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OVERCOMING LEGAL AND CARBON MARKET CHALLENGES TO BLUE CARBON PROJECTS ON PUBLIC LANDS

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I. INTRODUCTION

"Blue carbon" is an emerging method of mitigating greenhouse emissions that uses carbon markets to fund conservation and restoration of coastal wetlands. Public land management agencies are important partners for blue carbon projects. Many coastal wetlands appropriate for blue carbon projects are owned by governments and controlled by their land management agencies. The responsible agencies often lack the resources to restore degraded wetlands or undertake the active management activities necessary to conserve and maintain areas threatened by sea level rise and other stressors. Blue carbon projects can offer financial resources to support immediate restoration and ongoing maintenance of wetland ecosystems over a century-long scale.

While promising, blue carbon projects on public lands face both legal and carbon market challenges. Blue carbon projects can proceed only if agencies and their partners can design projects in compliance with public lands law and in conformity with carbon market standards. As few laws authorize and define how land managers can participate in blue carbon projects, most agencies are left to rely on general enabling legislation for authorization. In the absence of specific mandates, such as those originating in protected species laws, agencies generally have broad discretion in managing public lands. This discretion cuts two ways: it authorizes them to engage in the land management activities needed for successful blue carbon projects, but does not require them to do so or to maintain efforts over time. As a result, a commitment by an agency today can provide little

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confidence that the agency will continue to support conservation and restoration activities over the long term. Indeed, the ability of future elected leaders to change course is a foundational principle of U.S. governance. Credible carbon markets will need to require more substantial commitments to ensure the permanence of blue carbon activities in this sector given heightened risk of reversal associated with sea level rise. These commitments are likely to come from contractual arrangements between government agencies and non-governmental funding partners.

In contrast to their discretion in managing the use of public lands, agency enabling legislation often constrains the authority of agencies to enter into property or commodity agreements with non-governmental entities. Without sufficient authority, agencies cannot demonstrate the permanence of projects on public lands or guarantee their partners unambiguous ownership of carbon offsets in exchange for project funding, stopping blue carbon projects before they begin. Limitations on alienation of property rights or sale of commodities from public lands presents a trenchant legal challenge for public land managers seeking to participate in blue carbon projects.

Creative transaction structure may allow some projects to proceed under current law, but legislative reform is needed to clarify whether and how agencies can participate in blue carbon projects. To reach this conclusion, this article examines how current law enables and poses structural challenges for blue carbon projects on public lands. Part I introduces blue carbon as a concept and examines its status under carbon market regimes. Part II considers the few existing laws authorizing blue carbon projects on public lands. Part III considers how the broad agency discretion provided by most land management statutes enables participation in blue carbon project activities in the short term, while simultaneously undermining project permanence and conformity with carbon market standards, resulting in a need for agencies to commit to action by agreement. Part IV considers how limitations on agency authority to alienate public lands affect their ability to enter into those agreements to transfer carbon rights and credits, and presents four transaction structures that may address these challenges and enable successful blue carbon project implementation. Part V concludes that existing models for blue carbon legislation do not address the issues likely to arise in blue carbon projects in sufficient detail, and specific legislation would serve a useful role in clarifying agency authority to contract for and carry out blue carbon projects.

II. BLUE CARBON PROJECT RATIONALE AND STRUCTURE

Coastal wetlands are a diverse and valuable type of habitat worthy of conservation and restoration. Salt marshes, mangrove forests, seagrass meadows, and other coastal wetlands provide a range of ecosystem services valued at over $20 trillion per year on the global scale.[2] These services take a variety of forms.[3] For example, salt marshes play an important role in filtering nitrogen and other pollutants from runoff, mitigating the development of hypoxic areas in estuaries and nearshore coastal waters.[4] Mangroves, like other coastal wetlands, provide well-recognized flood protection benefits valued at $65 billion per year globally in 2020, including over $11 billion in property damage averted per year in the U.S. alone.[5] Seagrass meadows provide a critical nursery habitat for bay scallops and other important fishery species.[6] And healthy coastal wetlands sequester a staggering amount of greenhouse gases—as much as 20% to 30% of total stored soil carbon on the planet, though agreement with such estimates is not universal.[7]

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[2] Nick C. Davidson et al., *Worth of wetlands: revised global monetary values of coastal and inland wetland ecosystem services*, 70 MARINE & FRESHWATER RES. 1189, 1191 (2019).
[3] *See* Edward B. Barbier et al., *The Value of Estuarine and Coastal Ecosystem Services*, 81 ECOLOGICAL MONOGRAPHS 169, 170 (2011) (describing the three categories of ecosystem services).
[4] Joanna L. Nelson & Erika S. Zavaleta, *Salt Marsh as a Coastal Filter for the Oceans: Changes in Function with Experimental Increases in Nitrogen Loading and Sea-Level Rise*, 7 PLOS ONE no. e38558, 1-2 (2012).
[5] Pelayo Menéndez et al., *The Global Flood Protection Benefits of Mangroves*, 10 SCI. REP. no. 4404, 2-4 (2020); *see also, e.g.*, Fanglin Sun & Richard T. Carson, *Coastal Wetlands Reduce Property Damage During Tropical Cyclones*, 117 PROC. NAT'L ACAD. SCI. 5719, 5720 (2020) (showing an example of how coastal floodplains reduced flood damage from Hurricane Sandy by $625 million); *see also, e.g.*, Siddharth Narayan et al., *The Value of Coastal Wetlands for Flood Damage Reduction in the Northeastern USA*, 7 SCI.REP. no. 9463, 1-2 (2017) (describing how coastal floodplains could have mitigated $430 million in damages across nineteen counties in Florida alone).
[6] Robert J. Orth et al., *Restoration of Seagrass Habitat Leads to Rapid Recovery of Coastal Ecosystem Services*, 6 SCI. ADVANCES no. eabc6434, 1, 3, 6–7 (2020).
[7] A.M. Nahlik & M.S. Fennessy, *Carbon Storage in US Wetlands*, 7 NATURE COMM.no. 13835, 2 (2016) (citing WETLAND SOILS (M. J. Vepraskas & C. B. Craft, eds., 2nd ed. 2016)); *but see* Sophia C. Johannessen & James R. Christian, *Why Blue Carbon Cannot Truly Offset Fossil Fuel Emissions*, 4 COMMC'N EARTH & ENV'T 411 (2023) (noting methodological issues in global estimates).

Recognizing these benefits, government and private actors increasingly support conservation and restoration of these ecosystems.[8]

Coastal wetland conservation and restoration efforts are badly needed. Estimates suggest that 40% to 85% of coastal wetlands have been lost globally due to anthropogenic drivers, including coastal development and agriculture.[9] Voluntary and required restoration and mitigation efforts to address wetland losses have not been sufficient to replace the acreage or the services provided by natural wetlands.[10] Moreover, sea level rise and other emerging threats pose challenges to the continued survival and health of remaining coastal wetlands.[11] Active, ongoing management actions will be needed in addition to restoration efforts to conserve coastal wetlands and support their adaptation to climate change.[12] These efforts will not succeed without ongoing, consistent political will and funding over long periods—a condition that will likely require funding from non-governmental sources in addition to public contributions.[13]

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[8] *See, e.g.*, Rachel K. Gittman et al., *Voluntary Restoration: Mitigation's Silent Partner in the Quest to Reverse Coastal Wetland Loss in the USA*, 6 FRONTIERS IN MARINE SCI. no. 511, 1-2 (2019) (reviewing history of No Net Loss policies).

[9] *Id.*

[10] *Id.* at 5.

[11] *See* Sarah C. Crosby et al., *Salt Marsh Persistence is Threatened by Predicted Sea-Level Rise*, 181 ESTUARIES, COASTAL & SHELF SCI. 93 (2016) (discussing development of shorelines' effect on saltwater marshes); Donald R. Cahoon et al., *Evaluating the Relationship Among Wetland Vertical Development, Elevation Capital, Sea-Level Rise, and Tidal Marsh Sustainability*, 42 ESTUARIES & COASTS 1, 13 (2019) (discussing marsh elevation and degradation under sea-level rise conditions).

[12] A range of interventions may be needed. In the context of salt marsh elevation, interventions may include, for example, thin-layer deposition to increase the elevation of salt marshes or acquisition and protection of upland areas for marsh migration corridors. *See, e.g.*, Christine M. VanZomeren et al., *Restoring a Degraded Marsh Using Thin Layer Sediment Placement: Short Term Effects on Soil Physical and Biogeochemical Properties*, 120 ECOLOGICAL ENG'G 61, 62 (2018) (discussing thin-layer deposition using dredged sediment); Elizabeth R. Van Dolah et al., *Marsh Migration, Climate Change, and Coastal Resilience: Human Dimensions Considerations for a Fair Path Forward*, 40 WETLANDS 1751 (2020) (discussing social dimensions of interventions to allow shoreward movement of tidal marshes).

[13] *See* Winnie W.Y. Lau, *Beyond Carbon: Conceptualizing Payments for Ecosystem Services in Blue Forests on Carbon and Other Marine and Coastal Ecosystem Services*, 83 OCEAN & COASTAL MGMT. 5 (2013) ("[A] common and frequent barrier to achieving full effectiveness and wider adoption of [marine and coastal resource management] tools is the lack of adequate financing.").

Blue carbon markets are an emerging mechanism for generating resources and support for long-term wetland conservation and restoration projects by monetizing their carbon sequestration benefits. While healthy coastal wetlands sequester substantial volumes of soil carbon, they may also emit greenhouse gases, including methane and nitrous oxide, especially when degraded.[14] Active conservation and restoration of coastal wetlands can avoid or reduce future GHG emissions and/or actively sequester carbon in soils and vegetation, in either case producing net carbon sequestration benefits.[15] Sequestered carbon or avoided emissions can be monetized through carbon markets,[16] providing an external source of funding to enable wetland conservation and mitigation.

Carbon markets enable buyers wishing to reduce their net greenhouse gas emissions to purchase credits (also known as "offsets") from sellers who demonstrate that they are sequestering greenhouse gases.[17] Carbon markets take two basic forms. "Compliance markets" allow regulated entities to meet legal compliance obligations (such as cap-and-trade programs) through credit purchases.[18] The California Emissions Trading Program (ETP), for example, limits emissions by covered entities, but allows those entities to offset up to 8% of their emissions via purchase of carbon credits issued in accordance with Program

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[14] *See* Judith A. Rosentreter et al., *Methane and Nitrous Oxide Emissions Complicate Coastal Blue Carbon Assessments*, 35 GLOBAL BIOGEOCHEMICAL CYCLES no. e2020GB006858, 1 (2021) (discussing coastal wetland emission of greenhouse gases); Lishan Tan et al., *Conversion of Coastal Wetlands, Riparian Wetlands, and Peatlands Increases Greenhouse Gas Emissions: A Global Meta‐Analysis*, 26 GLOBAL CHANGE BIOLOGY 1638, 1639 (2020).

[15] *See, e.g.*, Stephen Crooks, et al., *Coastal wetland management as a contribution to the US National Greenhouse Gas Inventory*, 8 NATURE CLIMATE CHANGE 1109, 1111-12 (2018) (describing the impact of coastal wetlands on the U.S. National Greenhouse Gas Inventory); Matthew P.J. Oreska et al., *The greenhouse gas offset potential from seagrass restoration*, 10 SCIENTIFIC REPORTS no. 7325 (2020).

[16] VERRA, METHODOLOGY FOR TIDAL WETLAND AND SEAGRASS RESTORATION (VM0033), Version 2.1 (2023) [hereinafter VM0033].

