

Improving Water Quality and Ecosystem Health in California's Marine Managed Areas

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Summary

California's marine conservation regime is a model for the world, and includes a statewide network of marine protected areas and other marine managed areas (MMAs). But management authority remains distributed across multiple government entities, potentially compromising ecosystem-based approaches and adaptive management. The University of California, Irvine School of Law's Center for Land, Environment, and Natural Resources conducted extensive interviews and roundtable discussions to explore the current framework for managing coastal water quality and monitoring in the context of MMAs. This Article synthesizes the results of those discussions, and identifies challenges to and opportunities for enhancing MMAs through California's existing water quality and coastal protection programs, coordinating water quality monitoring and data access, and offsetting resource constraints on programs that protect marine water quality.

California's marine conservation regime, including those areas protected through the state Marine Life Protection Act (MLPA)¹ and Marine Managed Areas Improvement Act (MMAIA),² is one of the most advanced in the world.³ These Acts, in addition to the California Ocean Resources Stewardship Act⁴ and the California Ocean Protection Act (COPA),⁵ were integral in paving the way for a partnership-based approach to managing California's marine resources. Nonetheless, marine resource management authority in California remains distributed across multiple government entities with overlapping jurisdiction and differing mandates.⁶ This regulatory fragmentation may compromise marine resource conservation approaches such as ecosystem-based management,⁷ and impair each agency's ability to adapt and learn.⁸ Decentralized and overlapping regulatory systems can also result in significant impediments to addressing overarching issues, such as climate change.⁹

A wide range of resource managers and stakeholders acknowledge these challenges and are pursuing more integrated, ecosystem-based approaches to promote marine ecosystem health and manage conflicting coastal uses.¹⁰ The unique role of the Ocean Protection Council (OPC)

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1. CAL. FISH & GAME CODE §§2850-2863.
2. CAL. PUB. RES. CODE §§36600-36900.
3. See JULIA M. WONDOLLECK & STEVEN L. YAFFEE, MARINE ECOSYSTEM-BASED MANAGEMENT IN PRACTICE 76-78 (2017); Jason Patlis et al., *The National Marine Sanctuary System: The Once and Future Promise of Comprehensive Ocean Governance*, 44 ELR 10932, 10956 (Nov. 2014) (noting that the MLPA Initiative serves as an example of a process that integrates best available science, stakeholder interests, and private funding to protect valuable ecological and economic resources); Mary M. Gleason et al., *Designing a Network of Marine Protected Areas in California: Achievements, Costs, Lessons Learned, and Challenges Ahead*, 74 OCEAN & COASTAL MGMT. 90, 91 (2013).
4. CAL. PUB. RES. CODE §§36970-36995.
5. *Id.* §§35500-35650.
6. DONALD C. BAUR ET AL., AREA-BASED MANAGEMENT OF MARINE RESOURCES: A COMPARATIVE ANALYSIS OF THE NATIONAL MARINE SANCTUARIES ACT AND OTHER FEDERAL AND STATE LEGAL AUTHORITIES 79 (2013); Deborah A. Sivas & Margaret R. Caldwell, *A New Vision for California Ocean Governance: Comprehensive Ecosystem-Based Marine Zoning*, 27 STAN. ENVTL. L.J. 209, 228 (2009) (attributing past marine management failures to California's highly fractured system of ocean and coastal governance).
7. Sivas & Caldwell, *supra* note 6, at 228-30 (noting that California's piecemeal regulatory structure impedes the state's ability to manage for ecosystem health and long-term sustainability).
8. Alejandro E. Camacho, *Adapting Governance to Climate Change: Managing Uncertainty Through a Learning Infrastructure*, 59 EMORY L.J. 1, 25-27 (2009).
9. *Id.* at 26-32 (discussing the poor adaptive capacity of fragmented regulatory systems).
10. See Evan Fox et al., *Addressing Policy Issues in a Stakeholder-Based and Science-Driven Marine Protected Area Network Planning Process*, 74 OCEAN & COASTAL MGMT. 34, 37-38 (2013); see also WEST COAST RPB CHARTER (2016), available at <http://www.westcoastmarineplanning.org/documents/>

under California law,¹¹ the MLPA Implementation Memorandum of Understanding (MOU),¹² the Marine Protected Areas (MPAs) Statewide Leadership Team,¹³ recent updates to the California Ocean Plan,¹⁴ and investments in integrated regional water management (IRWM)¹⁵ exemplify these efforts to break down regulatory silos and coordinate across agencies and legal authorities.

The University of California, Irvine (UCI) School of Law Center for Land, Environment, and Natural Resources, in partnership with UCI OCEANS, convened two dialogues with policymakers, managers, scientists, and stakeholders involved in marine water quality protection or implementation of California's marine managed areas (MMAs)—a June 2016 scoping session and a January 2017 plenary roundtable. This Article, produced through research, interviews, and these dialogues, explores the current framework for managing coastal water quality and monitoring in the context of MMAs, and identifies challenges to and opportunities for enhanced coordination and improved management. Its focus is on three areas identified as presenting the most concrete opportunities under existing statutory regimes for improving marine water quality management in California.

Part I explores opportunities for enhancing MMA water quality through existing water quality and coastal protection programs and collaborations. Part II focuses on the coordination of water quality monitoring and data access.

Part III considers numerous ways to offset resource constraints on programs protecting marine water quality, and Part IV concludes.

I. Improving Coordination of Coastal Water Quality and Ocean Health Protection

Water quality impacts ocean health, including the marine ecosystems designed to be protected by California's areas of special biological significance (ASBS) and MPAs.¹⁶ Yet, ASBS and MPAs are regulated under different regimes with disparate management practices. The MLPA mentions concerns regarding water quality effects on MPAs,¹⁷ but does not provide any independent mechanism for restricting or abating sources of such pollution. Rather, California regulates coastal water quality through a separate regulatory regime. Moreover, while recent policies adopted by the State Water Resources Control Board (State Water Board) attempt to integrate MPAs into water quality regulation,¹⁸ there are a number of opportunities to improve the coordination of marine resource management and water quality regulation.

A. Background: Bifurcated MPA and Water Quality Protection

As discussed below, the two major categories of protected areas along California's coasts—MPAs and ASBS—are managed under separate legislative mandates: MPAs by the California Department of Fish and Wildlife (CDFW) in the Natural Resources Agency, and ASBS by the State Water Board in the California Environmental Protection Agency (CalEPA). The different missions of the two agencies are reflected in their implementing regulations, with MPA management focused on protecting marine resources and limiting direct extractive activities, and ASBS management focused on regulation of coastal discharges. Although both agencies aim to protect ecosystem function and integrity, these two regulatory regimes address different sets of stressors on coastal waters, and there are limited incentives to promote joint management. Some efforts have been made to enhance integration, but additional opportunities remain.

Telephone Interview With Cyndi Dawson, Marine Protected Area Policy Advisor, Ocean Protection Council (Mar. 17, 2016).

11. OPC is tasked with coordinating activities of ocean-related state agencies and establishing policies to coordinate the collection and sharing of scientific data related to coastal and ocean resources among agencies. CAL. PUB. RES. CODE §§35600-35625.
12. The 2010 MOU was amended in 2015; it recognizes the need for cooperative and coordinated efforts to implement the marine protected areas (MPAs) and is signed by 15 government and nongovernmental entities, including the State Water Board. MLPA Implementation MOU, *available at* http://www.opc.ca.gov/webmaster/_media_library/2016/08/151104-FINAL-MPA-implementation-MOU_scannedsigns.pdf [hereinafter MLPA Implementation MOU].
13. The MPA Statewide Leadership Team includes state and federal agencies and other partners that play a direct or key support role in management of the network. The Leadership Team is led by the OPC, and includes the Department of Fish and Wildlife (CDFW), DFW Law Enforcement Division, Fish and Game Commission, California Coastal Commission (CCC), California State Lands Commission, Department of Parks and Recreation, State Water Resources Control Board, California Ocean Science Trust (OST), MPA Collaborative Network, the National Park Service, Resources Legacy Fund, and West Coast Regional Office of National Marine Sanctuaries.
14. STATE WATER RESOURCES CONTROL BOARD, CALIFORNIA OCEAN PLAN (2015) [hereinafter OCEAN PLAN].
15. IRWM brings local agencies and other stakeholders, with a range of water-related roles and interests, together to address water management needs collaboratively within self-identified regions. Subsequent to the IRWM Planning Act of 2002, three state bond measures allocated funds to support IRWM planning and implementation efforts by regional water management groups. *See* DEPARTMENT OF WATER RESOURCES, STAKEHOLDER PERSPECTIVES, RECOMMENDATIONS FOR SUSTAINING AND STRENGTHENING INTEGRATED REGIONAL WATER MANAGEMENT (2017).

16. The MLPA establishes six overall goals for California's statewide MPA network, including protection of the natural diversity and abundance of marine life, and the structure, function, and integrity of marine ecosystems. CAL. FISH & GAME CODE §2853; ASBS are ocean areas requiring protection of species or biological communities. OCEAN PLAN, *supra* note 14, app. I, at 28.

17. *See, e.g.*, CAL. FISH & GAME CODE §§2851(c), 2852(d), 2853(b)(1), (3), 2857(b)(2).

18. *See infra* notes 50-54 and accompanying text.

I. California's Network of MPAs

The Marine Life Protection Program (MLPP),¹⁹ established to adaptively manage the MPA network, seeks to minimize resource disturbance by restricting, at various levels, human uses of certain areas. It accomplishes this through an interagency management program with four focal areas: policy and permitting, enforcement and compliance, outreach and education, and research and monitoring.²⁰ The CDFW and the Fish and Game Commission have jurisdiction over the management and take of species in state waters, with the Commission serving as the primary decisionmaking body and the CDFW providing data and implementing and enforcing regulations set forth by the Commission.²¹ OPC is directly responsible for setting and guiding MPA policy and is tasked with helping to coordinate activities of ocean-related state agencies.²² OPC's Science Advisory Team (OPC-SAT) is tasked with ensuring that the best available science is applied to OPC policy decisions.²³

The 2016 Master Plan for MPAs²⁴ implements the MLPP,²⁵ emphasizing coordination of California's marine and coastal governance as a statewide network. The MLPA Implementation MOU includes the State Water Board as a signatory and identifies roles for the Regional Water Quality Control Boards (Regional Water Boards).²⁶ Further, the MPA Statewide Leadership Team convened in 2014 to increase communication and collaboration among agencies and partners to promote effective MPA management. California's Partnership Plan, which was incorporated into the 2016 Master Plan, emphasizes and provides a framework for collaborative management within California's marine and coastal governance.²⁷ And the MPA Collaborative Network is composed of 14 member MPA collaboratives that bring together local experts and authorities to promote MPA implementation through outreach and education, enforcement and compliance, and research and monitoring initiatives.

2. A Complex and Separate Regime of Coastal Water Quality Protections

California protects coastal water quality through federal and state law discharge limitations. Under the federal

Clean Water Act (CWA),²⁸ states must adopt water quality standards and implement them primarily through permitting for specific levels of pollution from individual point sources²⁹ (known as national pollutant discharge elimination system (NPDES) permits)³⁰ and secondarily by developing total maximum daily loads (TMDLs) for each water body.³¹ If a water body fails to meet the state's standards, the state must list the water body as impaired and develop TMDLs for particular pollutants to restore water quality.³² However, like many other states, California has experienced challenges in both the establishment and enforcement of rigorous TMDLs.³³

Due at least in part to these difficulties, in 1990, the U.S. Congress passed the Coastal Zone Act Reauthorization Amendments (CZARA) to improve nonpoint source pollution control in coastal waters.³⁴ As required under CZARA, California developed a Coastal Nonpoint Source (NPS) Pollution Program in 2000 that established a statewide approach to dealing with nonpoint source pollution.³⁵ The State Water Board and the nine Regional Water Boards are responsible for the implementation of and compliance with the provisions of the CWA and, together with the California Coastal Commission, implement the NPS Program.³⁶

California also regulates water quality through the state's Porter-Cologne Water Quality Control Act,³⁷ which establishes a comprehensive program to protect water quality and beneficial uses for state waters.³⁸ The Porter-Cologne Act requires waste dischargers to establish self-monitoring programs and submit compliance reports to the relevant Regional Water Board, and authorizes the State and Regional Water Boards to issue and enforce waste discharge requirements, NPDES permits, and water quality certifications under §401 of the federal CWA.³⁹

The California Ocean Plan, first adopted in 1972, also establishes standards to protect the beneficial uses of ocean

28. 42 U.S.C. §§7401-7671q, ELR STAT. CAA §§101-618.

29. Point sources include any confined, discrete conveyance, such as pipes, ditches, wells, and containers. *Id.* §1362(14).

30. *Id.* §1342.

31. *Id.* §1313(d)(1)(C).

32. *Id.* §1313(d). Often referred to as the impaired water body or the "303(d)" list.

33. See Ryan P. Kelly & Margaret R. Caldwell, *Ten Ways States Can Combat Ocean Acidification (and Why They Should)*, 37 HARV. ENVTL. L. REV. 57, 75 (2013) (noting the failure of states to create enforceable TMDLs).

34. 16 U.S.C. §1455(b); see Kelly & Caldwell, *supra* note 33, at 87-88.

35. See CALIFORNIA NONPOINT SOURCE PROGRAM IMPLEMENTATION PLAN 2014-2020 (2015) [hereinafter NONPOINT SOURCE PLAN], https://www.waterboards.ca.gov/water_issues/programs/nps/docs/plans_policies/sip_2014to2020.pdf. The NPS Program aims to ensure the ongoing integration and coordination of point and nonpoint source efforts within the structure of the TMDL and watershed-based planning and implementation programs. *Id.* at 12.

36. The CCC was created in 1976 under the California Coastal Act with the mission to protect all coastal resources, including water quality, from the impacts of development, broadly defined. CAL. PUB. RES. CODE §§30000-30013.

