Mid-Atlantic and Northeast have also been put at risk due to mercury,¹⁷⁹ which has decreased populations by as much as 20%.¹⁸⁰ Throughout the Northeast United States, mercury bioaccumulation levels in songbirds "are high enough to cause detrimental effects to populations."¹⁸¹ Fish-eating birds are also substantially impacted. Reproduction rates for the common loon, for example, could decrease as much as 50% due to current mercury levels in fish,¹⁸² and 14 to 27% of bald eagles studied in the Great Lakes region are at risk of neurological impairment due to mercury contamination in their diet.¹⁸³

Likewise, a study of mercury in bats on the east coast of the United States found that 81% of all adult bats sampled near point sources had unsafe mercury levels.¹⁸⁴ In addition, the five bat species that are listed, pend-

177. David C. Evers et al., *Mercury in the Great Lakes Region: Bioaccumulation, Spatiotemporal Patterns, Ecological Risks and Policy*, 20 *ECOTOXICOLOGY* 1487, 1489 (2011). Citing the EPA, the authors find that these consumption advisories covered 16.8 million lake acres and 1.3 million river miles. *Id.*

178. See generally U.S. Food & Drug Admin., *Mercury Levels in Commercial Fish and Shellfish (1990–2010)*, FOOD (last updated Oct. 8, 2014) <http://www.fda.gov/food/food-borneillnesscontaminants/metals/ucm115644.htm> (advising against any consumption of king mackerel, sharks, swordfish, and tile fish due to their high mercury concentrations).

179. BIODIVERSITY RES. INST., *MERCURY CONTAMINATION WITHIN TERRESTRIAL ECOSYSTEMS IN NEW ENGLAND AND MID-ATLANTIC STATES: PROFILES OF SOIL, INVERTEBRATES, SONGBIRDS, AND BATS* 29–57 (Jan. 27, 2012). These birds are impacted by mercury bioaccumulation as a result of ingesting of mercury in their food. *Id.* at 29. Several species, such as the Rusty Blackbird, have had populations decline by 90%. Mercury bioaccumulation is one of several reasons for such a decline. *Id.* at 35–36.

180. Claire W. Varian-Ramos, *Mercury Reduces Avian Reproductive Success and Imposes Selection: An Experimental Study with Adult- or Lifetime-Exposure in Zebra Finch*, 9 *PLOS ONE* 1, 2 (2014). The authors conducted an experiment to determine the effects of different mercury levels on songbirds and found that depending on the mercury concentration, zebra finches, a model songbird, produced 16 to 50% less offspring than a control group, and in reality the population impacts will be variable based on geographic location and species. *Id.* at 4.

181. BIODIVERSITY RES. INST., *supra* note 179, at 11.

182. David Evers et al., *Adverse Effects from Environmental Mercury Loads on Breeding Common Loons*, 17 *ECOTOXICOLOGY* 69, 70 (2007). However the authors concluded that only sixteen percent of individual birds had mercury levels that posed threats, though this does not include the possibility of mercury "hot spots" that could be causing populations sinks. *Id.* at 78.

183. Jennifer Rutkiewicz et al., *Mercury Exposure and Neurochemical Impacts in Bald Eagles Across Several Great Lakes States*, 20 *ECOTOXICOLOGY* 1669, 1674 (2011). The authors base these percentages on other thresholds found in the literature but encourage further research into thresholds specific to bald eagles. *Id.*

184. David Yates et al., *Mercury in Bats from the Northeastern United States*, 23 *ECOTOXICOLOGY* 45, 53 (2014).

ing, or under consideration as endangered under the Endangered Species Act (ESA), all had elevated mercury concentrations, a potential cause for concern.¹⁸⁵ In comparison, the three bats impacted most by wind turbines¹⁸⁶ are all listed as “Least Concern” in the International Union for Conservation of Nature’s (IUCN) Red List.¹⁸⁷ Lastly, it should be noted that mercury bioaccumulation can cause consequential, albeit non-lethal, impacts on various other mammals, including river otters,¹⁸⁸ beavers,¹⁸⁹ and Florida panthers.¹⁹⁰

185. See *id.* Since there has been little historical research into the behaviors of bats, the authors are careful to note that the many potential adverse impacts of mercury on bats, such as limited reproduction success, decreased survival rates, and other neurological implications need to be investigated further and validated in future research, though these would be the expected impacts to physiologically similar species. *Id.*

186. Paul M. Cryan, *Wind Turbines as Landscape Impediments to the Migratory Connectivity of Bats*, 41 ENVTL. L. 355, 364 (2011). These three species are the hoary bat, the eastern red bat, and the silver haired bat. *Id.*

187. See Int’l Union for Conservation of Nature (IUCN), *Lasiurus cinereus*, THE RED LIST OF THREATENED SPECIES, <http://www.iucnredlist.org/details/11345/0> (last visited Oct. 11, 2015) (hoary bat); IUCN, *Lasiurus borealis*, THE RED LIST OF THREATENED SPECIES, <http://www.iucnredlist.org/details/11347/0> (last visited Oct. 11, 2015) (eastern red bat); IUCN, *Lasionycteris noctivagans*, THE RED LIST OF THREATENED SPECIES, <http://www.iucnredlist.org/details/11339/0> (last visited Oct. 11, 2015) (silver haired bat). On the other hand, the Indiana Bat, which is widespread along the Midwest’s wind resources, can create obstacles to wind energy development due to its endangered status, even though it is not often impacted by collision mortality, requiring wind developers to undertake mitigation or curtailment efforts. See Kirsten S. Balzer, *Bats and Breezes Take on Federal Policy: The Windy Effects of Animal Welfare Institute v. Beech Ridge Energy LLC*, 22 VILL. ENVTL. L.J. 225 (2011).

188. William Stansley et al., *Mercury and Halogenated Organic Contaminants in River Otters (Lontra Canadensis) in New Jersey, USA*, 29 ENVTL. TOXICOLOGY & CHEMISTRY 2235, 2238–39 (2010); Jonathan M. Sleeman et al., *Mercury Poisoning in a Free-Living Northern River Otter (Lontra canadensis)*, 46 J. WILDLIFE DISEASES 1035 (2010) (finding the highest recorded mercury concentration in any land mammal, 150 µg/g, in the brain samples). *But see* Peter Dornbos et al., *Mercury Exposure and Neurochemical Biomarkers in Multiple Brain Regions of Wisconsin River Otters (Lontra canadensis)*, 22 ECOTOXICOLOGY 469, 471, 473–74 (2013) (finding that average mercury concentrations of river otter in the Wisconsin area are significantly less than historical averages).

189. Brenda Gail Bergman & Joseph K. Bump, *Mercury in Aquatic Forage of Large Herbivores: Impact of Environmental Conditions, Assessment of Health Threats, and Implications for Transfer Across Ecosystem Compartments*, 479–80 SCI. TOTAL ENV’T 66, 74 (2014). The authors went on to criticize the EPA’s threshold for beavers, since the beavers studied had concentrations well below the agency’s lethal level, but exceeded the EPA’s reference dose for humans, which the authors suggested would cause neurological damage to the beavers such that it would affect the senses “that the animals depend upon for survival.” *Id.*

190. J. Newman et al., *Historical and Other Patterns of Monomethyl and Inorganic Mercury in the Florida Panther (Puma concolor coryi)*, 48 ARCHIVE ENVTL. CONTAMINATION TOXICOLOGY 75, 79 (2004) (investigating Florida Panther samples from museum collections and finding much higher concentrations of mercury after 1990 compared to before 1990). *But see* Marc G. Barron et al., *Retrospective and Current Risks of Mercury to Panthers in Florida Everglades*, 13

The most significant wildlife impact of renewable electricity is collision mortality,¹⁹¹ as birds and bats often collide with wind turbines and solar towers.¹⁹² It was recently estimated that approximately 234,000 birds collide with wind farms per year in the United States.¹⁹³ However, the magnitude of these impacts is substantially less than that of other sources of anthropogenic avian mortality,¹⁹⁴ and there is evidence that wind energy does not pose any population risks to bird species.¹⁹⁵ Moreover, while it is estimated that land-based and offshore wind turbines cause anywhere from 0.24 to 1.79 bird deaths per GWh of energy produced,¹⁹⁶ in comparison,

ECOTOXICOLOGY 223, 227 (2004) (finding only a 4.6% chance that mercury concentrations are high enough in any Florida Panther to cause death).

191. S.R. Loss et al., *Estimates of Bird Collision Mortality at Wind Facilities in the Contiguous United States*, 168 BIOLOGICAL CONSERVATION 201, 202 (2013). While less significant than collision mortality, land transformations from renewable energy development can also impact wildlife through habitat displacement and disruption. However, when including the lifecycle impacts of conventional electricity (e.g., mining and transportation of fuel), the magnitude of land transformation for renewable energy has been found to be approximately equal to that of conventional energy development. See Vasilis Fthenakis & Hyung Chul Kim, *Land Use and Electricity Generation: A Life-Cycle Analysis*, 13 RENEWABLE & SUSTAINABLE ENERGY REV. 1465, 1469, 1466–68 (2009). However, the analysis presented in Fthenakis & Kim includes the entire lifecycle of conventional electricity, and much of the land transformation would occur beyond the individual states discussed in this Article. *Id.*

192. Other forms of solar power, such as rooftop photovoltaic do not pose significant collision risks to wildlife. See Damon Turney & Vasilis Fthenakis, *Environmental Impacts From the Installation and Operation of Large-Scale Solar Power Plants*, 15 RENEWABLE & SUSTAINABLE ENERGY REV. 3261, 3265–66 (2011).

193. Loss et al., *supra* note 191, at 205.

194. See Meredith Blaydes Lilley & Jeremy Firestone, *Wind Power, Wildlife, and the Migratory Bird Treaty Act: A Way Forward*, 38 ENVTL. L. 1167, 1172 (2008) (summarizing the literature of anthropogenic avian mortality). For example, building collisions, motor vehicle collisions, power line collisions, and domesticated cats each kill nearly 100 million birds each year. *Id.* at 1172 tbl.1.

195. J. Ryan Zimmerling et al., *Canadian Estimate of Bird Mortality due to Collisions and Direct Habitat Loss Associated with Wind Turbine Developments*, 8 AVIAN CONSERVATION & ECOLOGY 10, 15 (2013) (finding that Canadian wind farms killed less than 0.07 to 0.12% of any bird species per year); see also M. Wing Goodale & Anita Milman, *Cumulative Adverse Effects of Offshore Wind Energy Development on Wildlife*, J. ENVTL. PLAN. & MGMT. ONLINE 1, 8 (Nov. 14, 2014), <http://www.tandfonline.com/doi/full/10.1080/09640568.2014.973483> (noting the lack of evidence that direct collision mortality and habitat loss or displacement caused by offshore wind has impacted population levels of birds).

196. See Benjamin Sovacool, *The Avian and Wildlife Costs of Fossil Fuels and Nuclear Power*, 9 J. INTEGRATIVE ENVTL. SCI. 255, 260 (2012) (estimating that wind power kills 0.26 birds per GWh per year); see also McCormack & Noel, *supra* note 161, at 18 (summarizing the literature of bird mortality from European offshore wind farms). The higher estimate of 1.79 bird deaths per GWh was calculated using total bird deaths from Loss et al., *supra* note 191, and EIA wind production figures, see EIA, *supra* note 156. Bird mortality per turbine varies significantly depending on where the wind turbine was sited. Loss et al., *supra* note 191, at 204 tbl.2.

coal kills an estimated 0.2 to 9.36 birds per GWh and nuclear plants kill an estimated 0.638 birds per GWh.¹⁹⁷

Bat impacts of renewable power generation are less understood, especially as the details of bat migration and behavior remain almost entirely unknown.¹⁹⁸ Approximately 600,000 bats were killed nationwide by wind turbines in 2012, equating to approximately 3.5 bats killed per GWh.¹⁹⁹ Mitigation measures could, at relatively low cost, decrease such fatalities anywhere from forty to ninety percent.²⁰⁰

While onshore wind and solar have no known impacts on aquatic life, offshore wind can have moderate to minor effects on fish behavior during construction.²⁰¹ Most substantially, the noise from construction can cause either temporary or permanent hearing damage to marine mammals.²⁰² Nevertheless, with proper mitigation efforts, it is expected that noise impacts can be reduced to levels below thresholds that would cause even temporary hearing damage.²⁰³

197. Sovacool, *supra* note 196, at 261. Professor Sovacool's higher estimate for coal considers the impacts of climate change on bird populations. *Id.* at 258–59 tbl.2. It is important to note that climate change is the most serious threat to bird populations, but the numbers Sovacool calculates for climate change-related deaths are highly speculative. Sovacool also attributes the bird deaths due to climate change, 9.16 deaths per GWh, to natural gas and oil as well. *Id.* at 261.

198. Cryan, *supra* note 186, at 360.

199. Mark A. Hayes, *Bats Killed in Large Numbers at United States Wind Energy Facilities*, 63 *BIO SCIENCE* 975, 977 (2013). Like avian mortality, the magnitude of bat collisions varies significantly with geography, with the highest death rates occurring in the Appalachian region. Cf. Manuela M.P. Huso & Dan Dalthorp, *A Comment on "Bats Killed in Large Numbers at United States Wind Energy Facilities"*, 64 *BIO SCIENCES* 546, 547 (2014) (criticizing the methodology utilized in Hayes, *supra*, as not statistically representing the seasonal variation of the impacts or current wind farm practices and concluding that "[g]iven the shortcomings of the available data, an accurate estimate of total bat fatality is not currently possible").

200. Cryan, *supra* note 186, at 369. However, Cryan notes that there is no legal mechanism to require such curtailment methods. *Id.* at 368–69.

201. CHRISTINA MEULLER-BLENKLE ET AL., COWRIE, REF: FISH 06-08, EFFECTS OF PILE-DRIVING NOISE ON THE BEHAVIOR OF MARINE FISH (2010). It should also be noted that offshore wind construction also poses potential threats to sea turtles, but such threats have not been studied as extensively as fish or marine mammals. Goodale & Milman, *supra* note 195, at 5.

202. See SVEN KOSCHINSKI & KARIN LÜDEMANN, DEVELOPMENT OF NOISE MITIGATION MEASURES IN OFFSHORE WIND FARM CONSTRUCTION 2013, at 89 (2013) (discussing ways to mitigate noise impacts to avoid hearing damage in marine mammals).

203. NAT'L OCEANIC & ATMOSPHERIC ADMIN., (NOAA), DRAFT GUIDELINES FOR ASSESSING THE EFFECTS OF ANTHROPOGENIC SOUND ON MARINE MAMMALS: ACOUSTIC THRESHOLD LEVELS FOR ONSET OF PERMANENT AND TEMPORARY THRESHOLD SHIFTS 17, 20 (2013). According to this report, assuming proper mitigation, as discussed in KOSCHINSKI & LÜDEMANN, *supra* note 202, at 15–23, 30–37, offshore wind construction can avoid Level B harassment, the temporary hearing damage threshold, under the Marine Mammal Protection Act (MMPA). See 16 U.S.C. § 1362 (18)(A)(i)–(ii) (2013) (defining "harassment"); see also KOSCHINSKI & LÜDEMANN, *supra* note 202, at 89.

Offshore wind also provides a potential artificial reef effect while farms are in operation.²⁰⁴ While the actual benefits of artificial reefs are far from certain,²⁰⁵ many studies have concluded that there is some evidence of a local artificial reef effect.²⁰⁶ As offshore wind development continues and the artificial reef effect matures, offshore wind farms “may provide long-term benefits by enhancing local ecosystem services.”²⁰⁷

C. Climate Change

Perhaps the most significant impact of conventional electricity production is its contribution to global climate change, a threat which can be largely mitigated by transitioning to renewable energy. Recent surveys of global wildlife populations suggest a dire situation, as populations are already rapidly decreasing and extinction rates are significantly higher than historical averages.²⁰⁸ While there are other causes of wildlife population decline and extinction, it is expected that climate change will become the most important driver of both extinction rates and population decline.²⁰⁹ Climate change will have far-reaching impacts on the environment and will impair wildlife populations in various ways, creating new problems and exacerbating existing problems for terrestrial wildlife.²¹⁰ Likewise, climate

204. Olivia Langhammer, *Artificial Reef Effect in Relation to Offshore Renewable Energy Conversion: State of the Art*, 2012 SCI. WORLD J. 1, 4 (finding that offshore wind can create a net of 650–677 square meters of new habitat per turbine). Purposefully designed artificial reefs in scour protection could result in a tripling to quadrupling of net habitat and expected biomass created. *Id.* at 4 tbl.1.

205. See H.J. Lindeboom et al., *Short Term Ecological Effects of an Offshore Wind Farm in the Dutch Coastal Zone; a Compilation*, 6 ENVIL. RES. LETTER 1, 11 (2011).

206. Mathias H. Andersson & Marcus C. Öhman, *Fish and Sessile Assemblages Associated with Wind-Turbine Constructions in the Baltic Sea*, 61 MARINE & FRESHWATER RES. 642, 648 (2010); see also MUSEUM, ROYAL BELGIAN INST. OF NAT. SCIENCES, ENVIRONMENTAL IMPACTS OF OFFSHORE WIND FARMS IN THE BELGIAN PART OF THE NORTH SEA 161 (Steven Degreear et al. eds., 2013), <http://odnature.naturalsciences.be/winmonbe2013/report>; J.T. Reubens et al., *The Ecology of Benthopelagic Fishes at Offshore Wind Farms: A Synthesis of 4 Years of Research*, 727 HYDROBIOLOGIA 121, 130 (2014). Ruebens et al. could not conclude that there was production of fish on a regional scale and suggested against allowing commercial fishing within the wind farm. *Id.* at 133. In addition, the main benefit to fish in the wind farm area may be due to the prohibition of commercial fishing activities rather than the artificial reef effect. *Id.* at 130.

207. Lena Bergströmm et al., *Effects of an Offshore Wind Farm on Temporal and Spatial Patterns in the Demersal Community*, 485 MARINE ECOLOGY PROGRESS SERIES 199, 208 (2013).

208. See generally Richard Dirzo et al., *Defaunation in the Anthropocene*, 345 SCI. 401 (2014).

209. *Id.* at 403; see also Céline Bellard et al., *Impacts of Climate Change on the Future of Biodiversity*, 15 ECOLOGY LETTERS 365 (2012).

210. See, e.g., Catheryn H. Greenberg et al., *Climate Change and Wildlife in the Southern United States: Potential Effects and Management Options*, in CLIMATE CHANGE ADAPTION AND MITIGATION MANAGEMENT OPTIONS: A GUIDE FOR NATURAL RESOURCE MANAGERS IN SOUTHERN

change will also impact ocean systems: increasing water temperatures will cause significant declines in cold water fish, and increasing water acidity will decrease coral and invertebrate productivity in North America.²¹¹

While the wildlife impacts of climate change are highly uncertain and dependent on the magnitude of increased temperatures, some estimates predict that from one to eighty percent of all global species may go extinct, with an average extinction estimate between twenty and thirty percent.²¹² Combined with other wildlife impacts, worst-case scenarios lead to “extinction rates that would qualify as the sixth mass extinction in the history of the earth.”²¹³ Climate change, if not mitigated, obviously poses substantial population threats to all species.

Additionally, climate change will also impair the availability and quality of water resources. Surface freshwater resources, such as lakes and rivers, will be dramatically diminished as temperatures increase and overall precipitation decreases, causing water level drops and reductions in stream flows and limiting overall availability of water resources.²¹⁴ As precipitation and temperatures become more extreme, increases in dissolved organic carbon are expected to impact freshwater quality, causing higher acidity, greater toxicity, and lower dissolved oxygen levels.²¹⁵ Furthermore, as climate change causes sea levels to rise, groundwater resources may be impacted through saltwater intrusion.²¹⁶

FOREST ECOSYSTEMS 390 (James M. Vose & Kier D. Klepzig eds., 2014) (noting that a 2 degree Celsius increase would result in the almost complete loss of shorebirds in Texas by 2100); see also *id.* at 399–411 (providing various case studies on how climate change will reduce the range and populations of small mammals, birds, and amphibians in the Southern United States).

211. Working Grp. II, Intergovernmental Panel on Climate Change, *Part B: Regional Aspects*, in CLIMATE CHANGE 2014 IMPACTS, ADAPTATION, AND VULNERABILITY 1443, 1459 (V.R. Barros et al. eds., 2014).

212. WORKING GRP. II, INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2007: IMPACTS, ADAPTATION AND VULNERABILITY 242 (M.L. Parry et al. eds., 2007) (reviewing 78 articles, each with variable extinction estimates); see also S.L. Pimm et al., *The Biodiversity of Species and Their Rates of Extinction, Distribution, and Protection*, 344 SCI. 1,246,752-1, 1,246,752-5 (2014) (estimating a loss of 10 to 14% of species, but citing high uncertainty).

