

# **Casco Bay Plan 2024**

*Approved Draft 04/05/2024*

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## Introduction

For three decades, the Casco Bay Estuary Partnership (CBEP) has guided efforts to sustain a healthy Bay and watershed: protecting key habitats, improving water quality, and encouraging sound stewardship. This collective work on behalf of the Bay has yielded many positive outcomes—like cleaner swimming beaches; more shellfish beds open to harvesting; and improved fish passage along our streams and rivers. But stressors on the Bay are changing in character and growing in number and magnitude. The work of CBEP is changing as well.

Today, CBEP brings together dozens of organizations and individuals in a collaborative network on behalf of Casco Bay. The Partnership’s core staff, housed at the University of Southern Maine (USM), strives to anchor the network, strengthening the effectiveness of all members of the Partnership on behalf of Casco Bay, the watershed, and the people of the region. The organization is science-based, watershed focused, and collaborative.

### The Bay and Its Importance

Casco Bay stretches from Cape Elizabeth in the south to Phippsburg to the east. The bay inshore of Halfway Rock totals about 160 square miles in area. It is a geographically complex place with 575 miles of shoreline, and 785 islands, islets, and ledges. It borders the Portland metropolitan area, Maine’s largest urban center. Ferries service six year-round Casco Bay island communities.

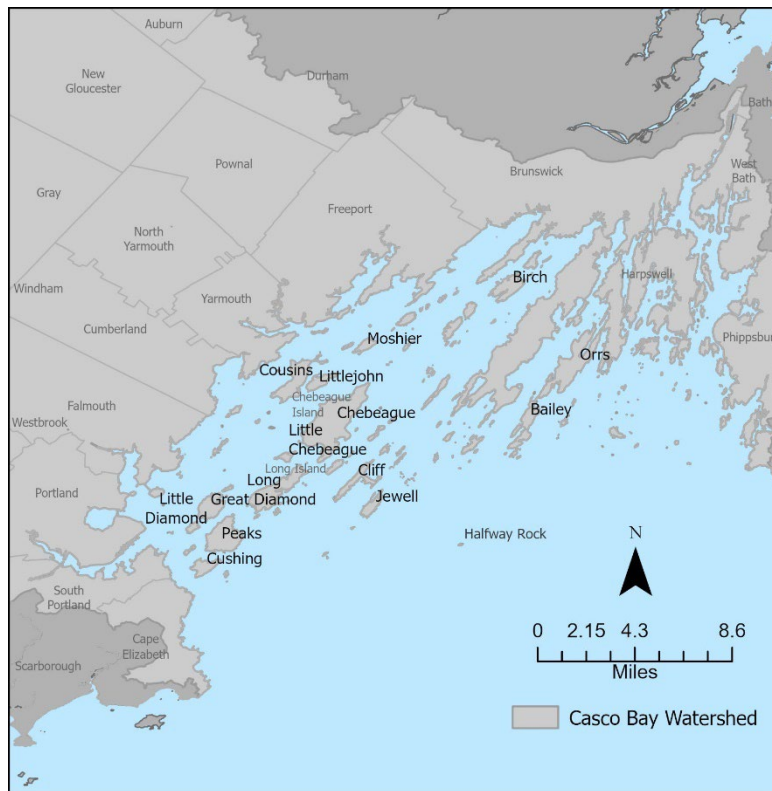


Figure 1: Map of Casco Bay showing numerous islands and complex shoreline.

The Bay's strong tides swirl in and out among all those islands and ledges, creating a mélange of coastal and marine habitats, from broad tidal flats to exposed rocky shores, tidal marshes to kelp beds. The typical daily tidal range in Portland is just under 10 feet but spring tides approach 14 feet between low water and high water.

Casco Bay has abundant maritime trades, a strong lobster fishery, and more than 800 documented marine species. The region's residents enjoy the many recreational amenities it offers, including swimming, boating, fishing, clamming, and wildlife-watching.

According to NOAA, the marine economy in 2018 accounted for 10 percent of the total jobs in Cumberland County (which aligns closely with the Casco Bay watershed) and about one billion dollars of economic activity. That amounts to 4.4% of all economic activity in the county. 82% of marine-related jobs were in tourism and recreation and another 4% in marine resources, especially fishing and aquaculture.

Yet market measures rarely account for the worth of the ecological elements and systems that make life possible—such as the work of soils in filtering water, plants in generating oxygen, wetlands in nurturing juvenile fish and shellfish, salt marshes in buffering shorelines, and woodlands in limiting flooding. Economists and ecologists are only beginning to estimate the financial significance of the gifts that natural ecosystems offer. A 2012 study commissioned by Manomet Center for Conservation Sciences estimated the annual value of the diverse ecosystem functions within Cumberland County to be between \$800 million and \$2 billion (in 2012 dollars).

The true value of Casco Bay to area residents and visitors extends further still. The Bay holds inestimable cultural, recreational, aesthetic, and spiritual importance to those who live or spend time along its shores. With its fisheries, shipping trade, summer colonies, maritime industries, military history, and famed Calendar islands, Casco Bay has left a large and indelible imprint on the region's literature, history, and way of life. The region is what it is because of the Bay.

Yet the Bay is far from pristine. Roadways, lawns, wastewater treatment plants and air pollution contribute excess nutrients and toxic chemicals to marine ecosystems. Development can fragment the landscape, reducing wildlife habitat. Species that once supported iconic Maine fisheries, such as cod and haddock, have experienced steep declines. CBEP's State of the Bay, Sixth Edition reveals status and trends evident in the region.

### The Watershed

The Casco Bay watershed is 986 square miles in area. It forms an elongated triangle, extending from Cape Elizabeth in the south to Bethel in the northwest, and Phippsburg in the east. Sebago Lake, Maine's second largest and deepest lake, sits in the heart of the watershed. Forty-eight municipalities touch the watershed. Those forty-eight towns and cities include some of the most populous and prosperous in the state of Maine. These towns represent about 4.4% of Maine's total land area, but they house a quarter of Maine's population and one-third of all Maine jobs.

