NAVIGATING TOWARDS TOMORROW IN THE URBAN SEA: THE CHALLENGES AND OPPORTUNITIES OF MARINE SPATIAL PLANNING IN LONG ISLAND SOUND

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I. INTRODUCTION

Long Island Sound (referred to throughout as Long Island Sound or the Sound), a large estuary situated along the Atlantic coast of southern New England, is governed by Connecticut and New York. The Sound serves as the jurisdictional boundary between the two states and its governance is concomitantly distributed among the states, federal government, and a multitude of coastal municipalities. The uses and users of the Sound are managed by different agencies and regulations, which are not necessarily coordinated or consistently applied. Several years ago, ad hoc efforts began in the Sound to develop marine spatial planning (MSP), defined by UNESCO as "a process of analysing and allocating parts of three-dimensional marine spaces to specific uses, to achieve ecological, economic, and social objectives that are usually specified through the political process."

In 2015, Connecticut passed legislation to implement MSP in the state. Although New York has developed a marine spatial plan for its Atlantic Ocean waters, it has not followed suit in Long Island Sound. This article investigates the challenges and opportunities that exist to develop and implement bi-state MSP in the waters of Long Island Sound. Based on the premise that a goal of MSP is to make management more comprehensive, cohesive, coordinated, and less institutionally fragmented, the authors entered into this effort to examine how the emerging MSP efforts would address the bi-state governance of the Sound.

The authors hypothesize that obstacles to multi-party cooperation involve perceived competition for the use and control of shared natural resources and the

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benefits generated by the Sound's ecosystem services, and also political and institutional concerns regarding jurisdictional authorities and state sovereignty. Interviews were conducted with official stakeholders involved in on-going MSP efforts in both states to understand barriers and prospects associated with this effort. An index was constructed to assess the management compatibility of state approaches towards the regulation of a suite of activities and impacts. Of the sixteen activities, respondents perceived only two to be incompatible: dredge disposal and sand and gravel mining.

Part II provides a background on the particular challenges and opportunities associated with the governance of marine systems, including the emergence of MSP. Part III includes an overview of Long Island Sound as a coupled natural-human system and explores its natural and economic inheritance, along with the legal and policy framework governing this maritime space. Parts IV, V, and VI outline the research methods, present the results, discuss the interviews, and conclude with an analysis of the responses by MSP practitioners regarding the development of MSP in the Sound and their understanding of the obstacles and opportunities they believe impede or facilitate progress towards that goal. Finally, Part VII provides recommendations with an eye towards contributing to the emergence of successful bi-state governance of the Sound. The good news is that the two states' management approaches are overwhelmingly perceived to be compatible, with the exceptions of dredge disposal and sand and gravel mining. With an enhanced effort to foster substantive ways for managers and stakeholders hailing from both sides of the Sound to communicate, participate, and interact, efforts to implement MSP have a good chance of moving forward.

II. INSTITUTIONAL DIMENSIONS OF MARINE GOVERNANCE

Marine systems pose several unique challenges to actors wishing to control or govern human uses. These challenges are embedded in the marine environment's innate physical nature, size, fluidity, three-dimensionality, dynamism, lack of human settlements, difficulty in delineating boundaries, and in monitoring and enforcing such human constructs, among others. At the same time, these systems can also provide opportunities to craft innovative institutional solutions. Recent advances in this realm include ecosystem-based management, coastal zone management, and MSP.

A. *Governance Challenges*

Since Garrett Hardin published his famous essay in 1968,[2] the ocean has been a poster child for the Tragedy of the Commons.[3] Even before Hugo Grotius declared the freedom of the seas in his 1608 treatise *Mare Liberum,* the ocean had a long history as an open access region, and in the years following, it became one of the first widely accepted principles of international marine law.

In the wake of Grotius, the absence of ocean governance, coupled with a widely-held view of the ocean as unchanging and unchangeable, invulnerable to human impacts, has led to a degradation of the ocean environment and resources. The biotic and abiotic make-up of the oceans have become increasingly altered by a range of human activities, such as pollution, fisheries depletions, and increased carbon emissions. Scientists mapped seventeen anthropogenic drivers of ecosystem change across the marine environment and found just 4% to be relatively unaffected by humans, while over 40% were experiencing moderate to heavy impacts.[4] The marine

[2] Garrett Hardin, *The Tragedy of the Commons*, 162.3859 SCIENCE 1243-48 (1968).

[3] Of the four general ownership regimes under which environments and resources can be controlled, the open ocean has long been considered *res nullius*, literally "nobody's property," unable to be owned, appropriated, or transferred and lacking rights to exclude. Hardin confused this absence of property rights with *res communes*, or common ownership, in which a community or group of independent users exert a collective right to control. Hardin also neglected to identify the historically and culturally rich variety of solutions to the tragedy, which go beyond government control or privatization approaches. There is a large and growing literature describing the variety of ways that access to the commons has been managed through time and around the world. *See generally* David Feeny et al., *The Tragedy of the Commons: Twenty-Two Years Later*, 18.1 HUMAN ECOLOGY 1-19 (1990), *available at* https://www.kth.se/polopoly_fs/1.197993!/Menu/general/column-content/attachment/Feeny_etal_1990.pdf; ARTHUR MCEVOY, THE FISHERMAN'S PROBLEM: ECOLOGY AND LAW IN THE CALIFORNIA FISHERIES 1850-1980 (Cambridge Univ. Press, England 1986); BONNIE MCCAY & JAMES ACHESON, THE QUESTION OF THE COMMONS: THE CULTURE AND ECOLOGY OF COMMUNAL RESOURCES (McCay & Acheson eds., Ariz. Press, Tucson 1987); COMMON PROPERTY RESOURCES, ECOLOGY AND COMMUNITY-BASED SUSTAINABLE DEVELOPMENT 302 (Fikret Berkes ed., Belhaven Press, London 1989); Kenneth Ruddle & Tomoya Akimichi, *Sea Tenure in Japan and the Southwestern Ryukyus*, in A SEA OF SMALL BOATS 337-370 (J. Cordell ed., Cultural Survival Inc. 1989). *See* INTERNATIONAL ASSOCIATION FOR THE STUDY OF THE COMMONS, http://www.iasc-commons.org/ (last visited 2016) as a clearinghouse for information and research on approaches to sustaining commons around the world.

[4] *See* Benjamin S. Halpern, *A Global Map of Human Impact on Marine Ecosystems*, 319.5865 SCIENCE 948-52 (2008).

environment is changing and there is a growing recognition that these changes are at least in part rooted in failures of governance.[5]

The boundaries of any ecosystem can be difficult to define. Created by humans, boundaries are subjective products related to human objectives and management goals. However, system boundaries are even more difficult to delineate in the marine environment. Even on land, system boundaries are porous, allowing biotic and abiotic movements across boundaries. Aquatic systems have several attributes that create additional challenges for governing them. They are three-dimensional, often poorly understood due to difficulties in accessing, investigating, and perceiving them, and while some features or resources are stationary, others are mobile and dynamic.

Marine systems often intersect or act as boundaries among adjacent governance units. Internationally, transboundary rivers such as the Mekong, Rhine, Nile, and Danube demarcate the boundaries of nation-states, flowing through multiple countries on their way to the sea. This is also true of marine systems such as seas, gulfs, bays, and sounds. They are rarely encapsulated within one governance jurisdiction. Within the United States, rivers such as the Columbia, Connecticut, and Mississippi create borders between adjacent states. Coastal estuaries like Chesapeake Bay and Long Island Sound are bisected offshore by the invisible lines of state boundaries. At smaller spatial scales, rivers, brooks, creeks, and estuarine embayments often form the boundaries between local municipalities. As a result, the jurisdictional shapes of the relevant governance institutions rarely fit the shapes of the natural ecosystems they seek to govern. Problems of "fit" refer to the ways in which institutions fail to match the ecosystems they govern.[6] Problems of fit are crucial drivers in determining the effectiveness of resource management regimes since their ability to prevent environmental degradation or achieve desired outcomes is premised in large part

[5] THE WHITE HOUSE COUNCIL ON ENVTL. QUALITY, FINAL RECOMMENDATIONS OF THE INTERAGENCY OCEAN POLICY TASK FORCE 2 (July 19, 2010), *available at* https://obamawhitehouse.archives.gov/files/documents/OPTF_FinalRecs.pdf (stating that "[t]he challenges we face in the stewardship of the ocean, our coasts, and the Great Lakes lie not only within the ecosystems themselves, but also in the laws, authorities, and governance structures intended to manage our use and conservation of them.").

[6] *See* ORAN R. YOUNG ET AL., IHDP REPORT NO. 16: SCIENCE PLAN: INSTITUTIONAL DIMENSIONS OF GLOBAL ENVIRONMENTAL CHANGE (H. Shroeder ed., Rev. Ed. 2005) (1999); *See also* ORAN R. YOUNG, THE INSTITUTIONAL DIMENSIONS OF ENVIRONMENTAL CHANGE: FIT, INTERPLAY, AND SCALE (MIT Press, 2002) (expanding on these themes); *See also* L.B. Crowder et al., *Resolving Mismatches in U.S. Ocean Governance*, 313.5787 SCIENCE 617-18 (2006) (amplifying problems of scale, fit, and institutional fragmentation).

on their fit with the surrounding biogeophysical system.[7] In addition, some geo-political contexts (especially where flows are directional) create upstream-downstream problems, which can create a particularly pernicious variation of Hardin's tragedy.[8]

Even within a single political jurisdiction, the multitude and diversity of regulated activities, laws, and agencies creates a dense and fragmented field of institutions which often overlap and conflict, focused on fulfilling divergent mandates or incompatible ends.[9] This situation is responsible for the existence of problems of "interplay," which involve the interactions among different institutions operating in the institutional space.[10] The lack of comprehensive planning does not mean that the activities which occur in marine areas are unregulated or that these spaces are unallocated. Rather regulation occurs primarily within "individual economic sectors."[11]

Scaling down below the layer of federal authority, complexities may increase as multiple states compete to impose their individual management regimes on what in actuality are single, unified natural systems. This creates situations where different approaches to managing water quality and quantity, living resources, mineral extraction, transport and shipping lanes, dredging and dredge disposal sites, maritime heritage, recreational and cultural sites and resources, and other realms are deployed within a single aquatic ecosystem. Inappropriate or misaligned incentives, often embedded within human-environment relationships, can also pose significant challenges to governance.[12] Incentive mismatches may be caused by spatial, temporal, and valuational asymmetries, among other factors.