[17] Roger Ullman et al., *Introducing Blue Carbon in Climate Market Mechanisms*, 83 OCEAN & COASTAL MGMT. 15, 15 (2013).

[18] *See id.* at 15 ("a central authority sets a limit, or cap, on the amount of a greenhouse gas that can be emitted, and the cap is allocated or sold to entities in the form of credits which represent the right to emit a specific volume of the gas. The emitting entities are required to hold a number of credits equivalent to their actual emissions, and the total amount of existing credits cannot exceed the cap. Entities may then trade credits among themselves if they need to increase their emissions or have been able to reduce emissions.").

protocols.[19] A "voluntary market," by contrast, is not based on a compliance mandate, but on purchase of offsets by willing participants. The Verified Carbon Standard (VCS) is an example of a standard enabling a voluntary market.[20] Regardless of the type of market, market providers only issue credits for projects that comply with the associated standards and protocols.

The structure of carbon markets may be illustrated by an example. A California Court of Appeal explained the structure of the ETP system:

> Under cap-and-trade, offset projects must comply with rules and procedures—called compliance offset protocols (CARB Protocols), which CARB adopts and administers through an Offset Project Registry (OPR). OPRs facilitate "the listing, reporting, and verification of offset projects developed using the [CARB Protocols], and issue registry offset credits." OPRs must be approved by CARB and "shall use [CARB Protocols] to determine whether an offset project may be listed . . . for issuance of registry offset credits."[21]

In the ETP, the CARB Protocols provide the mandatory conditions that projects must meet for listing by an OPR. Other carbon market systems, such as the VCS, establish their own standards and detailed methodologies, authorize assessors to evaluate projects for conformity with those standards, and provide markets for generated credits.

Credible carbon market standards include provisions to mitigate the risk of failed or fraudulent claims of sequestration. Among other requirements, these standards require project proponents to demonstrate: (1) that a project will produce sequestration additional to that under business as usual; (2) that the sequestration will be permanent; and (3) that the proponent is the sole and

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[19] CAL. CODE. REG. tit. 17 § 95856(h)(1)(A); *See also* *Compliance Offset Program*, CAL. AIR RES. BD. (last visited Feb. 28, 2024).

[20] *See* *Verified Carbon Standard*, VERRA (last visited Feb. 28, 2024) (providing an overview of the VCS program); *See* Golden Door Properties, LLC. v. County of San Diego, 50 Cal. App. 5th Supp. 467, 511–12 (Cal. Ct. App. 2020) (striking down county climate action plan authorizing compliance via purchase of offsets via voluntary registries but noting process for CARB approval of standards).

[21] *Golden Door Properties, LLC.*, 50 Cal. App. 5th Supp. at 485 (internal footnotes and citations omitted).

unambiguous owner of the project and has the right to receive credits.[22] Once an assessor verifies that a project will satisfy all conditions (as detailed in the relevant standard and protocols), the market provider will approve the project and periodically issue credits representing the carbon as it is sequestered. Project proponents can then trade these credits on the relevant market exchange or directly with a specific trading partner.

Blue carbon projects have been unable to access voluntary carbon markets until recently, and remain unable to access compliance markets, due to challenges in quantifying their effects on carbon flux. Unlike activities such as afforestation, for which calculations of sequestered carbon have long been accepted,[23] blue carbon projects, like other forms of soil carbon sequestration projects, have faced substantial technical challenges.[24] In recent years, however, characterization of carbon sequestration on coastal wetlands has advanced sufficiently to enable quantification of the effects of project activities on carbon storage.

As researchers have begun to overcome technical challenges, protocols for blue carbon project registration in carbon markets have been developed, with the voluntary market leading the way. VCS has approved a "Wetlands Restoration and Conservation" (WRC) project category[25] and methodologies and guidance for specific WRC activities, including for creation of coastal wetlands (issued in 2014 and inactivated in 2023 due to a lack of use) and tidal wetland and seagrass

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[22] Additional market requirements also apply broadly to all credible markets. *See, e.g., id.* ("GHG offsets 'must be real, additional, quantifiable, permanent, verifiable, and enforceable.'"); HAW. REV. STAT. § 342B-72(c)(1) ("Any rule adopted by the director . . . shall ensure . . . [t]he greenhouse gas emission reductions achieved are real, permanent, quantifiable, verifiable, and enforceable by the director."); GORDON SMITH, CLIMATE ACTION RESERVE, FOREST OFFSET PROJECTS ON FEDERAL LANDS 5 (2012).

[23] *See* Emily Hope et al., *A financial analysis of four carbon offset accounting protocols for a representative afforestation project (Southern Ontario, Canada)*, 51 CAN. J. FOREST RES. 1015 (2021) (comparing multiple afforestation protocols).

[24] *See* Lauren Bernadett, *Agricultural Soil Carbon Sequestration Offset Programs: Strengths, Difficulties, and Suggestions for Their Political Use in AB's 32 Cap and Trade Program*, 31 UCLA J. ENV'T L. & POL'Y 199, 221–23 (2013) (noting acceptance of soil carbon by offset programs has been limited due in part to technical challenges affecting soil carbon sequestration).

[25] VERRA, VERIFIED CARBON STANDARD METHODOLOGY REQUIREMENTS §§ A1.16–A1.22, Version 4.0 (2019).

restoration (issued in 2015 and last updated in 2023).[26] In September 2020, VCS also approved a REDD+ (Reducing Emissions from Deforestation and Forest Degradation Plus1) methodology for wetlands,[27] allowing blue carbon projects to contribute to meeting Nationally Determined Contributions under the Paris Agreement.[28] Other market providers have also established standards under which blue carbon projects may qualify.[29] Blue carbon-specific project methodologies thus are now available to voluntary market participants. By contrast, the author is aware of no existing protocol for blue carbon projects in any compliance markets. However, an effort to develop a blue carbon protocol under the California ETP was undertaken beginning in 2014,[30] and other efforts are underway elsewhere.[31]

Despite increasing availability of blue carbon market protocols, few projects have been approved to date. Recent data indicates that only 11 blue carbon projects were registered or near registration under the VCS globally between 2014 and 2022.[32] The author is aware of no coastal wetland projects completed in the U.S. under any Verra-registered standard or methodology to date, though at least one project—the Virginia Seagrass Reserve Seagrass

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[26] VCS, APPROVED VCS METHODOLOGY VM0024, METHODOLOGY FOR COASTAL WETLAND CREATION Version 1.0 (2014); VM0033, *supra* note 16 (tidal wetland and seagrass restoration); *see also Methodologies*, VERRA (last visited Feb. 28, 2024) (collecting approved methodologies by project category).

[27] VCS, VM0007: REDD+ METHODOLOGY FRAMEWORK (REDD+ MF) Version 1.6 (2020).

[28] *See* Conference of the Parties, United Nations Framework Convention on Climate Change, Paris Agreement, art. 5.2, *in* Decision 1/CP.21(Adoption of the Paris Agreement) U.N. Doc. FCCC/CP/2015/L.9/Rev. 1 (Dec. 12, 2015) (encouraging parties to use "results-based payments" to support emissions reductions); TILL NEEF ET AL., FOOD & AGRIC. ORG. OF THE U.N., FROM REFERENCE LEVELS TO RESULTS REPORTING: REDD+ UNDER THE UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE 1 (2019) (providing overview of REDD+ and its relationship to Nationally Determined Contributions under the Paris Agreement); Albert C. Lin, *Carbon Dioxide Removal After Paris*, 45 ECOLOGY L. Q. 533, 554–57 (2018) (discussing implementation of REDD+ under the Paris Agreement).

[29] Moritz von Unger, Silvestrum Climate Associates, Voluntary Carbon Markets: Opportunities for Blue Carbon, Presentation at the Blue Carbon Law Symposium, University of Georgia School of Law (May 17, 2023) (noting availability of standards and methodologies from markets including Plan Vivo, American Carbon Registry, and Climate Action Reserve).

[30] Ullman et al., *supra* note 17, at 16. The state has not approved a protocol to date. *See also Compliance Offset Program*, CAL. AIR RES. BD. (last visited Mar. 1, 2024).

[31] *See, e.g.*, Tomohiro Kuwae et al., *Implementation of blue carbon offset crediting for seagrass meadows, macroalgal beds, and macroalgae farming in Japan*, 138 MARINE POL'Y 104996, at § 3.3 (2022) (discussing intention to transition J-Blue Credit pilot to compliance markets).

[32] INT'L FIN. CORP., DEEP BLUE: OPPORTUNITIES FOR BLUE CARBON FINANCE IN COASTAL ECOSYSTEMS § 2.1 (2023).

Restoration Project—is under development.[33] While difficulty in overcoming scientific challenges on project sites may explain some of the slow uptake of blue carbon projects,[34] legal challenges represent an important additional stumbling block that requires attention for blue carbon projects to proceed.

Blue carbon projects in the U.S. generally must occur, in whole or in part, on public lands. Coastal wetlands are located primarily on submerged and intertidal lands, as well as some emergent lands. Seagrass meadows are located primarily in shallow subtidal and intertidal environments,[35] while mangroves and the communities they support are largely restricted to intertidal and adjacent areas.[36] Similarly, salt marshes are located primarily in intertidal and adjacent upland areas subject to regular and occasional flooding.[37] States exert ownership over submerged lands pursuant to the Submerged Lands Act.[38] The shoreward property boundary differs by state, but includes (with limited exceptions) subtidal lands in all states and some intertidal areas in most states.[39] Thus, states own and control a substantial proportion of the area suitable for coastal wetland habitat in the U.S. Moreover, government ownership has played an important role in avoiding the development of coastal wetlands over time, such that many of the remaining intact coastal wetlands (particularly in upland areas) are protected under state or federal government ownership.[40]

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[33] *Virginia Reserve Seagrass Restoration Project, VSC Project 2360*, VERRA (last visited Mar. 1, 2024).
[34] *See* *Blue Carbon Activities*, BLUE CARBON INITIATIVE (last visited Mar. 1, 2024) (noting science, policy, and management challenges and links to related efforts).
[35] Frederick T. Short et al., *Global Seagrass Distribution*, *in* GLOBAL SEAGRASS RESEARCH METHODS 5, 5–7 (FREDERICK T. SHORT & ROBERT G. COLES, EDS. 2001).
[36] *See* P. BARRY TOMLINSON, THE BOTANY OF MANGROVES 11–14 (Cambridge Univ. Press, 2d ed. 2016) (discussing distribution of mangroves and associated communities).
[37] *See* Mark D. Bertness & Aaron M. Ellison, *Determinants of Pattern in a New England Salt Marsh Plant Community*, 57 ECOLOGICAL MONOGRAPHS 129, 130 (1987) (noting differentiation between low and high marsh species and characteristics).
[38] 43 U.S.C. § 1311 (1953).
[39] 78 AM. JUR. 2D *Waters* § 303 (2021) ("The lands within the territorial limits of a state below ordinary high-water marks of navigable waters is the property of the state by virtue of its sovereignty. Some states, however, have chosen to resign to riparian proprietors rights which properly belong to them and hold that the title of the riparian owner extends to the low-water mark on tidewaters …. Other states, however, retain full ownership of the submerged land and hold that the riparian owner's title extends only to the high-water mark in tidal waters or tidelands …") (internal footnotes omitted).
[40] Rebecca Epanchin-Niell et al., *Threatened Protection: Sea Level Rise and Coastal Protected Lands of the Eastern United States*, 121 OCEAN & COASTAL MGMT. 118 (2017).