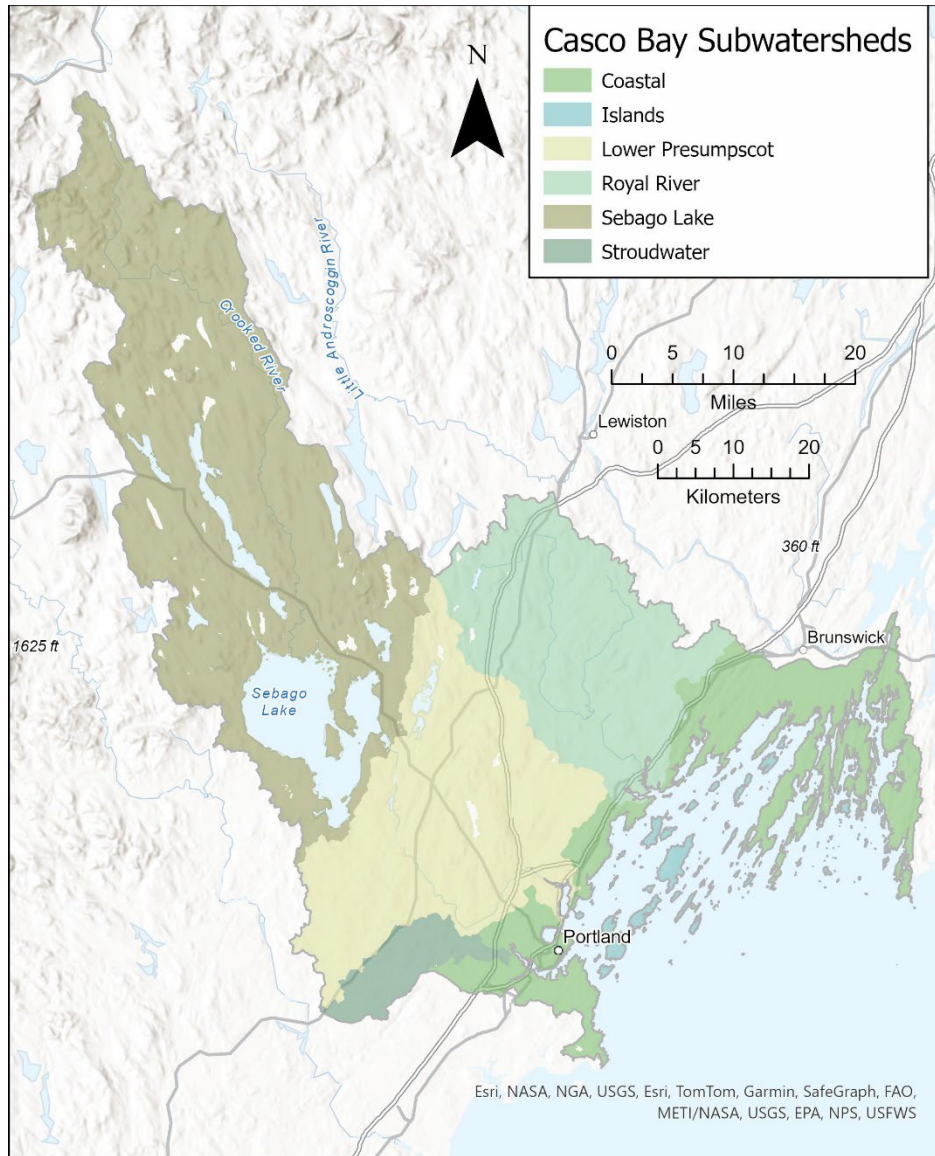


Figure 2: Major Subwatersheds of the Casco Bay watershed.

The Bay has two major tributaries, the Presumpscot and Royal Rivers. Together, these two rivers drain 82% of the Casco Bay watershed. The remainder of the watershed, including most coastal areas and the islands, contains some thirty smaller tributaries. The Bay is also influenced by the Kennebec River to our north. Coastal currents sweep the outflow of the Kennebec south and into the Bay, reducing salinity in the Eastern Bay.

The Portland metropolitan area, Maine’s largest urban center, anchors the region’s economic strength, but not all parts of the watershed share equally in this prosperity. Towns vary widely in population, wealth, basis of the local economy, and municipal capacity. Inland and island communities are often more dependent on tourism and natural resources industries, have smaller year-round populations, higher poverty rates and limited municipal personnel. Exurban communities (both along the Casco Bay shore and in the mid-watershed) have more resources, but face significant challenges regarding housing,

transportation, stormwater management, flood risk reduction and environmental protection due to some of the region's highest growth rates and past underinvestment in water infrastructure.

### *Changes and Challenges*

Casco Bay is changing. Evidence of that change is all around us, from declining eelgrass and the disappearance of northern shrimp to more intense winter storms. While climate change alone does not cause all the changes we see in the Bay, it now forms the inescapable backdrop for the changes and challenges facing the Bay. Climate stressors exacerbate existing problems such as water pollution, habitat degradation and the proliferation of non-native species. They impose new costs on our communities, whether for climate adaptation and disaster preparedness or for recovery. Extensive damage from severe winter storms that struck the Maine Coast in 2022, 2023, and 2024 has ignited a growing sense of urgency regarding the need for proactive planning and implementation of strategies to protect community touchstones, from roads and boatyards to parks and private piers.

### *Regional Stressors*

**Development Pressures:** The region's population is growing, with much of the new development dispersed in suburban and rural villages and towns – interrupting stream corridors, disrupting wildlife habitats, and contributing to runoff pollution. Development pressure on waterfront land drives up property values, makes conservation of shorelines expensive, and restricts public and commercial access to the water.

**Urbanization and Stormwater:** Human activity and urbanization threaten water quality, especially in Casco Bay's semi-enclosed bays and the watershed's lakes and streams. Human activity affects water quality when pollutants enter our waterways, but also when loss of forest and wetlands or construction of impervious surfaces like roads and parking lots alter how water moves through the landscape. While the region's population growth remains low compared to some U.S. areas (less than half a percent a year), the rate has increased to almost 1% a year in recent years, and so have land use changes that can put our waters at risk.

**Combined Sewer Overflows:** Despite decades of work eliminating combined sewer overflows (CSOs) and reducing frequency and magnitude of CSO discharge events, dozens of outfalls remain, discharging millions of gallons of largely untreated combined sewage and stormwater to the Bay. Fixes are costly and time-consuming.

**Influx of Invasive Species:** The number of harmful non-native species is increasing. "Rapid assessment" surveys by scientists of marine organisms in 2013 and 2018 at two Casco Bay locations found that between one-sixth and one-third of all identified marine species were not native. European Rock Shrimp, first seen in Maine less than a decade ago, are now widespread in Casco Bay, just one of several invaders first reported in recent years.

### *Climate Stressors*

**Rising Air Temperatures:** Worldwide, 2022 was the sixth-warmest year on record based on NOAA data. The 10 warmest years have all occurred since 2010. Maine's annual temperature has increased by 3.2°F since 1895 (although the trend at the Portland Jetport since 1935 has been more gradual). An additional



2 to 4°F increase in Maine temperatures is forecast by 2050, with up to a 10°F increase by the end of the century.

**Warming Ocean Temperatures:** Between 2004 and 2013, the Gulf of Maine warmed faster than 99 percent of the global ocean. In the five-year period from 2015 to 2020, Gulf waters were warmer than any previous five-year period in the instrumental record. Summer water temperatures in Casco Bay have warmed more than 3° F in just 30 years.