213. Ballard et al., *supra* note 209, at 375.

214. Noah D. Hall & Brett B. Stuntz, *Climate Change and Great Lakes Water Resources: Avoiding Future Conflicts with Conservation*, 31 HAMLIN L. REV. 639, 647–51 (2008); see also Working Grp. II, Intergovernmental Panel on Climate Change, *Part A: Global and Sectoral Aspects*, in CLIMATE CHANGE 2014 IMPACTS, ADAPTATION, AND VULNERABILITY 361–411 (C.B. Field et al. eds., 2014).

215. P.G. Whitehead et al., *A Review of the Potential Impacts of Climate Change on Surface Water Quality*, 54 HYDROLOGICAL SCI. J. 101, 101 (2009).

216. Holly A. Michael et al., *Global Assessment of Vulnerability to Sea-Level Rise in Topography-Limited and Recharge-Limited Coastal Groundwater Systems*, 49 WATER RESOURCES RES., 2228, 2228 (2013).

D. *Environmental Impacts Synthesis*

In conclusion, the environmental impacts of electricity production are diverse and complex. Renewable energy is not without its impacts and can place differing environmental values in conflict with each other, such as the protection of migrating birds and the mitigation of climate change. Nevertheless, the scientific literature attests that renewable energy is substantially less detrimental to wildlife, water resources, and the general environment in comparison to conventional energy. Given its displacement of conventional electricity, renewable energy has the potential to reduce the various wildlife and other environmental impacts caused by conventional energy. Because wildlife impacts are complex and nuanced, laws and regulations on the issue should likewise be nuanced and flexible, while also being comprehensive. Although current wildlife laws governing electricity production at times provide stringent rules, they typically only focus on a single issue and do not weave the negative impacts and benefits together. As such, current environmental laws fail to provide adequate protection from the impacts of electricity production in their full context. It is here that the public trust doctrine can provide a more flexible and comprehensive approach that properly protects all wildlife and water resources and encourages the development of renewable electricity. In the case studies below, we demonstrate that the public trust doctrine is an effective means to regulate the wildlife and environmental impacts of electricity production.

V. STATE CASE STUDIES

This Part analyzes four individual states to demonstrate the potential application of the public trust doctrine to protect natural resources and encourage renewable energy development. As discussed above, the contours of the public trust doctrine differ across states. Likewise, each state has a disparate energy mix, regulatory framework, and approach to renewable energy development. Nonetheless, as shown above, it is clear that the application of the public trust doctrine to the impacts of electricity production is an appropriate and helpful tool for advancing renewable energy development. This Part explores the application of the public trust doctrine to electricity production in California, Wisconsin, Hawaii, and New Jersey. These four states were selected because each has a well-developed, distinct public trust doctrine; each relies on a distinct fuel mix for electricity generation; and each has divergent renewable electricity policies.

A. California

1. Current Electricity System

California's largest single source of electricity is natural gas, accounting for 60% of annual in-state generation.²¹⁷ After natural gas, renewable electricity sources, including land-based wind, geothermal, and solar, are collectively the second most abundant source of generation, comprising 20% of total generation.²¹⁸ The remaining 20% is produced by hydroelectric and nuclear power plants.²¹⁹ California generates less than 1% of its in-state generation from coal.²²⁰

2. Public Trust Doctrine in California

Since statehood, California courts have continually faced public trust doctrine issues. The California Supreme Court first held that alienation of lands under navigable waters is subject to the state's paramount authority²²¹ and that the state is required to act as trustee "for the benefit of the people."²²² Likewise, early California case law acknowledged the state's authority to protect and preserve wildlife for the public good.²²³ Furthermore, the

217. Cal. Energy Comm'n, *Total Electricity System Power*, ENERGY ALMANAC (Sept. 25 2014), http://energyalmanac.ca.gov/electricity/total_system_power.html. It should be noted that California imports nearly a third of the electricity consumed within the state, from both conventional and renewable electricity sources. *Id.* However since it is generated outside of the state, we assume that this generation would fall outside the jurisdiction of the California public trust doctrine. However, there could be public trust implications when deciding to import electricity, such as relying on climate change-inducing fuels, which will in turn impact California trust resources.

218. *Id.*

219. *Id.* While this Article does not focus on hydroelectricity, the public trust doctrine can be readily applied to California's hydroelectric system and its substantial environmental impacts on water and fish resources. See Tarlock, *supra* note 156; see also Sarah E. Null et al., *Optimizing the Dammed: Water Supply Losses and Fish Habitat Gains from Dam Removal in California*, 136 J. ENVTL. MGMT. 121, 127 (2014) (removal of certain dams would present considerable fish habitat gains for Chinook salmon and steelhead trout, with only small reductions of water deliveries and hydroelectric generation).

220. Cal. Energy Comm'n, *supra* note 217.

221. *Ward v. Mulford*, 32 Cal. 365, 372 (1867).

222. *People v. Gold Run Ditch & Mining Co.*, 4 P. 1152, 1159 (Cal. 1884).

223. See *Ex parte Maier*, 37 P. 402, 404 (Cal. 1894) (wildlife belongs to the people of the state in their collective and sovereign capacity). But see *People v. Brady*, 286 Cal. Rptr. 19, 22 (Ct. App. 1991) (state does not truly "own" wildlife such that an illegal take of fish equates to grand theft); *Moerman v. State*, 21 Cal. Rptr. 2d 329, 332-33 (Ct. App. 1993) (California does not truly own nor control wildlife, thus damages resulting from wildlife restoration cannot constitute a taking).

public's right to wildlife is not tied to the navigability of waters and extends to all wildlife, on both public and private property.²²⁴

Despite setting out the paramount authorities of the state and recognizing the public's right in trust resources in early cases, the state of California did not shy away from utilizing the state's trust resources so long as their use benefitted the general public. California courts have found that various non-environmental uses are consistent with the public interest. For example, drilling for oil is a valid use of trust waters because such use furthers the public's interest in commerce.²²⁵ The California Supreme Court views the public trust doctrine as a way to maximize benefits to the state, construing the purpose of the trust "with liberality to the end of benefitting all the people of the state."²²⁶ The court has emphasized that the state, when determining the best means to serve the general welfare through the utilization of navigable waters, must be cognizant of the changes in the public interest as society modernizes and scientific knowledge develops.²²⁷

In addition to the common law public trust doctrine, California has recognized trust duties in its constitution and statutes. The California Constitution states that water must be used for a beneficial purpose to the fullest extent possible and must not be wasted or used in an unreasonable way.²²⁸ Likewise, state ownership of tidal lands below the high water mark has been codified,²²⁹ as has the state's trust responsibility to wildlife.²³⁰

Early adoption of an expansive and liberal public trust doctrine, including the codification of public trust concepts in statutes and the state constitution, has laid the foundation for further expansion of the doctrine in California as a tool for environmental protection. California, recognizing that the public trust doctrine is "sufficiently flexible to encompass changing

224. See *People v. Truckee Lumber Co.*, 48 P. 374, 401 (Cal. 1897).

225. See *Boone v. Kinsbury*, 273 P. 797, 812 (Cal. 1928). The Court, before ruling on the validity of deeming oil production as a trust value, assumed that oil-drilling operations would not seriously injure or destroy fish and aquatic wildlife. *Id.* at 816. Therefore, had the court found that there was substantial or unnecessary damage to fish or aquatic wildlife, it may have considered oil drilling to be an invalid use of public trust lands.

226. *Colberg v. California*, 432 P.2d 3, 9 (Cal. 1967) (reviewing previous public trust cases that had included using trust waters to build railroads, develop oil and gas interests, and reclaim land impacted by recent flooding, before holding that building a bridge over navigable waters was an acceptable use within the public interest).

227. *Id.* at 12.

228. CAL. CONST. art. X, § 2 ("It is hereby declared that . . . the water resources of the State be put to beneficial use to the fullest extent of which they are capable, and that the waste or unreasonable use or unreasonable method of use of water be prevented, and that the conservation of such waters is to be exercised with a view to the reasonable and beneficial use thereof in the interest of the people and for the public welfare.").

229. CAL. CIV. CODE § 670 (West 2007).

230. CAL. FISH & GAME CODE § 711.7 (West 2013).

public needs,²³¹ became among the first states to explicitly protect ecological processes for the benefit of the public.²³² Moreover, courts have determined that recreational and ecological public rights are paramount to privately-held riparian rights,²³³ requiring the state to affirmatively protect these interests to the maximum extent possible.²³⁴

Although the state's declarations of ecological values have been exclusively connected to navigable waters, courts have also protected navigable waters when they are affected by the diversion of water from non-navigable tributaries.²³⁵ Likewise, cognizant of the impacts that are peripherally, but indisputably, connected to navigable waters, courts have forbidden the discharge of debris in non-navigable streams under the public trust doctrine because of the risk that such debris would travel downstream and obstruct navigable waters.²³⁶ On the other hand, courts have refrained from applying the public trust doctrine in cases where there is an insufficient nexus to navigable waters.²³⁷ In a recent case regarding the impact of groundwater diversions on navigable waters, the court was careful to ground its application of the public trust doctrine to navigable waters.²³⁸ The court clarified that it did not find that "*groundwater* itself is a resource protected by the public trust doctrine,"²³⁹ but rather, only the navigable water impacted by the diversions was so protected.²⁴⁰ Thus, the California public trust doctrine does not apply to all waters of the state; rather, it applies to navigable waters or waters that are sufficiently related to navigable waters.²⁴¹

231. Marks v. Whitney, 491 P.2d 374, 380 (Cal. 1971).

232. *Id.* (holding that the public trust doctrine includes preservation of tidelands as "ecological units for scientific study").

233. California v. Superior Court, 625 P.2d 239, 251 (Cal. 1981) ("[T]he public's rights are not confined to commerce, navigation, and fishing, but include recreational uses and the right to preserve the tidelands in their natural state."). On the other hand, the court also ruled that the public trust doctrine no longer burdens lands that have long since been reclaimed, but only the tidal portions thereof. *See* City of Berkeley v. Superior Court, 606 P.2d 362, 374 (Cal. 1983).

234. Nat'l Audubon Soc'y v. Superior Court, 658 P.2d 709, 712 (Cal. 1983).

235. *See generally id.* at 720–21.

236. *See, e.g.,* People v. Gold Run Ditch & Mining Co., 4 P. 1152, 1155–56 (Cal. 1884).

237. Golden Feather Cmty. Ass'n v. Thermalito Irrigation Dist., 257 Cal. Rptr. 836 (Ct. App. 1989). While the Court refuted the public trust claim, it was sure to note that when there is a public interest, "the state has broad powers to protect those interests, even where otherwise nonpublic trust properties are affected." *Id.* at 843.

238. *Env'tl. Law Found. v. State Water Res. Control Bd.*, No. 34-2010-80000583, 2014 WL 8843074, at *8 (Cal. Super. Ct. July 15, 2014).

239. *Id.*

240. *Id.* at 9.

241. The courts have not addressed what constitutes a sufficient nexus to navigable water. However, the essence of the public trust doctrine is public access to waters for navigation and fisheries. Thus, the criteria for determining this sufficient nexus would likely be

On the other hand, the wildlife trust is not qualified: any impact to wildlife, direct or indirect, merits consideration under the public trust doctrine. In a recent case regarding the wildlife impacts of land-based wind energy, the California Court of Appeals clarified that the public trust doctrine encompasses the protection and preservation of wildlife regardless of its relation to submerged lands.²⁴² In dicta, without ruling on the adequacy of the state agency's efforts, the court found that the state agency had not ignored the highly complex and value-laden aspects of wind turbines, specifically the impacts to birdlife.²⁴³ While it was clear that the agency had performed the basic duties of planning trust resources, the court left it to further proceedings to determine whether the agency adequately minimized harm to wildlife resources, as required by the public trust doctrine.²⁴⁴

In this first public trust application to the wildlife impacts of electricity production in California, the court was mindful to weigh the common law and statutory wildlife trust interests, while noting the "strong public interest in allowing for the development through the harnessing of wind power."²⁴⁵ One commentator argues that this litigation increased knowledge of avian mortality and that improved wind turbine technology "may lead to greater protection of the birds while still allowing wind energy to develop into a significant source of power for the future."²⁴⁶ Yet despite the public trust application to wind energy and the learning opportunities gained, the wildlife public trust doctrine has yet to be applied to conventional electricity production, even though those impacts are more substantial.²⁴⁷ In sum, there is a stark absence of comparison between electricity production

tied to how the non-navigable waters would affect the navigation of and the fisheries in navigable waters. See *Golden Feather*, 257 Cal. Rptr. at 842.

242. Ctr. for Biological Diversity v. FPL Grp., 83 Cal. Rptr. 3d 588, 599 (Ct. App. 2008).

243. *Id.* at 606–07. Despite this important declaration of the public trust application to wildlife, the court dismissed the case, ruling that the plaintiff had sued the wrong party and should have sued the state trustee instead of the private operator of the wind farm. *Id.* at 602.

244. *Id.* at 606–07. Though it would depend on the specific definition of feasible, it would appear that repowering the site with newer models of turbines would be a cost-effective mitigation policy since they would increase electricity production, and thus revenue, while simultaneously decreasing avian mortality given slower rotational speeds. *Id.* at 592; see also Kathryn Wiens, Center for Biological Diversity, Inc. v. FPL Grp., Inc.: *Encouraging Wind Energy Production While Protecting the Public Trust*, 32 ENVIRONS ENVTL. L. & POL'Y J. 389, 391 (2008–2009) (saying the FPL Group's reliance on older turbines killed an unnecessarily high amount of birds for the same energy as compared to newer designs of turbines).

245. Wiens, *supra* note 244, at 393.

246. *Id.* at 394.

247. See *supra* Sections IV.B–C.

sources and the state's duty to plan and protect public trust resources to the maximum extent possible.

3. Overview of Current California Electricity Laws

California has developed a comprehensive electricity policy framework that promotes development of renewable energy and attempts to mitigate the impacts of conventional electricity. First, California is required by state law to conduct a periodic assessment of the energy industry.²⁴⁸ Using these assessments, the state must establish energy policies that protect the environment,²⁴⁹ which includes developing and promoting renewable energy generation and climate change mitigation technologies.²⁵⁰ Yet none of these statutes, which are some of the most progressive nationwide, connect the state's public trust responsibilities to electricity production.

California, like many states, has a Renewable Portfolio Standard (RPS) that requires a certain amount of electricity to come from renewable energy sources.²⁵¹ As of 2013, 20% of all electricity sold in California must be generated by renewable sources.²⁵² By 2020, 33% of all electricity sales must be renewable.²⁵³ The definition of renewable encompasses many technologies, including "biomass, solar thermal, photovoltaic, wind, geothermal, fuel cells using renewable fuels, small hydroelectric generation of 30 megawatts or less, digester gas, municipal solid waste conversion, landfill gas, ocean wave, ocean thermal, or tidal currents, and any additions or enhancements to the facility using that technology."²⁵⁴ These represent technologies that have renewable sources of fuel but do not necessarily minimize damages to public trust resources,²⁵⁵ and California law does not currently connect the objectives of renewable electricity implementation to the state's public trust duties.

California has implemented progressive environmental programs to reduce the state's carbon footprint and increase energy efficiency. The most significant California renewable energy law is Assembly Bill 32, the Global Warming Solutions Act (AB 32).²⁵⁶ AB 32 aims to reduce GHG emissions

248. CAL. PUB. RES. CODE § 25,301(a) (West 2007).

249. *Id.*; see also *id.* § 25,303(b) (West 2007 & Supp. 2015).

250. *Id.* § 25,305(a)–(d) (West 2007).

251. CAL. PUB. UTIL. CODE § 399.15(b)(2)(B) (West 2004 & Supp. 2015).

252. *Id.*

253. *Id.*

254. CAL. PUB. RES. CODE § 25,741(a)(1) (West 2007 & Supp. 2015).

255. For example, hydroelectric plants obviously have impacts to local water resources, though they reduce carbon dioxide emissions. Tarlock, *supra* note 156, at 1735–38.

256. California Global Warming Solutions Act (A.B. 32), CAL. HEALTH & SAFETY CODE § 38,500–38,599 (West 2014).

to 1990 levels by 2020 and 80% below 1990 levels by 2050.²⁵⁷ The Act gives the California Air Resources Board (CARB) broad authority to implement reductions of GHG emissions from all sectors, but especially electricity production.²⁵⁸

Since AB 32's enactment in 2006, CARB has implemented several new policies to reduce the electricity sector's contribution to climate change, including a cap-and-trade program and the Million Solar Roofs Program, and incorporated existing renewable energy policies such as the RPS.²⁵⁹ In brief, the cap-and-trade program allocates a certain amount of GHG allowances to the electricity production sector.²⁶⁰ Participants in the sector then must reduce their emissions or purchase additional GHG allowances at quarterly auctions.²⁶¹ CARB has updated the scoping plan, but the policies remain largely unchanged, with recent focus on mitigation plans beyond 2020.²⁶²

As a result of these regulations, California has significantly incentivized renewable energy to meet the ambitious emission target of 80% below 1990 GHG levels by 2050.²⁶³ Since 2010, California has added 8.3 GW of renewable generation capacity in order to comply with these regulations,²⁶⁴ but the electricity sector still faces a considerable GHG reduction target for 2020.²⁶⁵ Moreover, from 2020 until 2050, the annual GHG reduction will be five times the current annual rate, with fewer allowances.²⁶⁶

Despite California's leadership in climate change mitigation, consideration of wildlife is noticeably absent in California's renewable energy policies. Unlike the state's response to climate change, California's rules on CWIS only meet the minimum, but do not exceed, federal requirements under section 316(b) of the Clean Water Act (CWA).²⁶⁷ Despite the poten-

257. *Id.* § 38,550 (West 2014).

258. *Id.* §§ 38,560, 38,560.5, 38,562 (West 2014).

259. CAL. AIR RES. BD., CLIMATE CHANGE SCOPING PLAN 30–53 (2008). However, many of these efforts are rightly not related to electricity, including focuses on transportation and agriculture.

260. *See id.* at 30.

261. *Id.*

262. CAL. AIR RES. BD., FIRST UPDATE TO THE CHANGE SCOPING PLAN 93–100 (2014).

263. *See generally* Michael Hanemann, *California's New Greenhouse Gas Laws*, 2 REV. ENVIL. ECON. & POL'Y 114 (2008) (summarizing and describing the history and implications of AB 32).

264. CAL. AIR RES. BD., *supra* note 262, at 40. Of the 8.3 GW installed, large-scale centralized renewable energy projects account for 3.9 GW and distributed renewable energy projects account for the remaining 4.4 GW. *Id.*

265. CAL. CODE REGS. tit. 17, § 95,481 (2015).

266. CAL. AIR RES. BD., *supra* note 262, at 33.

267. CAL. CODE REGS. tit. 23, § 2922 (2015) (establishing rules that implement best technology available for minimizing adverse environmental impact, as required by the federal

tial co-benefits of integrating aggressive climate change policies with wild-life protection required under the public trust doctrine, these two remain disconnected in California law.

In conclusion, California is undeniably a leader in renewable energy and climate change mitigation policy, actively promoting and implementing renewable energy for the betterment of the environment. However, energy policies remain unconnected to the state's robust public trust doctrine. Thus, California is derogating its affirmative duty to consider and minimize all potential impacts to public trust resources.

4. Applications of the Public Trust Doctrine in California

There are two potential applications of the public trust doctrine to current California energy policy: (1) utilizing the duties under the public trust to defend against legal challenges of California's renewable energy efforts, and (2) expanding the scope of renewable energy laws to further protect wildlife and encourage more development of renewable electricity.

California's substantial efforts to mitigate climate change have not been without their controversies and criticisms. California's seminal climate change law, AB 32, has been challenged by both industry and environmental groups.²⁶⁸ The public trust doctrine can be used to navigate and help resolve these issues.

a. Using the Public Trust Doctrine to Defend Environmental Initiatives Already Underway

First, California could use the public trust doctrine to defend against in-state challenges to its cap-and-trade program. Currently, ninety percent of electricity emissions allowances are given away by the state for free,²⁶⁹ suggesting that electricity production has not been burdened by these regulations. However, the electricity sector will face more stringent GHG reductions as CARB continues to enact regulations in accordance with their ambitious goal of eighty percent reduction below 1990 levels. These more stringent regulations may generate additional political and legal challenges from in-state electricity producers.

Clean Water Act § 316(b)); *see also* 33 U.S.C. § 1362(b) (2013) (establishing the best technology available for minimizing adverse environmental impact standard). By not enacting more stringent rules on CWIS, fish and other aquatic wildlife will continue to be impacted. *See supra* notes 161–63 and associated text.

268. *See, e.g.,* Ass'n of Irrigated Residents v. Cal. Air Res. Bd., 143 Cal. Rptr. 3d 65 (Ct. App. 2012); Rocky Mountain Farmers Union v. Corey, 730 F.3d 1070 (9th Cir. 2014).

269. Steven Ferrey, *Courts Cap the "Trade": Regulation of Competitive Markets When Courts Overturn State and Federal Cap-and-Trade Regulation*, 117 W. VA. L. REV. 691, 708 (2014).