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[7] YOUNG, THE INSTITUTIONAL DIMENSIONS OF ENVIRONMENTAL CHANGE: FIT, INTERPLAY, AND SCALE, *supra* note 6.

[8] *See* Syma A. Ebbin, *Swimming Upstream: Institutional Dimensions of Asymmetrical Problems in Two Salmon Management Regimes*, 27.5 MARINE POLICY 441-48 (2003); Syma Ebbin, *What's Up? The Transformation of Upstream-Downstream Relationships on Alaska's Kuskokwim River*, 26.2 POLAR GEOGRAPHY 147-66 (2002) (thoroughly explicating the problems associated with asymmetrical problem structures).

[9] THE WHITE HOUSE COUNCIL ON ENVTL QUALITY, *supra* note 4, at 13. ("United States governance and management of these areas span hundreds of domestic policies, laws, and regulations covering international, Federal, State, tribal, and local interests.").

[10] *See* YOUNG ET AL, *supra* note 6.

[11] Fanny Douvere, *The Importance of Marine Spatial Planning in Advancing Ecosystem-Based Sea Use Management*, 32 MARINE POLICY 762-71 (2008).

[12] YOUNG, *supra* note 7.

Misaligned incentives can produce outcomes where negative impacts are externalized to the detriment of other individuals, but more importantly, to the ecosystem (and resource base) as an integrated whole. Work on the prisoner's dilemma and game theory has laid out the mechanics and dynamics of these misaligned incentives through the analysis of player decisions to defect or cooperate.[13] Successful joint use can develop when players act (or refrain from acting) in ways that contribute to each other's well-being. Free-riding behavior is the antithesis of reciprocity, which depends on players demonstrating behaviors that meet mutual expectations over time. Individuals learn what to expect from each other over time and alter their behavior accordingly. Thus, cooperation based upon reciprocity can be achieved when interactions are future-oriented, continuous (non-finite), and there is a good possibility that participants will meet again.[14] Cooperation is of course enhanced with a foundation of trust based on interpersonal history, as well as good communication – both missing from the original prisoner's dilemma. Parties engaged in the joint use and control of shared resources may operate under a similar incentive structure and have competing interests in accumulating benefits, externalizing costs, and retaining jurisdictional authorities.

B. *Governance Opportunities*

Ecosystem management may be one possible way to avoid the ensuing conflicts caused by institutional interplay and problems of fit. Ostensibly geared to encompass entire ecosystems, with the goal of encompassing all sources of mortality which impact all species within a given system, ecosystem management takes into account impacts on the surrounding system's structures and functions. However, this approach, especially when focused on resources within marine environments, has not been elaborated sufficiently to enable it to be implemented in a cohesive manner.[15] Another way to meet these challenges in marine

[13] Game theory is a modeling approach used by a number of disciplines including mathematics, economics, political science, among others, to explore the role that incentives play in decision-making as well as the evolution of conflict and cooperation. The "games" that game theory refers to are interactive situations involving independent, rational decision-makers. The prisoner's dilemma is one such game that is designed to show how incentives can be structured to promote outcomes that are less than optimal from the perspective of both the players and society. Oran Young notes that in addition to the prisoner's dilemma, many other "circumstances generate incentives to act in ways that seem rational from an individualistic perspective but yield collective outcomes that are unattractive to all." *See* YOUNG, *supra* note 7, at 31.

[14] ROBERT AXELROD, THE EVOLUTION OF COOPERATION (Basic Books, New York rev. ed. 1984).

[15] JULIA M. WONDOLLECK & STEVEN L. YAFFEE, MARINE ECOSYSTEM-BASED MANAGEMENT PRACTICE: DIFFERENT PATHWAYS COMMON LESSONS (Island Press 2017) (describing development of five types of ecosystem-based approaches to marine management, showing the breadth and

governance might be through a place-based spatial planning approach.[16] In fact, place-based approaches have been put forth as a vehicle to implement ecosystem management and create a more comprehensive and integrated management process.

The concept of land use planning has been in use since ancient times, but the concept of zoning – that is designating certain land uses as spatially explicit zones on maps – began in the latter half of the 19th century. These efforts arose in response to conflicts that emerged among users and uses of the land.[17] As cities expanded, the utility of developing spatially explicit plans for managing drinking water sources and wastewater effluents along with other industrial land uses became clear. In the United States, zoning was first applied in 1916 in New York City, upheld ten years later by the Supreme Court of the United States in the case *Euclid v. Ambler*, and adopted by all states and most municipalities in the following years.[18] Individual review and permitting of land use proposals has been supplemented by overarching planning processes that guide future conservation and the development of communities.

C. *Marine Spatial Planning*

Spatial planning efforts have been implemented in marine systems in the last few decades, often, but not always, evolving from efforts to manage and protect significant marine habitats, such as the Florida Keys National Marine Sanctuary and Great Barrier Reef Marine Park in Australia.[19] These MSP efforts

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variation among the ways this approach has been implemented); See Heather Leslie & Karen McLeod, *Confronting the Challenges of Implementing Ecosystem-Based Management*, 5.10 ECOLOGY AND THE ENVIRONMENT 540-48 (2007) for an outline of some of the work needed to implement marine-based management, answer questions that remain over how to implement ecosystem assessments and multi-species approaches, and adjudicate tradeoffs among resources.

[16] Oran Yong et al., *Solving the Crisis in Ocean Governance: Place-Based Management of Marine Ecosystems*, 49.4 ENVIRONMENT 21-32 (2007).

[17] Douvere, *supra* note 11.

[18] *See Zoning Background*, NYC PLANNING - DEPARTMENT OF CITY PLANNING (2016), https://www1.nyc.gov/site/planning/zoning/background.page (citing *Village of Euclid, Ohio v. Ambler Realty Co.*, 272 U.S. 365 (1926) describing the U.S Supreme Court decision that the zoning regulations Euclid enacted were constitutional and ruling that these efforts were an appropriate extension of the police powers derived under the 10th Amendment to ensure public health, safety, and welfare).

[19] See Briana W. Collier, *Orchestrating Our Oceans: Effectively Implementing Coastal and Marine Spatial Planning in the U.S.*, 6.1 SEA GRANT LAW AND POLICY JOURNAL 86-87 (2013), *available at* https://www1.nyc.gov/site/planning/zoning/background.page, for a review of international initiatives in marine spatial planning. This article is also available on the National Sea Grant Law Center's website at http://nsglc.olemiss.edu/sglpj/vol6no1/5-Collier.pdf.

have sought to integrate the suite of human activities in spatially delimited areas through processes which are explicitly embedded within specific biophysical, socioeconomic, and jurisdictional contexts. UNESCO has come to define MSP as a "process of analyzing and allocating parts of three-dimensional marine spaces to specific uses, to achieve ecological, economic, and social objectives that are usually specified through the political process."[20]

In the United States, beginning with the passage of the Oceans Act of 2000, which established the U.S. Commission on Ocean Policy (Commission), and the publication of the Commission's Blueprint Report in 2004, the idea of creating a more integrated and coordinated approach to ocean management began to receive greater attention.[21] Indeed, this approach was recommended by the Interagency Ocean Policy Task Force (Task Force) established by President Obama in 2009.[22] The Task Force recommended establishing a new framework for a national ocean policy along with a set of national priority objectives that included "implement[ing] comprehensive, integrated, ecosystem-based coastal and marine spatial planning and management in the United States."[23] The report goes on to define MSP as a "comprehensive, adaptive, integrated, ecosystem-based, and transparent spatial planning process, based on sound science, for analyzing current and anticipated uses of ocean, coastal and Great Lakes areas."[24] It further notes that this process aims to identify the areas "most suitable for various types of classes of activities in order to reduce conflicts among uses, reduce environmental impacts, facilitate compatible uses, and preserve critical ecosystem services to meet economic, environmental, security, and social objectives."[25]

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[20] CHARLES EHLER & FANNY DOUVERE, VISIONS FOR SEA CHANGE: REPORT OF THE FIRST INTERNATIONAL WORKSHOP ON MARINE SPATIAL PLANNING – INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION AND MAN AND THE BIOSPHERE PROGRAMME 4 (UNESCO iOC 2006), *available at* http://unesdoc.unesco.org/images/0015/001534/153465e.pdf.

[21] U.S. COMMISSION ON OCEAN POLICY, AN OCEAN BLUEPRINT FOR THE 21ST CENTURY, FINAL REPORT 10 (2004), *available at* http://govinfo.library.unt.edu/oceancommission/documents/full_color_rpt/000_ocean_full_report.pdf ("Ultimately, a streamlined program for each activity should be combined with a comprehensive offshore management regime that considers all uses, addresses the cumulative impacts of multiple activities, and coordinates the many authorities with interests in offshore waters.").

[22] THE WHITE HOUSE COUNCIL ON ENVTL. QUALITY, *supra* note 5, at 2.

[23] THE WHITE HOUSE COUNCIL ON ENVTL. QUALITY, *supra* note 5, at 32.

[24] THE WHITE HOUSE COUNCIL ON ENVTL. QUALITY, *supra* note 5, at 41.