**Intensifying Precipitation:** Maine is experiencing increases in both annual precipitation and extreme precipitation events, raising concerns about flooding and stormwater impacts. Stormwater runoff carries excess nitrogen and phosphorus into marine waters—aggravating coastal acidification, lowering dissolved oxygen (leading to fish kills), stimulating harmful algal blooms, and altering ecological communities.

**Rising Seas:** The Maine Climate Council’s Science and Technical Committee estimates that Maine is likely to experience a foot and a half of sea level rise by mid-century and 3.9 feet by 2100 (compared to a Year 2000 baseline based on intermediate assumptions). Because most of Casco Bay’s coastal infrastructure was designed and built with a static sea level in mind, even a foot of sea level rise will lead to increases in the frequency of coastal flooding, erosion, and infrastructure damage. Rising seas also put valuable coastal wetlands at risk.

**Acidifying Coastal Waters:** When marine waters absorb carbon dioxide, they become more acidic, experiencing changes in water chemistry that make it more difficult for juvenile shellfish to build and maintain shells. Global CO<sub>2</sub> levels are important, but local processes play a role here in Casco Bay. The Bay’s waters are especially vulnerable due to local geology and frequent rainfall. Runoff and water pollution, especially nutrient loads, also contribute.

### *Regional Challenges*

**Loss of Eelgrass Beds:** Between 2001/2002 and 2013, Casco Bay lost more than half of its eelgrass beds—which provide essential habitat for waterfowl and many marine organisms and help protect water quality. A partial recovery between 2013 and 2018 offered hope, but eelgrass continued to decline between 2018 and 2022. By 2022, the area of eelgrass in Casco Bay was only 28% of 2001/2002 levels.

**Changes in Fisheries:** Aquaculture operations in Casco Bay (involving oysters, kelp, and blue mussels) are growing in number while once-abundant species like cod are increasingly rare. Heavy reliance on the lobster industry makes coastal economies vulnerable should something threaten Maine’s iconic shellfish species. Harvesters of wild shellfish report soft shell clams in decline, while quahogs are on the rise. Blue crab and other mid-Atlantic species are now well established in Casco Bay.

**Disruptions to the Marine Food Web:** Marked declines in wild-caught fisheries (particularly large, predatory species) and in the population of clams and mussels may be causing shifts in the Bay’s food web. Warming waters, influx of mid-Atlantic species and arrival of non-native species from distant shores exacerbate the problem.

## Casco Bay Estuary Partnership

Casco Bay Estuary Partnership is one of twenty-eight national estuary programs around the country. The National Estuary Program (NEP) was created by Congress under Section 320 of the Clean Water Act as part of the 1987 Clean Water Act Amendments and is administered by the U.S. Environmental Protection Agency (EPA). The program establishes locally led, non-regulatory, collaborative programs to protect and restore the water quality and ecological integrity of Estuaries of National Significance.

In 1990, Governor McKernan submitted a request to EPA to designate Casco Bay as an Estuary of National Significance, CBEP was created the following year. The Casco Bay Estuary Project, as it was known at the time, was (and still is) administered by EPA Region 1, which covers the six New England states, and hosted by the Maine Department of Environmental Protection (DEP). The group spent five years gathering information and building partnerships. The first Casco Bay Plan was released in 1996. That same year, the Estuary Project moved from DEP to the Marine Law Institute, part of Maine Law School, which was itself part of the University of Maine system. CBEP has been hosted by the University of Southern Maine (through the Marine Law Institute, the Muskie School of Public Service, and most recently, the Catherine Cutler Institute) ever since. The name of the organization was changed to the Casco Bay Estuary Partnership in 2006 to reflect the role of collaboration in our work.

### *CBEP Structure and Governance*

CBEP consists of the Partnership, a Management Committee, Executive Committee, and the Staff.

***The Partnership.*** The Partnership includes individuals and organizations working together to help achieve our mission or implement portions of the Comprehensive Conservation and Management Plan (CCMP, aka Casco Bay Plan). The Partnership welcomes participation by anyone with an interest in helping protect and restore coastal habitats; improve water quality in the Bay or the watershed, engage and work with communities on climate vulnerability or water resource challenges, or gather the information and understanding we need to better manage our waters.

***Management Committee.*** The Management Committee is the most important oversight body for the work of CBEP. Most formal decision-making authority rests with the Management Committee. A Chair and Vice-Chair are selected to serve two-year terms. Decisions are ordinarily made by consensus. Members of the Management Committee represent individuals and organizations with a stake in the work of the Partnership, including citizens, federal and state agencies, local government, and nonprofit organizations. While some members of the Partnership serve on the Management Committee, others (such as land trusts and lake associations, and most local governments) are not directly represented. The Management Committee meets at least quarterly. Meetings are open to the public and publicized via our website.

***Executive Committee.*** The Executive Committee meets monthly with the CBEP Director to provide advice and direction. Members of the Executive Committee are selected by the Management Committee from among their members. The Executive Committee is empowered to act on behalf of the full Management Committee when issues need to be addressed in a timely manner.

***Staff.*** The CBEP Staff provides technical expertise, coordination, training, and leadership to implement projects, strengthen work on behalf of Casco Bay, and support the work of partners. The staff has expertise in environmental sciences, climate resilience planning, coastal restoration, community

engagement, facilitation, and project management. Staff priorities are developed annually in coordination with the Management Committee.

### *Our Guiding Vision*

1. **Enhance Casco Bay:** focus on actions that increase the Bay’s well-being—improving marine ecosystems, economic vitality, and the region’s quality of life.
2. **Drive innovation:** catalyze creative, cost-effective, and enduring environmental solutions that are grounded in good science and meet community needs.
3. **Work collaboratively:** build on the collective strength of diverse interests, including those of underserved or vulnerable communities, advancing a shared agenda for the Bay.
4. **Link people and place:** foster widespread appreciation of the Bay’s ecological and economic values, and inspire residents, businesses, and municipalities to adopt practices that reduce their impact on Casco Bay.
5. **Build capacity and understanding** provide training and broadly disseminate information on Bay-related research, community initiatives, educational programs, and volunteer opportunities.
6. **Adapt as conditions change** foster regional resilience—the capacity for ecosystems, and economies to adapt as climate and other variables shift, and to bounce back from unexpected disruptions.

### *The Casco Bay Plan*

The first Casco Bay Plan was adopted in 1996 and updated in 2006, reflecting ten years of progress addressing persistent challenges facing Casco Bay. The Casco Bay Plan was rewritten in 2016 to reflect changing conditions along the coast of Maine, especially growing concern about the impact of climate change on coastal ecosystems and coastal communities. The current Plan, issued in 2024, represents an update to the 2016 Plan. Its overall structure is like that of the 2016 Plan, but Goals, Strategies and Actions (below) have been updated to reflect changing circumstances.