If CARB connects the dots between climate change and the public trust doctrine, it could defend against most challenges posed to climate change regulation by relying on the state's duty to protect trust resources *whenever feasible*.²⁷⁰ Since climate change undoubtedly negatively impacts trust resources, the public trust doctrine further authorizes—indeed mandates—CARB to take action to mitigate these impacts to the extent feasible. Thus, if faced with legal challenges, CARB could utilize the public trust doctrine to validate its further implementation of the statutory requirements of AB 32.

b. Using the Public Trust Doctrine to Incentivize Future Renewable Energy Development

Going a step further, the public trust doctrine offers a tool for citizens to incentivize renewable energy development. Citizen groups have brought several legal challenges against CARB regarding AB 32 implementation. First, in *Association of Irrigated Residents v. California Air Resources Board*, an environmental justice citizen group argued that CARB's scoping plan did not achieve the maximum technologically feasible and cost-effective reduction of carbon emissions and that the plan unfairly burdened already overburdened communities.²⁷¹ Despite the potential for further reductions and the inequalities of the plan, the California Superior Court ruled that CARB was well within the bounds of reason when developing the plans and rejected the citizen group's claim.²⁷²

Similarly, in *Citizens Climate Lobby v. California Air Resources Board*, another citizen group sued CARB seeking to invalidate the proposed use of carbon offset credits.²⁷³ The plaintiffs questioned whether these offsets provided emissions reductions beyond what would otherwise have occurred.²⁷⁴ Again, the California Superior Court denied the citizen group's claim, finding that the standards set forth by CARB were reasonable and within the authority granted to it by legislation.²⁷⁵ In both of these cases, citizen

270. See *Nat'l Audubon Soc'y v. Superior Court*, 658 P.2d 709, 712 (Cal. 1983).

271. *Ass'n of Irrigated Residents*, 143 Cal. Rptr. at 70–71. Specifically, the plaintiffs, Association of Irrigated Residents, argued that CARB failed to decrease health impacts to low-income communities. *Id.* at 79–80.

272. *Id.* at 81.

273. *Citizens Climate Lobby v. Cal. Air Res. Bd.*, CGC-12-519554, 2013 WL 861396 (Cal. Super. Jan. 25, 2013). An offset credit is a tradable instrument representing a reduction of GHG emissions from an uncapped source that is purchased by a capped source in order to meet the cap requirement in California's cap-and-trade program. This allows a capped source to purchase a reduction in GHG emissions from a third party rather than reduce their own emissions.

274. *Id.* at *7.

275. *Id.* at *33.

groups sought to force CARB to implement further, more tangible environmental protections that would arguably have been justified or compelled by the public trust doctrine, if that issue had been raised.

While the goals of AB 32 are lofty, the actual bill is quite brief and gives CARB wide-ranging discretion to implement climate change emissions reductions,²⁷⁶ resulting judicial deference to the expertise of CARB.²⁷⁷ As a result, without the public trust doctrine in their quiver, these decisions reveal that environmentalists may have little recourse to challenge CARB's decisions in front of the judiciary.²⁷⁸ Given that California courts have frequently deferred to CARB, one can see "why environmental justice advocates feel aggrieved."²⁷⁹

Instead of challenging the administrative reasonableness of AB 32's implementation, environmental citizen groups may find more success utilizing the principles of the public trust doctrine. Though California courts have previously recognized public health as a protected resource in public trust doctrine decisions,²⁸⁰ citizen groups may be able to gain additional, and potentially better, recourse by arguing that climate change threatens recreational and environmental resources that are held in trust by California for its citizens to enjoy.

If successful, this litigation could have the co-benefit of reducing health effects of conventional generation and ensuring further climate change mitigation. For example, citizen groups could utilize the public trust doctrine to challenge a peripheral, though connected issue: open-cycle CWIS. In California, 16.5% of 2014 generation occurred in plants employing open-cycle CWIS.²⁸¹ These are usually among the oldest, most-polluting, and least-

276. Ann E. Carlson, *Regulatory Capacity and State Environmental Leadership: California's Climate Policy*, 24 *FORDHAM ENVTL. LAW REV.* 63, 68 (2013).

277. See, e.g., *Ass'n of Irrigated Residents*, 143 Cal. Rptr. 3d at 72; *Citizens Climate Lobby*, 2013 WL 861396, at *22–23; Penni Takade, *Association of Irrigated Residents v. California Air Resources Board: Climate Change and Environmental Justice*, 40 *ECOLOGY L.Q.* 573, 581 (2013).

278. Takade, *supra* note 277, at 581–82 (concluding that environmentalists in *Ass'n of Irrigated Residents* were unlikely to have the court find a violation against CARB, noting the lawsuit was an "uphill battle from the state").

279. *Id.* at 582.

280. See, e.g., *Nat'l Audubon Soc'y v. Superior Court*, 658 P.2d 709, 716 (Cal. 1983) (recognizing the impact to human health from airborne silt matter from dry riverbeds while also recognizing the air as a traditional trust resource).

281. The authors calculated this percentage by determining the generation for individual plants that utilize open-cycle CWIS. Water Res. Control Bd., Cal. Env'tl. Prot. Agency, *Thermal Discharges - Cooling Water Intake Structures*, OCEAN STANDARDS – CWA § 316(B) REGULATION (Mar. 30, 2015), http://www.waterboards.ca.gov/water_issues/programs/ocean/cwa/316/powerplants/ (listing plants that utilize open-cycle CWIS); U.S. DEP'T OF ENERGY, ENERGY INFO. ADMIN., 2014: FORM EIA-923 (2014), <http://www.eia.gov/electricity/data/eia923/>

efficient power plants. Since open-cycle CWIS processes have such a dramatic effect on trust resources and there are a myriad of feasible alternatives,²⁸² citizen groups could sue the state to force these electricity producers to go beyond the standards of the Clean Water Act section 316(b) to a standard based on the reasonable use provision under the public trust doctrine.

If CARB requires these plants to mitigate harms they cause to public trust resources, this will increase their operating costs, potentially forcing some plants to shut down or making renewable electricity more cost competitive.²⁸³ Both of these options would indirectly decrease health impacts and mitigate climate change. Though this course of action does not directly coincide with the previous efforts of these citizen groups, the public trust doctrine offers another avenue of recourse for their voices to be heard.

The public trust doctrine can be utilized by California as a legal defense and by citizen groups as a tool to encourage the further development of renewable electricity. Because California has pioneered other creative climate change mitigation policies, the public trust doctrine has been largely forgotten; however, the doctrine has great potential to help environmental initiatives in the state and should not be overlooked.

B. Wisconsin

1. Current Electricity System

Wisconsin's energy portfolio provides a sharp contrast to California. Wisconsin relies heavily on coal as its main source of fuel for electricity. In 2012, Wisconsin used coal for 54% of its electricity generation, followed by natural gas and nuclear, which comprised 12.8% and 15.3% of annual generation, respectively.²⁸⁴ Renewable energy, comprised mostly of wind and biomass, totaled about 1.9% of annual generation.²⁸⁵ Because Wisconsin uses

(click on the "ZIP" button for 2014: EIA-923 data on the right side of the page) (providing excel files with 2014 generation data for individual plants). Of the 16.5%, half of this generation uses nuclear as a fuel source, and the other half uses natural gas. *See id.* (specifying generation for individual plants by type of fuel used).

282. These alternatives could include either closed-cycle CWIS or air drying.

283. McCormack & Noel, *supra* note 161, at 17. Of course, in addition to the CWIS argument, the citizen groups could also add undue health impacts to their argument under the public trust doctrine, though there is less legal basis for it.

284. WIS. STATE ENERGY OFFICE, 2013 WISCONSIN ENERGY STATISTICS 9, 26 (2013), http://www.stateenergyoffice.wi.gov/section_detail.asp?linkcatid=2847&linkid=1451&locid=160. Note that in 2012, Wisconsin imported about 15.4% of its generation needs. *Id.*

285. *Id.* Hydroelectricity provides about 0.6% of Wisconsin's generation needs. *Id.* at 5, 9, 26 (reporting that hydro accounted for approximately 32.1% of renewable production, which in turn accounted for 1.9% of generation for electricity and electric utilities).

conventional electricity for more than 89% of its generation,²⁸⁶ the Wisconsin grid is quite carbon intensive, which has had substantial impacts on local wildlife. For example, Wisconsin's reliance on coal has led to high levels of mercury bioaccumulation in the Great Lakes region, exceeding human and ecological risk thresholds.²⁸⁷ Despite significant regional reductions in mercury emissions, especially from sources other than coal, bioaccumulation of mercury continues to increase, threatening walleye, lake trout, northern pike, common loons, and bald eagle nestlings in and around the Great Lakes region.²⁸⁸ Likewise, coal and natural gas have had significant impacts on water resources through their CWISs and substantially contribute to climate change.²⁸⁹

2. Public Trust Doctrine in Wisconsin

Wisconsin is bordered by Lake Superior and Lake Michigan and has more than 15,000 inland lakes and 12,000 rivers.²⁹⁰ Given the abundance of water resources, it is unsurprising that the public trust doctrine has played a central role in protecting Wisconsin's water quality.²⁹¹ Wisconsin's public trust doctrine has roots in the Northwest Ordinance of 1787, which acknowledged the importance of public access to navigable waters.²⁹² Upon statehood, the Northwest Ordinance was incorporated into the Wisconsin Constitution: "the river Mississippi and the navigable waters leading into the Mississippi and St. Lawrence, and carrying places between the same, shall be common highways and forever free."²⁹³ This constitutional provision gives authority to the state to regulate navigable waters and imposes a duty on the state to preserve and promote rights to use trust property.²⁹⁴

286. *Id.*

287. Evers et al., *supra* note 177, at 1495. Furthermore, the highest such concentrations are generally found in Lake Superior. *See id.* at 1493.

288. *Id.*

289. *See supra* Section IV.A.

290. Gabe Johnson-Karp, *That the Waters Shall Be Forever Free: Navigating Wisconsin's Obligation Under the Public Trust Doctrine and the Great Lakes Compact*, 94 MARQ. L. REV. 415, 415 (2010).

291. *Id.* at 416 (citing Melissa Kwaterski Scanlan, 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, 141-42 (2000)).

292. Northwest Ordinance, art. IV, 1 Stat. 50, 52 (1789), *reprinted in* 1 U.S.C., LI, LV (2012).

293. WIS. CONST. art. IX, § 1.

294. Scanlan, *supra* note 291, at 141-42 (citing *Muench v. Public Serv. Comm'n*, 53 N.W.2d 514, 512 (Wis. 1952) and *City of Milwaukee v. State*, 214 N.W. 820, 830 (Wis. 1927)).

Beyond the original constitutional incorporation of the doctrine, the state of Wisconsin has codified several aspects of the public trust doctrine into its statutes. These include the state's right to regulate navigation for the public interest;²⁹⁵ the state's right to protect and regulate state lands and fisheries;²⁹⁶ state title to all wildlife, which allows Wisconsin to regulate its enjoyment, use, disposition, and conservation;²⁹⁷ and the right and duty to "protect, maintain and improve" water quality, especially in navigable waters.²⁹⁸

As a result of the broad powers of the state set forth in both the state constitution and in state statutes, the Supreme Court of Wisconsin has wrestled with the contours of the state's public trust doctrine.²⁹⁹ For example, the Court has grappled with the conflict between private riparian rights and public rights in navigable water. In early cases, the Wisconsin Supreme Court clarified the state's title in navigable waters, employing a navigability-in-fact test³⁰⁰ and stating that the state held this title in trust for the public to protect navigation and fishing in these waters.³⁰¹ Citing *Illinois Central Railroad v. Illinois*, the court also held that riparian rights include constructing a landing or wharf, but these rights are subject to the statutes and regulations as the state may promulgate to protect the public's rights.³⁰²

The court first addressed the conflict between riparian rights and public trust rights in *Willow River Club v. Wade*.³⁰³ The court rejected the plaintiff's claim of title to fish taken by a trespasser from a river flowing through the plaintiff's land, holding that "the public should have the right to fish in all the public navigable waters of the state."³⁰⁴ This right to fish and hunt has since been rigorously protected by the Wisconsin courts as "incident to the right of navigation."³⁰⁵

295. WIS. STAT. §§ 30.01–30.99 (2013–2014).

296. *Id.* § 23.11 (2013–2014).

297. *Id.* § 29.011 (2013–2014).

298. *Id.* §§ 281.11–281.12, 281.31 (2013–2014). Section 281.31 specifically directs the state to protect navigable waters, as required by the public trust doctrine. *Id.* § 281.31.

299. Sax, *supra* note 28, at 509.

300. See *Diedrich v. Nw. Union Ry. Co.*, 42 Wis. 248, 262–63 (1877). It should be noted that while riparian title ends at the bank for lakes, Wisconsin courts have held that riparian owners hold title to lands underneath rivers and streams, though subject to the public trust doctrine. See *Willow River Club v. Wade*, 76 N.W. 273, 281 (Wis. 1898).

301. *McLennan v. Prentice*, 55 N.W. 764, 770 (Wis. 1893) (holding that the state's title in navigable waters was subject to the paramount authority of Congress).

302. *Id.* (citing *Ill. Cent. R.R. v. Illinois*, 146 U.S. 387 (1892)).

303. *Willow River Club*, 76 N.W. at 273.

304. *Id.* at 277.

305. *E.g.*, *Diana Shooting Club v. Husting*, 145 N.W. 816, 819 (Wis. 1914).

Likewise, Wisconsin courts have recognized the state's title in wildlife and acknowledged Wisconsin's broad authority in wildlife regulation, noting, "[T]he state holds title to the wild animals in trust for the people."³⁰⁶ In addition, the Wisconsin Supreme Court held that the regulation and conservation of wild animals is a uniquely statewide interest under the trust doctrine, as opposed to a merely local concern.³⁰⁷ Thus, as the protector of the public rights in waterways and wildlife, the state has paramount authority above both local governments and private riparian owners.

Beyond affirming the state's authority to protect public trust resources, the Wisconsin Supreme Court also documented the duty associated with these resources. The Court held that the public trust doctrine is not passive.³⁰⁸ Rather, it "requires the law-making body to act in all cases where action is necessary, not only to preserve the trust but to promote it."³⁰⁹ However, the state's duty to continually protect and promote the public interest does not prevent the development or alteration of trust resources.³¹⁰ The state is not required to keep trust resources in the same condition as they existed prior to the advent of the white civilization in Wisconsin as long as these developments improve the public interest.³¹¹

One unique aspect of the Wisconsin public trust doctrine is that "scenic beauty" has been incorporated as a protected trust resource. In *Muench v. Public Service Commission*, a private citizen sought judicial review of the permit for the construction and operation of a hydroelectric dam, arguing that the dam would negatively impact the public's recreation and scenic enjoyment of the navigable river.³¹² The Wisconsin Supreme Court ruled that the public has the right to enjoy navigable streams for all recreational purposes, "including the enjoyment of scenic beauty, [which] is a legal right that is entitled to all the protection which is given financial rights."³¹³

In addition to scenic beauty, the court has recognized and protected all public uses of water, including pleasure boating, sailing, fishing, swimming,

306. Krenz v. Nichols, 222 N.W. 300, 303 (Wis. 1928).

307. Monka v. State Conservation Comm'n, 231 N.W. 273 (Wis. 1930).

308. City of Milwaukee v. State, 214 N.W. 820, 830 (Wis. 1927).

309. *Id.*

310. *Id.*

311. *Id.* at 832. In fact, the state is required to improve trust resources to maximize benefits to the public. *Id.* at 931.

312. Muench v. Pub. Serv. Comm'n, 53 N.W.2d 514, 515 (Wis. 1952).

313. *Id.* at 522.

hunting, and skating.³¹⁴ The Wisconsin Supreme Court has also explicitly extended the public trust to water quality.³¹⁵

Despite these protections, the court has not forbidden all encroachments on public trust lands.³¹⁶ To navigate the potential conflicts of preserving the public interest in trust resources with the duty to promote development in accordance with the public interest, Wisconsin courts devised a five-point guide:

- 1) Public bodies will control the use of the area;
- 2) The area will be devoted to the public purposes and open to the public;
- 3) The diminution of the public trust resource will be very small compared with the whole of the public trust resource;
- 4) No one of the public uses of the resource will be destroyed or greatly impaired; and
- 5) The disappointment of those members of the public who may desire to use the public trust resource who no longer can will be negligible when compared with the greater convenience to be afforded those members of the public who would benefit.³¹⁷

Moreover, the public trust can be a tool used by Wisconsin to avoid regulatory takings.³¹⁸ Under Wisconsin takings law, a land taken for public benefit is compensable whereas land regulated to avoid public harm is not.³¹⁹ The eradication of pollution and prevention of further pollution is

314. State v. Pub. Serv. Comm'n, 81 N.W.2d 71, 74 (Wis. 1957).

315. Reuter v. Dep't of Nat. Res., 168 N.W.2d 860, 861 (Wis. 1969) (recognizing that the public's interest in sailing, rowing, canoeing, bathing, fishing, hunting, skating, and other public purposes would be impaired by water pollution).

316. These encroachments have included construction of auditoriums, civic centers, parking lots, and highways. See *id.*; see also *City of Madison v. State*, 83 N.W.2d 674, 679 (Wis. 1957).

317. Paepcke v. Pub. Bldg. Comm'n, 263 N.E.2d 11, 19 (Ill. 1970) (citing and summarizing *City of Madison*, 83 N.W.2d at 680 and *Pub. Serv. Comm'n*, 81 N.W.2d at 73-74). The Wisconsin courts have yet to rule on the implications of only partially sufficing these five points. However, the cases cited imply that if these five points are demonstrated, it is likely not a violation of the public trust doctrine. However, failing to demonstrate all five points may not preclude a court from declining to find a violation of the public trust doctrine.

318. See generally *Lucas v. S.C. Coastal Council*, 505 U.S. 1003, 1027-29 (1992) (finding that background principles of state or federal law that are antecedent to property rights can be used as a defense against takings claims). Essentially, the state can use the public trust doctrine, a background principle of state law antecedent to property rights, to prevent harm from a trust resources without constituting a regulatory taking.

319. *Just v. Marinette*, 201 N.W.2d 761, 767-68 (Wis. 1972); see *Lucas*, 505 U.S., at 1024-32 (discussing the implications of conferring benefits or preventing harms on regulatory takings).

not, in a legal sense, “benefit-securing” in that it simply maintains the natural *status quo* of the environment.³²⁰ Rather, such efforts prevent a harm to the public interest, suggesting that no compensation is due.

Additionally, the Court extended the public trust from navigable rivers to those non-navigable waters connected to navigable waters,³²¹ much as California did in the *National Audubon Society*.³²² As a result, the court emphasized that the active trust duty of the state “requires the state *not only* to promote navigation *but also* to protect and preserve waters for fishing, recreation and scenic beauty.”³²³ The court confirmed this more expansive view of the public trust doctrine by displacing the common enemy doctrine with the reasonable-use rule regarding riparian water use and management,³²⁴ holding that riparian rights are subject to the public trust doctrine.³²⁵ On remand, it warned the lower court that the economic social utility of land development was to be given far less value than it had historically been accorded.³²⁶

Under public trust analysis, state agencies are required to go beyond any statutory presumption to determine what constitutes a “reasonable use” in light of each situation’s particular facts.³²⁷ Though Wisconsin has always cautiously weighed private riparian rights against the interests of the public, recent cases reflect growing concern over the environmental and recreational interests of the public. In *Lake Beulah Management District v. Department of Natural Resources*, for example, the Lake Beulah Management District challenged a decision by the Wisconsin Department of Natural Resources (WDNR) to issue a permit for a groundwater well, arguing that the groundwater diversions would have an adverse impact on nearby wetlands and navigable surface waters.³²⁸ The court reiterated the comprehensive

320. *Just*, 201 N.W.2d at 768.

321. *Id.*

322. See generally *Nat’l Audubon Soc’y v. Superior Court*, 658 P.2d 709 (Cal. 1983); *supra* Subsection V.A.2.

323. *Just*, 201 N.W.2d at 768 (emphasis added).

324. Briefly, the common enemy doctrine is a common law doctrine that authorizes a landowner to fight surface waters in whatever way the owner deems appropriate, and if an adjacent landowner’s property is damaged, there would be no cause of action. See *State v. Deetz*, 224 N.W.2d 407, 411–12 (Wis. 1974).

325. *Id.* at 417–18.

326. *Id.* at 417.

327. *Hilton v. Dep’t of Nat. Res.*, 717 N.W.2d 166, 174 (Wis. 2006). Wisconsin statutes would normally have entitled the riparian owner to construct a wharf without requiring a permit, see WIS. STAT. § 30.12(1g)(f) (2013–2014), but the court held that the public trust doctrine required additional protection of trust resources from the agency. *Hilton*, 717 N.W.2d at 174.