[25] THE WHITE HOUSE COUNCIL ON ENVTL. QUALITY, *supra* note 5, at 41.

President Obama implemented the recommendations of the Task Force with Executive Order 13,547, signed on July 19, 2010.[26] This step led to the formation of nine regional planning bodies tasked with initiating regional efforts aimed at MSP. In the northeast, the Northeast Regional Ocean Council (NROC) was formed in 2005 by governors of the six New England states.[27] NROC's ocean planning, one of three NROC focus areas, has moved under the guidance of the Ocean Planning Committee to create a Northeast Ocean Data Portal which showcases the spatial dimensions of marine resources and resource uses.

In 2012, the Northeast Regional Planning Body (RPB) was formed to develop an ocean plan for New England.[28] The Northeast RPB has representatives from each New England state, federally recognized tribes, relevant federal agencies, and the New England Fishery Management Council. The Northeast RPB's work has been supported by the NROC Ocean Planning Committee. Over the past four years, the Northeast RPB has solicited input from the public, and in May 2016, it released a draft plan for the region and sought public feedback. This plan was certified by the National Ocean Council in December 2016. With no management authority of its own, the Northeast RPB's central objective in drafting the ocean plan has been to coordinate the efforts of the various state, tribal, and federal agencies involved in ocean management activities.[29] Connecticut is a member of the Northeast RPB and NROC. A parallel effort in the mid-Atlantic region spawned the Mid-Atlantic Regional Ocean Council (MARCO), as well as a Mid-Atlantic RPB and Mid-Atlantic Ocean Data Portal.[30] New York State is a member of MARCO and the Mid-Atlantic RPB.

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[26] *See* Exec. Order No. 13,547, 75 Fed. Reg. 43,023, [pin cite?] § 6 (July 19, 2010) for a description of the order that formally adopted the recommendations of the Interagency Ocean Policy Task Force and directed agencies to "participate in the process for coastal and marine spatial planning and comply with Council certified coastal and marine spatial plans, as described in the Final Recommendations and subsequent guidance from the Council."

[27] *See generally,* NORTHEAST REGIONAL OCEAN COUNCIL, http://northeastoceancouncil.org/, for more information.

[28] *See generally,* OCEAN PLANNING IN THE NORTHEAST, http://neoceanplanning.org/, for more information.

[29] *See* OCEAN PLANNING IN THE NORTHEAST, THE PLAN, 12 (2016), *available at* http://neoceanplanning.org/plan/ (specifying that the Northeast Ocean Plan "is a forward-looking document intended to strengthen intergovernmental coordination, planning, and policy implementation, while at the same time enhancing the public's ability to participate in the process of managing ocean resources.").

[30] *See generally* MID-ATLANTIC REGIONAL COUNCIL ON THE OCEAN, http://midatlanticocean.org/; *Mid-Atlantic Regional Planning Body*, BUREAU OF OCEAN ENERGY MANAGEMENT, https://www.boem.gov/Environmental-Stewardship/Mid-Atlantic-Regional-Planning-

Several other states have also moved forward with MSP efforts within state waters, as well as adjacent federal waters. California was early to adopt coast-wide marine planning with the passage of its Marine Life Protection Act in 1999. Although not strictly focused on MSP, the law phased in the creation of a series of marine reserves, which protect roughly 350 square miles of the state's offshore waters. As of January 2012, when the third phase created fifty reserves in southern California, the law prohibited extractive activities, such as commercial and recreational fishing and shell collecting, on over 10% of the coast.[31]

In the northeast, three states have developed marine spatial plans: Massachusetts, Rhode Island, and New York. Massachusetts was the first of these states to complete an ocean management plan for its state waters in December 2009.[32] An amended version of the Massachusetts Ocean Management Plan was released in 2015.[33] The Plan was initiated to provide a means to balance traditional marine uses with emerging uses of the ocean space and to develop guidelines for renewable energy development including offshore wind and tidal energy. It created guidelines for the protection and sustainable use of the state's marine waters, sensitive marine habitats and resources, and historically important recreational and commercial uses of Massachusetts' marine waters.[34]

In 2010, Rhode Island finalized an Ocean Special Area Management Plan (Ocean SAMP) for its offshore waters as part of its coastal zone management program, encompassing approximately 1,500 square miles of Rhode Island state waters and adjacent federal waters. The plan was initiated in response to offshore wind energy and other potential development projects.[35] The plan protected traditional commercial and recreational uses of its marine waters and created a Renewable Energy Zone where wind development is currently occurring. The

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Body/index.aspx; *Data Portal*, MID-ATLANTIC REGIONAL COUNCIL ON THE OCEAN, http://midatlanticocean.org/data-portal/.

[31] Erik Olsen, *No-Fishing Rule Roils Southern California,* N.Y. TIMES, Jan. 12, 2012.

[32] COMMONWEALTH OF MASSACHUSETTS, 2009 MASSACHUSETTS OCEAN MANAGEMENT PLAN VOLUMES 1-2 (Dec. 31, 2009), *available at* http://www.mass.gov/eea/waste-mgnt-recycling/coasts-and-oceans/mass-ocean-plan/2009-final-ocean-plan.html [hereinafter 2009 Plan].

[33] COMMONWEALTH OF MASSACHUSETTS, 2015 MASSACHUSETTS OCEAN MANAGEMENT PLAN VOLUME 1 (Jan. 6, 2015), *available at* http://www.mass.gov/eea/docs/eea/oceans/ocean-plan/2015-ocean-plan-v1-complete-low-res.pdf.

[34] *See generally,* COMMONWEALTH OF MASS. ENERGY & ENVTL. AFFAIRS, http://www.mass.gov/eea/waste-mgnt-recycling/coasts-and-oceans/mass-ocean-plan/, for more information.

[35] RHODE ISLAND OCEAN MANAGEMENT PLAN, OCEAN SAMP VOLUME 1, 2 (Oct. 19, 2010), *available at* http://seagrant.gso.uri.edu/oceansamp/pdf/samp_crmc_revised/RI_Ocean_SAMP.pdf.

plan also identified several areas of special concern, as well as areas requiring protection.[36] In 2015, a review of the Ocean SAMP was initiated as part of a regular schedule of updating the plan.

In January 2017, New York completed a marine spatial plan for its marine and estuarine waters, encompassing the 2017 to 2027 time period.[37] Although Long Island Sound is formally included in the geographic scope of this draft, the New York Ocean Action Plan (OAP) focuses on New York's offshore territorial waters extending up to three nautical miles offshore and a desire to impact the federal management of offshore waters contiguous to these, extending 200 nautical miles from New York's coastline. The OAP focuses on enhancing intergovernmental coordination and providing avenues for stakeholder input and participation in the planning process. The plan is also focused on developing "a better understanding of how current human activities and emerging opportunities for offshore development (e.g., renewable energy, aquaculture) may impact the ecological integrity of the ocean ecosystem" and aims to provide support for "offshore planning in order to minimize conflicts that often arise between diverse ocean user groups for limited space and resources."[38]

Efforts to implement coastal and MSP in the United States are beginning to proliferate at both the state and regional level. These initiatives have experienced both successes and challenges. In the United States, state-based MSP has until now involved single states developing unitary planning processes for their state waters, measured from the coast to three nautical miles, and in some cases, adjoining federal waters, which include waters three nautical miles to 200 nautical miles from their coasts. But at this time, there are no MSP efforts that involve multiple states in joint planning and governance in the United States, outside of the regional efforts discussed above.

Examples of joint or interstate governance of aquatic resources do exist, however. A variety of mechanisms have been used to develop various interstate agreements, commissions, and compacts. As per Article 1, Section 10 of the U.S. Constitution, states developing these types of interstate agreements must obtain congressional consent in addition to state authorization prior to implementation, assuring the federal government a role in multistate resource management.

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[36] *See generally*, OCEAN SAMP, http://seagrant.gso.uri.edu/oceansamp/, for more information.
[37] N.Y. DEP'T OF ENVTL. CONSERVATION, DEP'T OF STATE, NEW YORK OCEAN ACTION PLAN 2017-2027 (Oct. 2017), *available at* http://www.dec.ny.gov/docs/fish_marine_pdf/nyoceanactionplan.pdf.
[38] *Id* at 1.

Notable interstate compacts include the Atlantic States Marine Fisheries Commission (ASMFC), formed in 1942, which coordinates the management and conservation of the shared coastal fishery resources on the Atlantic coast. The Atlantic Coastal Fisheries Cooperative Management Act of 1993 has further mandated state compliance with fishery management plans to which they are party. Prior to this, compliance had been voluntary. The Columbia River Compact is another notable interstate agreement which involves the states of Oregon and Washington in the joint management of the fisheries of the Columbia River.

III. LONG ISLAND SOUND

Described as the "most domesticated body of salt water in the Western hemisphere" by F. Scott Fitzgerald in *The Great Gatsby*,[39] the estuary named Long Island Sound is surrounded by one of the most densely settled areas of the United States with over nine million people living near its shores (See Figure 1).[40] Long Island Sound continues to support a rich diversity of animal and plant species with over 1,300 invertebrates and fish species and 400 coastal bird species dwelling within it.[41] The Sound generates a tremendous value to residents of both New York and Connecticut, as well as others, through its economic provision of resources and services.