Public lands are also well-suited to blue carbon projects due to funding limitations associated with carbon markets. While blue carbon projects have been shown to produce substantial carbon mitigation benefits, and they are currently trading at a higher price than agriculture or forestry credits,[41] studies have found that the market price of credits produced has been insufficient to fully fund necessary project activities.[42] In the absence of private investment incentives, projects will proceed "only when project partners are motivated not only by a project's climate mitigation benefits, but also by co-benefits such as habitat conservation, fisheries enhancement, or water pollution control."[43] Government landowners are likely to value these co-benefits to meet policy or regulatory goals or mandates and may be able to leverage resources in addition to carbon credit transactions to support project activities. The involvement of government agencies may also increase market confidence in the credits produced, yielding higher credit prices and reducing the subsidy required for projects to advance.

Publicly-owned coastal wetlands are ideal locations to pioneer blue carbon projects. Governments generally own appropriate blue carbon project sites in whole or part. Further, government land managers value co-benefits of carbon sequestration, as evidenced by substantial public funding for successful, long-

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[41] von Unger, *supra* note 29, at 20 (citing OPIS Nov. 2, 2022) (noting that blue carbon credits trade at an average of $28/mt, while agriculture and forestry credits trade at an average of $15/mt). *See also* INT'L. FIN. CORP., *supra* note 32, at § 3.1 ("Blue carbon projects could fetch prices at the higher end of [the range of market prices]").

[42] Oreska et al., *supra* note 15 (noting that the financial benefit from carbon markets for a successful long-term seagrass restoration project was sufficient to cover roughly 10% of the project cost); Sebastian Thomas, *Blue Carbon: Knowledge Gaps, Critical Issues, and Novel Approaches*, 107 ECOLOGICAL ECON. 22, 32 (2014).

[43] READ PORTER ET AL., LEGAL ISSUES AFFECTING BLUE CARBON PROJECTS ON PUBLICLY-OWNED COASTAL WETLANDS 6 (2020) (citing Thomas, *supra* note 42, at 32). *See also* Oreska et al., *supra* note 15 ("Rather than rely solely on carbon offset-credits to finance meadow restoration, coastal managers should think holistically about the other values that seagrass systems provide, including fisheries *support*, nutrient removal, and reduced marsh erosion, among other services. Quantifying these values, even absent markets for co-benefit 'credits,' would provide further incentive for seagrass restoration, in addition to carbon sequestration."). Changes in carbon credit valuation may alter this calculus in the future, particularly if and when blue carbon protocols are accepted by compliance markets, which may lead to increased prices for carbon credits. *Id.*; Mathew A. Vanderklift et al., *Constraints and opportunities for market-based finance for the restoration and protection of blue carbon ecosystems*, 107 MARINE POL'Y 103429 (2019).

term wetland restoration projects.[44] Despite these apparent advantages, wetland restoration efforts on U.S. public lands have yet to translate into blue carbon projects for consideration by carbon markets. Legal challenges are undoubtedly one of many contributing reasons for this delay. The following sections illustrate these challenges.

III. CURRENT LAWS ADDRESSING CARBON PROJECTS ON PUBLIC LANDS

Legislatures have rarely spoken explicitly on whether agencies may participate in carbon markets. To the contrary, current federal and state law are marked by silence on the use of public lands for market-funded carbon mitigation activities: no federal laws or regulations speak explicitly to this use of lands, and only a few states have explicitly addressed the participation of state lands and agencies in carbon market transactions. This section reviews the few laws that speak directly to the issue.[45] Despite their rarity, these laws illustrate key legal challenges affecting the development of blue carbon projects on public lands.

Many states have enacted legislation allowing or considering their participation in carbon markets in roles other than landowner. Notably, California and northeast state participants in the Regional Greenhouse Gas Initiative regulate operation of carbon markets.[46] Other states have taken non-regulatory, administrative roles in carbon market programs. For example, Georgia and Pennsylvania have enacted legislation to create carbon sequestration registries to track in-state, voluntary emissions reductions.[47] Other states, including Hawaii, Connecticut, New Hampshire, and Maryland, have enacted legislation endorsing carbon market programs or calling for studies on the feasibility of participating in carbon markets, but have not yet followed up with substantive legislative or

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[44] *See, e.g.* Oreska et al., *supra* note 15 (describing long-term seagrass restoration project). *See also* Lindsey Sheehan et al., *Blue Carbon: an Additional Driver for Restoring and Preserving Ecological Services of Coastal Wetlands in Tampa Bay (Florida, USA)*, 39 WETLANDS 1317, 1321–22 (2019) (describing blue carbon assessment for Tampa Bay).

[45] This summary is current as of May 2023.

[46] JoAnne L. Dunec, *The Clean Air Act Handbook*, 31 NAT. RESOURCES & ENV'T 60 (2016).

[47] GA. CODE ANN. § 12-6-220 – 12-6-232 (2004); 71 PA. CONS. STAT. § 1361.6 (2008).

regulatory action based on these studies.[48] States thus are adopting multiple perspectives on carbon market participation, though many are focused on program administration roles rather than on direct participation in markets as landowners.[49]

A few states, however, have enacted or considered legislation that contains some form of explicit authorization to use public lands for carbon market projects. These authorizations include one or more of five elements, including:

1. Clarification that carbon market projects are consistent with land management mandates;

2. Authorization for agencies to enter into agreements necessary for carbon market projects on state lands;

3. Delineation of carbon credit ownership derived from projects on state lands;

4. Authorization for agencies to acquire public carbon rights easements on private lands; and

5. Direction for the use of funds derived from the sale of carbon credits on state lands.

In 2020, Virginia enacted the first state law to date explicitly authorizing blue carbon projects on state lands. Under this new authority, the Department of Environmental Quality (VDEQ) can "participate in any carbon market for which submerged aquatic vegetation restoration qualifies as an activity that generates carbon offset credits."[50] The law further authorizes VDEQ to "enter into

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[48] *See* CONN. GEN. STAT. § 23-32a(b) (2011) (discussing plans to sustain harvesting of forests); MD. CODE ANN., NAT. RES. § 5-102(b)(8) (2021); N.H. REV. STAT. ANN. § 485-G:3 (2016); HAW. REV. STAT. § 225P-6 (2018) (repealed 2022). The New Hampshire program, uniquely, specifically required consideration of a blue carbon market program focused on seagrass and oyster bed conservation and restoration. N.H. REV. STAT. § 485-G:3 (2016).

[49] Hawaii's feasibility study explicitly warned against participating in offset programs as both administrator and project developer. HAW. STATE OFF. PLAN., FEASIBILITY AND IMPLICATIONS OF ESTABLISHING A CARBON OFFSET PROGRAM FOR THE STATE OF HAWAI'I 35 (2019).

[50] VA. CODE § 10.1-1186.6.

agreements necessary" to participate in markets, provides that VDEQ holds "exclusive title to [carbon] credits until sold," and requires that funds received from the sale of credits must be used for further restoration.[51] While brief, this law explicitly incorporates the second, third, and fifth elements that have drawn attention in the other states considering the use of state lands for carbon projects, while the first element is implied.

As in Virginia, other state laws on carbon projects on state lands have been focused on specific sectors or lands — in a few cases involving coastal wetlands.

1. Louisiana law provides that "revenues from the sale of carbon credits" associated with coastal protection projects are deposited in the Coastal Protection and Restoration Fund.[52] State statutes do not otherwise address state use of coastal lands in carbon market projects, though the Coastal Protection and Restoration Authority has been active in development of market protocols. While other necessary elements of blue carbon approvals are implied, this section explicitly covers only the fifth element.

2. The Florida Forever Act provides that lands acquired under the Act must be managed for "multiple-use" and defines "multiple-use" to include "carbon sequestration, carbon mitigation, or carbon offsets."[53] This is the clearest extant example of a law explicitly and unambiguously confirming that state lands can be used for offset projects.

3. Oregon established an offset program for carbon mitigation on state forest and other nonfederal forest lands.[54] This legislation authorizes enrollment of acquired state forest lands and certain other state-owned forest lands in the program and authorizes the state forester to "execute

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[51] *Id.*
[52] LA. STAT. ANN. § 56:799 (2011). For further discussion of Louisiana law, see Valerie Black et al., *Legal Considerations for Coastal Blue Carbon Projects in Georgia and Louisiana* in this edition of the SEA GRANT LAW & POLICY JOURNAL.
[53] *See* FLA. STAT. ANN. § 259.105 (2020) (permitting "multiple-use" for offset projects).
[54] *See* OR. REV. STAT. §§ 526.780 – .789 (2001) (establishing an offset program for carbon mitigation).

any contracts or agreements necessary" to create offset opportunities on these lands.[55]

4. The Reinvest in Minnesota – Clean Energy program authorizes the state Board of Soil and Water Resources to acquire easements on private lands for soil carbon storage, as well as other purposes.[56] While carbon sequestration is among the purposes of the Reinvest in Minnesota program,[57] the law does not explicitly authorize the Board to participate in carbon markets or indicate ownership of carbon rights on easements.

5. Proposed legislation in Nebraska would have authorized the Board of Educational Lands and Funds to "enter into contracts for the sale of carbon sequestration rights" for soil carbon on state-owned school lands, though this provision was dropped from the bill before its passage.[58]

The limited, patchwork approaches to authorization for carbon market projects on any type of public lands suggests that most states have yet to grapple with potential legal issues associated with carbon market participation at all, let alone to address the unique challenges presented by blue carbon projects. As a result, blue carbon projects in states other than Virginia (and there, projects involving activities other than seagrass restoration) will require agencies to rely on existing, general authority to determine whether and how they can participate in blue carbon projects. The few existing laws indicate that projects relying on general authority may face questions on some or all of the five issues addressed by state legislatures to date. Two of these issues reflect particular challenges to agency participation in blue carbon projects, as opposed to restrictions on project implementation. These include: (i) whether agencies can promise ongoing support for blue carbon project activities for the full project duration; and (ii) whether agencies can enter into agreements for the sale of carbon credits derived from blue carbon projects on public lands. Each of these questions, and their

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[55] *Id.* § 530.050 (acquired state forest lands); *id.* § 530.500 (Common School Forest Lands and Elliott State Forest Lands).
[56] MINN. STAT. § 103F.518 (2020).
[57] *Id.* § 103F.505.
[58] L.B. 235, 101st Leg. (Neb. 2009). *See also* Sale or transfer of carbon sequestration rights on land owned and managed by the Board of Educational Lands and Funds, Neb. Op. Att'y. Gen. No. 10005 (Jan. 25, 2010) (reviewing legality of soil carbon provision).

relationship to conformity with carbon market standards, is addressed in the sections below.

IV. HOW DISCRETIONARY LAND MANAGEMENT AUTHORITY AFFECTS PERMANENCE

Public lands agencies face a myriad of challenges on managed lands and often have insufficient funding or other resources to address them, leading to difficult resource allocation decisions. Current laws offer agencies broad mandates that provide substantial discretion in making these decisions. This section considers the double-edged nature of this discretion with respect to blue carbon project development and credit integrity. In particular, agencies may be willing to participate in the development of a blue carbon project, but have limited authority to constrain their future decisions. As a result, subsequent administrations can change their mind and decline to invest in costly active management or take other actions with the effect of undermining the project. After considering how agency mandates support participation in blue carbon project activities, this section suggests that discretion may need to be limited to mitigate the risk of project failure and satisfy market requirements for project permanence.