328. *Lake Beulah Mgmt. Dist. v. Dep’t of Nat. Res.*, 799 N.W.2d 73 (Wis. 2011).

statutory and constitutional trust responsibilities of the WDNR.³²⁹ Similar to the recent California public trust case regarding groundwater,³³⁰ the Wisconsin court held that the state, as trustee, is required to consider any action that potentially impacts navigable waters.³³¹ In order to comply with its duty as trustee, the WDNR “must consider the environmental impact . . . when presented with sufficient concrete, scientific evidence of potential harm to waters of the state.”³³²

Generally, Wisconsin courts have required trustees to show that they have considered all relevant public and policy interests in trust resources, as long as there is a scientific connection between the action and the potential impact on the trust. Courts have generally deferred to the trustee in cases where the trustee has acted to protect public trust resources; conversely, the court has closely scrutinized any proposed trustee action that appeared to jeopardize trust resources.³³³ However, the progressive trend in the Wisconsin public trust case law came to a halt in a recent case, *Rock-Koshkonong Lake District v. Department of Natural Resources*, which considered the benefits of dam rehabilitation to non-navigable wetland ecosystems.³³⁴ The rehabilitation improved water quality of the lake but also restricted riparian access to the lake.³³⁵ The Lake District petitioned the WDNR to consider the economic interests of the residents, but the WDNR rejected the petition, citing its duties under the public trust doctrine.³³⁶ Despite the court’s tendency to affirm WDNR orders that aim to protect the public interest, the court closely scrutinized the WDNR decision.³³⁷ First, the court found that the decision was not entitled to “great weight” deference.³³⁸ Second, the court ruled that the WDNR had incorrectly relied on the public trust doctrine when considering the water quality of non-navigable private wetlands, stating the doctrine solely applies to navigable waters, and instead should have utilized its police powers to regulate water quality of these

329. *Id.*

330. *See* *Envtl. Law Found. v. State Water Res. Control Bd.*, No. 34-2010-80000583, 2014 WL 8843074, at *8 (Cal. Super. Ct. July 15, 2014).

331. *Lake Beulah*, 799 N.W.2d at 76.

332. *Id.* The court, however, concluded that this evidence had not been properly introduced procedurally, and thus the WDNR did not have sufficient scientific evidence that the groundwater well would impact navigable waters. *Id.* at 77.

333. Scanlan, *supra* note 291, at 140–47.

334. *Rock-Koshkonong Lake Dist. v. Dep’t of Nat. Res.*, 833 N.W.2d 800 (Wis. 2013).

335. *Id.* at 808–10.

336. *Id.* at 812.

337. Christian Eickelberg, *Rock-Koshkonong Lake District and the Surprise Narrowing of Wisconsin’s Public Trust Doctrine*, 16 VT. J. ENVTL. L. 38, 55 (2014) (saying that court’s lack of deference to the WDNR was “novel and inconsistent with its precedents”).

338. *Rock-Koshkonong Lake Dist.*, 833 N.W.2d at 815.

wetlands.³³⁹ In light of this decision, the future application of the Wisconsin public trust doctrine is uncertain. This case conflicts with previous precedents and calls into question the historical and expansive role the trust has played in Wisconsin.

3. Overview of Current Wisconsin Electricity Laws

Wisconsin law encouraging renewable energy is limited. Most electricity planning and policymaking is delegated to the Wisconsin Public Service Commission (WPSC). The WPSC is required to develop a strategic energy assessment every two years. In this assessment, the WPSC must “identify and describe existing and planned generating facilities that use renewable sources of energy.”³⁴⁰ Before constructing a new electricity facility, the utility must gain a certificate from the state.³⁴¹

Additionally, Wisconsin has a goal that “to the extent that it is cost-effective and technically feasible, all new installed capacity for electric generation in the state be based on renewable energy resources.”³⁴² Furthermore, the state has created a hierarchy for pursuing new energy generation under the Energy Priorities Law (EPL).³⁴³ The relevant part of the EPL states:

- (4) Priorities. In meeting energy demands, the policy of the state is that, to the extent cost-effective and technically feasible, options be considered based on the following priorities, in the order listed:
 - (a) Energy conservation and efficiency
 - (b) Noncombustible renewable energy resources
 - (c) Combustible renewable energy resources
 - (d) Nonrenewable combustible energy sources, in the order listed:
 1. Natural gas

339. *Id.* at 821–23. However, this appears to ignore the precedents set in *Just v. Marinette*, 201 N.W.2d 761 (Wis. 1972), and *Lake Beulah Management District v. Department of Natural Resources*, 799 N.W.2d 73 (Wis. 2011), both of which argue that the state has the authority and duty to consider all potential impacts to navigable waters, including non-navigable private wetlands, under the public trust doctrine. Indeed, one scholar argues that this precedent does “a disservice to Wisconsin’s protection of public trust resources.” See Eickelberg, *supra* note 337, at 65.

340. WIS. STAT. § 196.491(2)(a)(9) (2013–2014).

341. There are two types of certificates, which depend, among other things, on the size of the project. To protect the ratepayers, these certificates require the applicant to show analysis of the project and are required before construction of any new electricity facility. See *id.* §§ 196.49, 196.491(3) (2013–2014). The certificates are also often a point of litigation. See *infra* Subsection V.B.4.

342. WIS. STAT. § 1.12(3)(b) (2013–2014).

343. *Id.* § 1.12(4).

2. Oil or coal with sulfur content less than 1%
3. All other carbon-based fuels.³⁴⁴

Though the EPL stresses the priority of renewable generation, it is up to the WPSC to determine if renewable energy resources are both “cost-effective” and “technically feasible” when planning new electricity development.³⁴⁵ As discussed below, due to the WPSC’s discretion, the EPL has not always led to the selection of renewable energy or incentivized its development.

Like California and many other states, Wisconsin has an RPS. However, the goals of Wisconsin’s RPS are significantly less ambitious than California’s, with a modest requirement that renewable energy amount to at least 10% of all electricity consumed in the state by 2015.³⁴⁶ For both the RPS and the EPL, renewable technology includes renewable-sourced fuel cells, tidal and wave power, solar thermal and photovoltaic, wind power, geothermal, biomass, and waste fuel.³⁴⁷ Finally, the WPSC is statutorily forbidden from imposing any other requirements to increase any electricity provider’s renewable energy sales beyond the 10% mandate.³⁴⁸

Wisconsin does not have any comprehensive climate change or renewable energy legislation, as is the case in California. Furthermore, over the past decade, Wisconsin has failed to take any significant steps toward developing a renewable energy strategy.³⁴⁹ While many of the statutes pertaining to the WPSC require that the Commission consider the public interest,³⁵⁰ both the WPSC and the courts have interpreted the statutory language to mean protection of ratepayers.³⁵¹ Such a narrow construction of interests, primarily in terms of electricity costs, excludes other matters important to

344. *Id.*

345. *See, e.g.,* *Clean Wis., Inc. v. Pub. Serv. Comm’n*, 700 N.W.2d 768, 809–10 (Wis. 2005).

346. WIS. STAT. § 196.378(2) (2013–2014). Moreover, legacy hydroelectricity and renewables already comprised about 6% of total generation each year from 1990 to 2004. *See* WIS. STATE ENERGY OFFICE, 2013 WISCONSIN ENERGY STATISTICS BOOK 58 (2013), <http://www.stateenergyoffice.wi.gov/subcategory.asp?linksubcatid=3691&linkcatid=2847&linkid=1451&locid=160>.

347. WIS. STAT. § 196.378(1)(h).

348. *Id.* § 196.378(4m).

349. Marvin C. Bynum II, *Testing the Waters: Assessing Wisconsin’s Regulatory Climate for Offshore Wind Projects*, 93 MARQ. L. REV. 1533, 1573 (2010).

350. *See* WIS. STAT. § 196.49(3)(a) (2013–2014) (requiring “plans, specifications, and estimated costs of any proposed project which will . . . materially affect the public interest”); *see also id.* § 196.491(3)(d)(3) (2013–2014) (requiring the WPSC to find that the design of the project is in the public interest to issue a certificate).

351. *See, e.g.,* *Wis. Indus. Energy Grps. v. Pub. Serv. Comm’n*, 819 N.W.2d 240, 253 (Wis. 2012).

the public, including public health, climate, and trust resources. Thus, the trustee's fiduciary obligations to protect public water and wildlife resources remain largely disconnected from the WPSC's electricity planning and permitting responsibilities. By connecting the state's well-developed public trust doctrine to electricity planning and policy, the state of Wisconsin and its citizens can encourage renewable energy beyond the state's currently lackluster regime.

4. Applications of the Public Trust Doctrine in Wisconsin

Because Wisconsin's renewable energy laws are underdeveloped, there is an opportunity for the public trust doctrine to spur renewable energy development. Specifically, citizens could cite WDNR's broad authority and general duty under the public trust doctrine to influence WPSC's electricity decisionmaking process and encourage further development of renewable energy. Both the WPSC and the Wisconsin Supreme Court, when reviewing WPSC orders, appear to have either not considered or not been cognizant of the environmental and trust resource benefits that accrue from increased renewable electricity production.

In the few legal challenges to recent WPSC electricity decisions, courts have neither recognized the larger social and public trust benefits of renewable electricity development nor the consequences of continued conventional electricity production. Notably, in 2005, the Wisconsin Supreme Court was faced with a WPSC decision to grant the Wisconsin Electric Corporation (WEC) a certificate to begin construction on two large coal-fired plants on the shores of Lake Michigan.³⁵² Clean Wisconsin, a citizen's group, appealed the WPSC approval, arguing that the certificate application was incomplete and that the WPSC did not properly give priority to non-coal sources of electricity, especially under the EPL.³⁵³ The WPSC argued that the conditional approval was valid because it was conditioned on WDNR approval of permits.³⁵⁴ Despite coal-fired generation being the EPL's lowest priority, its selection was valid because all higher priority technologies were either not "cost-effective" or not "technologically feasible."³⁵⁵

The court concluded that the WPSC decisions are to be accorded "great weight" (the highest level of deference under Wisconsin law) so that Clean Wisconsin had the burden to demonstrate that there was "no rational basis"

352. *Clean Wis., Inc. v. Pub. Serv. Comm'n*, 700 N.W.2d 768, 788 (Wis. 2005).

353. *Id.* at 812.

354. *Id.* at 844.

355. *Id.* at 813–14.

for the WPSC order.³⁵⁶ The court's deference to the WPSC made Clean Wisconsin's challenge an uphill battle. By contrast, courts have historically given WDNR little to no deference when the WDNR makes a decision that appears to impair public trust resources.³⁵⁷ In spite of potential harms to the environment and the public, the court deferred to the WPSC and upheld the administrative decision.³⁵⁸ As a result, the court affirmed the WPSC's determination that neither land-based nor offshore wind would be able to replace the two coal-fired plants.³⁵⁹

Of particular interest in *Clean Wisconsin* was the challenge to WPSC's approval of the WEC's open-cycle CWIS. The WPSC found that despite the fact that one billion gallons of water were withdrawn per day and millions of aquatic organisms were killed, open-cycle CWIS would have "inconsequential" impacts on Lake Michigan's ecosystem.³⁶⁰ The court deferred under the "great weight" standard, finding that the WPSC had sufficed its responsibility to take a "hard look" at the environmental consequences of the coal plants.³⁶¹ However, this finding was based largely on a monitoring study conducted thirty years prior.³⁶²

In contrast to the majority opinion, the concurrence was not convinced by the WPSC's finding, failing to see how the mortality of millions of fish and other aquatic life "is of no consequence, irrelevant and lacking importance."³⁶³ Likewise, the dissent thoroughly questioned the majority's acceptance of the open-cycle CWIS, contending that the WPSC did not seriously consider the substantial environmental and technological changes regarding closed-cycle CWIS over the last three decades.³⁶⁴ Nevertheless, the major-

356. *Id.* at 801.

357. *See* Scanlan, *supra* note 291, at 140–47.

358. *Clean Wis.*, 700 N.W.2d at 853.

359. *Id.* at 801. Compare the WPSC's determination on the cost effectiveness of wind without any health externalities (or other externalities of interest, such as climate change externalities) to the monetization of coal's externalities. Including these externalities would necessarily increase the cost of coal substantially. *See* Paul R. Epstein et al., *Full Cost Accounting for the Life Cycle of Coal*, 1219 ANNALS N.Y. ACAD. SCI. 73, 91 (2011) (claiming a best estimate for the monetization of coal's externality would near 18 cents per kWh); *cf.* PUB. SERV. COMM'N OF WIS., NO. 5-EI-144, HARNESSING WISCONSIN'S ENERGY RESOURCES: AN INITIAL INVESTIGATION INTO THE GREAT LAKES DEVELOPMENT 19 (2009) (finding that offshore wind energy in the Great Lakes is technologically feasible).

360. *Clean Wis.*, 700 N.W.2d at 831–32.

361. *Id.* at 835.

362. *Id.* at 831–32.

363. *Id.* at 855 (Butler, J., concurring).

364. *Id.* at 858–60 (Bradley, J., dissenting). Justice Bradley also argued that the court should not have deferred to the WPSC order. *Id.* at 863.

ity emphasized the role of agency expertise and discretion in balancing various social and environmental values.³⁶⁵

In hindsight, Clean Wisconsin could have benefited from reframing its challenge under the public trust doctrine, given that Wisconsin Courts have more closely scrutinized agency actions under this doctrine. As there were several WDNR permits required prior to the WPSC's certificate approval,³⁶⁶ Clean Wisconsin could have utilized the WDNR's public trust obligations as a basis to challenge the construction of the coal plants.³⁶⁷ The WDNR has the affirmative duty beyond any statutory requirements, to protect public trust resources.³⁶⁸ By connecting the public trust to the WPSC order, the plaintiffs could have gained the advantage of a stricter standard of review and a more serious consideration of the impacts of open-cycle CWIS.³⁶⁹ Additionally, connecting the benefits of renewable energy, such as mitigating other adverse impacts, including mercury bioaccumulation and climate change, would have encouraged the prioritization of renewable energy under the EPL.

By granting the WPSC great weight deference, the Court neglected to seriously investigate the environmental impacts of the two coal plants. If Clean Wisconsin had instead challenged the DNR by citing its trust obligations, the court would likely have scrutinized each of the potential impacts of the coal plants and the conclusion that coal was the most "cost-effective" and "technologically feasible" option.

In spite of the recent limitations on the doctrine in *Rock-Koshkonong*,³⁷⁰ the public trust can still be readily applied to electricity production decisions, such as those presented in *Clean Wisconsin*. At worst, *Rock-Koshkonong*

365. *Id.* at 841 (majority opinion).

366. *Id.*

367. The WPSC cannot grant approval to the permit without the required regulatory approvals from the WDNR (though they can grant conditional approval of the permit). *See id.* at 823. While the WPSC is the primary agency for electricity decisions, the WDNR has been designated as the primary agency for managing the public trust. *See Scanlan, supra* note 291, at 171–72. Because the WPSC requires supplementary approval and permit information from the WDNR before granting a permit, Clean Wisconsin could challenge the WPSC's decision by arguing the WDNR failed to faithfully discharge its fiduciary duty to consider the impacts of the proposed action on public trust resources, and thus the WPSC did not acquire the requisite regulatory approvals from the WDNR before approving the permit. If the WPSC grants conditional approval of the CPCN, the permit applicant must still receive approval from the WDNR, including an analysis of the public trust doctrine.

368. *See Hilton v. Dep't of Nat. Res.*, 717 N.W.2d 166, 174 (Wis. 2006).

369. Given the substantial environmental impacts of open-cycle CWIS, as shown *supra* in Sections IV.A–B, the plaintiffs could have argued that the WDNR was jeopardizing public trust resources, and Wisconsin courts have generally closely scrutinized such actions. *See Scanlan, supra* note 291, at 294.

370. *Rock-Koshkonong Lake Dist. v. Dep't of Nat. Res.*, 833 N.W.2d 800 (Wis. 2013).

has narrowed the doctrine's application to exclusively navigable waters.³⁷¹ However, because the impacts from electricity production directly impact navigable waters and wildlife, there is little question that the public trust doctrine applies. For example, the two coal plants in *Clean Wisconsin* directly withdrew waters from Lake Michigan, a navigable water body.³⁷² Furthermore, coal plants constitute only a portion of the cumulative electricity production that impacts water. Because the majority of thermal plants employ open-cycle CWIS, electricity production in the Great Lakes watershed accounts for 86% of Wisconsin's total annual water withdrawals.³⁷³

Given these facts and the growing concern of continued water diversions from the Great Lakes,³⁷⁴ a less deferential standard of review would likely challenge the conclusion that impacts from open-cycle CWIS are inconsequential, especially considering the comprehensive and cumulative impacts on water and wildlife trust resources. Likewise, given the feasibility of closed-cycle CWIS and the significant reductions in impacts to trust resources, *Clean Wisconsin* could have made a much more convincing argument that the WDNR, not the WPSC, must require such a system. While both state agencies argued that the WDNR does not have authority under the CWA to do so, this argument ignores the fact that the coal plant's riparian rights to withdraw water from Lake Michigan are qualified and subordinate to public trust rights.³⁷⁵

Going forward, environmental groups could encourage the reprioritization of renewable energy under the EPL by citing the public's interest in trust resources. After *Lake Beulah*, the WDNR must consider any potential adverse, scientifically supported impacts to trust resources.³⁷⁶ In terms of

371. Eickelberg, *supra* note 337, at 60–62.

372. *Clean Wis.*, 700 N.W.2d at 788.

373. GREAT LAKES COMM'N, ANNUAL REPORT OF THE GREAT LAKES REGIONAL WATER USE DATABASE: REPRESENTING 2013 WATER USE DATA 36 tbl.19 (2014), <http://projects.glc.org/waterusedata/annualreports.php> (summarizing total water withdrawal data, divided by sector, including for “Self-Supply Thermoelectric Power Production (Once-through cooling)” and “Self-Supply Thermoelectric Power Production (Recirculated cooling)”). Combined, self-supply thermoelectric power plants withdrew about 3.6 billion gallons of water per day in 2013. See Great Lakes-St. Lawrence River Basin Water Res. Council, *Create Your Own Query*, WATER USE BASELINE DATABASE, <http://projects.glc.org/waterusedata/query.php> (last visited Nov. 13, 2015) (selecting “Wisconsin” for “Jurisdiction”, “2013” for “Year”, and both “Self-Supply Thermoelectric Power Production (Once-through cooling)” and “Self-Supply Thermoelectric Power Production (Recirculated cooling)” under “Water Use Sector” produces plant-specific withdrawal data in millions of gallons per day).

374. See generally Hall & Stuntz, *supra* note 214 (claiming climate change poses a severe threat to Great Lakes water resources, especially if diversions are not held in check).

375. *R.W. Docks & Slips v. State*, 628 N.W.2d 781, 788 (Wis. 2001).

376. *Lake Beulah Mgmt. Dist. v. Dep't of Nat. Res.*, 799 N.W.2d 73, 92 (Wis. 2011).

electricity production, there are two impacts in addition to CWIS that have scientifically-proven connections between electricity production and trust resources: mercury emissions³⁷⁷ and climate change.³⁷⁸ Mercury emissions impact wildlife resources and water quality in the Great Lakes region, and climate change is expected to “lead to lower lake levels, impacts on fisheries and wildlife, changes in Great Lakes shorelines, and reduction of ground-water supplies.”³⁷⁹ These impacts from electricity production are the same impacts that the *Rock-Koshkonong* court was concerned that WDNR overlooked.³⁸⁰ Moreover, unlike the interests at issue in *Rock-Koshkonong*, climate change also adversely impacts wildlife, wetlands, aesthetics, and water quality concerns protected by the public trust doctrine. Therefore, even in light of *Rock-Koshkonong*, climate change, mercury, and CWIS impacts from electricity production, especially coal, must be considered by the WDNR. Given the weight of the scientific evidence, it is hard to fathom how the WDNR could not conclude that such impacts negatively impact the public trust. As such, construction or renewal of these plants would not be in the public’s interest.

While the WPSC is not required to choose renewable electricity under the EPL if the environmental benefits are outweighed by other values,³⁸¹ decisionmaking under the EPL could be rebalanced by arguing that under the public trust doctrine, the WDNR’s paramount obligation is to protect the public interest in trust resources. For example, notably absent from *Clean Wisconsin* and another recent case authorizing construction of a wind farm³⁸² is a discussion of the larger social benefit of encouraging development of renewable energy.³⁸³ The application of the public trust doctrine to the EPL and the decisionmaking process of the WPSC and WDNR would encourage the development of this discussion. While the literature has connected the public trust implications of wind, specifically the environmental and aesthetic impacts of offshore wind,³⁸⁴ there have been no contextual

377. See Evers et al., *supra* note 177.

378. See Hall & Stuntz, *supra* note 214.

379. *Id.* at 676.

380. *Rock-Koshkonong Lake Dist. v. Dep’t of Nat. Res.*, 833 N.W.2d 800, 809–10 (Wis. 2013).

381. See *Clean Wis., Inc. v. Pub. Serv. Comm’n*, 700 N.W.2d 768, 829 (Wis. 2005).

382. *Wis. Indus. Energy Grps. v. Wis. Pub. Serv. Comm’n*, 819 N.W.2d 240 (Wis. 2012).

383. Compare these decisions to the California intermediate court’s opinion in *Center for Biological Diversity v. FPL Group*, 83 Cal. Rptr. 3d 588, 601–02 (Ct. App. 2008), which was cognizant of the larger benefits of wind energy, despite the potential impacts of avian mortality.