[39] F. SCOTT FITZGERALD, THE GREAT GATSBY 5 (Scribner, N.Y. 2004).
[40] *Compare* NEIWPCC LONG ISLAND SOUND STUDY, SOUND HEALTH 2012: STATUS AND TRENDS IN THE HEALTH OF LONG ISLAND SOUND 14 (2012), *available at* http://longislandsoundstudy.net/wp-content/uploads/2012/11/Sound_Health_2012_Report.pdf; *with* MARK ANDERSON ET AL., THE NATURE CONSERVANCY, THE LONG ISLAND SOUND ECOLOGICAL ASSESSMENT EXECUTIVE SUMMARY (2015), *available at* https://www.conservationgateway.org/ConservationByGeography/NorthAmerica/UnitedStates/edc/Documents/CT_LISEA_ExecSum_final.pdf (depending upon proximity, population density changes; according to this study, 23 million people live within 50 miles of Long Island Sound).
[41] NEIWPCC LONG ISLAND SOUND STUDY, SOUND HEALTH 2012: STATUS AND TRENDS IN THE HEALTH OF LONG ISLAND SOUND 14 (2012), *available at* http://longislandsoundstudy.net/wp-content/uploads/2012/11/Sound_Health_2012_Report.pdf.

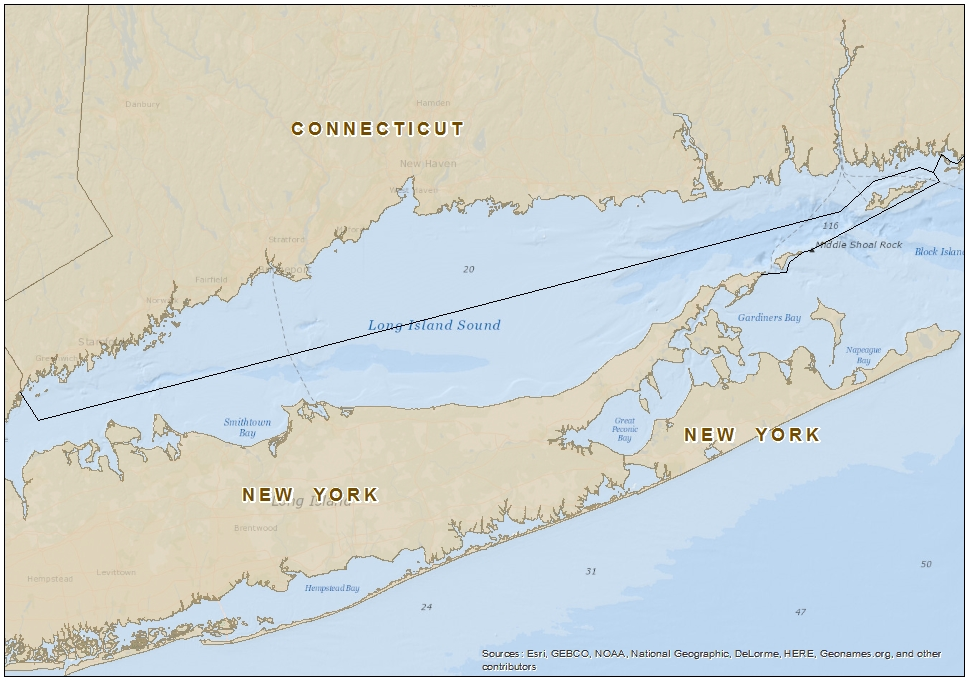

Figure 1. Boundary of Connecticut and New York State on Long Island Sound. Map by Nathaniel Trumbull.

In 1992, Altobello made initial estimates of the economic value of Long Island Sound. She calculated the total annual economic value of the Sound to be in excess of $5 billion.[42] A more recent economic valuation of the Long Island Sound basin, including its watersheds, concluded that the Sound generates between $17 and $37 billion in ecosystem goods and services every year and supports more than 190,000 jobs, bringing in over $12 billion in wages.[43] Over a

[42] MARILYN ALTOBELLO, UNIV. OF CONN., THE ECONOMIC IMPORTANCE OF LONG ISLAND SOUND'S WATER QUALITY DEPENDENT ACTIVITIES (1992) (on file with the author). In 1997, Mark Parker updated Altobello's estimated value, calculating the value to be $3.25 billion greater than the original estimate. *See Maritime Commerce Contributes to the Value of Long Island Sound*, SOUND OUTLOOK (CTDEP Newsletter) (June 2007).

[43] MAYA KOCIAN ET AL., EARTH ECONOMICS, THE TRILLION DOLLAR ASSET: THE ECONOMIC VALUE OF THE LONG ISLAND SOUND BASIN (2015), *available at*

100 year period, the authors estimated the asset value of this natural capital to be between $690 billion and $1.3 trillion, at a discount rate of 4%. Another recent study focused solely on Connecticut's maritime economy, excluding aquaculture production, and estimated its worth to be almost $7 billion, contributing nearly 40,000 jobs to the state.[44]

Despite decreases in the overall weight of fish and shellfish harvested in Long Island Sound since peaking in 1992, the overall value to harvesters of commercial finfish and shellfish has generally increased since 2005, exceeding $30 million a year in ex-vessel values, generating a far greater economic impact to coastal communities.[45] It has been estimated that over 200,000 recreational anglers from both Connecticut and New York make approximately 1,000,000 fishing trips each year, catching over 10,000,000 fish.[46] The Connecticut Department of Agriculture, Bureau of Aquaculture maintains information on the economic value of Connecticut's shellfish industry, noting on their website that shellfishing in the state generates over $30 million a year in farm-gate sales, supports over 300 jobs, and generates over $900,000 in revenue from the leasing of shellfish beds.[47]

The importance of Long Island Sound to Connecticut and New York, however, extends far beyond its ability to foster economic prosperity. The region's residents all rely on the Sound for a multitude of environmental services, including its role in nutrient cycling, regulating atmospheric gases, moderating regional climate, as well as supporting the hydrological cycle. In addition, the Sound has the ability to mitigate coastal hazards such as storms, floods, and droughts. Recent research indicates that every 2.5 acres of Connecticut's coastal wetlands prevents about $28,500 in storm-related damage each year.[48] These

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https://static1.squarespace.com/static/546d61b5e4b049f0b10b95c5/t/5500b552e4b0a43f0c73ddd7/1426109778859/Earth+Economics+Long+Island+Sound+Basin+2015+Final+Report.pdf.

[44] ROBERT S. POMEROY ET AL., CONNECTICUT SEA GRANT, VALUING THE COAST: ECONOMIC IMPACTS OF CONNECTICUT'S MARITIME INDUSTRY (Mar. 2013), *available at* http://media.ctseagrant.uconn.edu/publications/coastalres/value.pdf.

[45] JAMES S. LATIMER ET AL., LONG ISLAND SOUND: PROSPECTS FOR THE URBAN SEA 558 (Latimer, Tedesco, Swanson, Yarish, Stacey & Garza eds., Springer, N.Y. 2014).

[46] *Id.*

[47] *See generally,* CONN. DEP'T. OF AGRIC., BUREAU OF AQUACULTURE, http://www.ct.gov/doag/cwp/view.asp?a=3768&q=451508&doagNav, for more information on this and other economic information.

[48] Robert Costanza et al., *The Value of Coastal Wetlands for Hurricane Protection*, 37.4 AMBIO 241, 241-248 (June 2008), *available at*

crucial ecosystem services are likely to grow in importance in a world of changing climate and rising seas.

A. *Governance in Long Island Sound*

Long Island Sound serves as the jurisdictional boundary between Connecticut and New York State. The Sound's governance is concomitantly distributed among the states, federal government, and a multitude of coastal municipalities. Similar to other marine areas, the governance of marine-based activities, both extractive and passive, is delegated among a variety of governance levels and management agencies, creating a crowded and fragmented institutional space. Management goals and efforts are neither coordinated or integrated, nor necessarily consistent among the various authorities. Below are the most important spheres of activity on Long Island Sound, which also reflect the fragmented nature of management in the Sound.

1. Recreational and commercial fisheries

Long Island Sound's recreational and commercial fisheries exist entirely within state waters. The fisheries are under the jurisdiction of either the Connecticut Department of Energy and Environmental Protection (CT DEEP) or New York Department of Environmental Conservation (NY DEC). License requirements, catch limits, the timing of openings, and other fisheries regulations are not necessarily coordinated nor consistent between the two states, creating potential problems for fishermen. Fish stocks which are migratory or have a coast-wide distribution, including invertebrates like the American lobster, enter the waters of multiple states.

Cross-state boundaries come under the management purview of an interstate compact.[49] Those stocks are governed by the ASMFC, as well as the Mid-Atlantic Fishery Management Council and New England Fishery Management Council, established by the 1976 Magnuson-Stevens Fisheries Conservation and

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http://seagrant.noaa.gov/Portals/0/Documents/what_we_do/social_science/ss_tools_reports/value_hurricane_protection.pdf.

[49] *See* ENVTL. LAW INST. & THE CENTER FOR OCEAN SOLUTIONS, COASTAL & MARINE SPATIAL PLANNING: LEGAL CONSIDERATIONS (2010), *available at* http://www.centerforoceansolutions.org/sites/default/files/publications/Armsby-CMSP%20Legal%20Workshop%20Background%20Paper%20%282010%29.pdf.

Management Act.[50] Relevant laws also include the Endangered Species Act, under which several Long Island Sound fish species are listed, including the Atlantic Salmon (*Salmo salar*) and Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*). Marine managers from the state agencies develop stock assessments supplemented by fisheries scientists of the National Marine Fisheries Service (NMFS).

2. Energy

For energy siting issues in Long Island Sound, including tidal, current, wave, and wind, the Federal Energy Regulatory Commission has regulatory permitting authority with up to 15 other agencies and layers of oversight and review involved in the permitting process. Section 10 of the Rivers and Harbors Act of 1899 assigns the U.S. Army Corps of Engineers (USACE) a role in placing structures in navigable waters.[51] The USACE also oversees dredging or filling activities under Section 404 of the Clean Water Act (CWA).[52]

Under the Coastal Zone Management Act (CZMA), the states of New York and Connecticut, depending upon the specific location of the proposed activity, are charged with evaluating the consistency or lack thereof of actions with their individual state coastal management plans and other relevant state laws and policies.[53] In Connecticut, the CT DEEP has this authority while in New York, the NY DEC is charged with this responsibility. Similarly, under the CZMA neighboring states that are adjacent to the area of impact have the opportunity to submit feedback related to issues of mutual concern. At the federal level, the NMFS and U.S. Fish and Wildlife Service (USFWS) review the proposed siting of energy projects and are required to decide whether approval is allowable under the Fish and Wildlife Coordination Act, Endangered Species Act, Marine Mammal Protection Act, and Submerged Lands Act. Federal and state agencies also consider the impact on existing cultural and historic resources in these siting decisions.