### *Why This Update?*

This update to the Casco Bay Plan was undertaken to reflect significant changes in regional needs, growing understanding of the impact of climate change on the region, the changed policy context, and expectation of availability of extraordinary resources.

- We have completed some Actions from the 2016 Plan and have come to recognize that other Actions are no longer priorities. In eight years, we have learned lessons about the Bay, and what works and what doesn’t.
- We understand nutrient pollution in the Bay better than ever. Efforts are underway by Maine Department of Environmental Protection (DEP) to develop marine nutrient criteria for nitrogen pollution. While work remains to be done reducing nitrogen inputs to the Bay, a shift in focus back towards addressing principal sources of water pollution offers efficiencies for addressing nutrients in parallel with other water quality challenges.
- Our understanding of how a changing climate is affecting our region is growing. All work done on behalf of the Bay and our people needs to be forward-looking and inclusive. We must center our work on community and ecosystem resilience (not just restoration or protection) and

consider questions of equity as we ensure Casco Bay and the other waters of the region contribute to a prosperous future.

- The context in which we operate has changed and changed again. Maine’s focus on climate change, especially through the work of the Maine Climate Council and the Governor’s Office for Policy, Innovation, and the Future (GOPIF), has altered the context of our work, shifting agency priorities, building new coalitions, and opening new opportunities.
- Increases in federal funding for infrastructure improvement, climate resilience and ecosystem restoration have created opportunities for large-scale projects (whether for habitat or community resilience) that were previously out of reach. Yet underserved and underrepresented communities across the region often lack capacity to access these funds. Smaller towns, especially inland and island communities lack planning capacity, while people dependent on natural resource industries (who are directly vulnerable to changes in our lands and waters) are busy making a living and caring for families.

An in-depth reevaluation of our work was needed to reflect these and other changes. It has become increasingly apparent that our work now occurs in the context of accelerating changes in the coastal ocean. The past is no longer an adequate guide to future conditions. Even short-range planning must address this inherent uncertainty. The Casco Bay Plan must be able to respond as circumstances change. Therefore, this CCMP Update is intended to be amended in response to changing circumstances.

The Plan has been drafted with a nominal ten-year planning horizon. It is unlikely to persist as long as that unchanged, but a ten-year vision helped shape priorities. Most Actions, targets and outputs were drafted with reference to a five-year period (through 2029).

#### *How the Updated Casco Bay Plan was Developed*

This update was developed over the course of 16 months by CBEP Staff with input from the Partnership and the Management Committee. The update was informed by effort over several prior years to map out priorities via four supporting documents: *Habitat Plan*, *Monitoring Plan*, *Finance Plan* and *Communication Strategy* (see the appendices). Each of these subsidiary documents was used to inform the Goals, Strategies and Actions in this updated Plan.

In late fall of 2022, we began by soliciting ideas for changes in the Casco Bay Plan. CoastWise Partners (led by Holly Greening and Rich Batiuk) conducted one-on-one interviews with Management Committee members. CoastWise Partners provided CBEP with detailed anonymous notes from the interviews, and a summary of their findings. Notes were shared with all Management Committee members. We held a Strategic Planning retreat in January of 2023, facilitated by CoastWise Partners. Participants included Management Committee members as well as several thought leaders from the Partnership who have not recently been represented on the Management Committee, such as representatives of The Nature Conservancy and local land trusts. CoastWise Partners prepared detailed notes and a meeting summary.

Following the retreat, we formed working groups drawn principally from Management Committee members to focus on selected portions of the Casco Bay Plan. This included groups focused on habitat, water quality, community, and coordination and collaboration priorities. Each group met several times to provide CBEP staff with high-level suggestions within their area of expertise. Staff collated responses and brought them back to the Committees for additional feedback and refinement.

Once top-line priorities were identified, staff drafted detailed descriptions of Goals, Strategies and Actions. All Draft Goals, Strategies and Actions were shared with the Management Committee. Management Committee members were assigned principal reviewer responsibility for a minimum of two and in many cases three draft Actions. This assured that each Action was reviewed in detail by at least two Management Committee Members.

Staff revised the Goals, Strategies and Actions in response to Management Committee comments. CBEP's Executive Committee authorized Staff to prepare a single draft of the Goals, Strategies and Actions and solicit initial feedback from EPA Region 1. Region 1 provided detailed comments regarding EPA requirements for the CCMP and suggested structural and content changes. Staff revised the document based on EPA's feedback and shared the penultimate draft with EPA Region 1 and the Management Committee in early February. This document reflects additional comments received on the February draft from both members of the Management Committee and EAP Region 1.

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## *GOAL 1: Protect, restore, and enhance the key habitats that sustain ecosystem health of Casco Bay and its watershed for now and the future*

The long-term health of Casco Bay and the Casco Bay watershed depends on vital habitats that protect water quality and support native fish and wildlife, biodiversity, and commercial fisheries.

CBEP takes a landscape approach to habitat by focusing on geographic sub-regions and emphasizing connections between and among habitats rather than isolated species or habitat types. The health of the Bay (as well as of our lakes, rivers, and streams) depends on the forests and wetlands that protect natural hydrology and water quality. Connectivity among aquatic habitats is essential to help organisms migrate, withstand climatic extremes and sea level rise, and maintain their populations in the face of established and emerging stressors.

Habitat protection, aquatic connectivity, and the restoration of natural stream processes benefit human communities as well; supporting fisheries and tourism, providing recreational opportunities, decreasing flood impacts, and reducing infrastructure maintenance.

CBEP is committed to protecting, enhancing, and restoring critical coastal habitats (e.g., eelgrass beds, tidal wetlands, and mudflats), planning for future migration of intertidal habitats (as sea levels rise), and conserving the undeveloped forests, wetlands, floodplains and shorelines that protect water quality. Through these efforts, we strive to strengthen ecosystem functions and build climate resilience.

### *Strategy 1.1: Identify places and initiatives that are most important for the protection, restoration, and enhancement of key habitats*

Human alterations of the landscape have left their mark on the Bay and its coastal habitats as well as rivers, streams, lakes, and freshwater wetlands throughout the watershed. These modifications have often resulted in habitat fragmentation and a loss of connectivity between habitat types. In aquatic ecosystems, alterations to natural hydrology have impacted the flow of surface and groundwater, transport of sediment, nutrients, organic matter, and wood; and the movement of organisms. These changes have altered the fabric and function of regional habitat networks, leaving habitats more vulnerable to stressors including climate change. Place-based habitat planning can serve as a framework for organizing collaborations at the scale of a subwatershed or embayment that accelerate habitat protection, restoration, and enhancement activities across multiple habitat types. Landscape-scale analysis can inform resource allocation to protect important ecosystem functions considering climate change and continuing land use changes.