384. *Bynum II*, *supra* note 349, at 1570.

comparisons between the public trust implications of renewable and conventional electricity.

It may be useful to apply the five-point test developed in the Wisconsin public trust doctrine case law.³⁸⁵ Consider the choice between a potential coal plant and a potential offshore wind farm. Under the first point, neither the coal plant nor the offshore wind farm would truly control the use of an area: instead they would control the use of trust resources, such as water resources, for the purposes of cooling or the “use” of wildlife via mercury bioaccumulation in the case of the coal plant or avian mortality in the case of the offshore wind.³⁸⁶ On the other hand, offshore wind would likely exclude other public uses by obstructing navigation and impacting the aesthetic landscape.³⁸⁷ Second, neither the coal plant nor the offshore wind farm’s purpose in using the trust resource is to directly benefit the public at large; both would likely be closed to the public. Third, the overall diminution of trust resources by coal-fired plants is orders of magnitude higher than navigation, wildlife and aesthetic impacts from offshore wind, meaning coal diminishes a larger portion of the public trust resource as a whole than a properly sited wind farm.³⁸⁸ Fourth, cumulatively, coal has substantially impaired wildlife and water resources, whereas it is unlikely that offshore wind would impair navigation, wildlife, or aesthetic trust resources beyond minor impacts.³⁸⁹ Fifth, neither the coal plant nor the wind farm would provide direct public trust benefits, but both would create the public benefit

385. Paepcke v. Pub. Bldg. Comm’n, 263 N.E.2d 11, 19 (Ill. 1970) (citing and summarizing City of Madison v. State, 83 N.W.2d 674, 680 (Wis. 1957) and State v. Pub. Serv. Comm’n, 81 N.W.2d 71, 73–74 (Wis. 1957)). The five point guide, while informative, does not translate perfectly in the application to electricity production because it is used more to test the alienation of submerged lands and title, rather than the permitting of usufructuary rights.

386. While in both cases the state retains the authority to control the use of the area, both the coal plant and the offshore wind farm would necessarily occupy land and waters to the exclusion of other users. See Vasilis Fthenakis & Hyung Chul Kim, *Land Use and Electricity Generation: A Life-Cycle Analysis*, 13 RENEWABLE & SUSTAINABLE ENERGY REV. 1465, 1466–69 (2009).

387. Navigational interests may only be excluded at the turbine itself and a small buffer around it, but still allowing navigation and other interests in between the turbines. MINERALS MGMT. SERV. (MMS), U.S. DEP’T OF INTERIOR, CAPE WIND ENERGY PROJECT: FINAL ENVIRONMENTAL IMPACT STATEMENT 3-15, 5-266 (2009).

388. See *supra* Part IV.

389. For example, while there are continued concerns over the population impacts from mercury bioaccumulation for certain wildlife species and the future risks of extinction of wildlife and substantial alteration of water resources due to climate change, it is unlikely that offshore wind poses a population risk to avian populations, often considered the most significant impact of offshore wind. However, if substantial amounts of offshore wind are constructed, there may be cumulative risks to navigation and to wildlife from habitat displacement. See *supra* notes 191–207 and accompanying text.

of electricity production.³⁹⁰ Assuming equivalent benefits of electricity and the substantially larger consequences of utilizing coal, it is clear that offshore wind in the Great Lakes, using the five-point test, would be the superior choice under the public trust doctrine. This conclusion could be weighed against the WPSC's findings of "cost-effectiveness" and "technologically feasibility" and could encourage the reprioritization of renewable energy under the EPL.

Because the WDNR has been granted broad statutory and constitutional authority to protect the public trust whenever feasible,³⁹¹ and Wisconsin courts have generally given "great weight" deference to the WDNR when acting to protect trust resources, the WDNR has the capability to take actions that would promote renewable energy development. The courts have often required the WDNR to give full and careful consideration to all public trust interests, especially non-economic interests, a consideration that is currently lacking in Wisconsin electricity planning and policy. Scanlan argues that WDNR employees, especially Water Management Specialists (WMSs), have not fully utilized the public trust doctrine.³⁹² Scanlan continues that the public trust doctrine can authorize WMSs and the WDNR to take action on water quality.³⁹³ For example, WMSs have the ability to use the public trust doctrine to fill regulatory gaps left by other laws, such as the Clean Water Act (CWA), including regulating activities that cause non-point source pollution.³⁹⁴

Likewise, it is entirely reasonable given the scope of the Wisconsin public trust doctrine that the same argument can be made in favor of granting WDNR the ability to use the public trust doctrine to fill in the gaps left by other laws to regulate the impacts of electricity production beyond statutory requirements. Like any other riparian user, the rights of electricity producers to use water and to adversely impact wildlife and water through emissions are entirely subject to the power of the WDNR, whether WDNR employees act on that power or not. The WPSC's prioritization of cheap electricity over environmentally beneficial electricity emphasizes a common theme in electricity permitting decisions. The current structure of electricity laws in many states is primarily concerned with protecting ratepayers' interests in low electricity rates without regard to externalities, including those that impair trust resources. Nevertheless, citizen groups like Clean

390. Moreover, the offshore wind farm would provide further public benefits by displacing coal and natural gas. See *supra* Section IV.D.

391. See *supra* notes 327–32 and accompanying text.

392. Scanlan, *supra* note 291, at 169–72.

393. *Id.* at 173–77.

394. *Id.* at 177 (arguing that the WMSs have such authority despite the limited statutory authority in the CWA).

Wisconsin or WDNR employees can utilize the broad authority and general duty of the state of Wisconsin under its well-developed public trust doctrine to shift the focus and encourage protection of environmental resources and development of renewable electricity.

C. Hawaii

1. Current Electricity System

Hawaii overwhelmingly relies on fossil fuel for power generation, necessitating the importation of oil.³⁹⁵ In 2013, 18% of Hawaii's net electricity generation came from renewable sources, mainly comprised of wind, residential solar PV, biomass, and geothermal.³⁹⁶ The other 82% of generation came from fossil fuel sources, more than three quarters of which was oil-based and the remainder from coal.³⁹⁷ Though the percentage of fossil fuel generation has decreased from 91% over the last ten years,³⁹⁸ Hawaii's dependence on oil and coal has negative consequences, including contributing to climate change and ocean acidification.³⁹⁹ This dependence requires significant quantities of cooling water and emits a substantial amount of mercury.⁴⁰⁰ As a result, Hawaii has perhaps the most environmentally damaging electric grid of the four states investigated in this Article,⁴⁰¹ al-

395. HAW. PUB. UTIL. COMM'N (HPUC), ANNUAL REPORT FOR FISCAL YEAR 2014, at 16, 21 (2014), <http://puc.hawaii.gov/wp-content/uploads/2013/04/PUC-FY-2014-Annual-Report.pdf>.

396. HAW. STATE ENERGY OFFICE, ENERGY RESOURCES COORDINATOR'S ANNUAL REPORT 2014, at 20 (2014), <http://energy.hawaii.gov/resources/hawaii-state-energy-office-publications>. In addition, the Bureau of Ocean Energy Management (BOEM) recently received two unsolicited offshore wind lease applications proposing offshore wind facilities off the coast of Oahu. See Bureau of Ocean Energy Mgmt., *Hawaii Activities*, RENEWABLE ENERGY PROGRAMS, <http://www.boem.gov/State-Activities-Hawaii> (last visited Oct. 8, 2015).

397. HPUC, *supra* note 395, at 21. Note this does not include the HPUC's estimated role of energy efficiency on reducing overall generation needs, which HPUC determined accounted for a 12% reduction in demand. See also EIA, *supra* note 281 (84% of electricity generated in Hawaii came from fossil fuels in 2014 through November).

398. HPUC, *supra* note 395, at 21.

399. See William Moomaw et al., *Annex II: Methodology*, in IPCC SPECIAL REPORT ON RENEWABLE ENERGY SOURCES AND CLIMATE CHANGE MITIGATION 982 (O. Edenhofer et al. eds., 2011).

400. See Fthenakis & Kim, *supra* note 170, at 2043; see also MATS Rule, 77 Fed. Reg. 9304, 9368 (Feb. 16, 2012) (codified at 40 C.F.R. §§ 60, 63) (setting mercury emission standards for Hawaiian oil plants that are double the standards for continental oil plants).

401. Because Hawaii overwhelmingly relies on oil and coal for its electricity generation, the system as a whole can be considered more environmentally damaging than other grids considered in this paper for several reasons, including higher carbon intensity, mercury emissions, and water consumption. See Moomaw et al., *supra* note 399, at 982 (higher carbon intensity); MATS Rule, 77 Fed. Reg. at 9368 (higher mercury emission standards); Fthenakis & Kim, *supra* note 170, at 2043 (relatively high water use); see also *supra* Subsection

though it is also moving most aggressively towards a 100% renewable energy target.⁴⁰²

2. Public Trust Doctrine in Hawaii

Along with California, Hawaii is recognized for having one of the two most progressive public trust doctrines in the nation.⁴⁰³ While comparatively well developed,⁴⁰⁴ the public trust doctrine's history in Hawaii is complicated, winding through four separate governance and judicial regimes. The common law regarding natural resource management developed through these four legal regimes, becoming a confluence of Hawaiian customs, American common law public trust doctrine, and American influences of privatization.⁴⁰⁵

Early Hawaiian water law recognized both the appurtenant and riparian doctrines.⁴⁰⁶ In contrast, the public trust doctrine was not recognized by the Supreme Court of Hawaii until 1899, when the court recognized the then-Republic's ownership and trusteeship over submerged lands.⁴⁰⁷

As Hawaii transitioned into a U.S. Territory at the turn of the 20th century, Hawaiian courts continued to recognize the Territory's authority over water resources.⁴⁰⁸ Likewise, the court acknowledged that all fisheries belonged to the Territory in trust for the people, and the trustee's authority continually subjugates private fisheries to the Territory when acting for the

V.A.1 (describing California's electric grid, relying more on natural gas, implying lower emissions); *supra* Subsection V.B.1 (describing Wisconsin's electricity grid, relying on coal for only 54% of generation and little oil generation, substantially less than Hawaii's 82% of generation); *infra* Subsection V.D.1 (describing New Jersey's electricity grid, which relies on natural gas and nuclear instead of the more-damaging coal and oil for its generation).

402. In fact, earlier this year Hawaii amended its renewable portfolio standard to 100% by 2045. See Act 97, 28th Leg., Reg. Sess. (Haw. 2015), 2015 Haw. Sess. Laws *3 (to be codified at HAWAII REV. STAT. § 269-92) (amending subsection (a) to include a 100% target by 2045).

403. Kylie Wha Kyung Wager, *In Common Law We Trust: How Hawaii's Public Trust Doctrine Can Support Atmospheric Litigation to Address Climate Change*, 20 HASTINGS W.-NW. J. ENVTL. L. & POL'Y 55, 77 (2014).

404. On the other hand, Hawaiian courts have not spent as much time on the state's public trust obligations regarding wildlife resources, especially independent of the water aspects of the public trust. See, e.g., *id.* at 95-96.

405. See *McBryde Sugar Co. v. Robinson*, 504 P.2d 1330, 1339-45 (Haw. 1973).

406. An appurtenant right is a water right that is connected to a specific parcel of land, conveyed by the King of Hawaii, which were to be used only for cultivation of food and other basic needs. See *id.* Riparian rights, similar in that it is connected to property, are constrained to the bounds of reasonable use and also include the right to construct wharves. See *id.*

407. *King v. Oahu Ry. & Land Co.*, 11 Haw. 717, 725 (1899).

408. *Territory of Hawaii v. Kerr*, 16 Haw. 363, 376 (1905); see also *County of Hawaii v. Sotomura* 517 P.2d 57, 61-62 (Haw. 1973) (holding that the state owns all lands below the high water mark as shown by the vegetation line even if due to erosion).

common good.⁴⁰⁹ However, the public trust doctrine was noticeably absent in judicial opinions of the Territorial Hawaiian Court in its discussion of water rights. Indeed, in a series of cases, the Territorial Court consistently found in favor of private water rights and made no mention of the public interest in the waters.⁴¹⁰

However, “despite this long line of cases treating water as a private property,” the Supreme Court of Hawaii, which was constituted after statehood in 1959, held that all freshwater within the state is “held in trust by the state for the common good of its citizens.”⁴¹¹ Overturning previous court decisions supporting private ownership of water, the court held that because water in its natural state *de facto* belongs to the State in trust, surplus storm and fresh water is reserved to the State for the common good.⁴¹² The court also applied similar logic to Hawaii’s land. In the first and only public trust case to deal with the question of new lands caused by lava overflow, the Supreme Court of Hawaii ruled that all lands, in their natural state, including newly lava-formed lands, belong to the “people of Hawaii, held in public trust by the government for the benefit, use and enjoyment of all the people.”⁴¹³

The public trust doctrine was transformed in 1978 when the Hawaii Constitution was amended.⁴¹⁴ First and foremost, the public trust was applied to *all* natural resources

[f]or the benefit of present and future generations[.] [T]he State and its political subdivisions shall conserve and protect Hawaii’s natural beauty and all natural resources, including land, water, air, minerals and energy sources, and shall promote the development and utilization of these resources in a manner consistent with their conservation and in furtherance of the self-sufficiency of the State. All public natural resources are held in trust by the State for the benefit of the people.⁴¹⁵

409. Bishop v. Mahiko, 35 Haw. 608, 640–47 (1940).

410. Marie Kyle, *The “Four Great Waters” Case: An Important Expansion of Wai’ahole Ditch and the Public Trust Doctrine*, 17 U. DENV. WATER L. REV. 21, 25 (2013) (citing Hawaiian Commercial & Sugar Co. v. Wailuku Sugar Co., 15 Haw. 675, 680 (1904) (holding surplus water belonged to the konohikis and they could do whatever he pleases regardless of downstream impacts); Territory of Hawaii v. Gay, 31 Haw. 376, 377 (1930) (holding normal surplus water belongs to the private owner and the Territory cannot enjoin its use)).

411. *Id.* (citing McBryde Sugar Co. v. Robinson, 504 P.2d 1330, 1345–46 (Haw. 1973)).

412. *McBryde Sugar*, 504 P.2d at 1345–46.

413. State v. Zimring, 566 P.2d 725, 734–35 (Haw. 1977).

414. See Wager, *supra* note 403, at 90–98.

415. HAW. CONST. art. XI, § 1.

The amendment also explicitly mentioned water use, adding that the “State has an obligation to protect, control and regulate the use of Hawaii’s water resources for the benefit of its people.”⁴¹⁶ It also required the Legislature to set up a water resources agency to manage and conserve, as well as establish procedures for, the uses of Hawaii’s waters, which became the Commission on Water Resources Management (CWRM).⁴¹⁷ Less than a decade later, the Legislature adopted the State Water Code, which recognized “that the waters of the State are held for the benefit of the citizens of the State.”⁴¹⁸ The Code requires every water use permit applicant to establish reasonable-beneficial use.⁴¹⁹

Thus, the Hawaiian public trust doctrine has not only a complex and pluralistic common law history but also a detailed constitutional and statutory one. Moreover, an important effect of incorporating the public trust as a constitutional provision is that the courts became the ultimate authority to interpret and protect natural resources, especially water use.⁴²⁰ This greatly heightened the scrutiny of the court’s judicial review in public trust cases. Since the public trust doctrine was constitutionally codified, the Supreme Court of Hawaii has declined to draw a distinction between surface water and groundwater, holding that any diversion, whether from the surface or the ground, is subject to other protected rights, including public and native Hawaiian rights.⁴²¹

The development of the Hawaiian public trust doctrine culminated at the turn of the millennia in the seminal Hawaiian public trust doctrine case, *Waiahole I*.⁴²² In that case, “native Hawaiians and local farmers sought to restore streams that had been diverted by the State’s most powerful private interests, including former sugar plantations who had participated in the overthrow of the Hawaiian Monarchy during the late 1800s.”⁴²³ Despite the substantial authority and duty delegated to the CWRM, it continued to stumble to adequately protect the state’s water resources.⁴²⁴ Noting that the

416. *Id.* § 7.

417. *Id.*

418. HAW. REV. STAT. § 174C-2(a) (2011).

419. *Id.* § 174C-49(a)(2); see also *Waiahole I*, 9 P.3d 409, 442–47 (Haw. 2000) (discussing the definition of a reasonable and beneficial use, which includes the purpose of the use, its economic value, the potential damages to society, and potential mitigation of waste or harm).

420. See *Waiahole I*, 9 P.3d at 442–47; see also *In re Wai’ola O Moloka’i Inc.*, 83 P.3d 664, 684 (Haw. 2004).

421. *Reppun v. Bd. of Water Supply*, 656 P.2d 57, 73 (Haw. 1982).

422. *Waiahole I*, 9 P.3d at 433.

423. Kyle, *supra* note 410, at 22 (citations omitted); see also *Waiahole I*, 9 P.3d at 423–24 (discussing plantation owners involved in the case, but not their predecessors).

424. *Waiahole I*, 9 P.3d at 454, 467.

public trust doctrine has been elevated by the people of the Hawaii to the level of a constitutional mandate,⁴²⁵ the *Waiahole I* court condensed its public trust jurisprudence into a couple of essential principles. First, the constitutional amendment embodies both the protection and the maximum reasonable and beneficial use of water resources.⁴²⁶ Second, the CWRM is required to make plans and decisions regarding water “from a *global, long-term perspective*”⁴²⁷ while protecting and preserving “the *rights of present and future generations* in the waters of the state”⁴²⁸ as well applying the precautionary principle to trust resources.⁴²⁹

In the face of water use permit applications, the court held that the CWRM must begin with a presumption in favor of public trust resources—applicants have the burden of justifying their water uses in light of the purposes protected by the public trust.⁴³⁰ Likewise, the state is compelled to consider the water use application in the context of the cumulative impact of current and proposed diversions, potential alternatives, and the promotion of maximum beneficial use.⁴³¹ The court summarized that the state can only compromise public rights in trust resources in decisions made with a “level of openness, diligence, and foresight commensurate with the high priority these rights command under the laws of our state.”⁴³²

After *Waiahole I*, the Supreme Court of Hawaii used the public trust doctrine to hold groundwater well permit applications subject to native Hawaiian water reservations.⁴³³ In addition, the Court has recognized the role of the public trust doctrine in protecting wildlife habitat⁴³⁴ and water quality that was jeopardized by soil erosion.⁴³⁵ In each case, the Court required the petitioners to show that a public trust violation had occurred but concluded that the petitioner had been unable to demonstrate a threshold level of harm to trust resources.⁴³⁶ Though the courts denied the public trust

425. *Id.* at 433.

426. *Id.* at 451. This requires the CWRM to both protect and develop waters to the maximum extent practicable.

427. *Id.* at 455 (emphasis added).

428. *Id.* at 453 (emphasis added).

429. *Id.* at 467.

430. *Id.* at 454.

431. *Id.* at 455–58.

432. *Id.* at 455.

433. *See In re Wai'ola O Moloka'i Inc.*, 83 P.3d 664, 692–94 (Haw. 2001).

434. *See, e.g., Morimoto v. Bd. of Land & Nat. Res.*, 113 P.3d 172, 184 (Haw. 2005).

435. *See, e.g., Kelly v. 1250 Ocean Side Partners*, 140 P.3d 985, 989–90 (Haw. 2006).

436. *See, e.g., Morimoto*, 113 P.3d at 184 (finding the state had provided “substantial evidence” there would be minimal impacts to wildlife and included mitigation measures); *Kelly*, 140 P.3d at 1013 (finding the petitioners failed to meet their burden of demonstrating that the State failed to uphold the public trust).

claims in each case, they were careful to reiterate that the state and every political subdivision thereof has a non-discretionary, affirmative duty to protect all public trust resources.⁴³⁷

In 2012, the Supreme Court of Hawaii further expanded its jurisdictional authority, recognizing the role of the public to utilize the public trust doctrine to challenge *any* important water decisions on due process grounds.⁴³⁸ The court held that, despite the lack of a statutory requirement or authority for judicial review, the public can challenge interim instream flow standards set by the CWRM under the public trust doctrine, citing the importance of considering public water use rights, even in temporary standards.⁴³⁹ This opened the door for the public to challenge a myriad of State actions and decisions concerning water resources.⁴⁴⁰

Hawaiian courts also have required permit applicants to demonstrate that there is an “absence of practicable alternatives.”⁴⁴¹ In addition, in a recent public trust case regarding the bottling and sale of water, the Supreme Court of Hawaii affirmed the state’s manifest duty to require permit applicants to demonstrate that their actions will have no adverse impacts on the principles and purposes of the public trust doctrine.⁴⁴² Emphasizing that private commercial uses are not protected by the public trust and that public rights in trust resources are superior to private developmental interests,⁴⁴³ the court distilled a framework of the public trust doctrine detailing the trust obligations of the state, based on prior case law:

- a. The agency’s duty is to maintain the purity and flow of [state] waters for future generations and to assure that the waters . . . are put to reasonable and beneficial use.
- b. The agency must determine whether the proposed use is consistent with the trust purposes:
 - i. the maintenance of waters in their natural state;
 - ii. the protection of domestic water use;

437. *Morimoto*, 113 P.3d at 184; *Kelly*, 140 P.3d at 1006–10.