[50] Magnuson-Stevens Fishery Conservation and Management Act of 1976, 16 U.S.C. §§ 1801-1882 (2007).
[51] 33 U.S.C. § 401 (2016).
[52] 33 U.S.C. § 1344 (1987).
[53] Coastal Zone Management Act, 16 U.S.C. §§ 1451-1466 (1990).

3. Water pollution

The oldest federal environmental law in the United States, the Rivers and Harbors Act of 1899, prohibits the dumping of refuse into navigable waters (a provision of the law known as the Refuse Act).[54] The other critical law governing water quality is the Federal Water Pollution Control Act of 1972, amended in 1977 and 1987, and now commonly referred to as the CWA.[55] The CWA established the National Pollution Discharge Elimination System (NPDES) program, which requires any entity to obtain a permit to discharge pollutants into navigable waters from a point source.[56] The 1987 amendments of the CWA, focused on non-point source pollution, require states to develop Total Maximum Daily Loads (TMDL) to help combat non-point source pollution that does not require a NPDES permit.[57] In 1990, the CZMA required coastal states to develop coastal management programs and address non-point source pollution.[58] Under the CWA, the U.S. Environmental Protection Agency (EPA) can delegate to states the authority to issue NPDES permits, specify conditions, and enforce regulations.

In Long Island Sound, the CT DEEP and NY DEC are responsible for implementing these mandates. In 1985, the Long Island Sound Study, a federal-state partnership involving the EPA, New York, and Connecticut was formed to focus on restoring and protecting the Sound.[59] Since 2002, New York and Connecticut have used a nitrogen credit trading system to reduce the nitrogen discharged by seventy-nine public-owned sewage treatment plants into the Sound.[60]

4. Dredging and at-sea dredge disposal

The Marine Protection, Research and Sanctuaries Act (MPRSA, also known as the Ocean Dumping Act) regulates the dumping of waste, including

[54] 33 U.S.C. § 407 (1899).
[55] Federal Water Pollution Control Act, 33 U.S.C. §§ 1251-1376 (1987).
[56] 33 U.S.C. § 1342 (1972).
[57] 33 U.S.C. §1313(d) (1987) (commonly referred to as Federal Clean Water Act § 303(d)).
[58] 16 U.S.C. §§ 1455(b)-1466 (1990).
[59] *See About the Long Island Sound* Study, LONG ISLAND SOUND STUDY, http://longislandsoundstudy.net/about/about-the-study/.
[60] CT DEEP, BUREAU OF WATER PROTECTION AND LAND REUSE, CONNECTICUT'S NITROGEN CREDIT EXCHANGE – AN INCENTIVE-BASED WATER QUALITY TRADING PROGRAM 1-10 (2010), *available at* http://www.ct.gov/deep/lib/deep/water/lis_water_quality/nitrogen_control_program/water_quality_trading_summary_2010.pdf.

dredged materials, at sea.[61] The EPA and USACE have oversight over evaluating, permitting, managing, and monitoring the disposal of dredged material at sea.[62] Dredge and dredge disposal activities in Long Island Sound are also under the jurisdiction of the NY DEC and CT DEEP. The location, designation, and use of these sites in Long Island Sound is a contentious issue, reflecting divergent positions held by stakeholders and government agencies in New York and Connecticut.[63] For instance, recent efforts by the EPA and USACE to reauthorize the New London dredged material disposal site in the eastern portion of the Sound has led New York to bring litigation to stop the designation.

5. Environmental review

All federal activities in Long Island Sound that have significant environmental impacts, including fisheries, dredging, and energy development, among others, are subject to review under the National Environmental Policy Act (NEPA). NEPA provides for the development and review of environmental assessments and, if warranted, environmental impact statements to determine if an activity will have a significant impact.

B. *Marine Spatial Planning Efforts*

MSP efforts got off the ground in the spring of 2012 with the ad hoc formation of a Connecticut-New York Bi-State Marine Spatial Planning Working Group (WG).[64] The group, spearheaded by representatives of The Nature Conservancy (TNC) and Connecticut Sea Grant, includes representatives from state and federal agencies including the CT DEEP, NY DEC, New York

[61] 16 U.S.C. §§ 1431-1445 (2000); 33 U.S.C. §§ 1401-1445 (1988).
[62] The 1972 CWA provided jurisdiction over different aspects of dredging and the disposal of the spoils within three miles of shore to the EPA and USACE. While the USACE issues permits for dredging and the disposal of dredged material if it will have minimal impact, the EPA develops criteria that the USACE uses to assess these impacts. Both agencies oversee the selection of the sites receiving dredged material.
[63] *See generally,* Gregory B. Hladky, *New York to Sue Over L.I. Sound Dredging*, HARTFORD COURANT, Dec. 6, 2016, http://www.courant.com/politics/hc-ny-files-sound-dredging-lawsuit-20161206-story.html; Gregory B. Hladky, *New Federal Long Island Sound Dredging Plan Divides Connecticut and New York*, HARTFORD COURANT, Feb. 8, 2016, http://www.courant.com/news/connecticut/hc-sound-dredge-dispute-20160208-story.html; Stephen Singer, *Dredged Materials Dumped into Long Island Sound Spur Debate*, WASH. TIMES, July 31, 2015, http://www.washingtontimes.com/news/2015/jul/31/dredged-materials-dumped-into-long-island-sound-sp/.
[64] One of this article's authors, Syma Ebbin, has served on this group since its inception.

Department of State (NY DOS), New York Sea Grant, the EPA Long Island Sound Study office, U.S. Coast Guard, U.S. Navy, National Oceanic and Atmospheric Administration, NROC, Stony Brook University, and Rhode Island Sea Grant. The WG has also had representation from several marine stakeholder groups in Long Island Sound, including the Long Island Marine Trades Association, Connecticut Marine Trades Association, and Save the Sound.

The WG holds regular meetings via conference calls and occasionally meets in person. The group has established several sub-committees to tackle issues of datasets, frameworks, and stakeholder involvement. Funded by private foundation grants, the WG has hired consultants to facilitate data gathering and reporting functions. Although the Blue Plan legislation identifies a specific role and duties for the WG, as of the fall of 2016, its future is unclear since many individuals involved and activities addressed are now formally incorporated within the Blue Plan framework.

As part of the efforts of the WG and lobbying from TNC, bills to establish a MSP process in Connecticut were introduced to the Connecticut General Assembly in 2014 and 2015. The 2015 bill was successfully passed into law. The law, entitled *An Act Concerning a Long Island Sound Blue Plan and Resource and Use Inventory*, PA 15-66, became effective July 1, 2015. The law initiated the creation of a Blue Plan Advisory Committee and outlined its goals and responsibilities. The law sought to create a resource and use inventory for Long Island Sound and develop a spatially-based marine plan; which will enhance stewardship of Long Island Sound; promote science-based management, take into account the natural, social, cultural, historic, and economic characteristics of the Sound; and protect traditional water-dependent uses and activities. The Advisory Committee, chaired by the Commissioner of CT DEEP, includes representatives from Connecticut Sea Grant, TNC, and the Connecticut Department of Agriculture Bureau of Aquaculture, Connecticut Department of Transportation, Connecticut Siting Council, Connecticut Office of Policy and Management, as well as several members representing municipalities and other stakeholders.[65]

[65] In addition to those identified, the current Blue Plan Advisory Committee membership includes a gas and electric distribution industry representative to be appointed by the Governor, the Town of Old Saybrook Town Planner, Connecticut Fund for the Environment/Save the Sound, the General Manager and Dockmaster of the Rex Marine Center in Norwalk, a commercial boating representative to be appointed by State Senate Majority, a representative of Beebe Dock and Mooring Systems in Madison, a marine trades representative appointed by State Senate Minority Leader, a commercial finfish industry representative appointed by Speaker of the House, the Town of Westport Conservation Director, a coastal municipality representative appointed by House

New York representatives of the NY DEC and NY DOS are invited to participate in an official capacity in the work of the Advisory Committee.

C. *Overview of Past Connecticut and New York Conflicts*

Broader uses of Long Island Sound over which the two states have a long history of debate and discussion, include differences in the states' fishing regulations, issues with handling and mitigating runoff into the Sound, the future of the U.S. Department of Agriculture facility on Plum Island, New York, and the dredging and disposal of dredged materials into the Sound. Specific conflicts and disputes between Connecticut and New York have emerged in recent years over the placement of power cables on the bottom of the Sound in order to supply Long Island with electricity, the construction of the Indian Point pipeline, and perhaps most intensely, consideration (and eventual rejection) of the Broadwater liquid natural gas platform proposal in New York waters.[66]

IV. METHODS

Given the emerging MSP efforts by the state of Connecticut in Long Island Sound described in the preceding section, the authors initiated research efforts in 2016 to better understand the impediments and prospects that exist to develop and implement bi-state MSP in Long Island Sound. Based on the premise that MSP seeks to create a more cohesive and less institutionally fragmented management system, we sought to assess the prospects that the emerging MSP process would be successful in achieving its aims and grow to include meaningful participation by New York state agencies and stakeholders. To reiterate, the working hypothesis was that obstacles to multi-party cooperation involve perceived competition for the use and control of shared natural resources and benefits generated by the Sound's ecosystem services, and also political and institutional concerns regarding jurisdictional authorities and state sovereignty.