37. CAL. WATER CODE §§1251, 13000 et seq.

38. *Id.* §§13050(e), 13260(a), 13263(a), 13376, 13377.

39. CAL. WATER CODE §§13260, 13263. *Tahoe-Sierra Pres. Council v. State Water Res. Control Bd.*, 210 Cal. App. 3d 1421, 1431-38 (Cal. Ct. App. 1989).

19. CAL. FISH & GAME CODE §2855.

20. *Id.*

21. CAL. FISH & GAME CODE §2860.

22. *Id.* at §2850.5.

23. The OPC-SAT is composed of 26 esteemed scientists, convened to serve the science and policy needs of California. See OPC, *OPC Science Advisory Team (OPC-SAT)*, <http://www.opc.ca.gov/science-advisory-team/> (last visited July 30, 2018).

24. See CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE, 2016 FINAL MASTER PLAN FOR MARINE PROTECTED AREAS 2 [hereinafter 2016 MASTER PLAN].

25. CAL. FISH & GAME CODE §2855.

26. The MOU includes all of the signatories' commitment to avoiding adverse impacts to MPAs from a range of activities, including water pollution; MLPA Implementation MOU, *supra* note 12.

27. OPC, THE CALIFORNIA COLLABORATIVE APPROACH: MARINE PROTECTED AREAS PARTNERSHIP PLAN 10 (2014) [hereinafter PARTNERSHIP PLAN].

waters⁴⁰—uses ranging from industrial water supply to aesthetic enjoyment and shellfish harvesting.⁴¹ The State Water Board and six coastal Regional Water Boards implement the plan. The Ocean Plan applies to both point and nonpoint source discharges and provides for review standards to evaluate the effect of municipal industrial waste discharges on the marine environment.⁴²

Finally, in the mid-1970s, in response to a growing recognition that coastal ecosystems are a valuable economic and ecological resource, 34 ASBS were designated along the California coast.⁴³ The State Water Board designates ASBS in ocean areas that require protection of unique or significant species or biological communities. SBS remained unchanged until 2000 when, like MPAs, they were reclassified as an MMA under the MMAIA⁴⁴ and became a subset of state water quality protected areas (SWQPAs).⁴⁵

B. Problem: Insufficient Integration of MPA and Water Quality Protection

The size and complexity of California's coastal ecosystems, the multiplicity of agencies with authority over ocean and coastal resources, and substantial jurisdictional overlap among federal and state agencies⁴⁶ present inherent challenges for managing and improving marine water quality and ecosystem health. Fortunately, the MLPP recognizes the need for enhanced coordination, and is currently working to connect MPA science and management with other efforts to manage fisheries, climate change, and water quality.⁴⁷ Both the OPC and MPA Statewide Leadership Team integrate mechanisms that attempt to address these coordination challenges.⁴⁸ Existing efforts to meaningfully improve water quality in MMAs, however, necessarily rely

on the effectiveness of the fairly independent system of water quality regulation embodied in the CWA, Porter-Cologne Act, and California Ocean Plan.

I. Recommendation: Support and Expand Emerging Integration Efforts

Roundtable participants agreed that coordination between MPA and water quality management was vital. Several pointed to the MPA Statewide Leadership Team as a valuable avenue. The Leadership Team's current work plan has action items to align multiple management mandates and priorities that include integrating water quality and MPA management.⁴⁹

Recent Ocean Plan amendments and policies adopted by the State Water Board have also started to integrate concerns regarding MPAs into water quality regulation. In 2010, the State Water Board adopted a policy to implement CWA §316(b) to reduce the harmful effects associated with cooling water intake structures of coastal power plants and to phase out the use of once-through cooling (OTC Policy).⁵⁰ The policy gives preference to funding mitigation projects directed toward enhancing MPAs in the geographic region of the facility.⁵¹ In 2012, the State Water Board adopted Ocean Plan amendments to establish criteria for designating SWQPAs in MPAs, discussed further below. Finally, in 2016, the State Water Board adopted a stormwater strategy that aims to lead the evolution of stormwater management in California by advancing stormwater as a valuable resource, supporting policies for collaborative watershed-level stormwater management and pollution prevention, and integrating regulatory and nonregulatory interests.⁵²

The State Water Board also recently adopted Ocean Plan amendments to address effects associated with the construction and operation of seawater desalination facilities, including potential negative impacts to MPAs and

40. CAL. WATER CODE §13170.2. The Plan applies to ocean waters, defined as "territorial marine waters of the State as defined by California law to the extent these waters are outside of enclosed bays, estuaries, and coastal lagoons."

41. OCEAN PLAN, *supra* note 14, at 3.

42. The Ocean Plan also establishes standards for the physical, chemical, and bacteriological characteristics of offshore waters, and includes implementation provisions for MMAs. OCEAN PLAN, *supra* note 14, at 2-6, 21. The State Water Board has also adopted water quality control criteria covering thermal discharges through the California Thermal Plan, which sets out specific thermal criteria for various state waters. See WATER QUALITY CONTROL PLAN FOR CONTROL OF TEMPERATURE IN THE COASTAL AND INTERSTATE WATERS AND ENCLOSED BAYS AND ESTUARIES OF CALIFORNIA.

43. OCEAN PLAN, *supra* note 14, at 85-86. ASBS support an unusual variety of aquatic life and are considered the basic building blocks for a sustainable, resilient coastal environment and economy.

44. CAL. PUB. RES. CODE §§36600-36900.

45. *Id.* §36700(f).

46. Evan Fox et al., *Enabling Conditions to Support Marine Protected Area Network Planning: California's Marine Life Protection Act Initiative as a Case Study*, 74 OCEAN & COASTAL MGMT. 14, 15 (2013).

47. 2016 MASTER PLAN, *supra* note 24, at 35; see also Gleason et al., *supra* note 3, at 92 (stating that CDFW is identifying ways to integrate MPAs with fisheries management under the Marine Life Management Act).

48. As OPC consists of both the secretary of the National Resources Agency (involved in MPA management) and the secretary of CalEPA (overseeing state water quality programs), by its very structure, it provides a degree of coordination between these efforts. See OPC, *Marine Protected Areas*, <http://www.opc.ca.gov/programs-summary/marine-protected-areas/> (last visited July 30, 2018). The MPA Statewide Leadership Team is a key tool OPC uses to support interagency coordination of MPA management. *Id.*

49. See MARINE PROTECTED AREA (MPA) STATEWIDE LEADERSHIP TEAM WORK PLAN FY 15/16-17/18 [hereinafter LEADERSHIP TEAM WORK PLAN] (other action items include aligning MPA monitoring efforts with fisheries and climate change efforts and increasing alignment of research activities with state priorities).

50. STATE WATER RESOURCES CONTROL BOARD, STATEWIDE WATER QUALITY CONTROL POLICY ON THE USE OF COASTAL AND ESTUARINE WATERS FOR POWER PLANT COOLING (adopted May 4, 2010) [hereinafter OTC POLICY]. The policy was amended in 2011, 2013, and 2016. See also Angela Kelley, *A Call for Consistency: Open Seawater Intakes, Desalination, and the California Water Code*, 4 GOLDEN GATE U. ENVTL. L.J. 277, 278-79 (2011).

51. OTC POLICY, *supra* note 50. The State Water Board, OPC, and the Coastal Conservancy signed an MOU in 2016 regarding acceptance and use of interim mitigation funds and OPC is currently developing a framework to identify and prioritize projects that fulfill the requirements of the OTC Policy and are consistent with the State Water Board's preference for investment in the state's MPA network. See MOU between OPC, State Water Board, and Coastal Conservancy (2016), available at http://www.opc.ca.gov/webmaster/_media_library/2016/10/Compressed_Acceptance-Use-of-Interim-Mitigation-Funds-for-the-Once-Through-Coolin.pdf; STATE WATER RESOURCES CONTROL BOARD, ONCE-THROUGH COOLING MITIGATION PROGRAM (adopted Aug. 30, 2016).

52. See CalEPA, State Water Resources Control Board, *Strategy to Optimize Resource Management of Storm Water (Storm Water Strategy, STORMS)*, https://www.waterboards.ca.gov/water_issues/programs/stormwater/storms/ (last updated July 30, 2018).

SWQPAs from intake and discharge structures,⁵³ and to control trash, designed to prevent plastic pollution and other marine debris from entering the marine environment.⁵⁴ These recent amendments and policies represent an encouraging trend to integrate MPA protection into the water quality regulatory regime. However, existing efforts remain nascent and need sustained attention and support to flourish. Moreover, as detailed in the next subsections, additional meaningful opportunities for integration exist.

2. Recommendation: Increase Use of Water Quality Designations for MPAs

Although water quality is not regulated under the MLPA, it was identified as a major stressor in designating MPAs, particularly in the heavily urbanized South Coast. The CDFW's Science Advisory Team⁵⁵ recognized this and issued recommendations for siting MPAs in a way that anticipated these water quality issues.⁵⁶ Although secondary to core scientific guidelines regarding habitat type, size, and spacing of MPAs, stakeholders generally heeded this advice and avoided designating MPAs in areas already identified as zones of major water quality concern.⁵⁷ While some MPAs, particularly state marine reserves, were designated to overlap with preexisting ASBS under the water quality regulatory regime, many MPAs were not.⁵⁸ As a result, MPAs in these areas do not contain heightened water quality regulation associated with an overlapping ASBS.

Recognizing an opportunity to further integrate MPAs and water quality protection, in 2012, the State Water Board created a new designation that was anticipated to provide some protection of water quality in MPAs. It amended the Ocean Plan to establish a new type of SWQPA, "general protections" (GPs),⁵⁹ specifically intended to overlap with

MPAs and provide an intermediate level of protection.⁶⁰ The SWQPA-GP designation thus was created to give State and Regional Water Boards additional flexibility for protecting water quality in ecologically sensitive areas by providing an intermediate level of protection appropriate for areas where recreational and/or commercial take is allowed and where a discharge prohibition is unnecessary and/or not feasible.⁶¹ Within the SWQPA-GP designation, certain types of existing low-risk discharges are allowed, but future high-risk discharges are prohibited.⁶²

Unfortunately, although these new SWQPA designations might help address regulatory fragmentation, no SWQPA-GPs have been designated to date. There are political and practical challenges to designating new SWQPAs to overlap with MPAs, given that the MPA network is located off the coast of a heavily populated and developed state and that most of the costs related to implementation would fall on already fiscally stressed local governments. Implementation of these regulations could be prohibitively expensive if new infrastructure were required to meet water quality standards.⁶³ Moreover, some municipalities sought assurances during the MPA designation process that additional water quality regulations would not be imposed as a result of siting an MPA within its boundaries.⁶⁴ Without the political will to achieve such designations, the ability to enhance coastal water quality for MPAs will continue to be limited.

Accordingly, roundtable participants attempted to identify opportunities that might help cultivate such political will. Some suggested that proponents of MPAs should look to leverage regional stakeholders and the periodic review of basin plans to help increase opportunities for MPAs to benefit from protections under the water quality regulatory regime. New SWQPA proposals are developed at the Regional Water Board level and come to the State Water Board as a package for approval.⁶⁵ As such, any new proposal would benefit from buy-in and support from regional stakeholders. The MPA Collaborative Network can play a critical role in identifying high-priority sites for new SWQPA designations and building this local support.

To promote designation, Regional Water Boards could assess all existing discharges and use this information to determine what controls are needed to maintain water quality, including developing and adopting more stringent permits, discharge conditions, or prohibitions within these areas. Some Regional Water Board staff have stated they do not have adequate resources to conduct this type of com-

53. STATE WATER RESOURCES CONTROL BOARD, FINAL STAFF REPORT AND FINAL DESALINATION AMENDMENT, INCLUDING THE FINAL SUBSTITUTE ENVIRONMENTAL DOCUMENTATION (adopted May 6, 2015) [hereinafter FINAL SED FOR OCEAN PLAN AMENDMENTS]. STATE WATER RESOURCES CONTROL BOARD, STATEWIDE WATER QUALITY CONTROL PLANS FOR TRASH (adopted Apr. 7, 2015). *Id.*

54. STATE WATER RESOURCES CONTROL BOARD, STATEWIDE WATER QUALITY CONTROL PLANS FOR TRASH (adopted Apr. 7, 2015).

55. The Science Advisory Team, which consists of appointed technical experts in a range of fields including marine ecology, fisheries, economics, and social sciences, provides the scientific information and technical judgment that assists CDFW with meeting the objectives of the MLPA. See CDFW, *Master Plan Science Advisory Team (South Coast Study Region)*, <http://www.dfg.ca.gov/marine/mpa/scsat.asp> (last visited July 30, 2018).

56. MLPA MASTER PLAN SCIENCE ADVISORY TEAM WATER QUALITY WORK GROUP, DRAFT RECOMMENDATIONS FOR CONSIDERING WATER QUALITY AND MPAs IN THE SOUTH COAST STUDY REGION 10-11 (2008) (recommending avoiding placing MPAs in areas that contain power plant entrainment sites, major stormwater discharge sites, and major wastewater discharge sites).

57. Telephone Interview With Brian Owens, Member of Water Quality Workgroup, CDFW (Oct. 19, 2017).

58. The State Water Board determined that the stringent ASBS protections were not appropriate for some MPAs, as significant environmental and socioeconomic stressors might exist, particularly in densely populated areas and/or where substantial wastewater or stormwater outfall infrastructure is located. FINAL SED FOR OCEAN PLAN AMENDMENTS, *supra* note 53, at 33-35.

59. *Id.* at 42.

60. OCEAN PLAN, *supra* note 14, at iii; STATE WATER RESOURCES CONTROL BOARD, RES. NO. 2012-0056 (adopted Oct. 16, 2012).

61. FINAL SED FOR OCEAN PLAN AMENDMENTS, *supra* note 53, at 34.

62. *Id.* at 36.