A. Agency Authority to Conduct Blue Carbon Project Activities

Most land management agencies must rely on enabling legislation or other general land management authority when developing blue carbon projects. In such cases, it may be reasonable to ask whether those authorities are sufficiently broad to allow agencies to conduct the activities necessary for a blue carbon project to successfully sequester greenhouse gases. In practice, however, there is little doubt that most blue carbon project activities are fully consistent with existing land management mandates. A recent study considering the issue found few limitations on the ability of federal, state, or tribal land management agencies to conduct the wetland conservation and recreation activities necessary to implement blue carbon projects.[59] To the contrary, blue carbon project activities appear to be squarely within statutory mandates governing land management.

[59] PORTER ET AL., *supra* note 43, at 16–20. This article focuses on federal and state authority, but legal issues related to tribal participation in blue carbon merit closer consideration.

Most land management laws do not require agencies to undertake specific types of activities, but rather to meet broad goals. These laws allow agencies substantial discretion in interpreting these goals and in how they manage lands to achieve them. For example, the National Park Service (NPS) Organic Act requires NPS to "conserve park resources while providing for their enjoyment, and ensure that all park resources are left 'unimpaired for the enjoyment of future generations.'"[60] A lack of specific definitions of key terms and judicial acceptance of changing interpretations of this mandate over time led Biber and Esposito to find that the NPS has "very broad management discretion under the statute" and there is "little basis to conclude that the Organic Act really does constrain management choices in a significant way."[61] Similar analysis can be applied to other land management mandates, including those focused on wetland conservation, such as the National Wildlife Refuge (NWR) system.[62] Wetland conservation and restoration activities appear fully consistent with these broad mandates, as reflected in the fact that many agencies conduct these activities today, albeit without funding via carbon markets.

If agency authority to conduct blue carbon activities is clear, why then might legislatures wish to explicitly endorse these activities? In most states with carbon market legislation, statutory language has implicitly endorsed the use of state lands for project activities. The Florida Forever Act is an exception, however, explicitly authorizing offsets as an acceptable land use. Explicit endorsement of the use of land for blue carbon activities may arise from a desire to avoid uncertainty or from questions about whether these activities produce sufficient financial return to be consistent with multiple-use frameworks. For example, Florida "'sovereignty lands' are to be managed to produce proceeds for

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[60] Eric Biber & Elisabeth L. Esposito, *The National Park Service Organic Act and Climate Change*, 56 NAT. RES. J. 193, 205 (2016).

[61] *Id.* at 204, 229 ("[T]he significant changes in the Park Service's position over the years gives little basis to conclude that the Organic Act really does constrain management choices in a significant way.").

[62] 16 U.S.C. § 668dd (1998) (requiring FWS to manage NWRs "for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans."). *See also* PORTER ET AL., *supra* note 43, at 17 ("Blue carbon projects are congruent with NWRSIA directives, such as habitat conservation, biological integrity, and water quality.").

the state, unless leased to a state agency for a more specific use,"[63] and other lands may be designated for a single use that is incompatible with blue carbon work.[64] Such provisions could limit blue carbon projects if agencies interpret them to prefer or require activities that produce maximum or net fiscal benefits. Explicit authorization may also be politically beneficial to agencies as it provides clear evidence of approval of the activity by both the legislative and executive branches and may thus avoid challenges to carbon market initiatives in the form of oversight or bills seeking to prohibit this activity.

Recent experience with compensatory mitigation on federal multiple-use lands provides an example of how political factors, combined with agency interpretation, could limit blue carbon activities. Section 404 of the Clean Water Act requires compensation for unavoidable loss of wetlands, which can be accomplished by restoring or enhancing existing wetlands, including on public lands.[65] The federal Bureau of Land Management (BLM) is not explicitly authorized to participate in compensatory mitigation, but it participated in these compensatory mitigation projects, including under a solicitor's opinion finding authority based on its general land management mandate.[66] However, the Trump administration issued an opinion reversing this policy and asserting instead that it lacked the authority to conduct compensatory mitigation on its lands.[67] In turn, the

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[63] PORTER ET AL., *supra* note 43, at 18 (citing FLA. STAT. § 253.03 (2018)); FLA. STAT. § 253.03(2) (2018)) ("It is the intent of the Legislature that the board of trustees continue to receive proceeds from the sale or disposition of the products of lands and the sale of lands of which the use and possession are not subsequently transferred by appropriate lease or similar instrument from the board of trustees to the proper using agency.").

[64] FLA. STAT. § 253.034(2)(b) (2014).

[65] SANDRA S. NICHOLS ET AL., ENV'T L. INST., THE FEDERAL WETLAND PERMITTING PROGRAM: AVOIDANCE AND MINIMIZATION REQUIREMENTS 1 (2012) ("for a project to be permitted … compensation [must] be provided for any remaining unavoidable impacts.") (citing 33 U.S.C. § 1344); Compensatory Mitigation for Losses of Aquatic Resources, 73 Fed. Reg. 19594, 19605 (Apr. 10, 2008) (authorizing public lands mitigation projects despite criticism based on unfair competition with private mitigation banks and expectation of conservation without banking income).

[66] The Bureau of Land Management's Authority to Address Impacts of its Land Use Authorizations through Mitigation, Solicitor Mem. M-37039 (Dec. 21, 2016). *See also* Justin Pidot, *The Bureau of Land Management's Infirm Compensatory Mitigation Policy*, 30 FORDHAM L. REV. 1, 8 (2019) (describing that the FLPMA has no explicit mandate for BLM to condition use of public land on implementing compensatory mitigation).

[67] Withdrawal of M-37039, "The Bureau of Land Management's Authority to Address Impacts of its Land Management Authorizations Through Mitigation", Solicitor Mem. M-37046 (June 30, 2017); BUREAU OF LAND MGMT., COMPENSATORY MITIGATION, INSTRUCTION MEMORANDUM 2019-018 (2018).

Biden administration has reinstated the prior regime.[68] This back-and-forth illustrates how, in the current political environment, agency leadership may use a lack of explicit authority to prevent participation in activities to which they are hostile for policy reasons — and may become an issue of greater salience as a result of the recent judicial retreat from deference to agency interpretations of broad statutory mandates.[69] Similar rationales could prevent agencies from participating in blue carbon projects in the future.

These concerns remain primarily hypothetical in the context of blue carbon markets, however: most agencies have justifiably taken an expansive view of their authority in this area. In most jurisdictions and for most agencies, blue carbon project activities are consistent with public land management legislation on both conservation and multiple-use lands, and they are likely to continue to do so where project participation will not only support coastal wetland conservation, but also associated ecosystem services and other co-benefits that enhance public use and enjoyment of these lands.

B. Market Requirements for Specific Land Management Mandates

Carbon market approval of public lands blue carbon projects depends, in part, on whether agencies can demonstrate that they will maintain the carbon sequestered in wetlands permanently — generally defined by carbon markets as at least a century. This demonstration is difficult without a legal obligation to continue project activities for the duration of the project. However, public lands statutes rarely incorporate such obligations, instead retaining substantial flexibility for agencies to manage lands in line with evolving budgetary and policy priorities. Carbon markets thus must determine whether this flexibility is consistent with permanence requirements, and what legal mechanisms — such as contracts or property rights transactions, as discussed in the following section — may be necessary to reduce the impermanence risks.

Carbon markets require projects to demonstrate permanence by considering various natural and anthropogenic risks that may result in reversal.

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[68] Withdrawal of M-37046 and Reinstatement of M-37039, "The Bureau of Land Management's Authority to Address Impacts of its Land Use Authorizations Through Mitigation", Solicitor Mem. M-37075 (Apr. 15, 2022).

[69] *See* Thomas B. Griffith & Haley N. Proctor, *Deference, Delegation, and Divination: Justice Breyer and the Future of the Major Questions Doctrine*, 132 YALE L.J. FORUM 693 (2022) (considering development of major questions doctrine).

For example, the VCS requires land use projects to complete a "Non-Permanence Risk Tool" to assess internal, external, and natural risks that affect the likelihood that the project will achieve the projected mitigation benefits.[70]

Climate risks are perhaps the most obvious form of permanence risk for blue carbon projects because sea level rise is likely to degrade or destroy many coastal wetlands, increase land area losses due to erosion, and otherwise reduce or reverse sequestration. Active habitat management interventions are likely to be necessary during the project period to address these climate risks, and availability of funding or plans for these interventions when and where necessary should be a key element of credible permanence risk analysis. The VCS Non-Permanence Risk Tool requires consideration of certain "natural risks," including extreme weather. This analysis is based on historical return periods but allows (but does not require) forward-looking predictions that may affect these risk factors to capture the changing profile of natural risks in a changing climate.[71] WRC projects also must consider additional climate risks, including changes in the depth of the water table and deposition of wrack due to storm surge.[72] In addition, WRC projects must consider sea level rise as an "external risk" and are subject to an automatic risk increase unless proponents can "demonstrate that potential upstream and sea impacts that could undermine issued credits in the next 10 years are irrelevant or expected to be insignificant, or that there is a plan in place for effectively mitigating such impacts."[73]

The VCS approach to evaluating climate risk for blue carbon projects appears relatively permissive — particularly for projects that are certain to require active management within the crediting period but beyond a 10-year timeframe for mitigation planning. For example, salt marsh ecosystems can migrate with changes in sea level, but they are now threatened by the rapid pace of sea level rise and limitations in their landward spread due to development along the shore.[74] Active management of salt marsh ecosystems will be needed to maintain salt marshes over the next century, such as by modifying sediment accumulation or freshwater inputs (e.g., thin-layer deposition) or acquiring coastal property to

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[70] VERRA, AFOLU NON-PERFORMANCE RISK TOOL, Version 4.0 (2019).
[71] *Id.* § 2.4.1.
[72] *Id.*
[73] *Id.* §2.3.1.
[74] *See* Crosby et al., *supra* note 11, at 62 (discussing threats to coastal wetlands).

enable marsh migration into upland areas.[75] Such interventions are likely to be needed beyond the ten-year timeframe required for consideration of sea level rise for WRC projects under the VCS Non-Permanence Risk Tool. Despite this critique, however, the requirement to consider these risks demonstrates the importance of active mitigation planning to avoid reversal and mitigate climate risk.

Protection from development that is incompatible with carbon sequestration is a second key risk for blue carbon projects that include upland areas. The Risk Tool specifically requires consideration of the difference in net present value (NPV) between project activities and other potential land uses of the project site.[76] Where the NPV of alternative land uses is substantially higher than for project activities, projects must mitigate risks through means including a legally-binding commitment to continue management practices during the project crediting period and/or at least 100 years.[77] Acceptable commitments include "any legally enforceable agreement or requirement, such as a conservation easement or protected area law that would require the continuation of the management practice that sequesters carbon or avoids emissions for the entire project longevity."[78] The same definition also provides an example, explicitly authorizing reliance on forestry legislation "where allowing re-growth of harvested areas is required by law" and such re-growth is "common practice."[79] Public lands projects have satisfied non-permanence risk assessment requirements in part by citing enabling legislation and practice.[80] However, it is far from clear that public lands statutes offer effective mitigation for wetlands under the VCS standard and others using similar language. Development risks are substantial for project areas that rely on uplands as a migration corridor for coastal salt marsh or

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[75] *See, e.g.*, Donald R. Cahoon et al., *Evaluating the Relationship Among Wetland Vertical Development, Elevation Capital, Sea-Level Rise, and Tidal Marsh Sustainability*, 42 ESTUARIES & COASTS 1, 12 (2019) (discussing marsh elevation and degradation under sea-level rise conditions); VanZomeren et al., *supra* note 12, at 62 (discussing thin-layer deposition using dredged sediment); Van Dolah et al., *supra* note, at 12 (discussing social dimensions of interventions to allow shoreward movement of tidal marshes).