Action 1.1.A Develop science-based regional plans that integrate aquatic habitat protection, restoration, continuity, and resilience priorities

*Goal 1: Protect, restore, and enhance the key habitats that sustain ecosystem health of Casco Bay and its watershed for now and the future*

*Strategy 1.1: Identify places and initiatives that are most important for the protection, restoration, and enhancement of key habitats*

#### *Purpose*

Define geographic habitat priorities, highlight key habitat needs, focus collaborative efforts, and make efficient use of resources in meeting habitat objectives.

#### *Timeline*

Begin in 2024

#### *Lead Implementers*

- U.S. Fish and Wildlife Service Gulf of Maine Coastal Program (USFWS GOMCP; project co-lead with CBEP; mapping, technical assistance, and connection to Atlantic Coast Joint Venture)
- Casco Bay Estuary Partnership (project co-lead with USFWS GOMCP; process facilitation and document preparation)

#### *Other Cooperators*

- Maine Department of Inland Fisheries and Wildlife (connection to Maine Wildlife Action Plan)
- Maine Department of Marine Resources (relationship with Maine fisheries)
- The Nature Conservancy—Maine Chapter (regional and state-level priorities)
- Maine Coastal Program (coastal habitat plans, municipal connections)
- Maine Coast Heritage Trust (prioritization, connections to land trusts, awareness of potential habitat projects)
- National Oceanic and Atmospheric Administration Restoration Center (funding and knowledge of regional and national priorities)
- Greater Portland Council of Governments (planning expertise and connections to municipalities)
- Cumberland County Soil and Water Conservation District (connections with municipalities, watershed-based planning, perspective on implementation)
- Maine Department of Environmental Protection (watershed assessments, connections to stormwater and site development regulation, data)

#### *Location*

Regional plans may be developed for any subwatershed or region in Casco Bay or the watershed. Locations have not yet been selected.

#### *Description*

CBEP staff will work with the U.S. Fish and Wildlife Service Gulf of Maine Coastal Program (USFWS GOMCP) and other agency partners to analyze priorities for aquatic habitat protection, habitat restoration and enhancement, and habitat resilience. Priorities will be informed by existing state and

regional habitat plans, such as Maine Wildlife Action Plan, and the Atlantic Coast Joint Venture. Priorities will be integrated with CBEP's Habitat Plan (See Appendix 2) and used to evaluate proposals submitted to CBEP for funding under Habitat Protection Fund (Action 1.1.A) and Habitat Resilience (Actions 1.2.A and 1.2.B) grant programs. Priorities will also inform allocation of staff capacity for advancing the Strategies and Actions in Goal 1.

We will develop science-based priorities using available geospatial data analyzed at relevant ecological scales. Plans will be assembled for selected subwatersheds (e.g., lower Presumpscot watershed, Royal River watershed, and Stroudwater watershed) or embayments (e.g., Eastern Bay, Presumpscot Estuary, Royal River Estuary, Fore River Estuary). These subregional plans will collectively define regional habitat priorities for Casco Bay and its watershed.

Regional priorities will focus on priority habitats that sustain the ecological health of Casco Bay and its watershed. Therefore, the focus of the analysis, plans and priorities will be on aquatic resources and terrestrial habitats that contribute to water quality protection and ecosystem resilience. This approach reflects the need for technically-sound regional priorities that are independent of priorities of partners such as individual land trusts or towns and subregional collaborations like Sebago Clean Waters. Overlap with town, land trust, and regional collaboration priorities is both anticipated and desirable.

#### *Resources*

CBEP's existing Habitat program staff will coordinate and convene the habitat analyses with partner support. The task will require between 10% and 20% of a lead staff member's time annually to facilitate priority setting meetings, manage contracts and draft reports.

CBEP funds will be needed to contract for expert assistance assembling data, conducting analyses, producing high-quality graphics, and similar tasks. Most underlying data sets are available from public sources (e.g., National Wetland Inventory; State data on water quality attainment and at-risk watersheds), but some data may be proprietary, requiring additional CBEP funds. We anticipate spending less than \$25,000 in such additional costs to develop each subwatershed plan. Additional funds up to \$10,000 may be needed for graphic design and document preparation.

#### *Outputs*

- Geospatial priorities
- Subregional plans and maps
- Place-based planning documents comprised of maps and a summary narrative

#### *Outcomes*

##### **Short-term**

- Defined CBEP vision and habitat priorities for Casco Bay and selected Casco Bay watersheds

##### **Medium-term**

- Community stewardship, regional collaboration, and focused use of resources

**Long-term**

- Targeted improvements to the Bay’s habitats, water quality, ecosystem function and integrity

*Metrics and Targets*

| <b>Metric</b>   | <b>Target</b>      |
|---|--------------------|
| Assemble geospatial data and tools to support development of priorities (geodatabase) | 2025               |
| Pilot subregional plan  | One by end of 2025 |
| Four subregional plans in priority regions  | End of 2029        |

### Strategy 1.2: Permanently protect habitats that support resilience of aquatic ecosystems and protect water quality

The integrity of Bay ecosystems rests in large part on the persistence of coastal habitats (such as tidal flats, rocky intertidal areas, salt marshes and coastal forests) as well as inland river and stream corridors, freshwater wetlands, and upland forests. Even as Casco Bay responds to climate impacts, the watershed will support fish, wildlife, and birds. Through conservation projects over a period of decades, land trusts and local governments have made significant progress, permanently protecting over 15% of the Casco Bay watershed via an extensive network of coastal and inland conservation areas that help preserve water quality and support a healthy Bay. CBEP will continue advancing these efforts in the face of increased development pressures, sea level rise and greater storm frequency and intensity.

Action 1.2.A Invest in habitat protection via the Casco Bay Estuary Partnership Habitat Protection Fund

*Goal 1: Protect, restore, and enhance the key habitats that sustain ecosystem health of Casco Bay and its watershed for now and the future.*

*Strategy 1.2: Permanently protect habitats that support resilience of aquatic ecosystems and protect water quality.*

#### *Purpose*

Provide grant funding in support of efforts to permanently protect 20% of the Casco Bay watershed by 2030 with a focus on areas that safeguard health and resilience of aquatic ecosystems.

#### *Timeline*

Ongoing

#### *Lead Implementers*

- Casco Bay Estuary Partnership (funder)
- Maine Department of Inland Fisheries and Wildlife (priorities and proposal review)
- U.S. Fish and Wildlife Service Gulf of Maine Coastal Program (priorities and proposal review)

#### *Other Collaborators*

- Maine Coast Heritage Trust (knowledge of regional activities)
- Land trusts (grant recipient / project implementation)
- Local governments (grant recipient / project implementation)
- State agencies (grant recipient / project implementation)

#### *Location*

Throughout the Casco Bay watershed, with a focus on lands that protect water quality and habitats that benefit aquatic ecosystems.