63. Telephone Interview With Ken Schiff, Deputy Director, Southern California Coastal Water Research Project (SCCWRP) (Mar. 15, 2017) (noting that if water quality is the issue of concern, it is more effective to start with enforcing current water quality regulations).

64. Telephone Interview With Calla Allison, Director, MPA Collaborative Network (Dec. 20, 2016) (describing the city of Laguna Beach's requests).

65. Telephone Interview With Karen Larsen, Deputy Director, State Water Board (Dec. 22, 2016).

prehensive survey.⁶⁶ They did suggest, however, that interested groups could assist with gathering the information needed to promote designation.⁶⁷

As coastal Regional Water Boards conduct their basin plan reviews, additional opportunities for new SWQPA designations will likely arise. As established community networks for outreach and education, enforcement and compliance, and research and monitoring, the MPA Collaborative Networks are well-situated to enhance the informational capacity and political mobilization needed for SWQPA designation. The State Water Board should consider directing Regional Water Boards to work with the MPA Collaborative Network and others interested in enhancing coastal water quality to identify candidate areas for SWQPA designation and prepare for these basin plan reviews.

3. Recommendation: Upgrade ASBS Program Standard-Setting and Enforcement

Of course, mere designation as a SWQPA will not ensure that water quality and ecosystem health are protected. The new SWQPA-GP category provides a lower level of protection compared to an ASBS designation,⁶⁸ and participants agreed that even an ASBS designation does not automatically lead to adequate water quality protection. ASBS protections are intended to maintain natural water quality standards by preventing pollution from entering the area, but some noted that the program is not functioning as originally envisioned.⁶⁹

When the ASBS program was established in the 1970s with the goal of eliminating all discharge into these areas, managers did not foresee or adequately address the types of diffuse pollution caused by stormwater runoff.⁷⁰ While an ASBS designation may be a helpful tool in implementing water quality protection, deficiencies limit the effectiveness of the program.

First, the ASBS program requires maintenance of “natural” water quality, but what is deemed the natural baseline may already be fairly compromised, “the best of what is left.”⁷¹ As urban, industrial, and agricultural runoff have elevated background levels of pollution, the accepted “natural” water quality baseline today for the purposes of the ASBS program is different than what the baseline would have been 100 years ago.⁷² The ASBS Natural Water Qual-

ity Committee (NWQC)⁷³ has already recommended that the State Water Board identify strategies to account for shifting baselines, including identifying how they plan to deal with future increases in human population and development and the potential for water quality degradation in and near ASBS and present-day reference sites.⁷⁴ The NWQC also recommends (1) quantitatively defining natural water quality so that any detectable human influence on the water quality must not hinder the ability of marine life to respond to natural cycles and processes, and (2) continuing efforts to better understand the true range and causes of natural variability in water quality and impacts from anthropogenic contributions.⁷⁵ The State Water Board should adopt these recommendations to better quantify “natural ocean water quality” and take action to avoid shifting baselines.

Second, enforcement by the State and Regional Water Boards is deficient.⁷⁶ These problems are a result of competing priorities within the State Water Board, with more attention given to freshwater ecosystems and a general unwillingness within the State and Regional Boards to punish violators.⁷⁷ Roundtable participants also commented that, in general, the State Water Board does not verify monitoring reports or follow up with permittees that are not meeting even the basic requirements, and there is currently widespread noncompliance with ASBS program requirements as a result. A 2016 California Coastkeeper Alliance review and analysis of ASBS final compliance plans from the State Water Board also found widespread noncompliance with the ASBS Policy.⁷⁸

While the Ocean Plan has prohibited all waste discharges into ASBS from point and nonpoint sources since 1983, a 2003 survey found waste discharges into ASBS amounting to a total of 1,654 potential violations. In response to a CWA citizen suit over these violations, in 2012, the State Water Board adopted a resolution approving exceptions for selected discharges into ASBS.⁷⁹ Some contend that

66. Telephone Interview With Peter von Langen, Central Coast Regional Water Board (Oct. 13, 2017).

67. *Id.*

68. FINAL SED FOR OCEAN PLAN AMENDMENTS, *supra* note 53, at 33-37.

69. Telephone Interview With Sara Aminzadeh, Executive Director, California Coastkeeper (Mar. 9, 2017).

70. Telephone Interview With Jonathon Bishop, Chief Deputy Director, State Water Board (Nov. 1, 2017).

71. See NATURAL WATER QUALITY COMMITTEE, SUMMATION OF FINDINGS 2006-2009 (2010) [hereinafter SUMMATION OF FINDINGS] (warning against “shifting baselines” and lowered expectations for water quality).

72. Telephone Interview With Ken Schiff, *supra* note 63 (noting that the water quality baseline is shifting).

73. The NWQC was established under State Water Board Resolution No. 2004-52 to define natural water quality in the San Diego-Scripps ASBS and provide guidance for assessing impacts to water quality in any ASBS in the state. See STATE WATER RESOURCES CONTROL BOARD, RES. NO. 2004-0052 (adopted July 22, 2004).

74. See SUMMATION OF FINDINGS, *supra* note 71, at 19.

75. See SUMMATION OF FINDINGS, *supra* note 71, at 18.

76. See John J. Lormon, *California's Ban on Waste Discharges Into Areas of Biological Significance*, 20 NAT. RESOURCES & ENV'T 28, 29 (2005) (noting that despite numerous violations, only one enforcement action of an illegal discharge into an ASBS has been prosecuted).

77. See LITTLE HOOVER COMMISSION, CLEANER WATER: IMPROVING PERFORMANCE AND OUTCOMES AT STATE WATER BOARDS 32-36 (2009) [hereinafter CLEANER WATER].

78. The draft compliance plans for Carmel, Los Angeles County and Malibu, City and County of Monterey, Pacific Grove, Newport Beach, Pebble Beach, and Trinidad, and final compliance plans for San Diego and Laguna Beach, reveal that none of the compliance plans (1) acknowledges that discharges alter natural ocean water quality; (2) use, apply, or demonstrate compliance with the standards for pollution control set out in the ASBS exception; and (3) propose any best management practices beyond those already contemplated under other existing programs. E-mail Communication With Sara Aminzadeh, Executive Director, California Coastkeeper Alliance (Mar. 16, 2017).

79. STATE WATER RESOURCES CONTROL BOARD, RES. NO. 2012-0012 (adopted Mar. 20, 2012) (approving exceptions to the California Ocean

these exceptions are necessary because the zero-discharge approach is not feasible, particularly in heavily urbanized areas.⁸⁰ Others argue these exceptions have been applied too broadly.⁸¹

Finally, some advocate for the ASBS program to shift more toward reliance on holistic monitoring, assessment, and ultimately management of ecosystem health, rather than the program's current discharge-driven approach. Quantifying the chemical components of an effluent only partially assesses the potential of waste discharge to ASBS. It is also critical to assess the biological integrity of marine communities residing in ASBS to determine if anthropogenic influence on water quality is hindering the ability of marine life to respond to natural cycles and processes.⁸² Moreover, current monitoring protocols involve sending water quality samples to the lab for testing, as well as toxicity and bioaccumulation studies. However, only sporadic in situ biological monitoring is required under ASBS permits.⁸³ A long-term program with time-series data to track the status of living organisms within ASBS would be more informative.⁸⁴

Additionally, to keep pace with improving scientific understanding of ecosystem functioning, monitoring and management will need to adapt.⁸⁵ For example, climate change is adding to the stressors affecting these communities, and the ASBS program will need to address new threats such as ocean acidification and hypoxia (OAH).⁸⁶ Because the state of knowledge about these emerging threats is still limited, improved monitoring and assessment is vital and expected to increase the options available for promoting ecosystem health.⁸⁷

Due to these institutional deficiencies, a number of participants advocated for a comprehensive overhaul of the ASBS program so that it can function as originally intended and better protect biological communities. In particular, policymakers should consider exploring a suite of strategies for improving SWQPA monitoring and enforcement, including:

- Dedicating more resources for and improving marine monitoring and enforcement
- Adapting ASBS permit requirements to better assess ecosystem health
- Using grant funding to incentivize permittees to comply with ASBS regulations
- Addressing the issue of shifting baselines by quantitatively defining natural ocean water quality

In addition, reforms should seek to foster opportunities to coordinate with and make use of other public and private actors with the means and incentives to promote compliance with water quality protections. Given that many ASBS overlap with marine reserves, the MPA Collaborative Network and citizen science water quality monitoring programs could help promote monitoring and compliance.

In 2000, for example, Orange County Coastkeeper, a member of the Orange County MPA Collaborative (OCMPAC), advocated for the prosecution of illegal discharges into the Irvine Coast ASBS, prompting the Santa Ana Regional Water Board to issue a cease and desist order to the dischargers. To date, this is the sole enforcement action of ASBS discharge prohibitions. OPC should explore these and other potential reforms for integrating MPA and ASBS management and develop guidelines that help relevant agencies act in coordination to achieve effective coastal water quality protections, perhaps by convening further dialogues involving ASBS permittees, regulators, and scientists.

C. *Problem: Persistent Coastal Water Quality Impacts*

As water and its constituents readily move along the coast, improving water quality in MMAs inevitably requires a higher level of protection for California coastal waters as a whole. Regulators have long recognized the negative impacts that land use activities have on coastal water quality,⁸⁸ and OPC's Strategic Plan highlights this as an area of critical need for action.⁸⁹ Pollution from urban runoff significantly contributes to the impairment of downstream waters and aquatic-dependent wildlife, including nearshore habitats contained in MMAs.⁹⁰

Although California's NPS Program attempts to establish a statewide approach to managing nonpoint source pollution and identifies goals and objectives to reduce or

Plan for Selected Discharges into ASBS, including special protections for beneficial uses).

80. Telephone Interview With Bob Stein, Assistant City Engineer, City of Newport Beach (Oct. 19, 2017); *see also* Lormon, *supra* note 76.

81. *See* Coastal Envtl. Rights Found. v. California Reg'l Water Quality Control Bd., 12 Cal. App. 5th 178, 185 (Cal. Ct. App. 2017) (challenging the San Diego Regional Water Board's use of the exception for approval of fireworks displays and resulting discharges into the La Jolla ASBS and Heisler Park ASBS).

82. *See* SUMMATION OF FINDINGS, *supra* note 71, at 18.

83. Telephone Interview With Kimberly O'Connell, Environmental Specialist, University of California, San Diego (Nov. 9, 2017).

84. Telephone Interview With Steve Murray, OPC-SAT (Oct. 19, 2017).

85. *Id.* (noting that dischargers currently are not monitoring emerging chemicals of concern such as endocrine disruptors).

86. For example, the existing water quality criteria for pH are not scientifically valid for application to ocean acidification and will need to be updated. *Id.*; *see also* WEST COAST OAH SCIENCE PANEL, RECOMMENDATIONS AND ACTIONS app. G (2016).

87. *See* WEST COAST OAH SCIENCE PANEL, *supra* note 86, at 9. Nonetheless, managers can improve local conditions by managing factors known to contribute to declining water quality, such as implementing better controls on nutrients and organic matter pollution that flow from land into coastal waters. *Id.* at 7.

88. *See* Kelly & Caldwell, *supra* note 33, at 87-88.

89. *See* OPC, A VISION FOR OUR OCEAN AND COAST, FIVE-YEAR STRATEGIC PLAN 2012-2017, available at http://www.opc.ca.gov/webmaster/ftp/pdf/2012-strategic-plan/OPC_042412_final_opt.pdf.

90. Robin Kundis Craig, *Urban Runoff and Ocean Water Quality in Southern California: What Tools Does the Clean Water Act Provide?*, 9 CHAP. L. REV. 313, 314 (2006); Steven Bay et al., *Water Quality Impacts of Stormwater Discharges to Santa Monica Bay*, 56 MARINE ENVTL. RES. 205-23 (2003); Megan E. Mach et al., *Assessment and Management of Cumulative Impacts in California's Network of Marine Protected Areas*, 137 OCEAN & COASTAL MGMT. 1-11 (2017).

eliminate impacts,⁹¹ it is notoriously difficult to control technologically, politically, and regulatorily.⁹² For example, as the 2016 Orange County Infrastructure Report Card notes, the infrastructure improvements necessary to control runoff will require significant capital investment as well as innovation, collaboration, and integration among stormwater, water supply, wastewater treatment, and flood control agencies.⁹³ Further, although industrial dischargers are required to monitor and report stormwater sampling results to the Regional Water Boards, violations of allowed pollutant limits are rampant and enforcement is weak.⁹⁴

Even with effective monitoring and enforcement of prohibitions against direct discharge into ASBS and MPAs, many of these protected areas are located within or near watersheds that are not subject to these prohibitions.⁹⁵ Managers must consider water quality impacts outside MPA boundaries as well as within, as this will affect how the MPA itself performs and how the network functions as a whole. Though the precise impact of water quality in MPAs is not fully understood, it is often cited as a determinant factor in an MPA's success.⁹⁶

I. Recommendation: Make Better Use of Coastal Act Land Use Restrictions

Opportunities exist for better addressing the effects of urban runoff and other land use activities on protected marine areas through closer coordination among agencies managing coastal uses. Under the California Coastal Act, the California Coastal Commission addresses urban runoff and other sources of NPS pollution through their coastal NPS Program, working in partnership with coastal cities and counties primarily through the preparation of local

coastal programs (LCPs).⁹⁷ Because LCPs must be submitted to the Coastal Commission for review and approval, they present an opportunity to require local governments to consider and address impacts to coastal water quality.⁹⁸

As cities and counties update their LCPs, the Coastal Commission can educate local regulators and decisionmakers about local MPAs and other MMAs and incentivize their protection and restoration.⁹⁹ There is also an opportunity to positively affect coastal water quality planning by incorporating concepts such as low-impact development and other source control measures and best management practices (BMPs) into LCPs.¹⁰⁰ This can facilitate the movement toward distributed and green infrastructure (rainwater tanks and green roofs) as a complement to the centralized infrastructure (aqueducts, water treatment plants and, more recently, desalination plants) on which cities have long relied.¹⁰¹ However, the Coastal Act does not require LCP updates, and many LCPs do not have adequate measures to address runoff or new management issues such as climate change and sea-level rise.¹⁰²

In addition to ensuring that coastal development permits (CDPs) are consistent with any Regional Water Board-approved NPDES permits at the project scale, the Coastal Commission and local jurisdictions can also condition CDPs on measures to avoid impacts to MPAs and ASBS. For example, consistent with the Ocean Plan desalination amendment, potential impacts to nearby MPAs are a required consideration in the Coastal Commission's evaluation of the proposed Huntington Beach desalination facility.¹⁰³ Similarly, the Santa Ana Regional Water Board must also consider impacts to MPAs when determining whether to renew the facility's NPDES permit.¹⁰⁴ These agencies thus can and should condition permits to minimize or avoid impacts to MMAs.