[76] VERRA, *supra* note 70, at § 2.2.3.

[77] *Id.*

[78] *Id.* § 2.2.4(5). Internal document citations do not directly refer to this definition due to apparent scrivener's error. Prior versions of the Risk Tool refer to this definition; *See* VERRA, AFOLU NON-PERMANENCE RISK TOOL § 2.2.3 (Table 3) (Version 3.3 2016).

[79] VERRA, *supra* note 70, at § 2.2.4(5).

[80] *Id.*

mangroves in response to sea level rise, as uplands adjacent to coastal areas retain high value for incompatible development.

Public lands blue carbon projects will struggle to credibly rely on legislative mandates to satisfy market permanence requirements because public lands laws cannot guarantee the publicly-owned portion of the project area will remain protected or that active mitigation will occur. Some laws and regulations explicitly protect coastal wetlands from development. For example, the Rhode Island Coastal Resources Management Council's coastal management program calls for the preservation and enhancement of coastal wetlands, and activities other than those explicitly authorized (including restoration activities) are prohibited.[81] Permits are also restricted, as under other permitting programs, in areas where submerged aquatic vegetation (such as eelgrass) may be present.[82] However, as discussed below, many public lands laws allow or encourage the sale of public lands in fee, or interests in those lands (e.g., mineral rights), particularly on multiple-use lands. In many countries, national parks and other areas seemingly designated for conservation are even less protected than in the U.S. due to government policies favoring development and limited management and enforcement capacity — factors which have produced the well-recognized phenomenon of the "paper park."[83] Agencies thus may undermine sequestration without violating legislative conservation mandates, and market providers accept reversal risk if they accept statutory requirements as effective mitigation of development-related non-permanence risk.

Similarly, even where public lands laws offer strong protections against development, they do not include explicit, affirmative requirements requiring management practices to maintain habitats, as called for in the non-permanence risk tool. Public lands laws governing wetlands are permissive: agencies can conduct activities (including blue carbon project activities), including those that

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[81] 650 20-00 R.I. CODE R. §1.2.2(C).
[82] *See generally id.* § 20-00-1.3.1(R) (approving limited view restoration projects).
[83] *See, e.g.*, David Takacs, *Are Koalas Fungible? Biodiversity Offsetting and the Law*, 26 NYU ENV'T L. J. 161, 215–18 (2018) (noting debate); Xiao Recio-Blanco, *Protecting Marine Biodiversity in Latin America Through Area-Based Fisheries Regulation*, 28 GEO. ENV'T L. REV. 75, 83 (2015) (noting paper park issue in context of marine protected areas); Rebecca Nelson, *Regulating Grassland Degradation in China: Shallow-Rooted Laws?*, 7 ASIAN-PAC. L. & POL'Y J. 385, 400–06 (2006) (noting paper park issues in context of grasslands); Veronica Relano & Daniel Pauly, *The 'Paper Park Index': Evaluating Marine Protected Area Effectiveness Through a Global Study of Stakeholder Perceptions*, 151 MARINE POL'Y 105571 (2023) (finding that 27% of marine protected areas are likely 'paper parks').

are not explicitly authorized, but they are not required to follow particular management strategies or meet measurable benchmarks for ecosystem health or carbon sequestration. By contrast, laws governing forestry and other natural resource extraction activities establish requirements governing specific management practices, such as prohibitions on clear-cutting, that are clearly linked to carbon sequestration.[84] Wetlands laws do not include analogous requirements: agencies are not required to maintain sequestered carbon on their lands in general, let alone on specific tracts. As a result, these laws do not appear to provide the "legally enforceable requirements" needed to reduce permanence risk. Relatedly, agencies generally cannot commit in advance to conduct active management or maintain ecosystems in a particular form in perpetuity, as such commitments would require dedication of financing in violations of laws such as the federal Antideficiency Act.[85]

Project assessors are in the difficult position of needing to determine whether statutes or regulations limiting or preventing development, and non-binding statements of intent by agencies to conduct necessary interventions in the future, are sufficient to protect carbon sequestration on project areas for the project duration. Reliance on such intentions is particularly fraught for blue carbon projects intended to restore wetlands that have become degraded under agency management, as relying on that same management to guarantee permanence is optimistic at best. Land management agencies face not only funding limitations but also increasing demands due to the expected need for ongoing, active management to maintain ecological function in an era of climate change. Governments are unlikely to have the consistent resources, or the political will to dedicate them, to conduct these activities on project areas consistently over the long term without both binding legal commitments and adequate dedicated

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[84] *See, e.g.*, 16 U.S.C. § 1604(g)(3) (limits on clearcutting in management plans); *Id.* § 539d (requiring riparian buffers); *Id.* § 668dd (showing an example of the specific management practices required by laws concerning resource extraction).

[85] 31 U.S.C. § 1341 (prohibiting government obligation of funds that have not been appropriated by Congress). Agency actions may be constrained by the Endangered Species Act, but these constraints may change over time and may have unpredictable effects on the ability of agencies to carry out their intended actions. *See* 16 U.S.C. § 1536(a) ("Each Federal agency shall, in consultation with . . . the Secretary, insure that any [agency action] . . . is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of [critical] habitat . . . ").

funding streams over time.[86] Blue carbon funding so far has not covered the full cost of projects, so additional funding will likely be needed over time to maintain promised sequestration benefits. Under these conditions, reliance on agency intention and general directives for conservation appear unrealistically optimistic.

This analysis suggests that laws governing the management of public wetlands are rarely sufficient to demonstrate that blue carbon projects will offer permanent mitigation as defined by carbon markets, and credible carbon markets should demand more affirmative commitments to ensure that risks such as upland development and sea level rise are adequately mitigated. Public lands agencies are not explicitly required to undertake specific management activities contemplated as part of blue carbon projects — if they were, project sites might not require restoration and conservation in the first place. Moreover, fiscal realities suggest that public lands projects are unlikely to be successfully maintained over the long term absent non-statutory, enforceable legal commitments. As a result, carbon markets risk reversal if they do not require governments to commit to projects through measures beyond statutory compliance. These commitments, created through property or commodity agreements, raise separate challenges discussed in the next section.

V. HOW LIMITATIONS ON ALIENATION OF PUBLIC LANDS LIMIT BLUE CARBON TRANSACTION STRUCTURE

Transfer of property rights or commodities from public lands is likely to be necessary for blue carbon projects both to conform to carbon market standards and protect the interests of project partners. Such transfers are an issue of close concern to legislators and the public, however, so they are often constrained by public lands laws. This section reviews agency authority to enter into agreements to transfer carbon rights or credits before considering whether and how four types of transaction agreement structures may satisfy both legal requirements and market standards.

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[86] EPA and USACE have recognized the insufficiency of current budgets as one justification for the compensatory mitigation rule. Compensatory Mitigation for Losses of Aquatic Resources, *supra* note 65, at 19612 ("Credits secured by private developers [via mitigation banks or in-lieu fee projects] can provide a source of income for public entities to conduct . . . activities that could not be done under their current budgets.").

A. Agency Authority to Enter into Agreements to Transfer Carbon Rights or Credits

Blue carbon projects on public lands generally require land management agencies to transfer carbon rights or carbon credits to non-governmental entities. In most public lands carbon market transactions, a non-governmental funding partner will provide part or all of the resources needed to conserve and/or restore the project area in exchange for the right to claim the value of the carbon sequestered. If an agency cannot transfer that value to the funding partner, the transaction cannot occur. However, agencies commonly lack explicit authority to enter into contracts or agreements necessary for carbon market transactions, and their general authority to alienate public lands or associated natural resources is often limited. Such prohibitions or limitations on carbon value transfers may be the most substantial legal hurdle to completing blue carbon transactions.

i. The nature of carbon rights and credits

Carbon rights are the source of value underpinning carbon market transactions. Carbon rights have been defined as "the right to benefit from sequestered carbon and/or reduced greenhouse gas emissions."[87] These rights "flow from either the ownership of the asset or the control of the activity that lead to [sequestration]."[88] While few courts have been called upon to consider the nature of carbon rights to date, they may be generally understood as a property right that can be characterized as an entitlement of the landowner to the benefits associated with sequestration occurring on land.[89] Carbon rights from blue carbon

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[87] Charlotte Streck, *Who Owns REDD+? Carbon Markets, Carbon Rights and Entitlements to REDD+ Finance*, 11 FORESTS 959, at 1, 6 (2020) (quoting ANNA KNOX ET AL., FOREST CARBON RIGHTS GUIDEBOOK: A TOOL FOR FRAMING LEGAL RIGHTS TO CARBON BENEFITS GENERATED THROUGH REDD+ PROGRAMMING (2012)).

[88] *Id.*

[89] Roseland Plantation, L.L.C. v. U.S. Fish & Wildlife Serv., No. 05-0793, 2006 U.S. Dist. LEXIS 29334, at *3 (W.D. La. Apr. 5, 2006) (holding that potential to sell carbon credits derived from trees on plaintiff's land "make[s] up a portion of the bundle of rights in the real property."). Whether carbon rights have been transferred by past agreements may be disputed, as in the case of credits generated on lands subject to a conservation easement or timber sale that is silent on carbon rights. *Id.* (resolving motion to dismiss case over whether carbon rights were included in conservation easement); Aaron M. Schutt, *ANCSA Section 7(I): $40 Million Per Word and Counting*, 33 ALASKA L. REV. 229, 268–69 (2016) (assessing whether carbon credits are part of timber resource).

projects therefore generally accrue to the landowner — and thus, in the context of public lands projects, to the government.[90]

Carbon rights produce carbon credits when part of an approved mitigation project. Carbon credits are not property rights, but rather are fungible commodities representing a fixed amount of greenhouse gas emissions mitigated by an approved project.[91] Credits are issued or certified by a carbon market registry as mitigation benefits are realized; once issued, they can be traded or used to offset emissions.[92]

The owner of carbon rights on land has several options: (1) they may themselves claim and consume the credits generated on the land; (2) transfer the rights to another party or for a term of years via a carbon rights lease, easement or other property transaction, allowing the third party to claim credits produced from the land; or (3) continue to hold the rights but convey the credits to another party

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[90] Disputes may arise as to whether blue carbon rights accrue to the owner of the surface or mineral estate, as in the context of pore space used for carbon capture and storage. *See generally* A. Bryan Endres, *Geologic Carbon Sequestration: Balancing Efficiency Concerns and Public Interest in Property Rights Allocations*, 2011 U. ILL. L. REV. 623 (2011) (discussing ownership of pore space). For this and other reasons, blue carbon projects on split estate lands may be particularly complex. However, in most cases, the government may be assumed to be the holder of the carbon rights on public lands.

[91] HAW. STATE OFF. PLAN, *supra* note 49, at 25 ("An offset or offset credit . . . is a credit for mitigating 1 metric ton carbon dioxide (CO2) equivalent by paying someone else to avoid 1 metric ton CO2 equivalent. Offset credits are monetarily tradeable and must be evaluated and certified by an offset standard . . . ."). The law of timber sales appears to present a useful model for understanding carbon rights and credits. The sale of standing timber is a property transaction, as it is part of the land, whereas the sale of cut timber or timber to be cut imminently is considered a contract for the sale of goods. *See generally* William A. Thomas, *Natural Resources and the Uniform Commercial Code*, 7 NAT. RES. Law. 439, 440 (1974) (noting treatment of timber sales in the Uniform Commercial Code).