Majority Leader, and a recreational fishing/hunting community representative appointed by House Minority Leader. *See* STATE OF CONN., DEP'T OF ENERGY & ENVTL. PROT., LONG ISLAND SOUND BLUE PLAN ADVISORY COMMITTEE, http://www.ct.gov/deep/cwp/view.asp?a=2705&pm=1&Q=574830&deepNav_GID=1635.

[66] John Rather, *For Broadwater Gas Plant, Opposition on Many Fronts*, N.Y. TIMES, May 1, 2009, at CT5, *available at* http://www.nytimes.com/2009/05/03/nyregion/connecticut/03broadCT.html?rref=collection%2Fbyline%2Fjohn-rather&action=click&contentCollection=undefined&region=stream&module=stream_unit&version=latest&contentPlacement=1&pgtype=collection.

A set of interview questions were developed by the authors to assess the understandings of formal stakeholders with respect to the compatibility of management efforts in Long Island Sound, the obstacles and benefits associated with developing MSP, and the types of system threats that might be addressed under an MSP initiative. Interviews were solicited and scheduled via an emailed invitation to participate with members of the WG and the Blue Plan Advisory Committee. Interviews were conducted with experts directly involved in developing MSP efforts in Long Island Sound by phone, in person, or self-administered via an online interface.

Forty experts were invited to participate in the survey from both New York and Connecticut. Twenty-two individual experts responded to our interview request, among whom nineteen agreed to participate in the survey. They were interviewed on the condition of anonymity. Three individuals affiliated with the NY DOS who were invited to participate refused to participate in the survey. In total, there were five respondents from New York and fourteen from Connecticut. Interview were scheduled to take fifteen minutes; however, several interviews extended up to forty-five minutes. Five of the nineteen respondents chose to respond by email rather than during a telephone or in-person interview.

The survey consisted of eight closed and open-ended questions. Respondents were asked to provide their understanding of the relative compatibility of management and planning approaches taken by Connecticut and New York with respect to various extractive and non-extractive uses in Long Island Sound. The interviewees were asked a short series of open-ended questions related to their knowledge of the future of MSP, its potential effectiveness for Long Island Sound, and their views of existing obstacles to MSP implementation.

Respondents were asked to evaluate different realms of economic activity/use as most incompatible (value of 1) to most compatible (value of 5) in terms of management approaches between Connecticut and New York. Responses to this question were collected on a 5-point Likert scale. A management compatibility index (MCI), indicating the degree of compatibility or incompatibility of the management approaches of New York and Connecticut, was created for each of the sixteen activities based on the responses of the interviewees. The MCI was created by weighting the most incompatible category as a 1, and most compatible as a 5, and then averaging the responses for each realm of economic activity/use on Long Island Sound. An MCI greater than 3 indicates that respondents believe the two states' management approaches are compatible; an MCI less than 3 indicates a perceived incompatibility. An MCI

value of 3 indicates perceived neutrality among management approaches. The MCI thereby gives an indication of congruence or dissonance between the two sides of Long Island Sound, based on the views of the study's respondents.

In order to explore the topic, the authors attended quarterly meetings of the Blue Plan Advisory Committee, EPA-convened public hearings regarding the designation of dredge dump sites in Long Island Sound in summer 2016, and public information meetings of NROC.

V. RESULTS

The goal of the survey was to identify the relative compatibility, or incompatibility, of each state's management approaches with respect to sixteen different extractive and non-extractive uses of Long Island Sound. The results indicate that, to a great extent, the two states' approaches to managing Long Island Sound are perceived to be compatible. Only two spheres of economic activity, out of sixteen, were perceived to be incompatible. Dredge disposal (MCI value of 1.4) was the economic activity/use judged to be the least compatible. Sand/gravel mining followed as the second most incompatible activity (MCI 2.7). The siting of cables/pipelines had an average MCI of 3.0. (See Tables 1 and 2), with seven respondents responding that the two states' approaches had some degree of incompatibility, and five noting that the approaches were compatible to some degree.

Table 1. Frequency of Responses (n=19) and the Associated Management Compatibility Index (MCI) Values for Sixteen Spheres of Economic Activity in Long Island Sound as Derived from Interview

	Incompatible	Some-what Incompatible	Neutral	Somewhat Compatible	Compatible	MCI (1 = Incompatible; 5 = Compatible)
Cultural Sites	0	0	8	8	2	3.7
Protected Reserves/Parks	0	1	6	4	7	3.9
Military/Security Sites	1	3	8	2	4	3.3
Cables/Pipelines	2	5	6	1	4	3.0
Energy (Tidal or Current)	1	0	11	2	3	3.4
Sand/Gravel Mining	1	4	12	1	0	2.7
Nonpoint Source Runoff/Pollution	0	0	4	6	8	4.2
Wastewater Treatment/ Effluent Treatment/ Effluent	1	1	6	4	6	3.7
Shipping/ Navigational lanes	1	1	6	4	6	3.7
Significant or Critical Biological Area/Benthic Habitat	1	2	4	3	8	3.8
Energy/Infrastructure/Platforms	3	1	4	6	3	3.3
Shellfish Harvest Areas	0	1	6	6	5	3.8
Recreational Fishing	0	3	5	3	7	3.8
Commercial Fishing	0	1	8	6	3	3.6
Dredge Disposal	14	1	2	1	0	1.4
Aquaculture	0	4	8	2	4	3.3

Table 2. Responses Tallied by Percentage (%) (n=19) by Category

	Combined Incompatible and Somewhat Incompatible	Neutral	Combined Compatible and Somewhat Compatible
Cultural Sites	0	44	56
Protected Reserves/Parks	0	33	41
Military/Security Sites	23	44	33
Cables/Pipelines	39	33	27
Energy (Tidal or Current)	6	65	30
Sand/Gravel Mining	28	67	5
Nonpoint Source Runoff/Pollution	0	22	77
Wastewater Treatment/Effluent Treatment/Effluent	12	33	55
Shipping/Navigational Lanes	12	39	50
Significant or Critical Biological Area/Benthic Habitat	17	22	61
Energy/Infrastructure/Platforms	24	24	53
Shellfish Harvest Areas	6	33	61
Recreational Fishing	17	28	56
Commercial Fishing	6	44	50
Dredge Disposal	84	11	6
Aquaculture	22	44	33

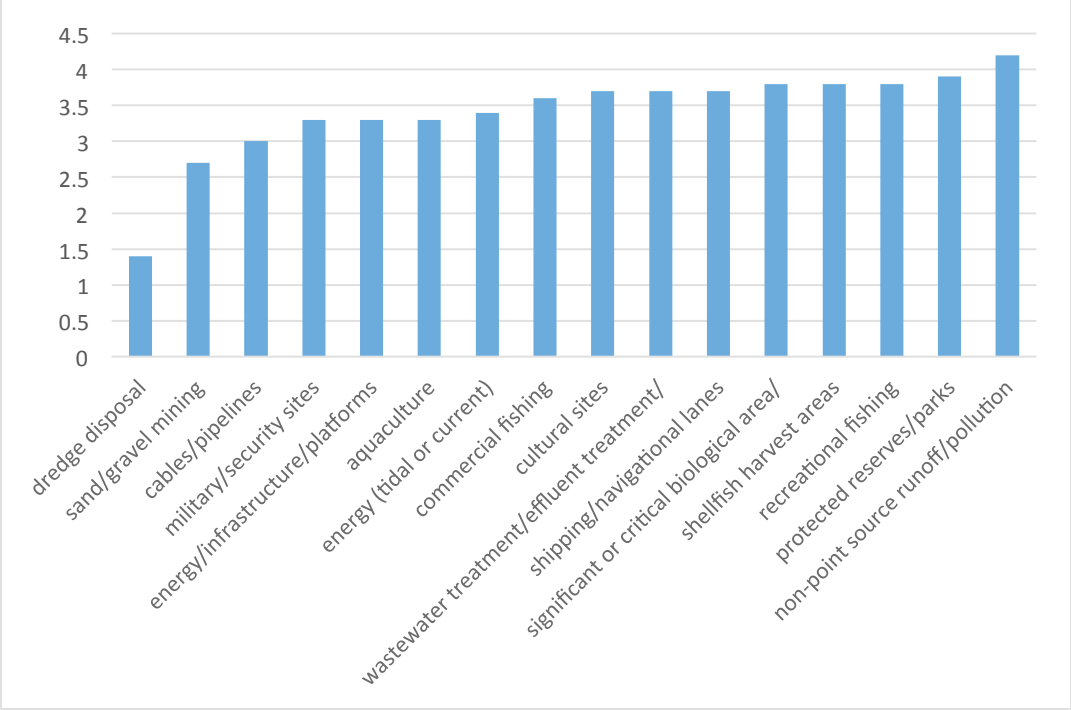

Figure 2. Comparison of Management Compatibility Index Values by Realm of Economic Activity/Use on Long Island Sound

Among those uses identified by respondents as having highly compatible management approaches are: non-point source runoff/pollution (MCI 4.0), protected reserves/parks (3.9), significant or critical biological area/benthic habitat cultural sites (3.8), recreational fishing (3.8), and shellfish harvest areas (3.8). Similarly, wastewater treatment/effluent (3.7), shipping/navigational lanes (3.7), and cultural sites (3.7) were identified as largely compatible (See Figure 2). One explanation for this perceived compatibility is related to the spatial segregation of the activity and its management to one or both state's coastal margins. It was believed in these cases that the activity and its management did not impact the other state's users, resources, or management. Another explanation put forth for the perceived compatibility reflects the role of federal governance and regulation in those realms, reducing perceptions of conflict between differing or opposing management approaches. For example, with respect to the management of nonpoint source pollution, the realm with the highest MCI, management approaches are mandated by the EPA under the CWA and other relevant laws.