2. Recommendation: Jettison "Safe Harbors" for Municipal CWA Violations

In addition to the Ocean Plan prohibitions against direct discharge, all ASBS are also generally subject to restrictions in municipal separate storm sewer system (MS4) permits

91. See NONPOINT SOURCE PLAN, *supra* note 35, at 13-15. The NPS Program consists of a myriad of Water Board and Coastal Commission programs (e.g., agriculture and irrigated lands, forestry, TMDL, coastal water quality protection, etc.).

92. See Craig, *supra* note 90, at 322-29 (describing the implementation of management measures under the CZARA to control nonpoint sources of coastal water pollution and the challenges, which are exacerbated with increasing numbers of coastal residents); see also Kelly & Caldwell, *supra* note 33, at 75 (noting that the failure of states to create enforceable TMDLs to more strictly enforce nonpoint source pollution requirements is a well-known problem).

93. AMERICAN SOCIETY OF CIVIL ENGINEERS/UNIVERSITY OF CALIFORNIA, IRVINE CIVIL AND ENVIRONMENTAL ENGINEERING AFFILIATES, 2016 ORANGE COUNTY INFRASTRUCTURE REPORT CARD 62 (giving surface water quality a grade of D+).

94. E-mail Communication With Matt O'Malley, Executive Director, San Diego Coastkeeper (Mar. 16, 2017); see also DECONSTRUCTING ENFORCEMENT, A PRIMER ON WATER QUALITY ENFORCEMENT 12 (2010) (noting that the most significant challenge facing the Regional Water Boards is the lack of adequate resources to assess compliance with the general industrial and construction stormwater permits); see also CLEANER WATER, *supra* note 77, at 32-36; see also Charles Lester, *CZM in California: Success and Challenges Ahead*, 41 COASTAL MGMT. 219, 243 (2013) (noting that the Coastal Commission has a backlog of more than 1,750 enforcement cases).

95. See Peter A. Rogowski et al., *An Assessment of the Transport of Southern California Stormwater Ocean Discharges*, 90 MARINE POLLUTION 135-42 (2014) (finding that major river systems in southern California have the potential to expose MPAs to urban stormwater runoff).

96. Ken Schiff et al., *Impact of Stormwater Discharges on Water Quality in Coastal Marine Protected Areas*, 87 WATER ENV'T RES. 772-82 (2015).

97. See NONPOINT SOURCE PLAN, *supra* note 35, at 6-7.

98. *Id.* at 20.

99. Telephone Interview With Michael Sandecki and Al Wanger, California Coastal Commission (Dec. 6, 2016).

100. *Id.*

101. See Asal Askarizadeh et al., *From Rain Tanks to Catchments: Use of Low-impact Development to Address Hydrologic Symptoms of the Urban Stream Syndrome*, 19 ENVTL. SCI. & TECH. 49 (2015).

102. See NONPOINT SOURCE PLAN, *supra* note 35, at 6-7.

103. See Letter From Eric Sklar, President, California Fish and Game Commission, to Dayna Bochco, Chair, and Members, CCC (Feb. 1, 2017) (urging avoidance of open ocean intakes and siting away from MPAs), https://www.waterboards.ca.gov/santaana/water_issues/programs/Wastewater/Poseidon/Letter_CFG_2017_02_01.pdf.

104. See Santa Ana Water Resources Control Board, *Huntington Beach Desalination Facility Permit, Orange County*, https://www.waterboards.ca.gov/santaana/water_issues/programs/Wastewater/Poseidon.html (last updated July 18, 2018).

for stormwater runoff.¹⁰⁵ Polluted stormwater runoff is regularly transported through MS4s and discharged into local water bodies.¹⁰⁶ As such, these MS4 permits offer an additional avenue for addressing direct and adjacent discharges into ASBS.¹⁰⁷

However, several Regional Water Boards recently adopted alternative compliance, or “safe harbor” provisions, for municipal stormwater permits, which create a partial or complete exemption from enforcement for violations of water quality standards.¹⁰⁸ Such amendments weaken a permit holder’s accountability by shielding it from citizen suit, so long as it has a plan to improve water quality.¹⁰⁹ CWA citizen suits,¹¹⁰ when available as a means of enforcement, have proven effective at improving water quality, reducing or eliminating harmful discharges,¹¹¹ and instituting needed infrastructure improvements.¹¹²

Unraveling these exemptions would undoubtedly require substantial political will. Regrettably, the trend at the federal level is decidedly in the opposite direction.¹¹³ Fortunately, some in the California Legislature have shown interest in adopting pre-Donald Trump federal environmental and safety regulations as the minimum standards

under California law.¹¹⁴ Nonetheless, without more stringent standards and enforcement, ASBS and MPAs will continue to be exposed to damaging discharges from MS4s. At a minimum, protection of MMAs from MS4 discharges necessitates that local plans adopted through the exemption process for improving water quality are rigorous and enforceable.

3. Recommendation: Leverage Stakeholders in Implementation, Education, and Enforcement

Given the ubiquity of polluted runoff and resource limitations, stakeholders play a key role in implementation and education to address runoff and other water quality problems. Because toxic runoff is the result of many diffuse actions, such as failure to properly dispose of pet waste or over-irrigating yards, numerous groups can provide education and outreach to the public about the problem and what they can do to prevent it. Moreover, citizen groups undoubtedly have helped promote enforcement and innovative strategies for improving coastal water quality.

For example, San Diego Coastkeeper and Surfrider, both members of the San Diego Collaborative, successfully led efforts to challenge the outdated permit for the city of San Diego’s Point Loma Wastewater Treatment Plant.¹¹⁵ The resulting Pure Water Program seeks to transition to large-scale wastewater recycling, including a cooperative agreement laying out steps to achieve both significant reduction in discharges of treated sewage to the ocean and production of at least 83 million gallons per day of drinking water by 2035, enough to meet about 40% of the city of San Diego’s current use.¹¹⁶

A possible additional avenue for harnessing private parties to promote coastal water quality, particularly in light of any prospects of future limitations on federal citizen suits, might include the addition of a citizen suit provision under state law through the Porter-Cologne Act.¹¹⁷ Citizen suit plaintiffs generally seek declaratory and injunctive relief, and settlement agreements often include payments identified as supplemental environmental projects or “mitigation payments,” intended to offset impacts to local waters

105. Phase I NPDES stormwater permits are for medium (serving between 100,000 and 250,000 people) and large (serving 250,000 or more people) municipalities. Phase II general permits provide coverage for smaller municipalities (population less than 100,000), including nontraditional small MS4s, such as military bases. See State Water Resources Control Board, *Storm Water Program*, https://www.waterboards.ca.gov/water_issues/programs/stormwater/ (last updated Apr. 4, 2018).

106. See U.S. EPA, *Stormwater Discharges From Municipal Sources*, <https://www.epa.gov/npdes/stormwater-discharges-municipal-sources> (last updated Apr. 4, 2018).

107. Telephone Interview With Ken Schiff, *supra* note 63.

108. San Francisco, Los Angeles, and San Diego Regional Water Boards have adopted safe harbor to some extent. See, e.g., SAN DIEGO REGIONAL WATER QUALITY CONTROL BOARD, RES. NO. R9-2015-0100, NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT AND WASTE DISCHARGE REQUIREMENTS FOR DISCHARGES FROM THE MUNICIPAL SEPARATE STORM SEWER SYSTEMS (MS4s) DRAINING THE WATERSHEDS WITHIN THE SAN DIEGO REGION (adopted Nov. 18, 2015).

109. E-mail Communication With Matt O’Malley, *supra* note 94.

110. 33 U.S.C. §1365. The federal CWA authorizes any person to file a suit on his or her own behalf to enforce violations of a standard or limitation imposed in an NPDES permit or violations of orders issued with respect to such standards or limitations.

111. E-mail Communication With Matt O’Malley, *supra* note 94 (noting that San Diego Coastkeeper and San Diego Surfrider’s sewage spills litigation resulted in a 90% reduction of such spills in the city of San Diego). For example, San Francisco Baykeeper secured stricter regulations for stormwater runoff into the bay after successfully suing several Bay Area cities under the CWA for deficient stormwater management. By working closely with the San Francisco Bay Regional Water Board to improve the guidelines, Baykeeper was able to ensure stronger controls on trash, pesticides, and other toxic pollution in stormwater. See *Local Cities Taking Steps to Reduce Storm Water Pollution*, S.F. BAYKEEPER, Aug. 2, 2012, <http://baykeeper.org/blog/local-cities-taking-steps-reduce-storm-water-pollution>.

112. For example, Baykeeper recently settled a lawsuit against the city of San Jose that requires the city to spend \$100 million on “green infrastructure” to capture and filter polluted stormwater. Paul Rogers, *San Jose Agrees to \$100 Million Pollution Cleanup Program to Reduce Trash, Sewage Spills*, SAN JOSE MERCURY NEWS, June 14, 2016.

113. The Trump Administration has repeatedly sought to reduce funding and staffing for environmental law implementation and enforcement, including drastic cuts to EPA funding. See Brady Dennis, *Trump Budget Seeks 23 Percent Cut at EPA, Eliminating Dozens of Programs*, WASH. POST, Feb. 12, 2018; see also Coral Davenport, *Trump Budget Would Cut EPA Science Programs and Slash Cleanups*, N.Y. TIMES, May 19, 2017.

114. S.B. 49, part of the “Preserve California” legislative package introduced in 2017, would make certain federal laws, including the CWA, enforceable under state law, even if the federal government rolls back and weakens those standards. See California State Senate, *Preserve California*, <http://focus.senate.ca.gov/preserve-california> (last visited July 30, 2018). The bill is active and currently in the Assembly Rules Committee. California Legislative Information, *SB-49 California Environmental, Public Health, and Workers Defense Act of 2017*, http://leginfo.ca.gov/faces/billNavClient.xhtml?bill_id=20170180SB49 (last visited July 30, 2018).

115. See COOPERATIVE AGREEMENT IN SUPPORT OF PURE WATER SAN DIEGO (2014).

116. See Press Release, San Diego Coastkeeper, San Diego Coastkeeper Lauds City Council Approval of Large-Scale Recycled Water Program (Nov. 18, 2014), <http://www.sdcoastkeeper.org/act/fix/san-diego-coastkeeper-lauds-city-council-approval-of-large-scale-recycled-water-program>.

117. This is supported by a recent study finding that sanitary sewer overflow-related citizen enforcement actions initiated under the CWA’s citizen suit provision in California from 1996 through mid-2015 have helped improve collection system performance. NELL G. NYLEN ET AL., *CITIZEN ENFORCEMENT AND SANITARY SEWER OVERFLOWS IN CALIFORNIA* 140-42 (2016).

(through restoration projects, monitoring, watershed education projects, etc.) or improve infrastructure.¹¹⁸

Another more comprehensive and cooperative strategy might be to cultivate a network of regional coastal watershed collaboratives that builds on and proliferates the capacity of interested parties to promote coastal water quality. An entity analogous to the MPA Collaborative Network focused on coastal watersheds, with a diverse and engaged membership base and full-time support staff, could provide a forum for coordinated action at the State and Regional Water Boards. When a waste discharge requirement, stormwater permit, or water quality control plan relevant to protected areas is renewed or amended, this type of robust coastal watershed network could coordinate efforts to ensure that any water quality standards, effluent limitations, restrictions, and conditions will be adequate to protect coastal water quality.

While California has a history with watershed councils,¹¹⁹ funding for coordination has waned in recent years.¹²⁰ For example, in 2012, the regional watershed coordinator positions were eliminated due to budget cuts.¹²¹ In order to restore the critical linkage to communities involved in coastal resource protection projects, OPC and the State Water Board should examine avenues to support coastal watershed councils and the California Watershed Network, including support for regional watershed coordinator positions.

The Network of Oregon Watershed Councils (NOWC) offers a potential model for a coordinated and robust statewide network.¹²² Fifty-nine watershed councils receive funding through the Oregon Watershed Enhancement Board,¹²³ and NOWC provides capacity training as well as a collective voice to policymakers and natural resource agencies.¹²⁴ This community-based model is effective in part because it is financially supported by the state, but

also because it meaningfully involves and has buy-in from local governments, has an engaged membership base including landowners, and focuses on restoring land and water from “ridgetop to ridgetop” rather than according to political boundaries.¹²⁵

II. Integrating Monitoring and Assessment of Coastal Water Quality and Ocean Health

A comprehensive monitoring and assessment program is invaluable for the effective protection and restoration of coastal waters and associated ecosystems. Regulators recognize that collaboration in monitoring helps to build support and buy-in, and is critical to ensure that development and implementation of monitoring and assessment programs is informed by a broad range of experience and expertise.¹²⁶ However, entrenched institutional impediments often hamper the coordination across programs that is key to improved information access. Indeed, myriad local, state, and federal agencies, nongovernmental organizations (NGOs), universities, regulated entities, and water bond grant recipients conduct water quality and aquatic ecosystem monitoring with limited coordination,¹²⁷ spending millions of dollars each year.¹²⁸ Enhanced alliances between key agencies and organizations both within and outside state government is necessary to bridge the water quality and marine resource monitoring communities.