438. *In re Iao Ground Water Mgmt. Area High-Level Source Water Use Permit Application & Petition (Four Great Waters)*, 287 P.3d 129, 145 (Haw. 2012).

439. *Id.* at 163.

440. Kyle, *supra* note 410, at 37; *see also Four Great Waters*, 287 P.3d at 183 (Acoba, J., concurring) (noting that a “public trust claim can be raised by members of the public who are affected by potential harm to the public trust” and arguing for further expansion of the Court’s jurisdiction regarding public trust cases).

441. *In re Contested Case Hearing On the Water Use Permit Application Filed By Kukui (Molokai), Inc. (Kukui (Molokai))*, 174 P.3d 320, 334–35 (Haw. 2007).

442. *Kauai Springs, Inc. v. Planning Comm’n*, 324 P.3d 951, 984 (Haw. 2014).

443. *Id.* at 983.

- iii. the protection of water in exercise of Native Hawaiian and traditional and customary rights; and
 - iv. the reservation of water enumerated by the State Water Code.
- c. The agency is to apply a presumption in favor of public use, access, enjoyment, and resource protection.
 - d. The agency should evaluate each proposal for use on a case-by-case basis, recognizing that there can be no vested rights in the use of public water.
 - e. If the requested use is private or commercial, the agency should apply a high level of scrutiny.
 - f. The agency should evaluate the proposed use under a “reasonable and beneficial use” standard, which requires examination of the proposed use in relation to other public and private uses.⁴⁴⁴

The Hawaiian public trust doctrine, through its confluence of origins, has developed into a powerful constitutional and statutory tool that provides comprehensive protection for water resources. Furthermore, the public trust doctrine has provided “the judiciary with broad authority to mandate concrete, substantive results and grants them wide latitude in fashioning outcomes that adequately protect State’s trust resources.”⁴⁴⁵ Given the doctrine’s strength, it is surprising that Hawaiian courts have not found a single wildlife trust violation in any case they have heard.⁴⁴⁶ Instead, courts have focused on stringent protection on the water aspect of the public trust doctrine. Despite the robust protection of water resources, there has been no application of the public trust doctrine to Hawaii’s electricity production.

3. Overview of Current Hawaii Electricity Laws

Given the high economic and environmental costs of fossil fuels, Hawaii has set lofty goals for renewable energy initiatives and developed a number of renewable energy laws. Hawaiian law requires the statewide reduction of GHG emissions to 1990 levels by the year 2020.⁴⁴⁷ To accomplish this goal, Hawaii enacted an RPS, requiring 15% generation come from renewable sources by 2015, increasing to 25% by 2020, and rising to an

444. *Id.*

445. Kyle, *supra* note 410, at 50.

446. See, e.g., *Morimoto v. Bd. of Land & Nat. Res.*, 113 P.3d 172, 184 (Haw. 2005).

447. Douglas A. Codiga, *Hawaii Clean Energy Law and Policy*, 13 HAW. B.J. 4 (2009); see also HAW. REV. STAT. § 342B-72(a)(1) (2010) (instructing the Department of Health Director to establish measures to “achieve the maximum practically and technically feasible and cost-effective reductions in greenhouse gas emission”).

ambitious 40% by 2030.⁴⁴⁸ In addition to the RPS, Hawaii has also developed an energy efficiency portfolio standard (EEPS), requiring a 30% reduction in energy use by 2030.⁴⁴⁹ While Hawaii is currently ahead of both their interim RPS and EEPS goals,⁴⁵⁰ as of January 1, 2015, energy efficiency measures stopped counting towards the RPS.⁴⁵¹ Combining the EEPS and the RPS, Hawaii seeks to accomplish a 70% reduction in fossil fuel use and climate change emissions by 2030.⁴⁵²

Hawaii has developed a specific permitting process for renewable energy projects, known as section 201N, including a full-time Renewable Energy Facilitator position to streamline the development of renewable energy projects.⁴⁵³ Likewise, the state of Hawaii offers residents an investment tax credit of 35% of total capital costs of solar projects and 20% of capital costs of wind projects.⁴⁵⁴ The Hawaiian Public Utilities Commission (HPUC) has also implemented a feed-in tariff (“Hawaii FIT”), guaranteeing anywhere from 12 to 31.5 cents per kWh, depending on the technology, for new renewable energy projects, though the program is constrained to projects less than or equal to 5 MW in capacity.⁴⁵⁵ Thus far, the Hawaii FIT has largely been used for local or residential solar PV projects.⁴⁵⁶

448. HAW. REV. STAT. § 269-92(a) (2007 & Supp. 2013).

449. *Id.* § 269-96 (2007 & Supp. 2013). As an aside, there may be public trust implications of energy efficiency programs, such as the use of seawater to provide air conditioning. See JONATHAN LILLEY ET AL., CENTER FOR SUSTAINABLE COASTAL TOURISM, POTENTIAL BENEFITS, IMPACTS, AND PUBLIC OPINION OF SEA WATER AIR CONDITIONING IN WAIKIKI (2013), http://seagrant.soest.hawaii.edu/sites/default/files/publications/web_final_swac_public_report_2.pdf.

450. HPUC, *supra* note 395, at 26–29. In fact, in 2013, the HPUC found that Hawaii was ahead of schedule, already at its required 2015 levels. *Id.* at 26.

451. HAW. REV. STAT. § 269-92(b)(2). Before this change, energy *reductions* counted towards the renewable energy *production* goals. HPUC, *supra* note 395, at 26.

452. Codiga, *supra* note 447, at 6–7.

453. HAW. REV. STAT. § 201N-1 to 201N-33 (2001 & Supp. 2013); *see also* HAW. REV. STAT. § 201-12.5 (2001 & Supp. 2013) (establishing the duties of the Renewable Energy Facilitator).

454. *Id.* § 235-12.5. However, this incentive is capped at \$5,000 and \$1,500 for solar and wind projects, respectively. *Id.*

455. Haw. Elec. Co., *Feed-In Tariff Program*, CLEAN ENERGY (2015), <http://www.heco.com/heco/Clean-Energy/Clean-Energy-Generation> (follow “Feed-in Tariff (FIT)” hyperlink). Briefly, a feed-in tariff is a policy mechanism that guarantees a price for renewable electricity that is provided to the grid, often at rates much higher than the retail price of electricity. *See generally* Toby Couture & Yves Gagnon, *An Analysis of Feed-in Tariff Remuneration Models: Implications for Renewable Energy Investment*, 38 ENERGY POLY 955 (2010).

456. Codiga, *supra* note 447, at 10.

4. Applications of the Public Trust Doctrine in Hawaii

Despite lofty renewable energy goals and electricity production that is dominated by fossil fuels and large water use, Hawaiian courts have not been called upon to consider substantive legal challenges to the state's electricity policy. Because the state has not faced any significant legal challenges to its renewable energy plans, it does not yet need to utilize the public trust doctrine as a legal defense, though it may need to in the future as renewable energy penetration increases. However, at present, the public trust doctrine provides a tool for Hawaiian citizens to accelerate the state's transition to renewable energy, thus affording further protection of trust resources.

First, the Hawaiian public could utilize the strict protections on public trust water resources to attempt to force conventional electricity production plants to retrofit their open-cycle CWIS to closed-cycle. In 2013, pumps associated with electricity production comprised approximately 14 to 20% of Hawaii's overall water withdrawals.⁴⁵⁷ Furthermore, the overwhelming majority of these power plants utilize open-cycle CWIS despite Hawaii's protectionist water resource laws.⁴⁵⁸ Applying the framework from the public trust case law regarding water use to the electricity production's current water use clearly implicates the continued operation of open-cycle CWIS. Courts have repeatedly emphasized that while private commercial uses of water are not forbidden, they must meet a high level of scrutiny and maximize benefits to society, including mitigation measures and a lack of any practicable alternative.⁴⁵⁹

While this logic has typically been applied to private parties that have to bear increased capital costs to access alternative *sources* of water,⁴⁶⁰ there

457. Email from Neal Fujii, State Drought and Water Conservation Coordinator to Lance Noel, (Mar. 2, 2015) (on file with author) (providing well-pumping data from the Comm'n on Water Resources Management (CWRM) demonstrating that total withdrawals associated with electricity production in Hawaii in 2013 were 63.8 million gallons per day (mgd) and total Hawaiian withdrawals were 462 mgd, including brackish water); CTR. FOR ISLAND CLIMATE ADAPTATION & POLICY (ICAP), WATER RESOURCES AND CLIMATE CHANGE ADAPTATION IN HAWAII: ADAPTIVE TOOLS IN THE CURRENT LAW AND POLICY FRAMEWORK 10 (2012), <http://islandclimate.net/publications/> (total Hawaiian water withdrawals in 2010, the most recent year available, were 316.4 mgd, not including brackish water). Moreover, since the CRWM does not keep track of CWIS that use ocean water, these figures and impacts are conservative and do not include all power plants.

458. See HAW. ELEC. CO., HAWAIIAN ELECTRIC POWER SUPPLY IMPROVEMENT PLAN 5-62 (2014), <http://dms.puc.hawaii.gov/dms/> (search for docket number 2014-0183, which directs you to Power Supply Improvement Plans for Hawaiian Electric Company, Inc., Docket No. 2014-0183 (Haw. Pub. Util. Comm'n Aug. 26, 2014), switch to "Documents" tab, and look for the Improvement Plan document).

459. *Waiahole I*, 9 P.3d 409, 454-55 (Haw. 2000).

460. *Id.* at 427-28; see also *Kukui (Molokai)*, 174 P.3d 320, 495-96 (Haw. 2007).

is no reason this cannot or should not be applied to the capital costs to implement alternative *technologies*, such as a CWIS, to greatly reduce water demand. In accordance with the public trust doctrine, the state should require permittees to demonstrate an absence of any practicable mitigating measures, such as retrofitting to a closed-cycle CWIS, especially given the reliance on limited water and wildlife resources of the islands.

Beyond the direct water and wildlife impacts of the continued use of conventional electricity, Hawaii faces substantial impacts from climate change on its resources due to its island nature and low-lying topography.⁴⁶¹ One of the impacts of climate change that is of particular concern to Hawaii is sea-level rise and salt water intrusion, decreasing fresh groundwater discharge.⁴⁶² Because climate change, through sea-level rise, will affect the present and future generations' interest in the use of groundwater, the state has the authority and duty to minimize these impacts under the public trust doctrine.

Furthermore, Hawaiian courts have adopted a perspective on the public trust that is highly conducive to the connection between climate change and public trust waters. For example, the courts have advised state agencies to adopt a global, intergenerational perspective and ignore "artificial distinctions" not borne out of the present practical realities or current knowledge.⁴⁶³ These principles, combined with the scientific knowledge of climate change's impact on Hawaii's natural resources, give the state a clear authority under the public trust doctrine to regulate sectors that contribute to climate change and thereby protect *all* waters of the state, especially those reserved for public trust and native Hawaiian uses.

Despite the state's commitment to large-scale development of renewable energy and the enactment of section 201N to facilitate renewable energy permitting, the permitting process continues to be seen as the main barrier for renewable energy development in Hawaii.⁴⁶⁴ Confounding this issue,

461. Wager, *supra* note 403, at 64–65.

462. Michael et al., *supra* note 216, at 2230–38 (finding that the areas most likely to be vulnerable to these impacts are topography-limited, whereas other areas of Hawaii are recharge-limited and unlikely to be as vulnerable to the impacts from sea-level rise); see also ICAP, *supra* note 457, at 16 (discussing the rate of sea level rise in Hawaii and noting the impact on salt water intrusion).

463. *Waiahole I*, 9 P.3d at 447 (determining that the scope of the sovereign should not be constrained to "artificial distinctions neither recognized by the ancient system nor borne out in the present practical realities of the state" while recognizing that the public trust doctrine "does not remain fixed for all time, but must conform to changing needs and circumstances").

464. S. BUSCHE ET AL., NAT'L RENEWABLE ENERGY LAB., RENEWABLE ENERGY PERMITTING BARRIERS IN HAWAII: EXPERIENCE FROM THE FIELD 11 (2013), <http://www.nrel.gov/docs/fy13osti/55630.pdf> ("The permitting process continues to be a main barrier to the development of renewable energy projects in Hawai'i[.]").

the Hawaiian Department of Business, Economic Development & Tourism (DBEDT), which the legislature charged with implementing section 201N, recently conducted a study urging the legislature to repeal section 201N.⁴⁶⁵ Specifically, the DBEDT argues that section 201N fails to streamline renewable energy permitting and may actually prolong permitting time, including the perception that the DBEDT has become an unnecessary “middleman” that agencies are reluctant to commit to deadlines with, which in turn makes the process undesirable to renewable energy developers.⁴⁶⁶ On the other hand, repealing section 201N potentially reduces community involvement by creating the public perception that DBEDT no longer supports renewable energy development and by decreasing opportunities for public engagement during project development.⁴⁶⁷

Essentially, section 201N is an imperfect statute with several useful provisions that may be lost in the inefficacy of other provisions. Connecting the public trust doctrine to Hawaii’s energy planning decisions can help alleviate these concerns with section 201N and guide developers and permitting agencies under established expectations while the permitting statutes are repealed or amended, especially since the Hawaiian courts have ruled that the public trust can never be subsumed.⁴⁶⁸ It may be useful for the State, in the absence of section 201N, to apply the public trust framework as laid out in *Kauai Springs* to electricity permitting.⁴⁶⁹

The deployment of renewable electricity would increase the purity and flow of waters and return water to its source from private commercial CWIS. This would return waters back to the presumably favored uses of the public, while also reducing climate change and mercury pollution. This implies that the state has an affirmative obligation to implement renewable energy to properly discharge its fiduciary duty. This affirmative obligation also could work to facilitate DBEDT’s streamlining of renewable energy permitting without the agency having to rely on the burdensome and ineffective section 201N.

465. DEP’T OF BUS., ECON. DEV., & TOURISM, HAWAII STATE ENERGY OFFICE, RENEWABLE ENERGY FACILITATION ACTIVITIES AND THE RENEWABLE ENERGY FACILITY SITING PROCESS (2014), http://energy.hawaii.gov/wp-content/uploads/2011/10/Act-208-201N-Facilitator-Report_11-20-14_FINAL.pdf; see also HAW. REV. STAT. § 201N-1 to -33 (2001 & Supp. 2013).

466. DEP’T OF BUS., ECON. DEV., & TOURISM, *supra* note 465, at 11–12.

467. *Id.* at 14–15. While the DBEDT has made “considerable effort to notify and engage communities in its everyday operations,” repealing section 201N would require DBEDT to engage stakeholders further for the other resources still available through DBEDT outside of section 201N. *Id.*

468. *Waiahole I*, 9 P.3d at 442–43 (finding the “suggestion that such a statute could extinguish the public trust, however, contradicts the doctrine’s basic premise, that the state has certain powers and duties which it cannot legislatively abdicate”).

469. See *Kauai Springs, Inc. v. Planning Comm’n*, 324 P.3d 951, 984 (Haw. 2014).

Conversely, since Hawaiian courts have highly scrutinized agencies when they appear to abdicate their public trust duties and have recognized the public's right to judicial review, the public will have assurance that the DBEDT will continue to implement policies to encourage renewable energy. Any failure to uphold its duties could then result in judicial intervention to force DBEDT to protect public trust resources.⁴⁷⁰ Therefore, should section 201N be repealed, the public trust doctrine could work to advance the best of both worlds—the DBEDT could effectively encourage renewable energy in the absence of an effective statutory regime, and the citizens of Hawaii would be assured that the DBEDT will continue to implement renewable energy policies.

The comprehensive framework provided by Hawaii's public trust doctrine also protects against renewable energy deployment needlessly impacting public trust resources. For example, while wind energy provides significant benefits to public trust resources, there are growing concerns about its impacts to the endangered Hawaiian Hoary Bat.⁴⁷¹ Because the Hawaiian public trust doctrine authorizes and requires state agencies to continually reassess previous public trust-related permitting decisions, especially if the nature of the impact or possible alternatives on trust resources have changed,⁴⁷² the state can require all electricity production, including wind energy, to implement further mitigation at any time, even if the state has already granted the operator a permit. Such flexibility ensures that the state implements the most reasonable and beneficial electricity production while concomitantly maximizing protection of trust resources and value to society.

The public trust doctrine can ensure that Hawaii continues to implement renewable energy in a way that maximizes value to society in accordance with its trust duties, benefiting both the state and its citizens. Through the public trust doctrine, citizens are granted a legal tool to force the state to continually implement environmental protections in electricity planning. Likewise, the state is authorized under the trust to take broad

470. Although DBEDT was not originally burdened with any public trust duties by statute, nor has it been burdened by the courts, Hawaii's Constitution dictates that *all* political subdivisions of the State shall conserve and protect *all* natural resources of Hawaii, which would necessarily include the DBEDT. See HAW. CONST. art. XI, § 1.

471. See Edward B. Arnett & Erin F. Baerwarld, *Impacts of Wind Energy Development on Bats: Implications for Conservation*, in *BAT EVOLUTION, ECOLOGY, AND CONSERVATION* 435, 444–45 (Rick A. Adams & Scott C. Pedersen eds., 2013). While current impacts on the bats are minimal, increased penetration of wind energy may be cause for concern. *Id.* (stating that there have been somewhere between 4 and 8 Hawaiian hoary bats found at wind facilities and that wind power expansion may increase mortality for various endangered bat species).

472. See *Waiahole I*, 9 P.3d at 461.

action to streamline permitting and implementation of renewable energy, which Hawaii may find particularly useful in the coming years as RPS goals become potentially more difficult to accomplish. In conclusion, legislative recognition of the public trust doctrine's application to Hawaiian electricity planning and policy will improve decisionmaking, increase regulatory certainty, allow further community involvement, and maximize protection of the environment.

D. *New Jersey*

1. Current Electricity System

New Jersey relies almost entirely on natural gas and nuclear electricity generation. Together, these sources comprised nearly 93% of electric generation in 2014.⁴⁷³ The remaining 7% came primarily from coal, solar, landfill gas, and oil.⁴⁷⁴ Conventional electricity dominates the New Jersey grid, generating 97% of all electricity.⁴⁷⁵ Minimal coal usage and high penetrations of nuclear and natural gas results in fewer toxic and climate change emissions, especially in comparison to other grids such as Wisconsin and Hawaii that rely on coal or oil.⁴⁷⁶ However, reliance on thermal power plants, especially nuclear, has substantial negative effects on water resources and aquatic organisms. Thus, the absence of renewable energy poses threats to New Jersey's water and aquatic wildlife resources and, to a lesser extent, to the mitigation of climate change and toxic emissions.

2. Public Trust Doctrine in New Jersey

New Jersey has developed a unique perspective on the public trust doctrine. New Jersey was the one of first states to recognize and apply the public trust doctrine in *Arnold v. Mundy*,⁴⁷⁷ a hallmark case that "arose from a dispute in New Jersey over just a few bushels of oysters."⁴⁷⁸ *Arnold* focused on ownership of and access to oysters located on the bed of a navigable river, and the New Jersey Supreme Court seized the opportunity to broadly enunciate public rights.⁴⁷⁹ The *Arnold* court first found that title to

473. EIA, *supra* note 281 (detailing plant-specific monthly generation in New Jersey for the year of 2014).

474. *Id.* New Jersey has one wind farm, which represents only 0.3% of generation. *Id.*

475. *Id.*

476. On the other hand, New Jersey imports a substantial amount of its electricity, at least 25% of demand, most of which is coal-generated. N.J. BD. OF PUB. UTIL., NEW JERSEY ENERGY MASTER PLAN 26 (2011).

477. *Arnold v. Mundy*, 6 N.J.L. 1 (1821).

478. Timothy M. Mulvaney & Brian Weeks, "Waterlocked": Public Access to New Jersey's Coastline, 34 *ECOLOGY L.Q.* 579, 587 (2007).

479. *Arnold*, 6 N.J.L. at 12–13.

submerged lands under navigable rivers and the sea, as well as the exclusive right to fish, are reserved to the sovereign power of the state, which “hold[s] them subject to the common right of fishery of the citizens at large, of which they cannot deprive them.”⁴⁸⁰ The court went on to note that any such deprivation “would be a grievance which never could be long borne by a free people.”⁴⁸¹

Though *Arnold* would become an influential case, impacting public trust cases in numerous jurisdictions for years to come,⁴⁸² its broad language did not immediately produce a broad public trust doctrine in New Jersey. Despite the lofty language used in *Arnold*, the New Jersey public trust doctrine “remained relatively quiet from the second half of the nineteenth century through the first half of the twentieth century.”⁴⁸³ However, in 1972, in its first major action on the public trust since *Arnold*, the New Jersey Supreme Court lifted the public trust doctrine out of the water, expanding it to guarantee the public’s right to enjoy beach access.⁴⁸⁴ The court ruled that the public trust doctrine is sufficiently broad to include “public accessibility to and use of such lands for recreation and health, including boating and associated activities.”⁴⁸⁵ In finding that the public rights in tidal lands extend to “recreational uses, including bathing, swimming and other shore activities,” the court stressed that the “public trust doctrine, like all common law principles should not be considered fixed or static, but should be molded and extended to meet changing conditions and needs of the public it was created to benefit.”⁴⁸⁶

The New Jersey Supreme Court next expanded the scope of the public trust to include municipally-owned upland sand areas adjacent to the tidal

480. *Id.* at 30–31.