#### *Description*

Casco Bay Estuary Partnership has provided strategic financial support for habitat protection since 2000, committing more than \$950,000 to support permanent protection of 12,800 acres throughout the Casco

Bay watershed (including coastal islands, tidal flats, wetlands, riparian areas, and forests). Most of the properties funded allow public access.

As of 2020, 14.2% of the land area of the Casco Bay watershed had been permanently protected by conservation ownership or protected by conservation easement. Subsequent conservation activity had likely pushed that total over 15% by the start of 2024.

Through the Habitat Protection Fund, CBEP will continue to provide grants up to \$25,000 to land trusts, municipalities, and agencies to facilitate habitat protection through acquisition of fee title or conservation easements. Funds can be used to leverage local, federal, or state funding, help cover transaction costs; and support strategic “high risk, high reward” or time sensitive opportunities. Requests for funding will be reviewed by CBEP’s staff and Habitat Protection Committee, with representatives drawn from the land trust community and federal and state agencies.

To be eligible, the proposed conservation acquisition must benefit aquatic ecosystems in the Casco Bay watershed. Areas of particular interest include the Bay’s shoreline, intertidal habitats, and islands, river riparian areas and floodplains; freshwater wetlands; and forested areas near headwater streams. Natural areas that could accommodate tidal wetland migration (as sea levels rise) or that would protect or enhance sediment supply to tidal wetlands will be considered. CBEP is committed to improving equity in access to open space, fairness in distribution of Habitat Protection Fund grants, and supporting local communities and land trusts in identifying priorities and remediating inequities.

#### *Resources*

CBEP plans to coordinate two Habitat Protection Fund rounds per year, each fall and spring, allocating \$80,000 - \$100,000 in annual grant funding through a mix of BIL and core EPA Section 320 funds. Funding is anticipated to be commensurate with available BIL monies through 2027. Funding levels for these grant programs are likely to decline thereafter.

Limited CBEP staff time is needed to issue Requests for Proposals, convene the Habitat Protection Committee, administer grants, collect project data, and track program accomplishments.

#### *Outputs*

- Two Habitat Protection Fund requests for proposals annually
- Three to five Habitat Protection Fund grants annually

#### *Outcomes*

##### **Short-term**

- Acres acquired by partners through conservation easements or fee ownership

##### **Medium-term**

- Protection of priority habitats (coastal habitat, wetlands, forests, floodplains, and other areas that contribute to Bay water quality)

**Long-term**

- Resilience of Casco Bay’s aquatic ecosystems and maintenance of habitat values, water quality, ecosystem function, and integrity

*Metrics and Targets*

| <b>Metric</b>  | <b>Target</b>     |
|--|-------------------|
| Percentage of land area within the Casco Bay watershed permanently protected by 2030 (a “twenty by thirty” goal) | 20%               |
| New permanently protected acres by 2034 (beyond 2021 SOTB)   | 31,500 acres      |
| New acres of coastal habitat protected by 2034 (beyond 2021 SOTB)  | 250 acres         |
| New wetland acres protected by 2034 (beyond 2021 SOTB)   | 400 acres         |
| Number of projects funded per year   | Four through 2029 |

Action 1.2.B Provide technical assistance and coordination to land trusts and local governments to support land conservation

*Goal 1: Protect, restore, and enhance the key habitats that sustain ecosystem health of Casco Bay and its watershed for now and the future*

*Strategy 1.2: Permanently protect habitats that support resilience of aquatic ecosystems and protect water quality*

#### *Purpose*

Provide technical assistance and capacity for local and regional initiatives that help to permanently protect 20% of the Casco Bay watershed by 2030, with a focus on areas that safeguard health and resilience of aquatic ecosystems.

#### *Timeline*

Ongoing

#### *Lead Implementers*

- Casco Bay Estuary Partnership (technical assistance and coordination)
- U.S. Fish and Wildlife Service Gulf of Maine Coastal Program (technical assistance)
- Sebago Clean Waters (regional coordination, implementation)

#### *Other Collaborators*

- Land trusts (beneficiaries, implementors)
- Local governments (beneficiaries, implementors)
- Maine Department of Inland Fisheries and Wildlife (state-level planning and assistance)
- Maine Land Trust Network (state-wide coordination)
- State and federal habitat programs (funding and assistance)

#### *Location*

Throughout the Casco Bay watershed, with a focus on areas that safeguard health and resilience of aquatic ecosystems.

#### *Description*

Casco Bay Estuary Partnership will continue to support land conservation in partnership with organizations, such as the U.S. Fish and Wildlife Service Gulf of Maine Coastal Program (USFWS GOMCP), and through regional collaborations, like Sebago Clean Waters. CBEP has partnered with USFWS GOMCP to provide GIS (Geographic Information Systems) services and other forms of technical support for land conservation for many years. While some conservation professionals and many consultants now have GIS expertise, there remains an ongoing need for GIS support as some land trusts have minimal staffing and lack funds to hire GIS consultants. This partnership provides habitat analysis for 8 to 12 land conservation projects each year and supports evaluation of Habitat Protection Fund proposals.

Multi-organizational collaboration has emerged as an important and strategic approach to regional land conservation. As a partner to Sebago Clean Waters and other regional collaborations, CBEP's capacity to provide technical assistance is helpful in the development and expansion of regional approaches to land

protection. In a supporting role, CBEP staff members may help address ongoing training and technical assistance needs such as the mapping, habitat analysis, proposal drafting, grant management and reporting needed to secure federal and state habitat grants (e.g., Regional Conservation Partnership Program, North American Wetlands Conservation Act, Land for Maine's Future Program, Maine Outdoor Heritage Fund and Maine Natural Resource Conservation Program). Other types of technical assistance include coordination related to strategic planning, regional prioritization, and development of collaborative grant proposals.

CBEP also may provide direct financial support through its Habitat Protection Fund according to CBEP protection priorities (as articulated in Action 1.1.A).

#### *Resources*

Technical assistance on land conservation to towns and land trusts is provided by several members of the Partnership, including CBEP, U.S. Fish and Wildlife Gulf of Maine Coastal Program, CCSWCD, Sebago Clean Waters, Maine Coast Heritage Trust, and several federal and state agencies.

CBEP's existing habitat program staff provides dedicated staffing to nurture local initiatives and regional collaboration. Staff time may be used for a variety of tasks, including proposal development, or coordinating among partners. CBEP may also assist municipalities, land trusts and other organizations with specific projects.

Limited CBEP funding (less than \$20,000) may be needed from time to time to cover planning costs such as data gathering, mapping, or facilitation. This Action relates to Actions 1.1.A, 2.2.A, 3.2.A, and 3.2.B, which also address using planning, assistance, or funding to address community needs.