As a remedy to address these types of challenges, the legislature established the Water Quality Monitoring Council¹²⁹ (Monitoring Council) in 2006, and required CalEPA and the Natural Resources Agency to jointly address significant problems related to: (1) the coordination and efficiency of water quality and ecosystem monitoring, and (2) access to data and assessment tools.¹³⁰ In 2014, California conducted its first triennial audit of the Monitoring Council’s efforts to implement a comprehensive monitoring program strategy for the state. The audit found that while the Monitoring Council has made impressive progress in coordination, forming six interagency workgroups

118. For example, the Coastal Watershed Council received supplemental environmental project (SEP) funds to conduct watershed assessment and restoration projects. See Central Coast Regional Water Quality Control Board, *Coastal Watershed Council: Supplemental Environmental Projects*, https://www.waterboards.ca.gov/centralcoast/water_issues/programs/sep/projects/coastal_watershed_council.shtml (last visited July 30, 2018).

119. For example, the Coastal Watershed Council is dedicated to the conservation and restoration of watersheds that drain into the Monterey Bay National Marine Sanctuary. See Coastal Watershed Council, *Home Page*, <https://coastal-watershed.org/> (last visited July 30, 2018).

120. Personal Communication With Donna Meyers, Conservation Collaborative (Mar. 7, 2018).

121. See CALIFORNIA WATERSHED NETWORK (CWN), *WHITE PAPER ON FUNDING NATURAL RESOURCE PROJECTS & RECOMMENDATIONS 2* (2014) (noting that the progress made since 1997 in collaboration and integration of watershed restoration has begun to unravel). CWN, run by a volunteer board of directors, identifies multiple measures to enhance revenue as top policy issues. See CWN, *Home Page*, <http://www.watershednetwork.org/> (last visited July 30, 2018).

122. Oregon Watershed Councils are locally organized, voluntary, nonregulatory groups established to improve the conditions of watersheds in their local area. NOWC, *Home Page*, <http://www.oregonwatersheds.org/> (last visited July 30, 2018).

123. The Oregon Watershed Enhancement Board is a state agency that provides grants, funded from the Oregon Lottery, federal dollars, and salmon license plate revenue. See Oregon Watershed Enhancement Board, *Home Page*, <http://www.oregon.gov/oweb/Pages/index.aspx> (last visited July 30, 2018).

124. Telephone Interview with Shawn Morford, Executive Director, NOWC (Feb. 28, 2018).

125. *Id.*

126. See, e.g., SAN DIEGO REGIONAL WATER QUALITY CONTROL BOARD, *A FRAMEWORK FOR MONITORING AND ASSESSMENT IN THE SAN DIEGO REGION 16-21* (2012) [hereinafter *FRAMEWORK FOR MONITORING AND ASSESSMENT IN THE SAN DIEGO REGION*] (describing a 10-step process for collaboratively developing and implementing monitoring and assessment programs).

127. While the major monitoring programs generally have a high degree of internal coordination of monitoring designs and methods, there is much less coordination across programs. CALIFORNIA WATER QUALITY MONITORING COUNCIL, *MY WATER QUALITY OCEAN PORTAL ROADMAP 27* (2014) [hereinafter *OCEAN PORTAL ROADMAP*] (noting that this results in inconsistent quality assurance/quality control requirements and data formatting).

128. CALIFORNIA WATER MONITORING COUNCIL, *INCREASING EFFICIENCY AND EFFECTIVENESS THROUGH COLLABORATION 3-6* (2014) [hereinafter *INCREASING EFFICIENCY AND EFFECTIVENESS*].

129. Members of the Monitoring Council represent a diversity of interests, including state regulatory, resource management, and public health agencies; regulated stormwater, wastewater, and agricultural interests; water suppliers; citizen monitoring groups; the scientific community; and the public.

130. *INCREASING EFFICIENCY AND EFFECTIVENESS*, *supra* note 128, at 3.

to address water quality and associated ecosystem monitoring, assessment, and reporting, a large amount of work remains.¹³¹ After exploring the monitoring programs most relevant to coastal water quality and ocean health, this section details various opportunities for enhancing the coordination of such efforts.

A. *Problem: Coastal Monitoring Programs Are Not Well-Integrated*

California's coasts are subject to a variety of overlapping monitoring programs. MPA baseline monitoring was conducted by a range of agencies and academic, tribal, and citizen group organizations. For example, the South Coast rocky intertidal monitoring project¹³² included researchers from five academic institutions, representing two long-term monitoring programs (PISCO¹³³ and MARINE¹³⁴), as well as a long-term citizen science monitoring program (LiMPETS).¹³⁵ A majority of this Phase 1 MPA baseline monitoring data is compiled at OceanSpaces,¹³⁶ a website hosted by Ocean Science Trust (OST).¹³⁷ A Statewide MPA Monitoring Action Plan is currently in development under the leadership of CDFW and OPC.¹³⁸ While the Statewide MPA Monitoring Program strives to ensure that MPA monitoring data can also support broader ecosystem-based management,¹³⁹ most MPAs are subjected to only limited monitoring for water quality.¹⁴⁰

Under the ASBS regime, water quality monitoring tracks trends in compliance with Ocean Plan standards, pollutant loads to the coastal ocean, and impacts on tra-

ditional indicators of biological effects such as benthic communities.¹⁴¹ However, as participants noted, monitoring is limited and does not cover all ASBS. Others noted widespread noncompliance with ASBS water quality monitoring requirements, and the State Water Board is not verifying monitoring reports in most cases.¹⁴² Further, ASBS compliance monitoring for toxicity¹⁴³ could be improved by following the proper protocol to ensure protection of marine life from neurotoxic insecticides.¹⁴⁴

In addition, the State and Regional Water Boards conduct and oversee various monitoring programs relevant to coastal water quality and ocean health.¹⁴⁵ These programs include TMDL implementation monitoring, ambient monitoring under the state NPS Program, MS4 and publicly owned treatment works discharge monitoring, ambient and effectiveness monitoring under various grant projects, and monitoring conducted through California's Surface Water Ambient Monitoring Program (SWAMP).¹⁴⁶ Much of this data is uploaded to the California Environmental Data Exchange Network, a water quality database linked to EPA's Water Quality Exchange and the U.S. Geological Survey.¹⁴⁷

The Southern California Coastal Water Research Project (SCCWRP) investigates how to more effectively monitor and protect southern California's ocean and coastal watersheds, as well as how to bridge the gap between water quality research and sound management decisions.¹⁴⁸ The Southern California Bight Regional Monitoring Programs (RMPs) serve as comprehensive assessments of receiving water conditions by assessing reference locations (including ASBS) and locations influenced by urban runoff for water quality during storm events, as well as bioaccumulation of potential pollutants.¹⁴⁹ These assessments occur every five years,¹⁵⁰ with the next planned for 2018 (Bight '18). SCCWRP and OST house a joint post-doctoral fellowship program focused on integrating water quality and MPA science and management, with direct funding from the State Water Board and OPC.¹⁵¹

Numerous other state and local agencies, environmental groups, and citizen-monitoring groups conduct relevant

131. *Id.* at 7-11.

132. This baseline monitoring data was compiled into a report as part of the state-funded South Coast MPA Baseline Program. See OCEANSPACES ET AL., ROCKY INTERTIDAL SNAPSHOT REPORT: BASELINE HIGHLIGHTS FROM CALIFORNIA'S SOUTH COAST ROCKY INTERTIDAL ECOSYSTEMS—MONITORING LIFE AT THE INTERFACE, <http://oceanspaces.org/sites/default/files/rocky-intertidal-snapshot.pdf>.

133. The Partnership for Interdisciplinary Studies of Coastal Oceans (PISCO) is a long-term monitoring and research program designed to understand the California Current Large Marine Ecosystem. PISCO, *Home Page*, <http://www.piscoweb.org/> (last visited July 30, 2018).

134. The Multi-Agency Rocky Intertidal Network (MARINE) is a large consortium of research groups conducting long-term monitoring and biodiversity surveys at sites ranging from southeast Alaska to Mexico. See University of California, Santa Cruz, Ecology and Evolutionary Biology, *Multi-Agency Rocky Intertidal Network*, <https://www.eeb.ucsc.edu/pacificrockyintertidal/index.html> (last modified Mar. 9, 2018).

135. Long-Term Monitoring Program and Experiential Training for Students (LiMPETS) is an environmental monitoring and education program for students, educators, and volunteer groups developed to monitor the ocean and coastal ecosystems of California's national marine sanctuaries. LiMPETS, *Home Page*, <http://limpets.org/> (last visited July 30, 2018).

136. See OceanSpaces, *California's Statewide MPA Monitoring Program* [hereinafter *MPA Monitoring*], <http://oceanspaces.org/monitoring> (last visited July 30, 2018).

137. OST is an independent nonprofit created in 2000 under the California Ocean Resources Stewardship Act that serves as a liaison between state agencies, scientific institutions, and communities to support healthy ocean and coastal ecosystems. See OST, *About Us*, <http://www.oceansciencetrust.org/about-us/> (last visited July 30, 2018).

138. The Statewide MPA Monitoring Action Plan will identify the key sites and metrics for Phase 2 long-term monitoring once approved. See *MPA Monitoring*, *supra* note 136.

139. *Id.*

140. See OCEAN PORTAL ROADMAP, *supra* note 127, at 27.

141. *Id.* at 25.

142. Telephone Interview With Sara Aminzadeh, *supra* note 69.

143. See, e.g., CENTRAL COAST REGIONAL ASBS MONITORING PROGRAM, FINAL REPORT 2013-2016.

144. Telephone Interview With Brian Anderson, University of California, Davis (Nov. 1, 2017) (noting that the State Water Board protocol for monitoring toxicity in marine waters requires the use of organisms susceptible to pesticides of concern, such as the mysid *Americanysis bahia*).

145. See OCEAN PORTAL ROADMAP, *supra* note 127, at 27.

146. WATER QUALITY MONITORING COUNCIL, INVENTORY OF MONITORING PROGRAMS 2 (2008) [hereinafter *INVENTORY OF MONITORING PROGRAMS*].

147. INCREASING EFFICIENCY AND EFFECTIVENESS, *supra* note 128, at 8.

148. SCCWRP, *About SCCWRP*, <http://www.sccwrp.org/AboutSCCWRP.aspx> (last updated Mar. 31, 2015).

149. SCCWRP, *Project: Bight '13 Regional Monitoring*, <http://www.sccwrp.org/researchareas/RegionalMonitoring/Bight13RegionalMonitoring.aspx> (last updated May 31, 2016).

150. The 2013 assessment was integrated with MPA baseline monitoring. *Id.*

151. Telephone Interview With Olivia Rhoades, Science Integration Fellow, SCCWRP/OST (Oct. 19, 2017).

monitoring, with data hosted on various websites.¹⁵² The Department of Pesticide Regulation's Surface Water Protection Program monitors both agricultural and nonagricultural sources of pesticide residues in surface waters.¹⁵³ The Department of Public Health conducts monitoring and assessment through the Marine Biotoxin Monitoring Program, and the California Clean Beaches Program provides guidance and methods for monitoring beaches.¹⁵⁴ Monitoring is also performed by county health agencies in 17 different coastal and San Francisco Bay Area counties.¹⁵⁵ For example, Los Angeles County's Recreational Waters Program routinely collects ocean water samples in the surf zone and tests for total coliform, *E. coli*, and enterococcus bacteria.¹⁵⁶

Despite the existence of these many monitoring initiatives, understanding the water quality impacts and ecosystem response in protected areas has been difficult because the lack of coordination between distinct management regimes, monitoring programs, and databases precludes the necessary analysis.¹⁵⁷ These monitoring programs were developed over time to address various site-specific issues or to fulfill different regulatory compliance mandates. As a result, inconsistent objectives and methods inhibit the integration and synthesis of data that is necessary to support informed decisionmaking.¹⁵⁸

I. Recommendation: Promote Regional Coordination of Monitoring and Assessment

Significant opportunities exist for coordinating monitoring and assessment efforts relevant to coastal water quality and ecosystem health, including MPA and ASBS monitoring. In southern California alone, more than 60 agencies routinely monitor the condition of local aquatic and marine environments, collectively spending more than \$31 million per year.¹⁵⁹ These uncoordinated efforts focus on small areas and do not provide sufficient information to assess the health of the environment as a whole.¹⁶⁰

Successful RMPs in California include the San Francisco Bay RMP, the Stormwater Monitoring Coalition (SMC) Regional Bioassessment Monitoring Program, the

Southern California Bight RMP, and the Unified Beach Water Quality Monitoring and Assessment Program. As described below, these programs and the processes used in their development and implementation provide useful lessons and models for agencies and stakeholders to use in their efforts to improve monitoring and assessment.

1. The San Francisco Bay RMP is an innovative collaborative effort between the San Francisco Estuary Institute, the Regional Water Board, and the regulated discharger community.¹⁶¹ Monitoring determines spatial patterns and long-term trends in contamination through sampling of water, sediment, bivalves, bird eggs, and fish, and evaluates toxic effects on sensitive organisms and chemical loading to the bay. The program also combines RMP data with data from other sources to provide for comprehensive assessment and information targeted at the highest priority questions faced by managers of the bay.¹⁶² The RMP has established a climate of cooperation and a commitment to participation among a wide range of regulators, dischargers, industry representatives, NGOs, and scientists.¹⁶³ In addition, stable funding has enabled the RMP to develop long-term plans and adapt to changing management priorities and advances in scientific understanding.¹⁶⁴
2. The Southern California SMC was formed in 2001 by cooperative agreement of Phase I municipal stormwater NPDES lead permittees, the NPDES regulatory agencies in southern California, and SCCWRP.¹⁶⁵ Prior to the initiation of this collaborative effort, monitoring was conducted by numerous organizations, each with disparate programs that varied in design and frequency. The Regional Bioassessment Monitoring Program has defined specific monitoring questions, assessed how well monitoring programs are answering those questions, and developed a recommended stormwater monitoring infrastructure in order to increase comparability among programs throughout southern California.¹⁶⁶ Recent efforts to develop standardized assessments of water quality and aquatic

152. For example, Reef Check volunteers conduct monitoring relevant to the assessment of potential water quality impacts on protected areas, with survey results available on a Google Earth-based online database, Global Reef Tracker, <http://data.reefcheck.us/> (last visited July 30, 2018).