481. *Id.* at 78.

482. The first U.S. Supreme Court public trust cases relied on *Arnold*. *Martin v. Waddell's Lessee*, 41 U.S. 367, 417–18 (1842) (discussing *Arnold* as being “entitled to great weight”); *id.* at 419 (Thompson, J., dissenting) (concluding that the “majority of the court seem[s] to have adopted the doctrine of *Arnold* . . .”); *Ill. Cent. R.R. v. Illinois*, 146 U.S. 387, 456 (1892) (reiterating *Waddell's Lessee's* reliance on *Arnold*); see also BLUMM & WOOD, *supra* note 19, at 693–95 (discussing *Waddell's Lessee* and *Illinois Central* and their reliance on *Arnold*).

483. *Mulvaney & Weeks*, *supra* note 478, at 587. The cases until that point generally focused on questions of title of submerged lands. See, e.g., *Bailey v. Driscoll*, 111 A.2d 265, 267 (N.J. 1955) (holding that the title of riparian owners only extended to the high-water mark, and anything below that title belonged to the state in trust).

484. *Neptune City v. Borough of Avon-by-the-Sea*, 294 A.2d 47, 53 (N.J. 1972); see also David Carboni, *Rising Tides: Reaching the High-Water Mark of New Jersey's Public Trust Doctrine*, 43 RUTGERS L.J. 95, 102 (2012).

485. *Neptune City*, 294 A.2d at 306–07. It is worth noting that the Court went on to cite *Sax*, *supra* note 28, as an authority in the expansion of the public trust doctrine. *Id.* at 310.

486. *Neptune City*, 294 A.2d at 309.

waters.⁴⁸⁷ The court then moved to beach access to dry sand uplands owned by a quasi-public, quasi-private entity in *Matthews v. Bay Head Improvement Association*.⁴⁸⁸ The Bay Head Improvement Association prohibited access to the waters via their beach, as well as the use of their foreshore for recreational purposes, but did not restrict use of the water itself.⁴⁸⁹ However, the court held that “[w]ithout some means of access the public right to use the foreshore would be meaningless” and would effectively eliminate the rights of the public trust doctrine.⁴⁹⁰ Thus, the court held that private dry sand uplands are, to some degree, subject to the public trust doctrine and developed a four point framework to determine when privately-owned dry sand uplands must be made available to satisfy the public.⁴⁹¹ The four points include:

- 1) Location of the dry sand area in relation to the foreshore.
- 2) Extent and availability of publicly-owned upland sand areas.
- 3) Nature and extent of the public demand.
- 4) Usage of the upland sand by the owner.⁴⁹²

Two decades after *Matthews*, the New Jersey Supreme Court revisited the access rights of the public, this time considering an entirely privately-owned, dry sandy upland in *Raleigh Avenue Beach Association v. Atlantis Beach Club*.⁴⁹³ Reaffirming that “reasonable access to the sea is integral to the public trust doctrine,”⁴⁹⁴ the court applied the *Matthews* four-point framework, concluding that the each point was satisfied and thus the public has a right to use and access these private lands in question.⁴⁹⁵ Most recently, the New Jersey Supreme Court applied the public trust doctrine to deny a takings claim that arose due to an expansive beach replenishment program.⁴⁹⁶ The New Jersey courts also have held that even when the state conveys riparian lands, riparian rights are subject to the public trust, and the

487. See *Van Ness v. Borough of Deal*, 393 A.2d 571, 573 (N.J. 1978).

488. *Matthews v. Bay Head Improvement Ass’n*, 471 A.2d 355 (N.J. 1984).

489. *Id.* at 359–60.

490. *Id.* at 364.

491. *Id.* at 365.

492. *Id.* The Court provided this framework to help guide future applications of the public trust doctrine to privately-owned sandy uplands but did not speak to the relative importance of the four points. In addition, the Court declined to rule that all private beaches are subject to the public trust, and to what extent, only deciding that private lands are not immune from public trust claims. *Id.* at 369.

493. *Raleigh Ave. Beach Ass’n v. Atlantis Beach Club*, 879 A.2d 112 (N.J. 2005).

494. *Id.* at 120.

495. *Id.* at 121–24.

496. See *City of Long Branch v. Liu*, 4 A.3d 542 (N.J. 2010).

state “never waives its rights to regulate the use of the public trust property.”⁴⁹⁷

Despite a robust public trust doctrine in relation to beach access, there have only been a few modern applications to water or wildlife resources. The case of most relevance to electricity production⁴⁹⁸ is *New Jersey Department of Environmental Protection v. Jersey Central Power & Light Co.*, which held that fish and wildlife are trust resources.⁴⁹⁹ The court held that the State not only has the right, but more substantially, has an affirmative fiduciary obligation to ensure that the public’s rights are protected, as well as a duty to seek compensation for any diminution of trust resources.⁵⁰⁰

The court also recently emphasized trust language in *ZRB, LLC v. New Jersey Department of Environmental Protection*, a case regarding endangered species, finding that the legislative policy underlying the regulation of endangered and threatened species “is to ‘manage all forms of wildlife to insure their continued participation in the ecosystem’ and to ‘accord special protection’ to endangered species.”⁵⁰¹ The court continued that “[w]ildlife is the common property of all and held in trust by the State for all its people.”⁵⁰² Nevertheless, this constitutes merely dicta, and the New Jersey courts have not since addressed whether wildlife is part of the public trust doctrine, much less detailed the fiduciary duties of the state to protect wildlife.

New Jersey courts have applied the public trust doctrine to water in two other contexts: wetlands and drinking water. The court rejected a public trust claim that a permit to fill wetlands would damage the public interest, concluding that the petitioner failed to show that a public trust violation had occurred.⁵⁰³ It found that compensatory mitigation of other wetland areas not only does not violate the public trust doctrine but indeed serves the public interest by promoting tidally flowing and fresh waters.⁵⁰⁴ A New Jersey court also stated that because water is essential for human life, the

497. *Karam v. N.J. Dep’t of Env’tl. Prot.*, 205 A.2d 1221, 1228 (N.J. Super. Ct. App. Div. 1998) (citations omitted).

498. *See supra* notes 123–28 and accompanying text.

499. *N.J. Dep’t of Env’tl. Prot. v. Jersey Cent. Power & Light Co.*, 336 A.2d 750 (N.J. Super. Ct. App. Div. 1975), *rev’d on other grounds*, 351 A.2d 337 (N.J. 1976).

500. *Id.*

501. *ZRB, LLC v. N.J. Dep’t of Env’tl. Prot.*, 959 A.2d 866, 879 (N.J. Super. Ct. App. Div. 2008) (citing N.J. STAT. ANN. § 23:2A-2 (West 1997)).

502. *Id.* (citation omitted).

503. *In re Proposed Xanadu Redev. Project*, 955 A.2d 976, 1002 (N.J. Super. Ct. App. Div. 2008).

504. *Id.* The court also granted substantial deference to the state agencies in this decision, despite the potential impairment to public trust resources. *Id.* at 998.

public trust doctrine applies with “equal impact upon the control of our drinking water reserves.”⁵⁰⁵

Despite these examples, the New Jersey public trust doctrine is underutilized and underdeveloped outside the context of beach access. Indeed, although it was once considered to be a public trust doctrine pioneer, “New Jersey now finds itself behind the curve in protecting the public’s right to common ecological resources.”⁵⁰⁶ Furthermore, despite the notoriety of the New Jersey public trust doctrine, the state lacks any constitutional provisions codifying the public trust doctrine, and proposals to introduce such a provision have not been successful.⁵⁰⁷ Although the state statutes make it clear that water resources are held in trust for the public,⁵⁰⁸ no court has been called upon to adjudicate the scope and depth of the responsibilities that this statute places on the State. Therefore, the application of the New Jersey public trust doctrine to electricity production will rely largely on the common law, especially as it relates to the public’s right to recreation.

3. Overview of Current New Jersey Electricity Laws

New Jersey’s renewable electricity laws are largely comprised of its RPS standards and the associated Renewable Energy Credits (RECs).⁵⁰⁹ The New Jersey Board of Public Utilities (NJBPU) adopted a schedule that requires, by May, 2015,⁵¹⁰ that all electricity providers achieve an RPS of 11.3%, rising to a total of just over 20% by end of 2020.⁵¹¹ In addition to the overall RPS, there are also two carve-outs requiring a certain amount of solar and offshore wind.

The solar carve-out requires that a portion of all generation come from distributed solar energy using Solar Renewable Energy Credits (SRECs),

505. *City of Clifton v. Passaic Valley Water Comm’n*, 539 A.2d 760, 765 (N.J. Super. Ct. Law Div. 1987), *aff’d*, 557 A.2d 299 (N.J. 1989).

506. *Carboni*, *supra* note 484, at 106.

507. *Id.* at 122.

508. *See* N.J. STAT. ANN. § 58:1A-2 (West 2009 & Supp. 2015) (“[W]ater resources of the State are public assets of the State held in trust for its citizens . . .”).

509. *Id.* § 48:3-49 (West 2009 & Supp. 2015); *see also* Joshua S. Wirtshafter, *The Solar Resurrection: Keeping New Jersey’s Solar Industry Alive at the Expensive of Ratepayers*, 38 SETON HALL LEGIS. J. 189, 193–94 (2013) (detailing the history of the New Jersey RPS law and its amendments).

510. *See* N.J. STAT. ANN. § 48:3-51 (West 2009 & Supp. 2015). This statute was challenged in *PPL Energyplus, LLC v. Solomon*, 766 F.3d 241 (3rd Cir. 2014), where the Third Circuit found a different section, New Jersey Statutes section 48:3-98.2(b), was preempted by Federal Energy Regulatory Commission regulations, without preempting section 48:3-51. The court explicitly stated that “states may select the type of generation to be built—wind or solar, gas or coal,” essentially protecting the New Jersey RPS in section 48:3-51. *PPL Energyplus*, 766 F.3d at 255.

511. *See* N.J. STAT. ANN. § 48:3-87(d) (West 2009 & Supp. 2015).

which can be obtained for every megawatt hour (MWh) of solar energy produced.⁵¹² As a result of New Jersey's carve-out for solar, their SREC market is by far the largest in the nation, comprising nearly three-quarters of all national SREC trading.⁵¹³ However, the SREC market has fluctuated substantially since its inception in 2005, including a recent crash of SREC prices in 2012.⁵¹⁴ To save the SREC market, the New Jersey Legislature passed the Solar Resurrection Law in 2012, which has had mixed levels of success.⁵¹⁵

The second carve-out requirement under the New Jersey RPS directs the NJBPU to establish a program to authorize offshore renewable energy credits (ORECs) to support the construction of 1,100 megawatts of qualified wind projects.⁵¹⁶ The NJBPU also adopted rules on what constitutes a qualified offshore wind project, requiring applicants to show, among other things, a complete financial analysis of the offshore wind developer and of the project, a cost-benefit test demonstrating net benefits to the State, and a proposed OREC price, along with whatever other information the NJBPU requires.⁵¹⁷ However, unlike the RPS and the solar carve-out, there is no time constraint on the state to achieve the 1,100 megawatts of qualified wind projects. The NJBPU has full discretion to approve qualified offshore wind projects.⁵¹⁸ To date, the NJBPU has not done so and has not required any OREC obligations.⁵¹⁹

512. *Id.* § 48:3-87(d)(3). 2.45% of all generation in energy year (EY) 2015 must come from distributed solar energy, rising to 4.01% by EY 2028. *Id.*

513. LORI BIRD, NAT'L RENEWABLE ENERGY LAB., NREL REPORT NO. TP-6A20-52868, SOLAR RENEWABLE ENERGY CERTIFICATE (SREC) MARKETS: STATUS AND TRENDS 3, 19 (2011), <http://www.nrel.gov/docs/fy12osti/52868.pdf>.

514. Wirshafter, *supra* note 509, at 198. In 2012 the SREC price decreased from a high of \$650 to a low of \$50, largely due to an oversupply of SRECs in comparison to requirements. *Id.*

515. *Id.* at 202–03. As of October 2015, prices have slightly rebounded to \$170 per SREC. See N.J. Clean Energy Program, *Current SREC Trading Statistics Energy Year 2015*, SREC PRICING, <http://www.njcleanenergy.com/renewable-energy/project-activity-reports/srec-pricing/srec-pricing> (last visited Oct. 14, 2015).

516. N.J. STAT. ANN. § 48:3-87(d)(4) (West 2009 & Supp. 2015).

517. N.J. ADMIN. CODE §§ 14:8-6.5(a)(1) to 14:8-6.5(a)(16) (2015); see N.J. STAT. ANN. § 48:3-87.1(a) (West 2009 & Supp. 2015).

518. N.J. ADMIN. CODE § 14:8-6.2 (2015).

519. See, e.g., Brief of Respondent New Jersey Board of Public Utilities at 8, *In re* Petition of Fishermen's Atlantic City Windfarm, LLC (N.J. Super. Ct. App. Div. Jan. 15, 2015) (No. A-3932-13T3) [hereinafter *NJBPU Brief*] (A recent offshore wind application by the developer Fishermen's Energy has been denied several times and faced substantial difficulties.).

4. Applications of the Public Trust Doctrine in New Jersey

Because New Jersey overwhelmingly relies on conventional sources of electricity, particularly nuclear, the state's electricity production causes substantial damage to water and wildlife resources through water withdrawals. For example, in 2009, the most recent data available, the New Jersey Department of Environmental Protection (NJDEP) estimated that nearly half of all withdrawals in the state were from power plants, most of which used an open-cycle CWIS.⁵²⁰ Such withdrawals damage not only water quality, but also aquatic organisms that are killed as a result of impingement and entrainment (I&E).⁵²¹ Additionally, reliance on natural gas also contributes to climate change. With this in mind, there are two potential applications of the public trust doctrine to the impacts from electricity production. First, it may be applied directly to the public interest in wildlife and water resources, and second, it may be applied to water and wildlife impacts indirectly through the public's right to enjoy beaches and recreation.

As developed above, there is some precedent for the direct application of the public trust doctrine to the wildlife impacts of electricity production⁵²² as well as statutory support for a similar application regarding water impacts.⁵²³ Although less developed than access to dry sand beaches, the relative silence of New Jersey jurisprudence on the public trust's application to wildlife and water does not necessarily imply that the courts will not apply it robustly in the future. In fact, New Jersey courts have generally treated the scope of the trust doctrine as expansive, implying that it should be extended or fashioned in accordance to the public interest.⁵²⁴ Given the public's growing concern for wildlife and the environment, especially as they are impacted by climate change,⁵²⁵ it is reasonable to see how New Jersey courts could mold the heavily beach-access orientated public trust precedent to address the public's current needs: protecting local wildlife and

520. JEFFREY L. HOFFMAN, WATER WITHDRAWALS IN NEW JERSEY FROM 2000 TO 2009 (2014), <http://www.state.nj.us/dep/njgs/enviroed/infocirc/withdrawals2009.pdf>.

521. See *supra* Section IV.B.

522. See N.J. Dep't of Env'tl. Prot. v. Jersey Cent. Power & Light Co., 336 A.2d 750, 759 (N.J. Super. Ct. App. Div. 1975), *rev'd on other grounds*, 351 A.2d 337 (N.J. 1976).

523. N.J. STAT. ANN. § 58:1A-2 (West 2006 & Supp. 2015).

524. *E.g.*, Arnold v. Mundy, 6 N.J.L. 1, 12 (1821); see also Carboni, *supra* note 484, at 126 ("[T]he overall trend of the public trust doctrine in New Jersey has been to progressively recognize the public's changing needs . . ."); see also Van Ness v. Borough of Deal, 393 A.2d 571, 573 (N.J. 1978).

525. See, *e.g.*, Michael R. Greenberg et al., *Public Support for Policies After Hurricane Sandy*, 34 RISK ANALYSIS 997, 1007 (finding 64% of surveyed New Jersey residents felt that climate change is a risk to them and their families).

water resources from the direct impacts of conventional electricity production.

In fashioning such an application, the New Jersey judiciary might look to public trust doctrine jurisprudence in jurisdictions beyond its boundaries, as it has in the past. In *Neptune City*, for example, the court reviewed case law from Massachusetts, Wisconsin, Oregon, and California to come to the conclusion that beach access is required under the public trust doctrine.⁵²⁶ By looking to other jurisdictions, as well as the expansiveness and flexibility of its own public trust doctrine, New Jersey courts could, and indeed should, readily conclude that water and wildlife resources that are impacted by New Jersey's electricity system are included in the public trust *res*.

The direct application of the public trust doctrine to wildlife and water resources is not its only possible application to electricity production. Electricity production may directly reduce the public's ability to enjoy New Jersey's beaches by reducing opportunities to view wildlife and by degrading water quality.⁵²⁷ The more substantial concern, however, is that New Jersey's electricity system will continue to significantly threaten beaches by contributing to climate change, causing "severe long-term erosion and destruction associated with major storm events."⁵²⁸ In addition to destruction from hurricanes and other storm events, the New Jersey coast also faces the "looming threat of migrating shorelines due to sea level rise" from climate change.⁵²⁹ Taking these factors together, it is appropriate for the state to act to protect the public interest in beach access and recreation from the damages caused by conventional electricity production. David Carboni has argued that the public trust should be used to facilitate adaptation to sea level rise, suggesting the public has a right to preserve trust lands from destruction—" [O]therwise, there would be no lands for the public to enjoy."⁵³⁰

If the public has such a right, it follows that the state has the authority and duty to actively prevent this destruction. Thus far, the New Jersey legislature has failed to take action to mitigate rising sea levels. In the absence of legislative action, the judiciary may well be the only effective guardian to prevent the harm of public trust resources caused by sea level rise.⁵³¹ Given that public access to its priceless beach areas will be endangered by sea level

526. Borough of Neptune City v. Borough of Avon-By-The-Sea, 294 A.2d 47, 55 (N.J. 1972).

527. Mulvaney & Weeks, *supra* note 478, at 613.

528. *Id.* at 600–01; Lauren Mudd et al., *Assessing Climate Change Impact on the U.S. East Coast Hurricane Hazard: Temperature, Frequency and Track*, 15(3) NAT. HAZARDS REV. 04014001 (2014).

529. Carboni, *supra* note 484, at 97.

530. *Id.* at 126.

531. *Id.*

rise, the New Jersey courts themselves have recognized that “[p]rompt and decisive action by the Court is needed.”⁵³² Without significant state action, New Jersey’s beaches will be substantially impaired, begging the question: “What is the value of perpendicular public access to New Jersey’s coastline . . . if the public cannot enjoy themselves when they get there?”⁵³³

New Jersey courts can and should use the public trust doctrine to incentivize renewable electricity to protect the public’s interest in water, wildlife, and beaches. The public trust doctrine can alleviate two current renewable energy problems in New Jersey: the underperforming SREC market,⁵³⁴ and the persistent denial of offshore wind permit applications.⁵³⁵

The public trust doctrine could be utilized by citizen groups interested in solar energy implementation to require the NJBPU to update the RPS, cognizant of the public trust benefits, such that the SREC market would no longer be debilitated. The New Jersey courts, if convinced that the NJBPU, as a subdivision of the state,⁵³⁶ has public trust responsibilities, could order the NJBPU to adopt higher RPS standards in accordance with the protection of public trust resources to the maximum extent practicable, while ensuring that the NJBPU only requires climate change mitigation measures that are cost effective.⁵³⁷

Assuming that NJBPU is burdened by the public trust doctrine, it also would be useful to apply the public trust to the recent controversy regarding the potential construction of a 25 MW offshore wind farm near Atlantic

532. Van Ness v. Borough of Deal, 393 A.2d 571, 574 (N.J. 1978) (emphasis added).

533. Mulvaney & Weeks, *supra* note 478, at 618.

534. Wirtshafter, *supra* note 509, at 213–14.

535. See *In re* Petition of Fishermen’s Atlantic City Windfarm, LLC for the Approval of the State Waters Wind Project and Authorizing Offshore Wind Renewable Energy Certificates, No. A-3932-13T3, at 37 (N.J. Super. Ct. App. Div. 2015).

536. Since New Jersey has not fully developed the obligations of the public trust doctrine, no New Jersey court has addressed whether any state agencies other than the NJDEP and municipalities have the fiduciary duties of a trustee. However, many other states hold that the public trust doctrine applies to all political subdivisions of the state. See, e.g., *supra* note 470 and associated text (Hawaiian courts have held all political subdivisions of the state have public trust duties under their Constitution.).