A comparison of New York and Connecticut respondents' views on the most incompatible activity, the disposal of dredged materials in Long Island Sound, demonstrates that the topic is perceived differently by respondents from each state (See Figure 3). Connecticut respondents' views on this issue are based on the economic interests at stake in Connecticut and the state's long-standing use of dredging and access to the relatively lower cost disposal of dredged material in the Sound (as opposed to disposal in more distant aquatic or terrestrial sites). Connecticut's three largest rivers (Connecticut, Housatonic, and Thames), along with most of its smaller rivers, carry large sediment loads (compared with the tributaries found on Long Island in New York) which gradually fill many of the state's harbors, ports, and moorage facilities on the Connecticut side with silt and sand. Regular dredging at low-cost is therefore perceived as essential in Connecticut to retain the economic viability of many coastal maritime activities, such as general navigation, shipping, military uses, commercial and recreational fishing, and recreational boating and its related services like marinas, yacht clubs, and mooring areas.

On the other hand, New York respondents focus on potential environmental externalities related to the disposal of dredged materials in the Sound. With relatively small watersheds, Long Island's harbors generally do not need regular dredging to remain open and have a lower contaminant load than Connecticut's more industrialized rivers and harbors. Dredged material originating in the region of New York City is not allowed to be disposed of at sea, requiring land-based disposal techniques. Thus, New York's Long Island Sound-based maritime economy is not dependent on dredging and the disposal of dredged material within Long Island Sound. This creates an asymmetrical problem where benefits of dredging and disposal are perceived to accrue to Connecticut alone with no perceived benefits, only deleterious impacts, generated for the New York economy.

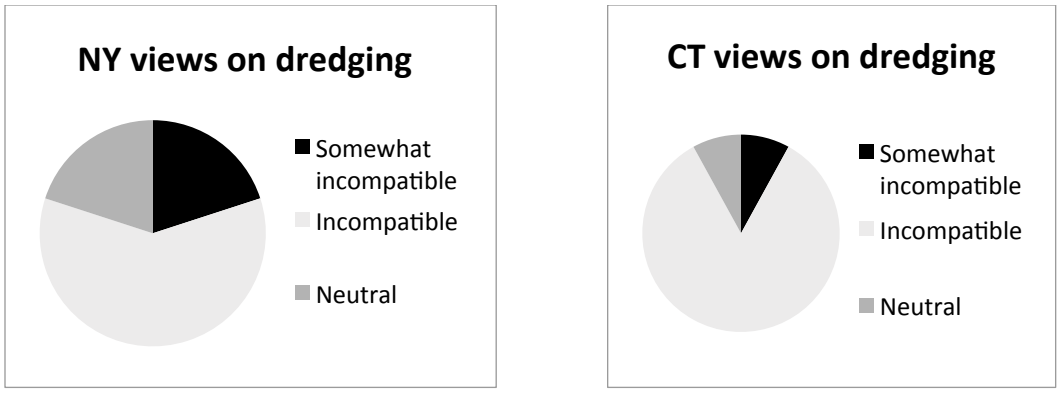

Figure 3. Comparison of New York and Connecticut Sides on Dredging and Dredge Disposal.

VI. ANALYSIS

A. *Asymmetric Interests and Spatial Dimensions*

Interview respondents placed a large emphasis on the different geographies of each state's coastlines when explaining their selected compatibility for the states' management approaches. Most of Connecticut's larger harbors have become well developed industrial and transportation hubs over the last three centuries. Connecticut's coast is directly impacted by the accumulation of sand and silt from its large rivers, which all drain into Long Island Sound. The Connecticut economy's relatively strong reliance on its coastlines for marine transportation plays directly into Connecticut leaders' thinking about dredging on the Connecticut side. Further, the viability of shipping, transportation, recreational boating, and military sites on the Connecticut side is highly dependent on dredging.

New York's Long Island Sound communities are less economically dependent on dredging. The fundamental differences in geography and the related historical landscape of industrialization (related to the existence of Connecticut's large rivers generating hydropower and economic opportunities) explains much of the disparity in the perceived threat to disposal of dredging into the Sound (Figures 2 and 3) that was identified in the survey. As one respondent of the survey noted, "[w]e don't always agree about what's significant and what are significant impacts on benthic habitat."

Connecticut and New York have traditionally had divergent viewpoints on the use of Long Island Sound for dredged material disposal. Connecticut sees disposal in the Sound as a viable and economically necessary activity while New York does not see this as an acceptable management approach under any circumstances. The four ocean dredged material disposal sites that currently exist in Long Island Sound are located in Connecticut territorial waters: Western Long Island Sound, Central Long Island Sound, Cornfield Shoals, and New London (See Figure 4). The EPA and USACE share management and monitoring responsibilities for the disposal sites. The EPA designated the Western and Central Long Island Sound ocean disposal sites under MPRSA for long-term use in 2005.[67] The USACE has selected the Cornfield Shoals and New London ocean disposal sites under Section 103 of the MPRSA for short-term use.

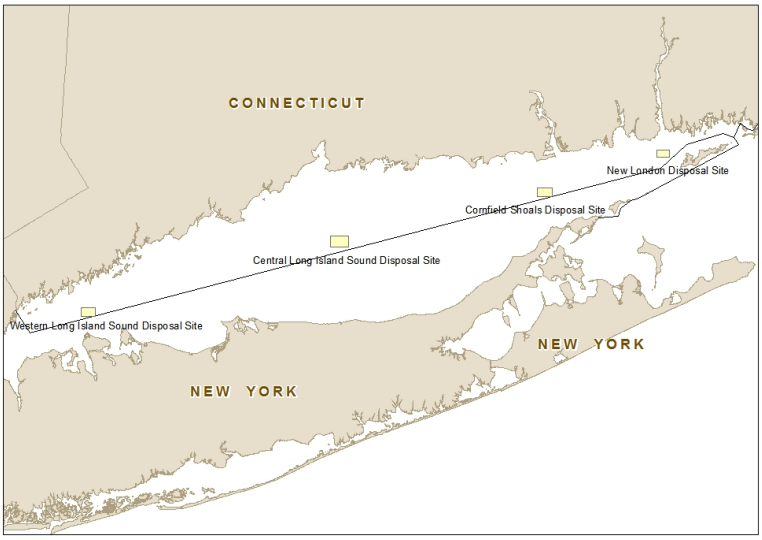

Figure 4. Long Island Sound Dredge Disposal Sites. Map by Nathaniel Trumbull.

[67] THE LOUIS BERGER GROUP, INC. ET AL, SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT FOR THE DESIGNATION OF DREDGED MATERIAL DISPOSAL SITE(S) IN EASTERN LONG ISLAND SOUND, CONNECTICUT AND NEW YORK DRAFT (Louis Berger & Univ. of Conn., Apr. 2016), *available at* https://www.epa.gov/sites/production/files/2016-04/documents/supplemental_environmental_impact_statement_for_the_designation_of_dredged_material_disposal_sites_in_eastern_long_island_sound.pdf.

Such differences in viewpoints on dredging became particularly manifest during the public hearings for the Eastern Long Island Sound Supplemental Environmental Impact Statement held in the spring and early summer of 2016. The EPA released a proposed rule for the designation of the Eastern Long Island Sound Dredged Material Disposal Site on April 27, 2016 and published a final rule designating the site on December 6, 2016.[68] Based on the EPA's analysis of how dredge material from Eastern Long Island Sound should be handled for the next 30 years, the EPA concluded that part of the current New London Disposal Site, slated to close in December, should remain open.[69] Connecticut leaders at the highest level supported the extension of the license for the New London Disposal Site (See Figure 5).[70] This asymmetry in economic interests on each state's side continues to contribute to and shape approaches to current management of Long Island Sound.[71]

Figure 5. Connecticut Governor Dannel P. Malloy, at podium, answers questions during a press conference at City Pier in New London on Aug. 17, 2016 in support of the EPA's proposed Eastern Long Island Sound Dredged Material Disposal Site. (Photo by N. Trumbull)

[68] *See* 40 C.F.R. § 228.15 (2017).
[69] Judy Benson, *Plan for New London Dredge Disposal Site Debated at Public Hearing*, THE DAY, May 26, 2016, http://www.theday.com/article/20160526/NWS01/160529362.
[70] Judy Benson, *Malloy Leads Support for Eastern Long Island Sound Dredge Disposal Site*, THE DAY, Aug. 17, 2016, http://www.theday.com/article/20160817/NWS01/160819379.
[71] *Long Island Sound: Three Critical Problems*, THE NATURE CONSERVANCY, https://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/connecticut/explore/long-island-sound-challenges.xml.

A common observation among interview respondents was that many of the Long Island Sound activities and uses of concern are located near-shore, and therefore, not the source of any perceived competition between the two states. That is, some activities, such as shellfishing, take place in the near-shore area of each side of the Sound, so one state's management of shellfishing activities does not impact the other side directly (though one might argue that the condition of water quality in the Sound impacts shellfishing overall on both sides). Similarly, such activities as navigation and marine transportation are under the jurisdiction of the U.S. Coast Guard and governed under a common set of federal navigational rules and regulations on both sides of the Sound. Therefore, interstate conflicts related to marine transportation seems unlikely. On the other hand, activities such as recreational fishing are regulated individually by each state. Complications arise when recreational fishermen pass into the other state and encounter new rules and regulations.

B. *Opportunities for Marine Spatial Planning in Long Island Sound*

Interview respondents were, in general, very positive about the development of MSP for Long Island Sound. As one respondent summarized, "I think it [MSP] can be an effective way to investigate and assess alternatives approaches to management decisions by visually showing impacts or by using best available data to help remove biases or assumptions of future states or conditions." Respondents emphasized the value of the MSP process, the inclusion of diverse stakeholders, and improved communication and trust, as a benefit of MSP. One respondent argued that the process of MSP could play a direct role in helping to overcome such a wide range of complexities of management of Long Island Sound. Long Island Sound hosts diverse uses including recreation, aquaculture, commercial and recreational fishing and boating, marine trades and transportation, and habitats for fish, shellfish, birds, marine mammals, and plants. Comprehensive, coordinated, and proactive planning through MSP will address complexities of managing these existing offshore and coastal resources while also considering new activities in Long Island Sound. "Marine Spatial Planning is a process that will improve information for stakeholder engagement and agency decision making," stated another respondent.