[92] *See, e.g.*, Laurie Ristino, *Conservation Easements in an Ecosystem Services Age*, 24 WATER RES. & ENV'T 56, 56 (2010) (credits are "issued by a regulatory body"); *see* John Monterubio, *Recognition of Property Rights in Carbon Credits under California's New Greenhouse Gas Cap-and-Trade Program*, 12 SUSTAINABLE DEV. L. & POL'Y 32, 32 (2012) (noting distinction in the nature of carbon rights and credits); Maron Greenleaf, *Using Carbon Rights to Curb Deforestation and Empower Forest Communities*, 18 N.Y.U. ENV'T L. J. 507, 539 (2011) ("Carbon rights (the right to the benefits of a specified pool of carbon) should be distinguished from carbon offsets (commodities that can be traded internationally")).

as they are produced.[93] A land management agency developing a blue carbon project on its lands may select any of these options, subject to legal constraints discussed below. Depending on which option is selected, a conveyance may require a property instrument (e.g., conservation easement) or commodity contract (e.g., sale of carbon credits).[94] The choice of transaction structure may depend on multiple factors, not least the nature of the agency's authority to transfer rights and credits on its lands.

ii. Limitations on alienation of public lands

Public lands laws vary widely in authorization of property and commodity transactions by responsible agencies. The extent of agency authority to alienate property interest in coastal lands and waters plays a critical role in whether and how an agency can structure blue carbon projects on its lands.

Agencies managing multiple-use lands (including many state lands agencies) often have broad mandates for exploitative use of public lands and are authorized to participate in a range of transactions involving both property and commodity interests in land for grazing, timber, mineral extraction, and other purposes.[95] As a recent study noted, for example, that "any Louisiana land-management entity, including but not limited to the Office of State Lands, can lease state lands under their jurisdiction 'for trapping, grazing, hunting, agricultural, and any other legitimate purposes' other than mineral development."[96] Broad authority of this nature is not uncommon at the state level

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[93] Fishing rights provide a useful analogy. Under a rights-based fishery management system such as an individual fishing quota (IFQ) system, a fisherman has the right to catch a fixed percentage of the catch each year. *see e.g.*, 50 C.F.R. § 622.21(a) (describing IFQ system for Gulf of Mexico red snapper fishery). The fisherman can sell that right in perpetuity or the annual allocation that it generates. *Id.* at § 622.21(b)(6) (distinguishing between permanent "share transfers" and one-year "allocation transfers"). Similarly, a carbon rights holder may sell the rights themselves or an offset generated by those rights in a given year.

[94] *See* Ristino, *supra* note 92 (noting the use of "contracts and real property instruments" for transactions processed on the Chicago Climate Exchange).

[95] SMITH, *supra* note 22, at 16.

[96] PORTER ET AL., *supra* note 43, at 25 (emphasis in original) (citing LA. STAT. ANN. §§ 41:1211–12 (covered agencies and authorizing leases)). Other states have similarly broad authorization for alienation of state lands not set aside for specific (often conservation) purposes. *See e.g.*, FLA. STAT. § 253.03(2) (2014) (directing the Board of Trustees of the Internal Improvement Trust Fund to "continue to receive proceeds from the sale or disposition of the products of lands and the sale of lands"); WASH. REV. CODE ANN. §§ 79.11–.13 (providing for sale and lease of all or property rights to certain emergent state lands).

for lands not dedicated to particular purposes or uses and provides maximum flexibility for blue carbon project structure.

In contrast to multiple-use lands, broad alienation authority is the exception, rather than the rule, for conservation lands. Agencies that manage lands dedicated to a specific (conservation) purpose are often subject to strict limitations on transfer of rights on those lands, whether by property or contract transaction. For example, the NPS cannot lease or sell property interests in lands within the National Park system, and it can only enter into contracts for a few purposes identified in the Organic Act.[97] FWS governing statutes similarly strictly limit the agency's authority to transfer property interests or sell commodities on NWR lands.[98] While not universal, state conservation agencies also face similar limits on both property and commodity transactions arising from the use of their managed lands.[99] Transfer of carbon rights or credits from conservation lands thus is usually, though not always, more legally constrained than such transfers on multiple-use lands.

iii. Public trust limitations on alienation of submerged lands

Public trust limitations may impose additional limitations on alienation of carbon rights on coastal submerged lands. The public trust doctrine requires that

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[97] *See, e.g.*, 54 U.S.C. § 101925 (commercial use authorizations); *id.* § 101925 (authorizing commercial use). S*ee also id.* § 100753 (2018) ("The Secretary . . . may sell or dispose of timber in cases where . . . the cutting of timber is required."). NPS can, however, sell or lease specific lands not in national parks or national monuments under certain conditions. 36 C.F.R. § 17.3 (authorizing commercial uses).

[98] 16 U.S.C. § 668dd (comparing the strict limits that the FWS has concerning transferring property on NWR land with the NPS); PORTER ET AL., *supra* note 43, at 24 (discussing FWS authority).

[99] *See* PORTER ET AL., *supra* note 43, at 25 (citing WASH. REV. CODE § 79.70.040 (2021)) (stating natural area preserves "shall be held in trust and shall not be alienated except to another public use upon a finding by the department of natural resources of imperative and unavoidable public necessity."); *but cf.* LA. STAT. §§ 56:1687(6) (2020), 36:204 (2020) (authorizing Office of State Parks to sell, lease, or sublease managed lands "when [the agency] believes it advantageous to the state to do so.").

states manage submerged lands, including coastal wetlands,[100] for the benefit of their citizens and prohibits them from violating their citizens' rights to use those lands.[101] Protected uses generally include at least fishing, commerce, and navigation, but some states have expanded protections to cover other uses, such as recreation.[102] Many states prohibit sale of submerged lands or rights to land — for example, Washington has prohibited sale of "state-owned tidelands and shorelands" to nonpublic entities since 1971.[103] However, states often allow lesser conveyances, such as a lease for a particular purpose, provided that they further a public interest and do not interfere with trust uses.[104]

Where state public trust law does allow leases of submerged lands, leases of carbon rights appear to be the type of transaction that would pass muster. Carbon rights lessees may require the power to prohibit or restrict activities that may result in reversal (e.g., dredging or mineral development), but such restrictions are unlikely to affect public access or use of the project area for navigation or recreation. Permanent alienation of submerged lands or carbon rights are not necessary in the lease context, though the length of the lease term is commonly limited by statute.

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[100] The boundaries of the areas subject to the public trust and the protected activities differ by state. In most states, the boundary between private ownership and public trust lands is mean high water, but some states have established different standards. Boundaries of public trust waters do not necessarily track property boundaries — to the contrary, states including Massachusetts and Louisiana "extend public trust rights to the high-water mark even though they recognize upland private ownership down to the low-water mark." Robin Kundis Craig, *A Comparative Guide to the Eastern Public Trust Doctrines: Classifications of States, Property Rights, and State Summaries*, 16 PENN. ST. ENV'T L. REV. 1, 15 (2007).

[101] *See* Illinois Central R.R. Co. v. Illinois, 146 U.S. 387, 458 (1892) (explaining the public trust doctrine); Shively v. Bowlby, 152 U.S. 1, 49–50 (1894) (establishing equal footing doctrine, so that each state owns submerged lands and is subject to public trust doctrine on joining union); Phillips Petroleum Co. v. Mississippi, 484 U.S. 469, 476, 493 (1988) (O'Connor, J., dissenting) (reaffirming that the public trust applies to all submerged lands subject to tides) (noting that the sale of mineral rights in submerged lands by a state violates the public trust).

[102] *See* Craig, *supra* note 100, at 17–18 (discussing protected uses by state for eastern states); Robin Kundis Craig, *A Comparative Guide to the Western States' Public Trust Doctrines: Public Values, Private Rights, and the Evolution Toward an Ecological Public Trust*, 37 ECOL. L. Q. 53 (2010) (characterizing elements of public trust doctrine in western states).

[103] WASH. REV. CODE § 79.125.200(2) (2021) ("Notwithstanding any other provision of law, from and after August 9, 1971, all state-owned tidelands and shorelands . . . shall not be sold except to public entities as may be authorized by law and they shall not be given away.").

[104] Tim Eichenberg & Barbara Vestal, *Improving the Legal Framework for Marine Aquaculture: The Role of Water Quality Laws and the Public Trust Doctrine*, 2 TERRITORIAL SEA. J. 339, 353–54 (1992).

In states with broader public trust restrictions, however, leases may not be possible and alternative approaches may be needed. Alternatives include statutory amendment to authorize carbon rights leases or other property transactions on submerged or intertidal lands for blue carbon use or the sale of carbon credits over time to avoid burdening the surface estate.

Public land management mandates establish a range of authority for agencies to transfer carbon rights and/or carbon credits. On multiple-use lands, transfers up to and including sale of fee simple lands may be authorized, subject to limitations imposed by the public trust. On conservation lands, however, authority to transfer rights and credits is often far more constrained, and existing law largely prohibits agencies from entering into property and/or commodity transactions that are not explicitly authorized. This explicit authorization is usually lacking in the case of carbon rights and credits — a serious issue for blue carbon projects, which are often best suited to lands managed by conservation-oriented agencies. Expansion of agency transactional authority thus has unsurprisingly been included in several state legislative reforms — most notably in Virginia. However, most agencies continue to lack such authority.

States and agencies lacking explicit authority to enter into blue carbon project agreements may wish to find a transaction structure that complies with the limited authority they have under existing law. The next section identifies four options that agencies may use for structuring blue carbon projects. Each structure raises different legal issues, but also has implications for conformity with carbon market standards.

B. Options for Transferring Carbon Rights and Credits

Given the array of authorities governing alienation of carbon rights and carbon credits on public lands, different transaction structures will be needed to comply with the law, conform to carbon market standards, and set forth the obligations of project participants. Ensuring unambiguous ownership of carbon rights or credits is likely to be a central concern for both funding partners and assessors evaluating conformity with market standards. The VCS, for example, requires project proponents to "demonstrate that they have the legal right to control and operate project . . . activities."[105] Where proponents do not own or

[105] VERRA, *supra* note 25, at § 3.6.

control the land, an "enforceable and irrevocable agreement" is required with the holder of the land rights "which vests project ownership in the project proponent."[106] This language appears to require the project proponent to control the carbon rights, including the ability to control activities on the land that may affect those rights. This language leaves room for a variety of arrangements in which the public agency, funding partner, or another partner may be the project proponent. The sections that follow explore how four transaction structures — including (i) sale or lease of carbon rights; (ii) sale of carbon credits as a commodity; (iii) transfer via memoranda of agreement; and (iv) retention of rights on acquired lands — are affected by both legal and carbon market requirements.

i. Lease or sale of carbon rights to public lands

Where agencies have the requisite authority, they may structure transactions around sale, lease, or other conveyance of carbon rights to a funding partner for the duration of the project period. As discussed previously, some agencies responsible for management of multiple-use lands have broad authority to engage in such transactions, up to and including fee simple sale of property rights. For such agencies and lands, a lease of carbon rights to enable a blue carbon transaction is likely a relatively simple process with ample precedent in natural resource extraction contexts.[107]

Carbon rights leases or other property transactions do not pose substantial issues for meeting the unambiguous ownership requirements of market standards. The property nature of a carbon right lease or sale means that such transactions are enforceable and irrevocable for their term. Thus, provided that the lease or sale document contains terms addressing other market requirements (such as obligation to perform management activities and monitoring), carbon rights transactions appear capable of satisfying carbon market standards.