153. However, this monitoring focuses on freshwater and largely ignores marine waters. Telephone Interview With Brian Anderson, *supra* note 144.

154. INVENTORY OF MONITORING PROGRAMS, *supra* note 146, at 6-7.

155. State Water Resources Control Board, *Beaches—California Clean Beaches Program*, http://www.swrcb.ca.gov/water_issues/programs/beaches/beach_water_quality/beaches_program.shtml (last updated June 5, 2018).

156. County of Los Angeles, Department of Public Health, *Recreational Waters Program, Ocean Monitoring—Beaches*, http://publichealth.lacounty.gov/eh/EP/rw/rw_oc_description.htm (last visited July 30, 2018).

157. OCEAN PORTAL ROADMAP, *supra* note 127, at 26.

158. *Id.* at 3.

159. SCCWRP, *Research Theme: Regional Monitoring*, <http://www.sccwrp.org/ResearchAreas/RegionalMonitoring.aspx> (last updated May 26, 2017).

160. When these agencies cooperate with regional assessments, many benefits are achieved including identification of problem areas, prioritizing resources, and targeting areas where mitigation actions are most needed. *Id.*

161. See San Francisco Estuary Institute & the Aquatic Science Center, *Regional Monitoring Program for Water Quality in San Francisco Bay*, <http://www.sfei.org/programs/sf-bay-regional-monitoring-program> (last visited July 30, 2018).

162. *Id.* A recent study of microplastic contamination in the bay found that aquatic organisms ingest these particles and that wastewater is a major source of this pollution. See Lindsay Hoshaw, *Hunting for Plastic in California's Protected Ocean Waters*, KQED Sci., Sept. 21, 2017 (noting that researchers suspect particles are drifting into northern California's three national marine sanctuaries and could be affecting marine life there).

163. Philip Trowbridge et al., *The Regional Monitoring Program for Water Quality in San Francisco Bay: Science in Support of Managing Water Quality*, 4 REGIONAL STUD. MARINE SCI. 21, 33 (2016).

164. *Id.*

165. Southern California SMC, *About SMC*, <http://socialsmc.org/about/> (last visited July 30, 2018).

166. See SMC BIOASSESSMENT WORKING GROUP, REGIONAL MONITORING OF SOUTHERN CALIFORNIA'S COASTAL WATERSHEDS (2007).

ecosystem conditions will help to answer critical monitoring questions such as whether beneficial use is impacted and identifying the cause and source of impairment.¹⁶⁷ Through collaboration, SMC and its project partners fill knowledge gaps and improve how dischargers and regulators address the challenge of urban runoff.¹⁶⁸

3. The Bight '13 MPA/Rocky Reefs Project developed monitoring indices of fishing pressure and pollution intensity to determine the relative impacts of each on the ecological health of rocky reefs.¹⁶⁹ It was an integrated, collaborative effort, successfully coordinating and integrating water quality and ecosystem monitoring among numerous organizations, including CDFW, Regional Water Boards, SCCWRP, OST, academic institutions, and county sanitation districts.¹⁷⁰ It leveraged limited but meaningful resources (including funding from the State Water Board and OPC) to inform assessments and management decisions regarding fishing and water quality regulations.¹⁷¹ As preparations for Bight '18 move forward, the study plans to incorporate MPA and ASBS research questions and to coordinate efforts with existing MPA and ASBS monitoring programs.¹⁷²
4. The Unified Beach Water Quality Monitoring and Assessment Program is the result of recent efforts in Orange County to coordinate beach water quality monitoring through a joint stakeholder group.¹⁷³ Historically, NPDES permit requirements, including monitoring locations, frequencies, types of microbial analyses, and reporting criteria, were established without regard to the potential integration of regional monitoring needs.¹⁷⁴ This created redundancy and ineffective use of limited resources, with each entity conducting beach water quality monitoring independently and for different reasons (the sanitation districts for their NPDES permits, the County Health Department for Assembly Bill 411

requirements,¹⁷⁵ and the County Stormwater Division for TMDL requirements), sometimes within feet of each other at the same time.¹⁷⁶ Although operating under disparate mandates, these entities recognized their shared objectives and the advantages of coordinating these diverse monitoring programs, including saved time and money and the ability to aggregate data sets to allow for improved assessments and management decisions.¹⁷⁷ The unified beach water quality monitoring and assessment program developed by the workgroup aligns with a new approach adopted by the San Diego Regional Water Board, which also emphasizes the need for question-driven, beneficial use-oriented monitoring and assessment with a focus on water body conditions rather than on discharges.¹⁷⁸ This program serves as a model to other coastal counties that could similarly benefit by forming a coastal water quality monitoring task force (including representatives from coastal cities, county agencies that conduct monitoring, the Regional Water Board, and NGOs) to identify opportunities for improved coordination.¹⁷⁹

These examples illustrate a number of factors that can promote effective coordination of monitoring and assessment that allows for efficiency gains as well as more robust data sets, which can then support more-informed management decisions. These include:

- Systematic assessment identifying knowledge gaps, redundancies, and shared interests;
- Careful research and program design that aligns participant objectives and methods and allows for data comparison;
- Cultivation of widespread and committed participation and cooperation; and
- Stable and meaningful funding.

The MPA Statewide Leadership Team can play a critical role in promoting these and similar RMPs by helping identify potential synergies, endorsing and transmitting these benefits, and fostering enhanced coordination among state and local-level member agencies involved in MMA management. The Leadership Team, which includes the State

167. See SOUTHERN CALIFORNIA SMC, ANNUAL REPORT 4-8 (2017).

168. Cumulatively, SMC and its project partners have expended more than \$9 million to fill these data gaps. *Id.* at iii.

169. The project found that water quality remains a significant concern of degradation for nearshore rocky reef habitats and that the twin stressors of fishing extraction and pollutant loading tend to co-occur and exert cumulative effects, especially across the highly urbanized portions of the South Coast. SCCWRP, TECHNICAL REPORT NO. 932: SOUTHERN CALIFORNIA BIGHT 2013 REGIONAL MONITORING PROGRAM (2016).

170. See *id.*

171. Telephone Interview With Ken Schiff, *supra* note 63.

172. Telephone Interview With Olivia Rhoades, *supra* note 151.

173. These efforts were initiated in 2009 when the county put together a stakeholder group that included all of the monitoring entities and the Regional Water Board along with representatives from SCCWRP, Surfrider Foundation, and coastal cities to work out a coordinated monitoring program. E-mail Communication With Ray Hiemstra, Associate Director of Programs, Orange County Coastkeeper (Mar. 23, 2017).

174. See WORKGROUP RECOMMENDATION FOR A UNIFIED BEACH WATER QUALITY MONITORING AND ASSESSMENT PROGRAM IN SOUTH ORANGE COUNTY (2014).

175. In 1997, A.B. 411 mandated that beaches with storm drains that discharge during dry weather and visited by more than 50,000 people per year be monitored at least weekly from April through October by the local environmental health agency. A.B. 411 allocates more than \$1 million per year to counties based on program size and expense.

176. E-mail Communication With Ray Hiemstra, *supra* note 173.

177. *Id.*

178. The primary purpose of the unified program is to answer the question “does beach water quality meet standards for the beneficial use of water contact recreation?” See WORKGROUP RECOMMENDATION FOR A UNIFIED BEACH WATER QUALITY MONITORING AND ASSESSMENT PROGRAM IN SOUTH ORANGE COUNTY, *supra* note 174, at 2.

179. Telephone Interview With Michael Gjerde, Ocean Standards Unit, State Water Board (Nov. 2, 2017) (noting that while there have been internal discussions, other counties have not yet adopted an integrated program).

Water Board, should form a working group specifically tasked with integrating water quality and MPA monitoring and management efforts.¹⁸⁰ The Leadership Team and OPC-SAT should collaborate with SWAMP to integrate water quality into MPA monitoring and management efforts. They should also collaborate with the State Water Board's Clean Water Team to integrate citizen science water quality monitoring data into MPA monitoring and management efforts.

Additionally, data collection through MMA monitoring could be integrated with data collection under state and federal water quality mandates. Despite the presence of multiple parallel monitoring programs that alternatively examine MPAs, ASBS, other control areas outside protected areas, or other aspects of coastal water quality, there has historically been little focused effort on direct examination of potential water quality impacts on marine ecosystems.¹⁸¹ As such, the Monitoring Council identified ocean and coastal ecosystem health as a prime area for bridging water quality and ocean resource management through coordination of monitoring and assessment activities.¹⁸² Moreover, the Monitoring Council initiated a scoping group to chart a road map for developing ocean-related water quality resources, with the overarching goal of providing targeted data and information to support decisionmaking.¹⁸³

Though still an ongoing effort, the scoping group created a case study illustrating that the synthesis of MPA and ASBS monitoring with water quality monitoring can be useful in informing the respective management programs and increasing their capacity to address questions about the effects of pollution on living marine resources.¹⁸⁴ As preparations are underway for Bight '18, an opportunity exists to build on the ecosystem health index developed for the Bight '13 Rocky Reefs project as a useful tool to learn more about the impacts of discharges and fishing pressures on protected areas and inform management decisions.¹⁸⁵ The Leadership Team should seek opportunities for collaboration with the Monitoring Council to facilitate and expand the work initiated by this scoping group.

2. Recommendation: Promote Access to and Dissemination of Data

To address the challenge of finding relevant data, the Monitoring Council created an online platform for streamlined access to water quality information. In addition, interagency workgroups have developed a variety of web portals addressing specific topics, such as the health of aquatic ecosystems,¹⁸⁶ seafood consumption safety, and swimming

safety. These are all now accessible through a single point of entry at MyWaterQuality.ca.gov.¹⁸⁷ However, the complexity of issues surrounding ocean data management and assessment, as well as a lack of focused institutional and financial support, has hindered progress toward a comprehensive ocean data portal.¹⁸⁸

Encouragingly, OPC and CDFW have begun to explore what a unified data system—including physical, chemical, and biological data—should look like. In addition, funding is designated for the development and launch of a comprehensive data management system that connects to existing data platforms, provides access to raw data, and depicts data sets through a map-based interface.¹⁸⁹ Roundtable participants recognized that there are tradeoffs between a narrow and broadly integrated data system. It may be complicated to bring different types of data together, and a more narrow focus can make success easier to attain. Nonetheless, integration is crucial for observing patterns in abundance and diversity and identifying the variables driving these patterns. This requires the use of baseline data, including reference sites, and overlaying other data, such as water quality data.

As OPC and CDFW develop a data management system, OPC and/or OST should join the Monitoring Council and support development of a marine environment data portal. As suggested by the Monitoring Council's scoping group, the California Wetland Monitoring Workgroup (CWMW) might be a model for the ocean data workgroup efforts.¹⁹⁰ By focusing on shared regulatory drivers and decisionmaking needs, the CWMW developed and promoted the use of standardized monitoring and assessment frameworks and improved transparent, web-based access to credible raw data and assessment tools.¹⁹¹

Additionally, the approach that the California Central Coast Healthy Watersheds Project has taken to create a web-based data navigator and report card system for efficient aquatic assessments¹⁹² could be developed and adapted for multiple measures of health within MMAs, including chemical, biological, and physical habitat data. In theory, combining multiple data types together into a single spatial and analytical framework will allow for more informed decisions about the impacts of water quality on overall ecosystem health. However, some caution that data harmonization can be very difficult because the structures of the data will vary by discipline—whether examining geophysical processes (such as the temperature or salinity within an ASBS), ecological processes (such as information

180. As mentioned previously, this objective is included in their current work plan. See LEADERSHIP TEAM WORK PLAN, *supra* note 49, at 7.

181. OCEAN PORTAL ROADMAP, *supra* note 127, at 27-28.

182. *Id.* at 3.

183. Other goals are to promote integration and collaboration among monitoring programs. *Id.*

184. *Id.* at 8.

185. Telephone Interview With Olivia Rhoades, *supra* note 151.

186. Recognizing their long-term collaborative efforts to coordinate monitoring and reporting of rocky intertidal coastal habitats along the West

Coast of North America, the Monitoring Council partnered with MARINE to produce a web portal highlighting that organization's California data and information.

187. INCREASING EFFICIENCY AND EFFECTIVENESS, *supra* note 128, at 10.

188. OCEAN PORTAL ROADMAP, *supra* note 127, at 5.

189. See MPA Monitoring, *supra* note 136.

190. The CWMW includes representatives of state, federal, and local agencies as well as NGOs. OCEAN PORTAL ROADMAP, *supra* note 127, at 3.

191. *Id.*

192. See KAREN R. WORCESTER ET AL., CALIFORNIA CENTRAL COAST HEALTHY WATERSHEDS PROJECT, REPORT CARDS FOR SCORING WATER QUALITY DATA TO CHARACTERIZE HEALTH AND CHANGE (2015).

characterizing the bioweb integrity within a given MPA), or chemical discharges from the end of a stormwater pipe.¹⁹³ While it may not be feasible or desirable to consolidate all water quality and marine resource monitoring data in a central repository, a properly designed and better coordinated data management system can increase efficiency and promote better management.