#### *Outputs*

- Habitat protection projects initiated
- Collaborative grant proposals submitted, and grants secured
- Diversification of funding for habitat protection

#### *Outcomes*

##### **Short-term**

- Formation and continuation of local and regional initiatives advancing habitat protection

##### **Medium-term**

- Increased capacity, community support, and funding for developing and implementing local and regional protects that permanently protect habitat

##### **Long-term**

- Resilience of Casco Bay's aquatic ecosystems and maintenance of habitat values, water quality, ecosystem function, and integrity



*Metrics and Targets*

| <b>Metric</b>   | <b>Target</b>                      |
|---|------------------------------------|
| Number of organizations accessing USFWS GOMCP GIS Service Center services   | Six annually                       |
| Number of geospatial analyses provided in support of habitat protection efforts   | Eight annually                     |
| Dollars secured (cash or equivalent, such as donated land) through local and regional collaboration on land conservation projects | An average of \$1 million annually |

### Strategy 1.3: Enhance habitat resilience and restore connectivity of coastal wetlands, aquatic habitats, and shorelines

Human impacts have compromised the ability of many inland and coastal aquatic habitats to sustain functions critical to long-term ecosystem health. These challenges have become more severe because of climate change, coastal acidification, and sea level rise. Where feasible, habitat restoration and enhancement can counter cumulative human impacts and buffer the effects of climate change. Priority targets in Casco Bay include restoring aquatic continuity in both freshwater streams and tidal channels and restoring and managing tidal marshes to enhance their ability to respond to rising seas. Other priority coastal habitats include tidal mudflats and shellfish bars and reefs.

Action 1.3.A Lead efforts to restore and manage coastal habitats to enhance resilience

*Goal 1: Protect, restore, and enhance the key habitats that sustain ecosystem health of Casco Bay and its watershed for now and the future*

*Strategy 1.3: Enhance habitat resilience and restore connectivity of coastal wetlands, aquatic habitats, and shorelines*

#### *Purpose*

Protect and enhance the resilience of tidal marshes, tidal flats, and shellfish bars.

#### *Timeline*

Ongoing

#### *Lead Implementers*

- Casco Bay Estuary Partnership (funding, preliminary engineering, permitting and project development)
- U.S. Fish and Wildlife Service Gulf of Maine Coastal Program (technical assistance, funding)
- Casco Bay Regional Shellfish Working Group (coordination with harvesters; implementation)
- Maine Coast Heritage Trust (regional coordination and implementation)
- Maine Coastal Program (funding, prioritization, coordination)
- Cumberland County Soil and Water Conservation District (project implementation)

#### *Other Collaborators*

- Ducks Unlimited (funding, regional coordination)
- Friends of Casco Bay (supplementary data collection supporting tidal flat projects)
- Land trusts (project implementation)
- Local governments (project implementation)
- Maine Department of Marine Resources (technical assistance, data access)
- Manomet (green crab population assessments and tidal flat elevation studies; coordination with harvesters)
- Natural Resources Conservation Service (funding)
- NOAA Restoration Center (funding and technical assistance)
- The Nature Conservancy – Maine (prioritization, funding)
- Wells Estuarine Research Reserve (regional coordination)

### *Location*

Coastal habitats throughout Casco Bay, especially tidal wetlands, tidal flats, and shellfish beds.

### *Description*

Coastal wetlands provide essential functions to human communities as well as habitat for a diverse array of species. The Bay's coastal wetlands have been impacted by centuries of human modification as well as the effects of climate change, pollution, invasive species, and other stressors. These impacts have compromised ecosystem functions and disrupted natural processes that are critical to long term ecosystem resilience. Where feasible and cost effective, CBEP will apply a process-based approach to increasing resilience of coastal wetlands.

Working with allied organizations through regionally focused committees, CBEP staff will provide strategic funding, technical assistance, grant writing, targeted outreach and training, and project coordination to support tidal wetland restoration and enhancement efforts, particularly those focused on tidal marsh, mudflats, and shellfish beds. Projects are complex, typically requiring years to reach implementation.

Priorities under this Action reflect the Casco Bay Habitat Plan (Appendix 2), as well as other regional and state-level habitat plans and priorities, including Maine's State Wildlife Action Plan and the Atlantic Coast Joint Venture

An established CBEP geographic priority is the *Maquoit and Middle Bay Focus Area of Statewide Ecological Significance*. This region includes tidal wetlands in the Cousins River, Harraseeket River, Maquoit Bay, and Middle Bay. Other geographic areas warrant consideration for focused protection and restoration activities as well (See Action 1.1.A).

Habitat restoration and enhancement targets will be met by:

- Developing a portfolio of restoration and enhancement opportunities;
- Working with communities, landowners and organizations to identify opportunities where barriers to completion can most readily be overcome;
- Implementing habitat restoration and enhancement activities, including projects that rely on nature-based solutions to achieve combined habitat and community goals (See Action 3.2.A); and
- Tracking progress and monitoring tidal marsh change to learn from our actions and achieve restoration and enhancement goals.

### **Tidal Marshes**

Tidal marshes exist in sheltered areas regularly flooded by the ebb and flow of the tides. They support coastal ecosystems by harboring juvenile fish, protecting water quality, and subsidizing nearshore food webs. Detritus exported from marshes is an important food source for nearby shellfish. Tidal marshes buffer coastal communities from storm surge and sea level rise. Maine's tidal marshes also sequester atmospheric carbon and slow the buildup of atmospheric CO<sub>2</sub>. Conversely, loss of tidal marsh can release large quantities of CO<sub>2</sub> stored in tidal marsh sediments.

Tidal marshes are at risk due to accelerating sea level rise, a threat compounded by the impact of centuries of human use and modification. European settlers constructed networks of ditches and embankments to boost production of salt marsh hay or to grow agricultural products in wetland areas. Today, these alterations contribute to subsidence, pooling, and habitat loss that increase vulnerability to rising seas. Many tidal marshes were also dammed to power tide mills or support ice production. To this day, significant marshes lie submerged beneath impoundments, like those beneath New Meadows Lake. The Bay's remaining tidal marshes are often affected by road and railroad crossings, which alter tidal exchange and drainage of floodwaters. Collectively, these hydromodifications result in conversion of salt marsh to freshwater or brackish wetlands, colonization by invasive plants, or permanent loss of marsh area. Species dependent on salt marshes, such as saltmarsh sparrow (*Ammospiza caudacuta*), which nests in high marsh habitats, are imperiled by these cumulative impacts. Remediation of hydrology can put marshes on a more resilient trajectory. CBEP will work with partners to develop a regional Salt Marsh Adaptation and Resilience Team (SMARTeam) to employ emerging methods for remediating historic ditching and diking.