Carbon rights transactions raise policy concerns independent of legal authority and market standards, both within and beyond the U.S. These concerns are similar to those implicated in public-private partnerships, which have been used in a variety of non-natural resource contexts. For example, a substantial number of state and local governments have monetized or funded development of

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[106] *Id.* § 3.6.1(6).

[107] Leases are commonly used to monetize publicly-owned natural resources, such as oil, gas, and renewable energy. *See* 43 U.S.C. § 1337 (2018) (lease provisions for offshore energy development on the Outer Continental Shelf).

public infrastructure through leases of future revenues, such as tolls or parking fees, to private enterprises.[108] Public-private partnerships have also been attempted in public lands contexts, with varying results.[109] Commentators have critiqued such arrangements on multiple grounds, such as a loss of sovereign control over public assets resulting in management solely for profit and in opposition to other values.[110] These critiques likely also apply to some degree to blue carbon projects, as carbon rights holders may be able to demand or undertake actions to maximize carbon storage in ways that negatively affect co-benefits. While hypothetical, such actions might include limits on public access or maximizing growth of particular species rather than maintaining a balanced ecosystem. Careful consideration is needed to avoid unintended negative consequences of rights leases and to ensure that carbon rights leases contain terms to protect the broader interests of land managers and the public.

Agencies with existing leasing authority may be able to design leasing provisions on a project-by-project basis to address these considerations and include terms such as limitations on lease duration and the obligations of parties. However, a more comprehensive review of lease program design may be more appropriate to not only ensure compliance with legal requirements and conformity with carbon market standards, but also to establish when, where, and how these transactions are in the public interest.

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[108] *See generally* Ellen Dannin, *Crumbling Infrastructure, Crumbling Democracy: Infrastructure Privatization Contracts and Their Effects on State and Local Governance*, 6 Nw. J. L. & SOC. POL'Y 47, 51 (2011) (discussing challenges related to provisions in transportation infrastructure leasing contracts).

[109] *See, e.g.*, Tom Ribe, *An Experiment in Privatizing Public Land Fails After 14 Years*, HIGH COUNTRY NEWS (Feb. 12, 2015) (discussing history of Valles Caldera National Preserve); Alex Brown, *Privatizing State Parks Can Save Them – Or Wreck Them*, STATELINE (Dec. 3, 2019) (discussing benefits and pitfalls associated with public-private partnerships on state private lands).

[110] *See, e.g.*, Ribe, *supra* note 109 and Brown, *supra* note 109. *See also* Jon D. Michaels, *We the Shareholders: Government Market Participation in the Postliberal U.S. Political Economy*, 120 COLUM. L. REV. 465, 489–90 (2020) (critiquing government market participation across multiple subject matter areas); Mary Grant, *Water Privatization Overview: A Public Interest Perspective on for-Profit, Private Sector Provision of Water and Sewer Services in the United States*, 14 J. L. SOC'Y 167, 176–77 (2013) (discussing concession arrangements for maintenance and provision of water and sewer services). The forces prompting privately-funded carbon sequestration projects on public lands are similar, and reflect a similar policy outlook, to forces driving public-private partnerships in other contexts. Critiques of public-private partnerships and of neoliberal approaches to governance thus apply to some degree to public lands carbon credit projects. This article recognizes but does not directly evaluate critiques of public-private partnerships in the context of carbon sequestration transactions.

ii. Sale of carbon credits without transferring underlying carbon rights

Agencies without authority to lease or otherwise convey property rights on public lands may be authorized to enter into commodities contracts for the sale of carbon credits. Agencies may have broader legal authority to sell commodities than property rights, though for some agencies and lands, this too will be prohibited. Where authorized, transactions based on the sale of carbon credits would involve agency receipt of capital from the funding partner in exchange for the transfer of carbon credits as they are produced during the project, with the government retaining the underlying carbon rights. The agency, as carbon rights owner, would remain the project proponent responsible for both initial restoration and continuing maintenance of the project area, subject to commitments to the carbon credit purchaser. The carbon credit sale contracts would undoubtedly set out these obligations, whether they are to be carried out by the land manager or by a third-party implementation partner.

There is ample precedent for sale of commodities from public lands. Notably, timber sales on National Forest lands are required to be executed as sales contracts with a maximum of a ten-year term.[111] These contracts are subject to a wide range of specific terms and conditions set out in Forest Service regulations, such as a requirement that timber and forest products be paid for in advance of cutting and requirements for appraisal of the value of the timber to be cut.[112] With adequate legal authority, similar blue carbon transactions would involve contracts between the agency and funding partner, providing the funding partner with a contract for the term of the project, likely with an initial payment for restoration and additional payments for maintenance in advance of annual issuance of carbon credits.[113]

Revenue bonds are a second potential model for carbon credit sales, though they are only beginning to be used in the natural resource context. Municipalities and other government entities commonly issue revenue bonds to

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[111] 16 U.S.C. § 472a (2011).
[112] 36 C.F.R. Part 223, subpart B; *id.* § 223.34 (advance payment); *id.* §§ 223.60–.66 (appraisal).
[113] Unless specifically exempted, agency carbon credit sales contracts would need to comply with the Antideficiency Act, 31 U.S.C. § 1341, and similar laws and regulations governing government contracting.

raise capital for revenue-generating infrastructure projects, such as toll roads.[114] These bonds provide their government issuers with capital for use in construction or maintenance projects, which is repaid to investors over time as those projects produce revenue. For example, Rhode Island sold $600 million in bonds as part of the RhodeWorks program, to be repaid from future toll revenues.[115]

Like toll roads, carbon projects produce future revenue in the form of carbon credits. Future carbon credits therefore could be used to support interest payments on a green bond. The first such transaction was completed in 2016, when the International Finance Corporation (IFC), an arm of the World Bank, issued a "forestry bond" that allows investors to be paid interest in the form of REDD+ carbon credits.[116] This bond — apparently the first financial instrument payable in carbon credits — originated in the Kasigau Corridor Programme in Kenya and has been sufficiently successful for IFC to develop a similar "Multi-Country Forests Bond Programme" for private-sector REDD+ projects in the Democratic Republic of Congo, Madagascar, and Peru.[117] Both programs have been criticized on numerous grounds — tied in particular to governance issues and whether they are producing real and additional mitigation[118] — but they illustrate the potential for bonds to provide restoration funding to government

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[114] *See* Christine Sgarlata Chung, *Rising Tides and Rearranging Deckchairs: How Climate Change is Reshaping Infrastructure Finance and Threatening to Sink Municipal Budgets*, 32 GEO. ENV'T L. REV. 165, 182–84 (2020) (noting shift by municipalities to use revenue bonds rather than general-obligation bonds).

[115] Ted Nesi, *New Questions About $595M Savings from Raimondo Truck-toll Plan*, WPRI.COM (Dec. 10, 2015). *See also* Am. Trucking Ass'ns v. Alviti, 944 F.3d 45, 47 (1st Cir. 2019) ("Rhodeworks imposes a daily limit on such tolls of $40 per truck and a $20 limit on border-to-border trips along Interstate 95. Within those limits, RIDOT determines both the locations of toll collection and the amounts of the tolls. Under RIDOT's authority, the Rhode Island Turnpike and Bridge Authority ("RITBA") collects the tolls and deposits the revenue into a special account. This account, called the "Rhode Island bridge replacement, reconstruction, and maintenance fund," can be used only "to pay the costs associated with the operation and maintenance of the toll facilit[ies]" and to fund the "replacement, reconstruction, maintenance, and operation of Rhode Island bridges."). The Rhodeworks program was subsequently determined to violate the dormant commerce clause for reasons other than its use of revenue bonds. Am. Trucking Ass'ns v. Alviti, 630 F.Supp.3d 357 (2022), *appeal docketed* No. 22-1795 (1st Cir. Oct. 19, 2022).

[116] Hamza Ali, *IFC Launches Forestry Bond That Can Pay its Coupon Using REDD+ credits*, ENV'T FIN. (Oct. 17, 2016); Jennifer Hughes, *Bonds – From Carbon Credits to Chinese Central Bankers*, FIN. TIMES (June 1, 2017).

[117] NORAH BERK & JOE EISEN, RAINFOREST FOUNDATION UK, GOOD MONEY AFTER BAD? RISKS AND OPPORTUNITIES FOR THE GREEN CLIMATE FUND IN THE CONGO BASIN RAINFORESTS 1, 18–21 (2019).

[118] *Id.*

entities in advance, while compensating investors through carbon credits that accrue over time — without requiring conveyance of an ownership interest in the underlying carbon rights. These bonds may thus avoid some of the public policy challenges associated with carbon rights leases.

Carbon credit transactions appear consistent with carbon market requirements for unambiguous ownership and other requirements of carbon markets. In these transactions, the government continues to serve as the unambiguous owner of the rights and will commit to undertake certain management actions on behalf of the purchaser of the carbon credits. These commitments will be set out in the sales contract and can be drafted to be irrevocable and enforceable for the duration of the contract. Carbon credit sales therefore appear to pose few challenges to carbon market approval.

Agencies with authority to sell future commodity revenues may be able to complete credit sale transactions without violating legal restrictions preventing conveyance of carbon rights. However, only agencies with broad authority to divest resources on public lands are likely to have sufficiently broad authority to sell carbon credits — particularly when those credits are sold in the form of a bond transaction. Authorizing carbon credit transactions by other agencies is likely to require an appetite for legal reform.

iii. Transfers of carbon rights or credits by MOA

Even agencies that face substantial restrictions on transfer of rights to or commodities derived from public lands can enter into nonbinding agreements regarding the use of those lands. However, these legally-unenforceable mechanisms, such as Memorandum of Agreement (MOA), appear to clearly violate carbon market standards for unambiguous ownership and are not a credible means of allocating carbon rights or credits.

There is precedent for the use of MOAs to establish carbon sequestration projects on public lands in the U.S. where contracting authority is limited — most notably, FWS afforestation projects in the lower Mississippi River basin. As described in Porter et al., for example, the "Restoration of Bottomland Hardwood Forests at National Wildlife Refuges in the South Central US" project used MOAs to describe the relationship of project partners, including ownership of carbon credits:

> The project restored planted areas of four NWRs in Arkansas and Louisiana, some but not all of which were in the Refuge system prior to the project. Carbon offset rights were claimed by Entergy, and other project partners acknowledged and agreed not to claim the carbon rights, via a series of MOAs for each Refuge. While the complete MOAs are not available to the public, the project documentation includes excerpts, including the following language for lands in Overflow NWR owned by FWS prior to the project:
>
> This Agreement documents the understanding of the parties regarding the transfer of the Acquired Reforestation Tract to the Service, the planting and management of the Acquired Reforestation Tract, management of the Refuge Reforestation Tract by the Service, and the donations made and to be made by Entergy and The Conservation Fund under the Fish and Wildlife Act of 1956. The donations from Entergy are made expressly subject to the condition that Entergy reserves the right to report and may report, on its behalf and for its affiliates, sequestered carbon associated with the trees planted on the Acquired Reforestation Tract and the Refuge Reforestation Tract.[119]

This and other MOA-based projects were accepted by the American Carbon Registry, though the purported reservation of carbon rights on NWR lands by Entergy in this instance appears unenforceable, since FWS lacks legal authority to transfer those rights.[120]

MOAs, such as the one quoted above, do not appear to satisfy the VCS standard requirement that agreements used to transfer rights to projects be legally enforceable and irrevocable. To the contrary, such agreements are nonbinding and unenforceable, and they can be dissolved at any time by any party with little recourse for counterparties. Termination or breach of an MOA in a blue carbon transaction could leave the project proponent with no legal right to claim any carbon credits produced on the site. In addition, unenforceable agreements allow landowners to modify land use practices at any time during a project without recourse, increasing the risk of reversals (i.e., permanence failures), which must

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[119] PORTER ET AL., *supra* note 43, at 8–9 (internal footnotes and citations omitted) (quoting TERRACARBON LLC, ENTERGY CORP., RESTORATION OF BOTTOMLAND HARDWOOD FORESTS AT NATIONAL WILDLIFE REFUGES IN THE SOUTH CENTRAL U.S. 80 (2011)).
[120] *See supra* note 98 and associated text.

be covered by other projects for the market to remain viable. Non-enforceable agreements thus pose substantial risks not only to project proponents but to market stability.