III. Countering Resource Challenges

A. Problem: Limited Resources

The costs to achieve sustained water quality improvements and protect coastal ecosystems are escalating, and there is increasing competition for the use of limited public funds.¹⁹⁴ Local agencies absorb a majority of these costs, with a heavy reliance on bond funding, as state expenditures from the general fund have decreased.¹⁹⁵ Unfortunately, virtually all the programs specifically designed to address coastal water quality and/or ecosystem health in California are affected by the problem of insufficient resources.

The State and Regional Water Boards face funding challenges that some feel have impaired their ability to effectively carry out their full mission.¹⁹⁶ Indeed, the State Water Board's recently adopted Water Quality Enforcement Policy acknowledges that enforcement prioritization is necessary to leverage their scarce enforcement resources and "to achieve the general deterrence needed to encourage the regulated community to anticipate, identify, and correct violations."¹⁹⁷ However, self-reporting is the primary method used by the Water Boards to identify violations, and even among known violations, enforcement is selective due to resource limitations.¹⁹⁸ Unsurprisingly, the many monitoring initiatives discussed in this report are limited by a lack of reliable funding as well.¹⁹⁹

It is important to note that improving resource use efficiencies should, in addition to promoting a more drought- and climate-resilient California,²⁰⁰ also alleviate these resource challenges. Yet significant resource limitations for promoting marine water quality protection are expected for the foreseeable future.

I. Recommendation: Coordination Might Enhance Cost-Effectiveness

Despite these limitations, existing resources may be leveraged more effectively. Most current water planning occurs using a single-purpose cost-benefit approach—in essence, the costs and benefits to any one agency.²⁰¹ This can lead to decisions that rule out certain multi-benefit projects if costs and benefits are not identified for other agencies. In the context of stormwater, most investment decisions do not currently weigh benefits to the city, county, watershed, or region, or reliably make the case for the co-investments that could make stormwater projects more economically feasible.²⁰² This lack of integration of stormwater management with water supply and wastewater treatment and the failure to treat stormwater as a resource can waste already scarce resources from stormwater treatment and capture and lead to more polluted runoff and higher cleanup costs.

Some local agencies recognize this and are moving toward enhanced integration. For example, the Irvine Ranch Water District in Orange County recently changed its charter to incorporate stormwater cleanup responsibilities; the district now uses revenues from the top tiers of its water rate structure to capture and treat polluted runoff from landscape overwatering within its service area to help protect water quality in the Newport Bay watershed, which includes a CCA, ASBS, and MPA. Several other local agencies are leading efforts toward holistic water management,

193. E-mail Communication With Tony Hale, Director for Environmental Informatics, San Francisco Estuary Institute (Oct. 27, 2017).

194. For example, to meet new MS4 requirements, stormwater costs to Los Angeles County Basin cities are estimated at \$120 billion for full compliance. See TREEPEOPLE, MOVING TOWARDS COLLABORATION: A NEW VISION FOR WATER MANAGEMENT IN THE LOS ANGELES REGION 18 (2015) [hereinafter MOVING TOWARDS COLLABORATION].

195. See ELLEN HANAK ET AL., PAYING FOR WATER IN CALIFORNIA 49 (2014).

196. E-mail Communication With Matt O'Malley, *supra* note 94. Telephone Interview With Barbara Barry, Santa Ana Regional Water Board (Oct. 20, 2017) (noting that MS4 enforcement has suffered due to delays in renewing the NPDES permit for Orange County).

197. See STATE WATER RESOURCES CONTROL BOARD, WATER QUALITY ENFORCEMENT POLICY (2017) (stating that the Water Boards shall rank violations, then prioritize cases for formal discretionary enforcement action to ensure the most efficient and effective use of available resources).

198. Telephone Interview With Chiara Clemente, Santa Ana Regional Water Board (Oct. 23, 2017) (noting that if the Water Boards do not know a violation exists, the enforcement policy will not function as intended).

199. For example, although the MLPP intends to engage in some monitoring for water quality within MPAs (2016 MASTER PLAN, *supra* note 24, at 36-37), it remains to be seen how the Statewide MPA Monitoring Action Plan allocates limited monitoring funds. Prop 84 funding provided support for Phase 1 baseline MPA monitoring, but these funds terminate as of 2018. See PARTNERSHIP PLAN, *supra* note 27, at 22. The state has committed an annual general fund allotment of \$2.5 million for Phase 2 long-term monitoring, beginning in fiscal year 2015/2016. Similarly, while the Monitoring

Council's work to develop an ocean data portal shows progress, it faces significant capacity challenges as the founding legislation did not include dedicated funding. INCREASING EFFICIENCY AND EFFECTIVENESS, *supra* note 128, at 10. Efforts to build the ocean data portal thus have generally stalled. Telephone Interview With Kristopher Jones, California Water Monitoring Council (Dec. 15, 2016) (noting that implementation has thus far been largely reliant on volunteer efforts). A recent legislative bill recognizes the need for data integration and sharing in open data format, but this bill also would not provide funds to do so. See A.B. 1755, which promotes integration and sharing of water data and associated ecological data through an open-source data platform. See California Legislative Information, AB-1755 The Open and Transparent Water Data Act, https://leginfo.ca.gov/faces/billTextClient.xhtml?bill_id=201520160AB1755 (last visited July 30, 2018).

200. Stormwater capture as a means of augmenting local water supplies can lead to significant energy savings. The State Water Project, which pumps water over the Tehachapi Mountains to Los Angeles, is the single greatest consumer of energy in California. See NATURAL RESOURCES DEFENSE COUNCIL & PACIFIC INSTITUTE, ENERGY DOWN THE DRAIN v (2004). Runoff and pollution can be addressed through aggressive water conservation programs, increasing recycled water usage, and working to increase stormwater capture.

201. See MOVING TOWARDS COLLABORATION, *supra* note 194, at 14.

202. TreePeople has created a cost-benefit analysis tool for multi-benefit watershed projects, and organized projects with other partners that demonstrated the feasibility of building distributed green infrastructure at the individual parcel, school, park, and street levels. *Id.* at 16.

such as the city of San Diego's Pure Water Program²⁰³ and the Los Angeles Department of Water and Power's Stormwater Capture Master Plan.²⁰⁴

Similarly, enhanced interagency coordination in implementation, monitoring, and enforcement could improve the efficiency of MMA management, even without increased funding. Designed correctly, as discussed previously, the formation of a working group within the Leadership Team focused on identifying opportunities to leverage existing programs and implement coordination measures could lead to cost savings. Additionally, as new threats arise, such as plastic pollution or ocean acidification, coordinated efforts may be better situated to secure state, federal, and private funds dedicated to monitor and address these emerging threats. For example, OPC is funding research regarding the issue of nutrient runoff as it affects ocean acidification that requires monitoring to identify acidification hot spots.²⁰⁵ Through partnerships, this monitoring is being leveraged to determine how these hot spots align with MPAs and ASBS.

2. Recommendation: Effectively Leverage Available Tools and Resources

a. Prevent Pollution at the Source

Some of the most cost-effective approaches for stormwater pollution prevention involve source control, and hence may require action at the state level rather than at the level of the municipal authorities. For example, rather than attempt prohibitively expensive (and not fully effective) treatment to remove highly toxic copper from runoff in some areas, efforts have focused on removing the problem at the source by changing the composition of automobile brake pads.²⁰⁶ In many cases, preventing pollution at the source costs much less than capturing and treating polluted runoff before it enters the affected water body. Of course, source controls may require stricter state standards, enhanced monitoring, and more reliable enforcement to ensure compliance.²⁰⁷

A source-control approach may also be necessary for substances that escape wastewater treatment, such as microplastics, nanoparticles, and other micropollutants originating from the use of substances such as pharmaceutical products for human use, veterinary drugs, personal hygiene products, or household chemicals. For example, California recently banned plastic microbeads in personal care products after studies showed they were rapidly accumulating in California waters, including protected areas.²⁰⁸

b. Develop Targeted Regulatory Fees

Entities whose activities or facilities could adversely affect conditions in coastal waters should be increasingly relied upon to help provide the resources needed for water body-oriented monitoring and assessment programs.²⁰⁹ Surcharges on water use, chemical use (e.g., fertilizers and pesticides), and road use (e.g., fuels and vehicle license fees) could help to close critical funding gaps.²¹⁰ For example, recognizing that road use is a major source of stormwater pollution, San Mateo County's surcharge on vehicle registration fees helps fund the countywide stormwater program, an effective way to ensure that road and highway users contribute to the costs of stormwater discharge prevention.²¹¹ While a small surcharge on chemical sales supports the operations of the state's regulatory oversight programs, surcharges are not currently being used to help fund programs to mitigate the harmful impacts of agricultural pesticides and other chemicals on public health or ecosystems.²¹²

Until recently, stormwater systems did not have utility status like water supply and wastewater treatment, and municipal stormwater programs primarily had to rely on allocation from the general fund.²¹³ However, the passage of Senate Bill 231 gives agencies an important new tool to fund these programs by expanding the definition of "sewer" to include systems for the collection, treatment, or

203. See COOPERATIVE AGREEMENT IN SUPPORT OF PURE WATER SAN DIEGO, *supra* note 115.

204. Initial results indicate that the city could capture between 30% and 45% of Los Angeles' current water demand if the required infrastructure, programs, and policies are funded. See LOS ANGELES DEPARTMENT OF WATER AND POWER, STORMWATER CAPTURE MASTER PLAN (2015).

205. See FRANCIS CHAN ET AL., THE WEST COAST OCEAN ACIDIFICATION AND HYPOXIA SCIENCE PANEL: MAJOR FINDINGS, RECOMMENDATIONS, AND ACTIONS (2016); Telephone Interview With Erin Meyer, Senior Scientist, OST (Nov. 28, 2016).

206. S.B. 346, enacted in 2010, established a program that will lead to the near elimination of copper in brake pads by 2025. The law grew out of a collaborative effort among brake pad manufacturers, government agencies, environmental organizations, and the California Association of Stormwater Quality Agencies. See HANAK ET AL., *supra* note 195, app. B at 13.

207. For example, in 2013, EPA developed new handling instructions to reduce over-applications of harmful pyrethroid pesticides (used primarily to keep ants out of buildings) after they were identified in sediments of water bodies adjacent to residential/urban areas. See U.S. EPA, *Pyrethrins and Pyrethroids Reregistration and Labeling*, <https://www.epa.gov/ingredients-used-pesti->

[cide-products/pyrethrins-and-pyrethroids-reregistration-and-labeling](https://www.epa.gov/ingredients-used-pesti-) (last updated Dec. 8, 2016). However, recent water quality monitoring results indicate that these voluntary measures have not been effective in reducing levels of pyrethroid pesticides found in aquatic ecosystems. Telephone Interview With Brian Anderson, *supra* note 144. Further, new classes of pesticides, including neonicotinoids, continue to enter into use and cause widespread harm to aquatic ecosystems. See Francisco Sanchez-Bayo et al., *Contamination of the Aquatic Environment With Neonicotinoids and Its Implication for Ecosystems*, 4 FRONTIERS ENVTL. SCI. 71 (2016). Since the use of seeds treated with neonicotinoids is responsible for most of the soil and aquatic contamination, one obvious solution is to stop the use of seeds coated with these insecticides and use alternative and carefully targeted methods for pest control in agriculture such as integrated pest management. *Id.*

208. See Phil Willon, *California Lawmakers Approve Ban on Plastic Microbeads*, L.A. TIMES, Sept. 8 2015; see also Hoshaw, *supra* note 162.

209. See FRAMEWORK FOR MONITORING AND ASSESSMENT IN THE SAN DIEGO REGION, *supra* note 126, at 15.

210. See HANAK ET AL., *supra* note 195, at 44.

211. *Id.*

212. *Id.* at 52.

213. The passage of Proposition 218 in 1996 required that new or increased property-related fees must be approved by voters, with the exception of water, sewer, and refuse fees. A 2002 California appellate court decision determined that a stormwater fee did not fall within the exemption for "sewers" and required voter approval before it could be adopted. See *id.* at 9.

disposition of stormwater.²¹⁴ This allows local agencies to include at least some stormwater programs in their current water or sewer fees, or to adopt new fees to fund stormwater projects, including those that will remove pollutants in stormwater runoff or collect dry-weather flows to increase groundwater recharge.²¹⁵

c. Leverage State and Local Funding Opportunities

Opportunities exist to leverage state and local funding sources and improve their effectiveness.²¹⁶ Two recent state bond initiatives include funding for coastal water quality and infrastructure improvement, and these have begun to be leveraged to integrate marine resource and water quality management. Proposition 84, approved in 2006,²¹⁷ provided matching grants to assist local public agencies to comply with the discharge prohibition into ASBS contained in the Ocean Plan, and the State Water Board approved 14 separate grants that included several projects directly benefiting MPAs.²¹⁸ In addition, Prop 84 funds have been directed to projects that advance MPA management, including more than \$20 million to MPA monitoring.²¹⁹

Proposition 1, approved in 2014,²²⁰ allocates a portion of funds to the California Ocean Protection Trust Fund and, when authorized by OPC, may be used for projects that fulfill the purposes of COPA such as improving coastal water quality.²²¹ In June 2016, OPC approved \$7.4 mil-

lion in Prop 1 funds, with most of the funding going to projects that will directly benefit MPAs or ASBS.²²² The State Water Board also allocates Prop 1 grant funds for stormwater management projects, IRWM, water conservation, wastewater treatment, and water recycling,²²³ with many projects targeting particular watersheds such as the San Diego River and the Los Angeles River.²²⁴

Local funding measures in particular watersheds are also a potential source of revenue. For example, the San Francisco Bay Restoration Authority was created by the California Legislature in 2008 to find solutions to the need for local funding for bay restoration.²²⁵ The Restoration Authority placed a regional parcel tax measure, the first in California's history, on the June 2016 ballots of the nine-county San Francisco Bay Area. The measure passed with 70% approval across the region, and the net revenue coming to the Restoration Authority will be approximately \$25 million per year, as projected.²²⁶

According to some participants, enhanced integration of marine resource and water quality protection efforts is one of the most effective ways to leverage limited funds.²²⁷ Several agencies involved in coastal water protection developed funding frameworks that include considerations for MPAs and ASBS in the award process, and integrated ways to encourage applicants to measure and address both water quality and ecosystem health.