In terms of the challenges of implementing MSP in Long Island Sound, a number of possible obstacles were cited by the respondents. A common shortcoming mentioned was financial resources, that is, neither Connecticut nor New York have dedicated financial resources towards MSP efforts for Long

Island Sound.[72] The Connecticut Blue Plan does not include a state budget allocation for its activities. Another challenge to implementing MSP, cited by several respondents, is the absence of a burning issue or cause around which both sides might oppose or support together. Several respondents mentioned the eventually unsuccessful Broadwater LNG loading platform proposed for Long Island Sound on the New York side as a previous issue that had drawn public attention to MSP on the Sound, as Connecticut and New York did not initially have consistent views on this proposed project.

In addition, a number of respondents commented that it has been difficult to meet together with colleagues on the opposite of the Sound.[73] Another respondent expressed a high degree of skepticism that MSP, even under the best of circumstances, would change any economic activities or the siting of new projects on the Sound.

C. *Challenges to Developing Marine Spacial Planning in Long Island Sound*

A number of respondents focused on the institutional differences between the approaches to Long Island Sound governance taken by Connecticut and New York. New York adopted the Long Island South Shore Estuary Reserve Comprehensive Management Plan in 2001, which focused on coastal communities, water-dependent businesses, and residents.[74] The Plan sought to provide a blueprint for the long-term health of the Reserve's bays and tributaries, tidal wetlands and wildlife, and tourism and economy. Respondents described the roles of the two overseeing agencies in New York, the NY DOS and NY DEC, as representing a much different institutional setting than that of the CT DEEP. "Their overall coastal policies are very similar to ours. But their institutional arrangements are very different," commented one respondent in regard to New York.

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[72] CONSENSUS BUILDING INSTITUTE, FINDINGS FROM EARLY INTERVIEWS WITH STAKEHOLDERS RELATED TO MARINE SPATIAL PLANNING IN LONG ISLAND SOUND (2016), *available at* http://www.ct.gov/deep/lib/deep/long_island_sound/lis_blue_plan/Early_Stakeholder_Interview_Findings_Feb_2016.pdf.

[73] The current long-advance-window for travel out of state for New York State public officials has been a regular impediment, according to several respondents in our interviews, to improved cooperation between the two states' agency representatives.

[74] SOUTH SHORE ESTUARY RESERVE COUNCIL ET AL., LONG ISLAND SOUTH SHORE ESTUARY RESERVE: COMPREHENSIVE MANAGEMENT PLAN (2017), *available at* https://www.dos.ny.gov/opd/programs/pdfs/SSERCMP.pdf

Respondents also expressed concern that the status of the Blue Plan in Connecticut could potentially upset institutional compatibility in the management of Long Island Sound. As one respondent explained, "[t]he greatest threat is that the Connecticut Legislature has decided to move forward, while New York State has not. There's an attempt through this to entrain New York in the Connecticut plan and to involve New York in the Connecticut plan." The Connecticut Blue Plan has made all the starker the absence of such a plan on the New York side. "It's now an official government activity in Connecticut. And the bi-state working group is not in control of it. And New York is not doing anything," commented another respondent. While Connecticut and New York are still far from such an agreement over developing bi-state governance of Long Island Sound, the fact that the Blue Plan Advisory Committee meetings now include two New York official representatives (one from NY DOS and one from NY DEC) is promising for future institutional cooperation between the two states.[75]

From the technical perspective of sharing Long Island Sound data, the New York State Geographic Information Systems (GIS) website is recognized as more robust and extensive than any such database in Connecticut. As a result, the Blue Plan will be relying on the framework of the New York State GIS database for the development of the Blue Plan. Looking toward a potential future agreement between Connecticut and New York, the Interim Framework Report Team, a sub-committee of the WG, argue that:

> Once an approach in each state is established, an appropriate bi-state agreement could potentially structure how the states will cooperate and communicate to effectively implement the respective plans. The goal is to ensure as much uniformity and consistency in implementation as is reasonably possible with the result that Long Island Sound can be collectively managed as a whole. [76]

[75] At the September 2016 meeting, the two New York representatives played an active and positive role. On several topics, the New York representatives were able to make constructive suggestions based on their own experience in New York State.

[76] INTERIM FRAMEWORK REPORT TEAM, OPTIONS FOR DEVELOPING MARINE SPATIAL PLANNING IN LONG ISLAND SOUND: SOUND MARINE PLANNING INTERIM FRAMEWORK REPORT (2016), *available at* http://www.ct.gov/deep/lib/deep/long_island_sound/lis_blue_plan/options_for_developing_marine_spatial_planning_in_long_island_sound-sound_marine_planning_interim_framework_report.pdf.

The number and variety of economic activities on Long Island Sound where cooperation between Connecticut and New York appears likely to occur in the future could be large.

VII. CONCLUSIONS

Overwhelmingly, our results demonstrate that the management approaches of the two states are compatible with respect to most realms of economic activities on Long Island Sound. Only two out of sixteen management approaches were perceived to be incompatible. This finding indicates that the possibility for developing collaborative or joint bi-state management is high with respect to the vast majority of uses of Long Island Sound. While the survey questions placed an emphasis on a comparison of perspectives, results support the hypothesis that an asymmetry in economic interests, and specifically as they concern dredging and sand and gravel mining, must be taken into account when cooperation over shared management of Long Island Sound is sought. Respondents repeatedly identified those differences in economic interests in New York and Connecticut as the greatest obstacle for implementing MSP in Long Island Sound.

As we noted above, those asymmetric interests stem from different perceptions of the distribution of economic benefits and costs. Dredge disposal appears to be the most contentious and asymmetrical problem in Long Island Sound, as the two states perceive the problem differently. New York respondents were concerned about not having enough input into the dredge disposal siting process, while Connecticut respondents tended to perceive that New York has too much influence in the siting process.

Existing institutional differences between Connecticut and New York may be an additional potential impediment to greater cooperation concerning Long Island Sound. The Interim Framework Report Team of the WG have also emphasized this institutional setting, noting that "[g]iven that Connecticut and New York may have different levels and types of legal authority to develop and/or adopt a MSP at any given time, … legislative or administrative changes that provide sufficient authority may need to be considered."[77] Such institutional changes are likely to be slow in coming. Other possible threats to cooperation between the states concern issues of sovereignty. A more likely scenario for developing cooperation between the two states would focus on specific topics and tasks of mutual interest and cooperation. Our results indicate that there is indeed

[77] *Id.*

much room for cooperation to develop based on the broad range of spheres of activity identified as compatible by respondents.

The work of preparing the Blue Plan has brought people together on a regular basis to build a collaborative process in which both Connecticut and New York participate. In this way, the process of preparing the Blue Plan represents a first step in addressing prisoner's dilemma mis-incentives. The regularly scheduled meetings of the Blue Plan Advisory Committee, including the previous efforts of the WG, may have created lasting relationships, trust, and improved communications that will facilitate future cooperation and collaboration. Another sign of potentially promising future cooperation comes from New York's commitment to assist with the development of the Long Island Sound data portal and Connecticut's commitment to use the New York's data portal in developing its Blue Plan.

MSP in Long Island Sound is an attempt to draw together independent sectoral governance regimes into a cohesive form, avoiding institutional fragmentation and overlapping and competing jurisdictional claims. MSP is a way of mitigating problems of fit and interplay. MSP is an on-going process that provides an alternative way of avoiding Hardin's tragedy and sets a course towards a more sustainable future.

The findings of this study suggest three broad recommendations concerning communicating, information sharing, and including a wide breadth of stakeholders.

First, the challenge of fostering communication between Connecticut and New York stakeholders is real and tangible, despite the relatively close distance across Long Island Sound. Any efforts to develop MSP in the Sound must focus consciously on creating avenues for two-way communication and engagement among all stakeholders.

Second, the bi-state sharing of spatially referenced ecological, biophysical, social, economic, and other information is essential and is already in the process of taking place. The fact that the Connecticut Blue Plan will use New York's data portal as the framework for Connecticut's spatial planning is a promising step. This approach will help ensure a common source of information to be used in planning and decision-making. Shared use of such data can serve as a powerful analytical tool that can help develop potential scenarios of joint management and shared uses of Long Island Sound and avoid future conflicts.

Third, and more challenging, stakeholders must learn more not only about the other side's spatially relevant biophysical and social information, but also about the other side's priorities and perspectives from an institutional and political perspective. The effort to include New York representatives within the Connecticut Blue Plan is an excellent first step. Further interactions, whether they include scientists, journalists, or other stakeholders and the public, are essential. Again, the short physical distance across Long Island Sound can be deceptive. Each state's perspectives will likely remain wide apart on issues such as dredging, sand and gravel mining, and the disposal of dredged materials. Wide and broad inclusion of different stakeholders and the public will help inject a diversity of views. This study has shown that the two states' management approaches to the majority of human uses of Long Island Sound are perceived to be compatible.

An overall consensus exists that Long Island Sound will not be sustainably and collaboratively managed if a single state or side pursues its goals unilaterally. Nurturing cooperation to overcome institutional differences and achieve bi-state governance of Long Island Sound is critical. As one respondent of our survey explained:

> We need maybe not a sea change, but a sound change in the views of the respective states, of their planning and natural resource agencies, and in terms of what lies outside their prerogatives…. There has to be a recognition that you can't get it done by yourself, and the walls have to come tumbling down to get that done.