It is tempting, but ultimately misguided, to suggest that carbon markets should allow the use of MOAs by public lands agencies. Public agencies appear to present lesser risks of non-permanence than non-governmental entities because of the very restrictions on transfer of property rights discussed above. However, these restrictions are themselves impermanent. Over even relatively short time periods (as the last few presidential administrations clearly indicate), government policy preferences can change drastically, and those preferences could lead to termination of MOAs. Markets must also consider the issue from an international perspective, recognizing the wide array of paper parks for which protections on development exist on paper but not in practice. As a result, markets are justified in holding a firm line against the use of unenforceable agreements by public agencies.

iv. Retention of carbon rights on acquired lands

Agencies without authority to transfer carbon rights or carbon credits appear to have only one option to participate in blue carbon projects on their existing lands at this time. That option is to accept donations of private lands from which carbon rights have been separated prior to the donation. Most FWS afforestation projects completed to date have used this "acquired lands" strategy to avoid transfer of property rights on existing NWR lands.[121] The credits for these projects were generated on lands not yet owned by the government, but donated to the government at closing without carbon rights.[122] The MOAs used for these projects note that the funding partner had acquired and explicitly reserved the carbon rights on the donated lands, so that they never passed to the government, and the funding partner therefore retained continuing rights to claim credits generated on those lands without the government needing to convey them.[123]

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[121] *See* PORTER ET AL., *supra* note 43, at 7–9 (reviewing past projects). The MOA quoted above at *supra* note 119 and associated text is the sole example known to the author of a project covering lands already in the NWR system.
[122] *Id.* at 20.
[123] *Id.*

This strategy is available to most public land agencies. Most agencies have some form of authority to accept donations of land, including encumbered land, though "the extent and conditions on acquisitions and gifts differ from agency to agency."[124] Limitations on donation authority and the availability of a quasi-governmental foundation able to act as fiscal agent are important considerations for this type of blue carbon project.[125] However, most agencies appear to have some legal authority to accept or acquire lands, allowing blue carbon projects dependent on donation or acquisition to proceed as long as the agency is willing to do so.[126]

Acquired lands projects appear capable of satisfying carbon market requirements. In these transactions, there is no doubt that the funding partner is the unambiguous, irrevocable, and enforceable owner of the carbon rights to project lands, and therefore of the resulting credits. Conveyance of the lands by a nongovernmental partner to the public can also ensure that the funding partner retains the right to conduct project activities on those lands for the duration of the project (or conversely, establish the duty of the agency to conduct those activities). Under these conditions, this transaction structure does not appear to limit acceptance by a credible market.

The downside of the 'acquired lands' project structure is that it is possible only for a small subset of potential blue carbon projects. Blue carbon projects are commonly conducted on submerged or intertidal lands, most of which are already in public hands. However, some submerged and intertidal lands are owned by private entities due to subsidence, conveyance prior to statehood, state coastal

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[124] *Id.* at 21, 21–24.

[125] *See id.* (discussing potential utility of National Park Foundation for blue carbon projects).

[126] Agencies may hesitate to accept donated lands on which carbon rights have been withheld for policy reasons. For example, NPS initially refused to take title to lands now within Everglades National Park because mineral rights on those lands had been separated from the surface estate and remained in private ownership. ALICIA BURTNER, NAT'L PARK SERVICE, MARJORY STONEMAN DOUGLAS WILDERNESS CORE ELEMENTS: 2010 5 (2010). Instead, the federal government accepted these lands as a NWR until the mineral rights issues could be resolved to NPS's satisfaction. *Id.* Split estates are in fact common on both NPS lands and NWRs, so NPS may not consistently refuse split estate lands in the future. *See* Andrew C. Mergen, *Surface Tension: The Problem of Federal/Private Split Estate Lands*, 33 LAND & WATER L. REV. 419, 431 (1998) (noting private ownership of mineral rights, including oil and gas rights, on public lands are present on two-thirds of NPS units and more than 100 NWRs). While blue carbon activities do not raise the same potential for environmental degradation as mining or oil and gas extraction, NPS or other agencies could potentially object to accepting lands on which carbon rights had been severed.

property boundaries, or other reasons.[127] Conveyance of private tidelands to public ownership may be desirable to land managers and well-suited to a carbon market transaction. Acquisition of some privately-owned uplands projected to become salt marsh in the future may similarly be desirable to enable marsh migration. Unlike submerged and intertidal areas, future marsh areas are often owned by private entities, but are poorly suited to development due to their current exposure to storm-induced flooding and the increasing regularity of tidal flooding that they will experience as sea level continues to rise. Donation of these lands to public ownership may be essential to enable marshes to migrate inland and protect the carbon sequestration and other co-benefits that these ecosystems provide. These examples indicate that while not appropriate in all cases, blue carbon projects on acquired lands may play an important role in conserving and restoring coastal wetlands.

VI. BLUE CARBON LEGISLATION: A NEEDED STEP

Coastal wetlands are threatened and require restoration and active conservation, but responsible agencies lack the resources necessary to maintain them. Blue carbon projects may provide badly-needed funding to support the continued functioning of these ecosystems as carbon sinks. While public wetlands are often ideal sites for blue carbon projects, projects on existing public lands face substantial challenges. As methodological and scientific issues are resolved, agencies and partners are facing increasingly urgent questions about how to overcome inter-related legal and market challenges.

This article suggests that agencies cannot rely on existing public lands law to support participation in blue carbon projects on public coastal wetlands. Although existing enabling legislation provides adequate discretion for agencies to conduct wetland conservation and restoration activities necessary for blue carbon projects, this discretion undermines project permanence and conformity with carbon market standards. Under these conditions, enforceable agreements among project partners are needed to provide confidence in the longevity of blue carbon projects and provide the resources for future management action necessary

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[127] *See, e.g.*, Jacques Mestayer, *Saving Sportsman's Paradise: Article 450 and Declaring Ownership of Submerged Lands in Louisiana*, 76 LA. L. REV. 889, 896 (2016) (discussing private ownership of coastal marsh bottoms in Louisiana); Erin J. Bryant & Kristin M. Fletcher, *Exploring a New Strategy for Marine Protection: Private Conservation of Tidelands in Massachusetts*, 12 OCEAN & COASTAL L. J. 15 (2006) (discussing private ownership of submerged lands and tidelands).

in the face of sea level rise. Agreements between agencies and nongovernmental project partners also serve other roles — notably, by clarifying ownership of carbon rights to the project area and of the carbon credits that will be produced during the project. Some agencies already have broad authority to enter into agreements for carbon transfers on public lands. However, many agencies — particularly those focused on conservation, which may be most interested in the success of blue carbon projects — cannot enter into carbon rights leases or sell carbon credits on managed lands, preventing them from entering into the legally-binding commitments that are necessary for projects to be credible and satisfy carbon market requirements. Current law related to agency authority to transfer carbon rights or credits therefore poses a substantial legal challenge that must be addressed for blue carbon projects to occur on public lands at scale.

Statutory reform appears necessary to enable blue carbon projects to meet both legal and carbon market requirements. As discussed in Part III, a few states have enacted legislation to enable agencies to participate in carbon market projects on public lands. This legislation addresses one or more of five issues relevant to carbon market participation:

1. Clarification that carbon market projects are consistent with land management mandates;

2. Authorization for agencies to enter into agreements necessary for carbon market projects on state lands;

3. Delineation of carbon credit ownership derived from projects on state lands;

4. Authorization for agencies to acquire public carbon rights easements on private lands; and

5. Direction for the use of funds derived from the sale of carbon credits on state lands.

Each of these elements is important to agencies interested in participating in blue carbon projects. However, these elements have been addressed in a patchwork fashion by individual states, which have generally responded to only one or a few

of these issues, often with little detail to support effective implementation. Even the most comprehensive such statute, enacted in 2020 in Virginia, addresses only a subset of these issues and only in broad outline. For example, while it authorizes agencies to "enter into agreements necessary" for blue carbon projects, this authorization is limited to projects for submerged aquatic vegetation and does not address the character of those agreements — for example, whether the agency can transfer carbon rights and/or carbon credits. While existing legislation points to the need for legislative clarification of agency roles in carbon market projects on public lands, it does not appear to be sufficiently broad or detailed to address the full range of legal and market challenges.

New federal and state legislation will be needed to address legal and market challenges in a systematic, rather than piecemeal, fashion. This legislation would not only authorize each of the necessary types of activities, but also resolve questions related to blue carbon project implementation in more detail than any existing law. For example, systematic legislation would not only authorize agencies to enter into agreements, but would also clarify the types of transfers that are approved (e.g., carbon rights leases versus carbon rights sales or securitization) and other limits on agency authority desired to protect the public interest. Legislatures have often established such limits in other public lands contexts, for example by setting the maximum duration and renewal of agreements for natural resource leases or sales.[128] While imperfect, existing laws governing natural resource extraction and compensatory mitigation on public lands are useful models for the potential scope and questions that blue carbon legislation will need to address.

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[128] Explicit limits on lease duration are common but vary by agency and the purpose of the lease. For example, NPS can lease historic properties for up to 60 years. 36 C.F.R. § 18.10 (2001). However, grazing privileges issued by BLM are limited to a maximum term of 10 years, though permittees and lessees have first priority to renew their privileges. 43 U.S.C. § 1752 (2021) ("the holder of the expiring permit or lease shall be given first priority for receipt of the new permit or lease," provided listed conditions are satisfied). State leases are similarly subject to a range of lease duration and renewability conditions. *See* PORTER ET AL., *supra* note 43, at 29 (discussing need to address lease duration); VERRA, *supra* note 70, AT § 2.2.4 (allowing projects that can demonstrate that "project ownership . . . can be maintained for the entire project longevity (e.g. where control is secured through a concession that is shorter than the project longevity, such concession is renewable for the full longevity period being claimed)."). Where laws specify a maximum lease duration that is shorter than the longevity period, leases will need to be renewable to safeguard the interests of funding partners, laws will need to change for carbon projects to allow longer terms or renewability, or market providers will need to waive or weaken requirements for longevity for public land projects.

While models from related contexts can support development of blue carbon legislation, the content of this legislation will need to be built on a nuanced consideration of the desired character of blue carbon transactions. Additional analysis will be needed in order to understand in detail the benefits and drawbacks of different approaches to issues such as transaction structure (e.g., carbon rights leases versus carbon credit sales) as well as how to address practical considerations most effectively. Carbon market providers are important partners in identifying preferred models, as legislation must enable conformity with market standards for the effort to be worthwhile. Blue carbon legislation that effectively supports agency, public, and carbon market needs can support new funding and long-term commitments for coastal wetlands conservation and restoration — a critical need for ecosystems facing increasing challenges due to climate change.