For example, the State Water Board Prop 1 Storm Water Grant Program Guidelines take MMAs into account.²²⁸ In addition, OPC Prop 1 Grant Program Guidelines give higher priority to water quality projects that address discharges that have historically and measurably impacted designated MMAs.²²⁹ The OPC Prop 1 scoring criteria rewards projects that provide multiple benefits in OPC Key Priority Areas, including MPAs and water quality. OPC

in accordance with statewide priorities.

214. S.B. 231 was signed by Gov. Jerry Brown on Oct. 6, 2017. California Legislative Information, *SB-231 Local Government: Fees and Charges*, https://leginfo.ca.gov/faces/billTextClient.xhtml?bill_id=20170180SB231 (last visited July 30, 2018).

215. See Bob Hertzberg, *Capturing Stormwater and Planning for California's Future*, L.A. DAILY NEWS, Apr. 21, 2017.

216. Environmental mitigation fees are one such source. For example, approximately \$5.4 million in OTC mitigation money over time may be available for monitoring MPAs. E-mail Communication With Becky Ota, Habitat Conservation Program Manager, CDFW (Mar. 23, 2017).

217. Proposition 84, the Safe Drinking Water, Water Quality and Supply, Flood Control, River, and Coastal Protection Bond Act §75060 (2006). Prop 84 allocates \$540 million for the protection of beaches, bays, and coastal waters and watersheds, including projects to prevent contamination and degradation of coastal waters and watersheds.

218. State Water Resources Control Board, *Financial Assistance Programs—Grants and Loans: Proposition 84 Areas of Special Biological Significance (ASBS) Grant Program*, https://www.waterboards.ca.gov/water_issues/programs/grants_loans/asbs (last updated June 13, 2018). For example, the Irvine Coast Infiltration Project at Crystal Cove State Marine Conservation Area treats polluted stormwater runoff from a beach parking lot using a combination of BMPs, such as porous pavement, biotreatment, and an infiltration gallery. See KENNETH SCHIFF & JEFF BROWN, SCCWRP TECHNICAL REPORT NO. 858, PROPOSITION 84 GRANT EVALUATION REPORT: ASSESSING POLLUTANT REDUCTIONS TO AREAS OF BIOLOGICAL SIGNIFICANCE (2015) [hereinafter PROPOSITION 84 GRANT EVALUATION REPORT].

219. Several of these projects address water quality. See OPC, *Funding Opportunities, Prop 84*, <http://www.opc.ca.gov/category/funding-opportunities/> (last visited July 30, 2018).

220. Proposition 1, the Water Quality, Supply, and Infrastructure Improvement Act §79730 (2014). Prop 1 authorizes \$7.545 billion in general obligation bonds to fund ecosystem and watershed protection and restoration, water supply infrastructure projects, including surface and groundwater storage, and drinking water protection.

221. Prop 1 allocates \$30 million to OPC for a competitive grant program for multi-benefit ecosystem and watershed protection and restoration projects

222. See OPC, *Agenda for June 29, 2016, OPC Meeting and Related Events*, <http://www.opc.ca.gov/2016/06/ocean-protection-council-meeting-wednesday-june-29th-2016/> (last visited July 30, 2018).

223. The State Water Board will administer funds for five programs, including \$200 million for green infrastructure, rainwater and stormwater capture projects, and stormwater treatment facilities, \$260 million for wastewater treatment projects, and \$625 million for water recycling projects. California Natural Resources Agency, *Bond Accountability—Proposition 1 Overview*, <http://bondaccountability.resources.ca.gov/p1.aspx> (last visited July 30, 2018).

224. Approximately \$1.5 billion was allocated toward protecting rivers, lakes, streams, coastal waters, and watersheds under Prop 1 and approximately \$1 billion has been committed to date. *Id.*

225. See San Francisco Bay Restoration Authority, *Home Page*, <http://sfbayrestore.org/> (last visited July 30, 2018).

226. Measure AA, or the San Francisco Bay Clean Water, Pollution Prevention, and Habitat Restoration Measure, proposed a 20-year, \$12 parcel tax to raise approximately \$25 million annually, or \$500 million over 20 years, to fund restoration projects in the bay. *Id.*

227. See, e.g., *supra* note 171 and accompanying text.

228. STATE WATER RESOURCES CONTROL BOARD, PROPOSITION 1 STORM WATER GRANT PROGRAM GUIDELINES apps. B and C (2015) (considering whether the proposed project is included in an ASBS compliance plan or whether the applicant has solid understanding of ASBS requirements applicable to the watershed).

229. The OPC's Grant Guidelines for the Prop 1 Grant Program awards bonus points to applicants if their project advances the management of individual MMAs or the statewide MMA network. OPC, GRANT GUIDELINES, OCEAN PROTECTION COUNCIL PROPOSITION 1 GRANT PROGRAM (2017).

is examining how best to use remaining Prop 84 funds to amplify benefits to both water quality and marine resources.²³⁰ The MPA Statewide Leadership Team can help guide these efforts and encourage similar efforts by other granting agencies.

d. Leverage Stakeholders to Promote Monitoring, Assessment, and Enforcement

Involving interested parties in management is essential for improving cost-effectiveness and achieving multiple benefits with scarce financial resources. Recognizing that water quality and ecosystem protection requires stakeholder engagement, regulators such as the San Diego Regional Water Board are moving toward a collaborative approach to monitoring and assessment to carry out their mission more strategically and more effectively.²³¹ The San Diego Water Board found that much of the monitoring and assessment it required other entities to conduct was not water body-oriented and, consequently, in many cases, there was considerable room for improvement.²³² The board also found that citizen monitoring groups can make significant contributions to water body-oriented monitoring and assessment with the help of community volunteers.²³³

Citizen science also plays an important role in the MPA monitoring program and contributes useful information for adaptively managing the MPAs.²³⁴ A recent study to quantify the annual value of in-kind contributions from non-state OCMPAC members to Orange County MPA and ASBS management found that these contributions totaled more than \$4 million over the two-year study period.²³⁵ For example, coastal cities and NGOs have trained hundreds of docents, who have logged thousands of volunteer hours in local MMAs providing tide pool education and enhancing MPA compliance.²³⁶ The report determined that without these contributions, which are

highly dependent on the ongoing interest and capacity of individuals participating in the collaboratives, MPA management may suffer.²³⁷

Further, the Monitoring Council was tasked with ensuring that theme-specific workgroups identify and achieve cost savings through increased coordination, efficiency, and access to data.²³⁸ It noted that the Southern California Bight Program funds periodic large-scale monitoring through a combination of compliance monitoring offsets, direct funding by participants, in-kind staff support, and core funding to SCCWRP from the State Water Board. Also, the San Francisco Bay RMP is funded by direct contributions from a wide range of participants. In both of these examples, regulatory compliance monitoring was reduced and the resources redirected to strengthen regional monitoring efforts.²³⁹

Finally, as mentioned previously, CWA citizen suits brought against polluters can also generate mitigation payments to help repair the damage to the ecosystem from their past pollution. For example, San Francisco Baykeeper has generated more than \$10 million in funding for projects that are reducing pollution and helping restore San Francisco Bay ecosystems.²⁴⁰ Untapped opportunities exist for interested community groups and organizations to supplement scarce public enforcement resources through similar citizen enforcement activities.

e. Enhance Accountability Through Reporting Standards and Statewide Metrics

Finally, funding initiatives could be improved by integrating systematic tools that promote learning.²⁴¹ In a 2009 report, the Little Hoover Commission specifically called for greater oversight and transparency for natural resource bonds.²⁴² A 2017 follow-up report found improvements.²⁴³ However, participants noted several ongoing problems regarding grant management practices for Prop 84 and Prop 1 funds, including a lack of guidance on what questions the monitoring data need to answer and lack of accountability in how funds are being used.

For example, a recent study assessed the efficacy of the Prop 84 grant program that allocated \$32 million to local agencies to reduce or remove discharges to ASBS, discussed

230. E-mail Communication With Holly Wyer, OPC (Jan. 3, 2018).

231. See FRAMEWORK FOR MONITORING AND ASSESSMENT IN THE SAN DIEGO REGION, *supra* note 126, at 6 (stating the first step to developing and implementing an effective program is assembling a representative workgroup comprising regulators, dischargers, and others with an interest in the beneficial use of waters in the region).

232. *Id.* at 23-24 (noting that the total amount spent on monitoring and assessment required by the San Diego Water Board is estimated to be several million dollars per year).

233. *Id.* See also Ashlee Jollymore et al., *Citizen Science for Water Quality Monitoring: Data Implications of Citizen Perspectives*, 200 J. ENVTL. MGMT. 456-67 (2017) (noting that citizen science can dramatically expand data collection and analysis at a fraction of the cost of traditional scientific campaigns and augment project scope and improve the statistical power of data sets as well as facilitate the observation of otherwise difficult to quantify phenomena).

234. Scientific benefits include broad spatial and temporal coverage, data from hard-to-access private land, and labor-intensive data collection that would otherwise be prohibitively expensive to collect. See OST, CITIZEN SCIENCE AND OCEAN RESOURCE MANAGEMENT IN CALIFORNIA: GUIDANCE FOR FORMING PRODUCTIVE PARTNERSHIPS (2014).

235. BLUE EARTH CONSULTANTS, VALUATION OF IN-KIND CONTRIBUTIONS MADE BY MEMBERS OF THE ORANGE COUNTY MARINE PROTECTED AREA COUNCIL (OCMPAC) TO ORANGE COUNTY MPA MANAGEMENT ACTIVITIES 3 (2016).

236. *Id.* at 4.

237. *Id.* at 12.

238. See CALIFORNIA WATER QUALITY MONITORING COUNCIL, A COMPREHENSIVE MONITORING PROGRAM STRATEGY FOR CALIFORNIA 40 (2010).

239. *Id.* at 42.

240. See San Francisco Baykeeper, *2016 Funds for Bay Restoration Generated From Baykeeper Lawsuits*, <https://baykeeper.org/content/2016-funds-bay-restoration-generated-baykeeper-lawsuits> (last visited July 30, 2018).

241. *Cf. generally* Camacho, *supra* note 8.

242. See LITTLE HOOVER COMMISSION, BOND SPENDING: EXPANDING AND ENHANCING OVERSIGHT (2009) (finding that because bond funds were spread across so many departments, policies sometimes worked at cross purposes).

243. See LITTLE HOOVER COMMISSION, BORROWED MONEY: OPPORTUNITIES FOR STRONGER BOND OVERSIGHT (2017) (noting that the Natural Resources Agency now has information available on its bond accountability website on past bond measures, as well as detailed information on Prop 1 programs and projects).

above.²⁴⁴ The study found of the 14 grants awarded, only eight grantees completed their construction and monitoring requirements in a timely manner.²⁴⁵ Several grantees were unaware that monitoring to address pollutant load reduction was a program goal.²⁴⁶ One grantee used its funds largely on public education, rather than a full-scale load-reduction BMP. Of the various BMPs evaluated, the study found varying degrees of effectiveness. The study also noted that it will require ongoing maintenance for most BMPs to ensure that they are performing at initial design standards. However, currently monitoring is not specifically required or planned to ensure maintenance or to quantify future pollutant reductions.²⁴⁷

At a minimum, these grant programs should be adjusted to foster grantee accountability and thus promote meaningful water quality improvements. Recipients should be required to report on the costs and efficacy of adopted remediation efforts and on past effectiveness in subsequent proposals. In addition, a portion of grant funding should educate and train grant recipients as to best practices and oversight of implementation.²⁴⁸ Roundtable participants also suggested the need for a statewide metric to judge how well the funds are being used. For example, the State Water Board should clearly delineate what questions they want grant recipients to answer, such as the volume of pollutants entering the waterways and volume of pollutants kept out due to project funds.

Moreover, granting agencies should integrate more adaptive approaches to their respective grant programs. Participants noted that funding under both Prop 84 and Prop 1 is released in rounds, which presents an opportunity to learn from previous rounds and improve grant management practices.²⁴⁹ Granting agencies should, indi-

vidually and in concert, review lessons learned from past grants and develop a uniform set of best practices for grant awards and management that can be adjusted over time. OPC and/or the MPA Statewide Leadership Team should help spearhead this effort.

IV. Conclusion

Coastal water quality management is complex, and inevitably challenges exist to coordinate across regulatory and ecosystem boundaries. However, MMAs can be leveraged to direct funding, research, and resources to bridge across agency jurisdictions to promote water quality and ecosystem health. Although more comprehensive programmatic reforms might ultimately be required to address the regulatory fragmentation and institutional and resource deficiencies that limit water quality protections in MMAs, the near-term, concrete opportunities for improving coordination described in this Article are practicable within the current management framework.

With the stresses of climate change on marine ecosystems being accompanied by a reduction in federal support for conservation programs under the Trump Administration, it is critical that action be taken to leverage other resources and opportunities for improvements in coastal water quality and MMA management. The recommendations detailed here present such opportunities for state and local authorities as well as private stakeholders. The successful coordination of these efforts will be vital for not only tackling existing harms to coastal water quality, but also helping to conserve the ecological health of California's coastal marine resources in the face of daunting future challenges.

244. See PROPOSITION 84 GRANT EVALUATION REPORT, *supra* note 218.

245. See *id.* at i (finding that grantees that already had well-developed engineering designs and processes and had experience with monitoring were best able to accomplish their grant requirements).

246. *Id.* at 8.

247. *Id.* at 101.

248. Roundtable participants noted that SCCWRP and OST are appropriate trainers.

249. The first Prop 1 proposals went out in 2015 and now is a good time to report back to the various agencies managing Prop 1 monies.