537. The NJBPU is required by statute to periodically consider increasing the RPS and accounting for the reductions of air and water pollution. N.J. STAT. ANN. § 48:3-87(o)(1) (West 2009 & Supp. 2015). Using a threshold of “maximum extent practicable” implies that the NJBPU is not required to ignore the costs of raising the RPS but rather should only raise the RPS to the extent that it is practicable, though it will depend on the definition of “practicable.” A threshold of “maximum extent *feasible*” might permit or force substantially higher increases to the RPS. Compare *Waiahole I*, 9 P.3d 409, 451 (Haw. 2000) (requiring the CWRM to protect waters to the maximum extent practicable) with *Nat’l Audubon Soc’y v. Superior Court*, 658 P.2d 709, 712 (Cal. 1983) (requiring protection of water and wildlife resources so far as feasible).

City by developer, Fishermen's Energy.⁵³⁸ To briefly summarize the contentious last three years of the project development process, Fishermen's Energy proposed to construct five 5-MW wind turbines as a demonstration project 2.8 miles offshore from Atlantic City.⁵³⁹ As required by statute, Fishermen's Energy submitted an OREC price for the NJBPU to consider as part of their permit application.⁵⁴⁰ After a remand from the New Jersey Superior Court, the NJBPU denied the Fishermen's Energy application, saying that its proposal did not provide a net economic benefit to the state.⁵⁴¹ Fishermen's Energy has since appealed the permit denial.⁵⁴² Fishermen's Energy has mostly focused on arguing that NJBPU acted arbitrarily and capriciously by refusing to use Fishermen's proposed OREC price while largely ignoring the NJBPU's decision not to include environmental benefits in their calculations.⁵⁴³ The public trust doctrine would be useful to the efforts of Fishermen's Energy in their appeal process in two ways. First, the public trust doctrine could be used to force the NJBPU to consider the monetized environmental benefits in the net benefits test. This would necessarily increase the calculated benefits to the state under the net benefits test, which, when added to the other benefits, would in turn likely outweigh the costs of the project, regardless of which OREC price was selected. Also at issue in Fishermen's appeal is the degree of deference the court should accord NJBPU.⁵⁴⁴ The NJBPU argues that the court must confine its review exclusively to whether there exists "a *reasonable* basis for the Board's action."⁵⁴⁵ Had the NJBPU been burdened by trustee responsibilities Fish-

538. *In re* Petition of Fishermen's Atlantic City Windfarm, No. A-3932-13T3, at 37.

539. *NJBPU Brief*, *supra* note 519.

540. N.J. ADMIN. CODE § 14:8-6.5(a)(1)-(16); *see also* N.J. STAT. ANN. § 48:3-87.1(a)(5) (West 2009 & Supp. 2015). In their application, Fishermen's Energy originally proposed an OREC price of \$454.78, but after switching turbine designs and receiving subsidies, reduced the proposed OREC price to \$199.17. *See* Brief on Behalf of the Petitioner/Appellant, Fishermen's Atlantic Windfarm, LLC at 14, *In re* Petition of Fishermen's Atlantic City Windfarm, LLC (N.J. Super. Ct. App. Div. Dec. 15, 2014) (No. A-3932-13T3) [hereinafter *Fishermen's Energy Brief*].

541. *NJBPU Brief*, *supra* note 519, at 42. The NJBPU did not use Fishermen's Energy's reduced OREC price, but rather used a price of \$263 per MWh, citing uncertainty that Fishermen's Energy would receive the subsidies. Fishermen's Energy argues that the refusal to use the \$199.17 OREC price out of concern of the project's viability if they do not receive the tax credit is capricious, because this would only result in Fishermen's Energy's rate of return on the project decreasing from 9.78% to 7.49%, nowhere near the viability threshold, especially from the ratepayer's perspective. *See Fishermen's Energy Brief*, *supra* note 540, at 56, 61.

542. *Id.* at 1.

543. *Id.* at 49-58.

544. *NJBPU Brief*, *supra* note 519, at 46.

545. *Id.* at 45 (emphasis added).

ermen's Energy would be able to argue that since NJBPU's decision is damaging trust resources, the court is burdened with a duty to take a "hard look" at NJBPU's decision, not grant it broad deference. One of the main purposes of judicial review regarding the public trust doctrine is to provide a check on other branches of the government, which works to prevent the state from continuing to damage resources, resources which it holds in trust for the benefit of the public.⁵⁴⁶

While New Jersey has not incorporated the public trust doctrine substantially beyond common law applications to beach access, the doctrine is readily applicable to the impacts of New Jersey's electricity production grid. Not only would such application improve the resources held in trust for the public, it would also benefit the energy policy and planning of the state, ensuring reasonable development of renewable electricity.

DISCUSSION AND CONCLUSION

As seen in these four case studies,⁵⁴⁷ the public trust doctrine can provide a flexible legal tool to both citizens and governments to help advance

546. Instead, the Superior Court rejected Fishermen's Energy's proposition to grant NJBPU little or no deference, and instead granted NJBPU its usual level of deference. As a result, the court ruled that the NJBPU had not acted "unreasonably" and affirmed their decision to deny the Fishermen's Energy application. *In re* Petition of Fishermen's Atlantic City Windfarm, LLC for the Approval of the State Waters Wind Project and Authorizing Offshore Wind Renewable Energy Certificates, No. A-3932-13T3, at 37 (N.J. Super. Ct. App. Div. 2015).

547. In addition to the four states analyzed in-depth, the vast majority of states have developed the constitutional, statutory, and common law bases for the public trust doctrine in ways similar to the four states on which this Article focuses. See Robin Kundis Craig, *A Comparative Guide to the Western States' Public Trust Doctrine: Public Values, Private Rights and the Evolution Toward an Ecological Public Trust*, 37 *ECOLOGY L.Q.* 53, 81 (2010) (neither Nebraska nor Nevada have fully developed their public trust law); see also 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, 24 (2007) (Alabama, Missouri, and West Virginia have limited their public trust doctrines). Underscoring this point, a recent Pennsylvania case expanded the public trust doctrine to natural gas exploitation and development and could serve as a model for other states to follow. *Robinson Township v. Pennsylvania*, 83 A.3d 901 (Pa. 2013). Despite having constitutionalized the public trust doctrine, Pennsylvania had minimally extended public rights beyond the traditional navigation and fishing interests. However, in *Robinson Township*, the Pennsylvania Supreme Court struck down under the public trust doctrine a state law that pressured local governments to maximize oil and gas development. *Id.* at 913, 1000. While doing so the court enunciated three principles based on the doctrine: first, people have a right to an undamaged environment; second, the state is burdened with the public trust doctrine and has an affirmative duty to protect trust resources; and third, the state must protect trust resources in such a way that is impartial to all, including both present and future generations. *Id.* at 957-59. To fulfill these fiduciary obligations, the court held that the state must "prevent degradation, diminution, or depletion of public natural resources, and . . . act affirmatively to protect the environment . . . with the

and shape renewable energy development. At present, each of the four states remains beset with conventional sources of electricity production that continue to pose substantial environmental risks to the public interest. While each state's sense of justice has produced a varied public trust doctrine, electricity production impacts all trust resources, whether they are the traditional triad, or the emerging ecological aspects of the trust. As a result of its general applicability across states, the public trust doctrine is uniformly available to states that are aggressively transitioning to renewable electricity generation or those that have failed to advance renewable production.

As illustrated in the four case studies, the public trust doctrine can serve as: (1) a tool for citizens to force states to act on renewable electricity development; (2) a legal defense for states to validate actions encouraging renewable electricity development; (3) a means for courts to take a closer look at legislation, rulemaking, and decisions in individual matters (such as licenses, permits, and applications) made by the state that affect sources of electricity generation in the state; and (4) an opportunity for state agencies to supplement and guide imperfect statutes. Together, these four purposes of the public trust can ensure reasonable and timely development of renewable electricity as well as sufficient protection of trust resources.

First, the public trust doctrine provides a greater role for the judiciary to safeguard environmental concerns in the context of electricity production. Given the urgency of climate change and the magnitude of the unchecked impacts of electricity production, it is essential for the judiciary to fill the void of government inaction and force governments "to fulfill their fiduciary duty to the trust beneficiaries."⁵⁴⁸ However, in environmental law, the judiciary has lost its potency as a check on administrative agencies as a result of its tendency to give substantial deference to agency decisions in implementing their statutory and regulatory mandates.⁵⁴⁹ While administrative deference is an essential principle of the judiciary, the procedural

evident goal of promoting sustainable development." *Id.* at 957–58 (emphasis added). Dozens of other states have public trust provisions akin to the one found in Pennsylvania's Constitution, and thus, the reasoning of *Robinson Township* could be applied in those states, including application to electricity production's impacts on water, wildlife, and climate change. Given the trend of the public trust doctrine and the strong foundation of public trust statutory and constitutional provisions across the nation, many states should be capable of expanding their public trusts to electricity production in the coming years.

548. Torres & Bellinger, *supra* note 141, at 313–15.

549. Mary Christina Wood, "You Can't Negotiate with a Beetle": *Environmental Law for a New Ecological Age*, 50 NAT. RESOURCESJ. 167, 193 (2010); see also *Citizens Climate Lobby v. Cal. Air Res. Bd.*, CGC-12-519554, 2013 WL 861396 (Cal. Super. 2013) (implying that California courts will likely continue to defer to CARB's expertise regarding climate change mitigation); *Clean Wis., Inc. v. Pub. Serv. Comm'n of Wis.*, 700 N.W.2d 768 (Wis. 2005)

nature of the public trust allows courts to review agency action with high scrutiny without second-guessing agency expertise and allows the reemergence of a more potent judiciary in environmental and energy law. Because the judiciary is only applying *procedural* scrutiny to the actions of the executive and legislative branches, the public trust doctrine does not require any specific result.⁵⁵⁰ That is, the public trust doctrine does not mandate a certain amount of renewable electricity to be built. This flexibility maximizes the benefit to the public by forcing states to weigh both the benefits and costs of electricity development in their full context.⁵⁵¹

This balancing of the true costs and benefits of electricity production is in stark contrast to the strong emphasis of state public utility commissions, and associated case law, on minimizing direct out-of-pocket costs to rate-payers. Admittedly, conventional electricity production does have some public benefits, including delivering electricity to consumers at low cost, if one ignores externalities. Nonetheless, the duty of government in electricity regulation “is not to us as consumers but to us as citizens.”⁵⁵² Moreover, no public benefit, even cheap electricity, makes any project immune to the public trust doctrine.⁵⁵³ Furthermore, the public trust doctrine can compel full consideration of the non-monetized benefits of renewable electricity, such as the reductions in fish deaths and greenhouse gas emissions. While current environmental law provides little consideration of these non-market costs and benefits, the flexible nature of the public trust doctrine allows it “to leap ahead of societal norms and meet changing needs.”⁵⁵⁴ As Professor Takacs argues, Sax invoked the public trust doctrine precisely for this pur-

(Wisconsin court refused to overturn PSC decision based on a high level of deference); *NJBPU Brief*, *supra* note 519 (NJBPU requests the court to defer to its expertise).

550. By applying procedural, as opposed to substantive, scrutiny, this obviates a major concern of the judiciary: that not granting agencies a high level of deference would either “second-guess” their expertise, or replace the agency’s expertise with the court’s own opinions.

551. *Cf. Clean Wisconsin*, 700 N.W.2d at 828–41 (glossing over the negative impacts of CWIS and entirely ignoring the larger social benefits of renewable electricity); *supra* notes 541–42 (NJBPU ignored the contextual benefits of Fishermen’s Energy offshore wind project.). Conversely, under the public trust doctrine, Wisconsin courts have rigorously enforced the state’s duties to fully consider these impacts. *See, e.g., Scanlan*, *supra* note 291, at 140–47 (Wisconsin courts tend to closely scrutinize any proposed trustee action that appears to jeopardize trust resources); *see also Waiahole I*, 9 P.3d 409, 454–56 (Haw. 2000) (under the public trust doctrine, courts have a responsibility to review state actions with heightened degrees of judicial scrutiny).

552. Torres & Bellinger, *supra* note 141, at 285.

553. *See Lake Michigan Fed’n v. U.S. Army Corps of Eng’rs*, 742 F. Supp. 441, 450 (N.D. Ill. 1990) (finding that a conveyance of public trust lands to a university, no matter their reputability or good intentions, is still subject to the public trust doctrine).

554. Jeffrey Thaler & Patrick Lyons, *supra* note 157, at 284.

pose: to recognize the true value of what has previously been considered valueless.⁵⁵⁵

Similarly, the public trust doctrine can help ensure that states adequately monitor and manage wildlife takings to ensure sustainable population levels. Under the public trust doctrine, states have the fiduciary duty to prevent substantial impairment to wildlife resources. However, a state will be unable to ensure this duty is being upheld if it does not know the baseline populations of wildlife resources under its jurisdiction. While developers have the duty to ensure that their proposed projects do not substantially impair these resources, the obligation to the public resides strictly in the state. The state, under its trust obligations, cannot grant a permit without reasonably knowing whether a proposed project will cause undue damage to trust resources. Essentially, it is the duty of a state to know how much of the population must be preserved in the face of electricity production appropriation, ensuring sustainable use of wildlife resources.⁵⁵⁶

Despite more significant impacts to wildlife, the impacts from conventional electricity are largely unknown, and when known, have been ignored.⁵⁵⁷ Conventional electricity plant operators are not burdened by their plants' external effects as renewable electricity developers are, despite the greater impacts the former have on wildlife resources. Furthermore, the wildlife law that currently regulates electricity production is a patchwork of isolated statutes that neglect to provide sufficient overall protection to wildlife populations. For example, the CWA has "failed to consider the benefit of 98% of aquatic species that are not commercially or recreationally valuable."⁵⁵⁸ Similarly, other rules, such as those recently promulgated related to mercury emissions,⁵⁵⁹ were not calibrated to consider the potential wildlife impacts of the rule, despite the substantial and sustained history of coal

555. David Takacs, *The Public Trust Doctrine, Environmental Human Rights and the Future of Private Property*, 16 N.Y.U. ENVTL. L.J. 711, 716 (2008). This can give economic value, comparable to private property, to these resources that had been overlooked, such as the fish species ignored by CWA § 316(b) analysis.

556. This would require the state to develop total population estimates for the wildlife impacted by electricity production to see if the proposed facility's impact on wildlife would constitute substantial impairment of that resource.

557. See *supra* Section IV.B.

558. Nicole M. Magdziak, *The Debate over Regulation Alternatives for Cooling Water Intake Structures Is Heating Up*, 38 SETON HALL LEGIS. J. 413, 442–43 (2014). In addition, despite twenty years having passed since the courts firsts intervened and created a timetable for promulgation of rules to regulate CWIS, the EPA's efforts remain lacking, and as a result it has been rightly criticized for "becoming more and more sensitive to the industry and less concerned with the environmental impacts that result from the alternatives [proposed in promulgations of rules]." *Id.* at 444–45.

559. See *supra* notes 174–90.

damaging wildlife resources with little to no restrictions. Likewise, in spite of “a powerful dual mandate” in the ESA, the federal agencies have essentially ignored their authority to actively promote and recover wildlife populations, not just prevent extinction.⁵⁶⁰ On the other hand, the obstinate MBTA presents a regulatory conundrum by criminalizing the take of *any* migratory bird without a permit while “simultaneously granting no permits whatsoever for incidental take,” preventing reasonable consideration and protection of migratory birds impacted by electricity production.⁵⁶¹ Worse yet, “none of the bat species currently known to be affected in large numbers by wind turbines are protected by federal conservation laws,” other than the ESA, meaning there is no “mandate to either monitor or take conservation actions toward bat fatalities at wind turbines.”⁵⁶²

While these regulatory gaps have brought specific criticism in their application to wind power, they are pertinent to all electricity production. Many wildlife populations impacted by electricity production are lost in the “millions of leaks in the membrane of environmental law” and “[t]o fix them, even a few of them, is a terribly complex endeavor.”⁵⁶³ It would appear unlikely that federal wildlife law, especially in the current political environment, will be substantially amended to afford reasonable and comprehensive protections to the wildlife lost in these regulatory gaps.

The public trust doctrine can appropriately fill the gaps of current statutory wildlife law, affording the legal authority and duty to the state to protect wildlife populations. Although the wildlife branch of the public trust doctrine is nascent and its application to electricity production novel, utilization of the public trust doctrine to fill regulatory gaps in current wildlife law can serve the purpose of common law: “to fill gaps left in the [statutory] legal framework.”⁵⁶⁴ The public trust doctrine can provide a legal framework that affords protection to *all* types of wildlife and, in the context

560. Mary Christina Wood, *Protecting the Wildlife: A Reinterpretation of Section 7 of the Endangered Species Act*, 34 ENVTL. L. 605, 633 (2004).

561. Lilley & Firestone, *supra* note 194, at 1181. By not allowing incidental take permits, which could require mitigation measures, the MBTA makes any and all migratory bird takes illegal, regardless of their impacts on populations, implicating wind farms. However, the Bald and Golden Eagle Protection Act (BGEPA), 16 U.S.C. §§ 668–668(d) (2014), like the MBTA, provides no statutory means to take eagles incidentally; yet the U.S. Fish and Wildlife Service (FWS) has since promulgated rules for incidental take permits under the BGEPA for wind energy farms. See 50 C.F.R. §§ 22.26 to .28 (2014); Samuel J. Panarella, *For the Birds: Wind Energy, Dead Eagles, and Unwelcome Surprises*, 20 HASTINGS W.-NW. J. ENVTL. L. & POLY 3, 20–24 (2014). The FWS presumably could act similarly pursuant to the MBTA. Until such time, the public trust doctrine can provide a helpful guide.

562. Cryan, *supra* note 186, at 367–68.

563. Wood, *supra* note 549, at 198.

564. Babcock, *supra* note 155, at 405.

of electricity production, can provide “the type of foresight needed to help drive scientific advances that allow us to better predict and deal with emerging threats to migratory wildlife.”⁵⁶⁵ Under the public trust doctrine, the state could weigh impacts contextually by comparing relative impacts of alternative means of electricity production, and make the most informed and beneficial decision regarding bat populations.

Finally, the public trust doctrine can offer “normative management standards that can guide resource managers.”⁵⁶⁶ Any perceived flaws in federal wildlife law can be buttressed by the public trust doctrine. For example, “[t]rust principles provide a normative anchor for [Endangered Species Act] interpretation” and they “are basic, logical, and geared towards sustaining society for generations to come.”⁵⁶⁷ Furthermore, applying these trust principles to the Endangered Species Act (ESA) would offer a foundation for government trustees to act affirmatively under section 7 “to restore the wildlife trust where it has been damaged or depleted.”⁵⁶⁸ Gaps in the CWA could also be addressed by the normative basis of trust principles. Under trust principles, government agencies would be obligated to act on behalf of the oft-ignored 98% of fish species in section 316(b) analyses and to require extra protections of all wildlife trust resources.⁵⁶⁹ Lastly, applying trust principles would bolster the protections of the MBTA in a manner that is rational with the overarching purpose and spirit of the statute, while simultaneously offering reasonable expectations to all electricity developers who impact migratory birds.⁵⁷⁰

565. Cryan, *supra* note 186, at 370.

566. Babcock, *supra* note 155, at 408. To clarify, this normative guide can be useful to both federal and state resource managers. Either of these managers could rely on the potential federal public trust doctrine (though its existence is at the moment questionable, as discussed *supra* in Section III.C), or rely on the public trust doctrine of the state in which the electricity project would occur. Likewise, either federal or state natural resource managers could use either the federal or a state public trust doctrine to fill the gaps in wildlife regulation. However, because state natural resource managers, and state agencies in general, frequently address wildlife and electricity decisions, and because a state public trust doctrine is a more concrete legal tool than the federal public trust doctrine, focusing on the state may be more useful.

567. Wood, *supra* note 606–07.

568. *Id.* at 631.

569. See, e.g., *Clean Wis. v. Pub. Serv. Comm'n of Wis.*, 700 N.W.2d 768, 832–34 (Wis. 2005) (largely ignoring the substantial impacts of a coal plant's CWIS).

570. While one could argue that the stringent rules of the MBTA and continual threat of FWS prosecution afford substantial protection, or that the promulgation of rule creating an incidental take permit would afford greater protection to migratory birds than the public trust doctrine, the purpose of the trust is not to displace these protections but rather to normatively guide these protections in a reasonable way. Nor does the MBTA subsume (at least in theory) the public trust doctrine and its normative standards. See *Waiahole I*, 9 P.3d 409, 442 (Haw. 2000).

The public trust doctrine can be utilized both to fill regulatory gaps and buttress current wildlife and environmental law. It is a more reasonable, more flexible, and more intuitive legal framework than the status quo and can both improve and advance current environmental laws. The dual prongs of the trustee's duty—to prevent substantial impairment, and to act affirmatively to minimize harm to trust resources, when either practicable or feasible—present the best of both worlds.

This Article demonstrates the suitability of applying the public trust doctrine to state electricity planning and policy. While the public trust doctrine has evolved over decades, there has been minimal application to electricity production despite the substantial benefits its application would provide. Such an application, however, would serve the important common law function of filling gaps in regulatory regimes, and here would benefit wildlife populations, conserve water, and advance electricity planning and policy more generally. This Article encourages its application, finding the public trust doctrine to be a fitting and useful tool to better calibrate electricity planning for the protection of natural resources and to incentivize the development of renewable electricity production.