The Maine Coastal Program, working closely with CBEP and incorporating data from previous CBEP efforts including the 2002 *Return The Tides* study, created the Maine Tidal Restriction Atlas that shows where roads, railroads, dams, and other structures cross tidal habitats and restrict tidal flow. The Atlas also shows crossings that are anticipated to become tidal as sea levels rise. We will continue to restore tidal functioning in these settings by replacing undersized culverts and removing coastal dams or dikes (following CoastWise best practices). These practices can increase aquatic connectivity and sediment transport, restore salt marsh habitat, and foster the capacity of wetlands to adapt as sea levels rise.

CBEP has previously supported several tidal restoration projects and will continue monitoring outcomes while pursuing new projects. CBEP will, in collaboration with partners, identify priority projects for protection, restoration, and enhancement of tidal marshes.

#### **Tidal Mudflats**

The Bay's tidal mudflats have been identified as important habitats since Casco Bay was designated an Estuary of National Significance in 1991. Extensive tidal mudflats are revealed at low tide within sheltered coves and embayments. Mudflats support the softshell clam, quahog, and bloodworm fisheries, and provide important feeding habitat for resident and migratory shorebirds.

Tidal flats have been heavily impacted by European green crabs, which prey upon softshell clams, blue mussels, and other invertebrates. Some flats show acidic conditions that reduce settlement of shellfish larvae and can even cause shells of young shellfish to erode. Many intertidal flats are visited multiple times each year for commercial harvests of marine worms, softshell clams and quahogs, and tidal flats are an increasingly common location for shellfish aquaculture. While less studied than tidal marshes, tidal flats are also vulnerable to sea level rise, which may change circulation patterns and deposition of marine sediments. Sediment supplies to tidal flats may also be reduced due to shoreline protection (riprap and other shoreline hardening methods) and impoundment behind dams on main stem rivers.

The impact of sea level rise on, and habitat restoration needs of tidal mudflats are not well understood. CBEP will work with partners to study the vulnerability of tidal flats to stressors, develop criteria for prioritizing protection, restoration, and enhancement of tidal flats, and evaluate methods to improve resilience through testing novel methods.

### **Shellfish Beds, Bars and Reefs**

Shellfish beds bars and reefs are important ecological communities that provide water quality benefits and structural habitat for other marine species. In Casco Bay, mussel bars historically were abundant, but European green crabs are thought to have decimated blue mussels leading to widespread losses. Monitoring and historical data are sparse, so it is difficult to quantify what was lost.

Shellfish beds are a CBEP priority for both study and restoration, especially for developing and testing methods that address vulnerability to invasive species. Methods for creating or restoring shellfish reefs are largely untested in Maine, but experimental oyster enhancement projects suggest that it may be feasible to replace emergent habitat values of lost blue mussel bars with oyster reefs on a small scale. As waters warm in conjunction with climate change, improving over-winter survival and reproduction of American oysters, it may become increasingly feasible to establish oyster bars and reefs in Casco Bay. Research is needed to develop methods for restoring blue mussel bars.

### *Resources*

Several CBEP partners dedicate significant resources towards restoration and resilience of coastal habitats, including U.S. Fish and Wildlife Service's Gulf of Maine Coastal Program Office, Maine Coastal Program, and Maine Coast Heritage Trust.

Significant staff time (30% of an FTE) will be involved with coordinating regional efforts, developing potential projects, drafting funding proposals and assisting organizations seeking implementation funds. Demand for assistance often exceeds CBEP and regional capacity. CBEP will seek targeted restoration and resilience grants and explore ways to tap BIL funds to expand staff and partner capacity.

Funding needs for coastal habitat restoration are significantly beyond the capacity of the National Estuary Program to fund directly, so implementation of coastal habitat restoration and resilience projects will continue to depend on dedicated fundraising.

BIL funding through the National Estuary Program is expected to be available to support habitat restoration and resilience projects through 2027. Our BIL Spending Plan forecasts spending about \$120,000 annually (including staff costs) facilitating habitat restoration and resilience projects through 2027. On the order of \$50,000 annually in NEP-related BIL funds will be used to support preliminary studies and analyses that help determine project scope, examine feasibility, and estimate costs.

Requests from partners for financial support for early project development costs have increased in recent years. To ensure these funds are available to all partners and community members in an equitable manner, approximately half of the BIL funds for habitat restoration and resilience projects will be awarded as grants via a competitive RFP.

*Outputs*

- Feasibility studies (e.g., topographic surveys, geotechnical assessments, hydrodynamic models, marsh surface analyses, engineering designs), research plans, supplies, and materials
- Site assessments, monitoring plans, monitoring data
- Grant proposals raising funds for implementation
- Permits, grant reports, landowner agreements
- Completed restoration and resilience projects

*Outcomes*

**Short-term**

- Project implementation and monitoring
- Restoration and enhancement of coastal habitat and habitat continuity

**Medium-term**

- Improvement of habitats, water quality, ecosystem function and integrity

**Long-term**

- Enhanced coastal resilience

*Metrics and Targets*

| <b>Metric</b>  | <b>Target</b>                        |
|--|--------------------------------------|
| Pilot tidal flat restoration in one or more embayments   | One by 2029                          |
| Pilot shellfish bed restoration in one or more embayments  | One by 2029                          |
| Number of outputs (e.g., feasibility studies or engineering designs) of tidal marsh restoration projects | Four by 2029, six by 2034            |
| Number of coastal wetland restoration or enhancement projects implemented                                | Six by 2029                          |
| Area of coastal habitat (other than eelgrass) restored or enhanced                                       | 50 acres by 2029<br>75 acres by 2034 |

Action 1.3.B Lead efforts to restore aquatic connectivity through culvert replacement, dam removal, and other methods

*Goal 1: Protect, restore, and enhance the key habitats that sustain ecosystem health of Casco Bay and its watershed for now and the future*

*Strategy 1.3: Enhance the resilience and connectivity of coastal wetlands, shorelines, and aquatic habitats*

*Purpose*

Restore ecological continuity for aquatic ecosystems through reconnecting streams and rivers.

*Timeline*

Ongoing

*Lead Implementers*

- Casco Bay Estuary Partnership (funding, preliminary engineering, permitting and project development)
- U.S. Fish and Wildlife Service, Gulf of Maine Coastal Program (funding, prioritization, technical assistance)
- Maine Department of Transportation (implementation of culvert replacement projects)
- Lakes Environmental Association (implementation)
- Sebago Clean Waters (regional coordination and priorities)
- Trout Unlimited (implementation)
- Cumberland County Soil and Water Conservation District (implementation)

*Other Collaborators*

- Local governments (implementation)
- Maine Audubon (“StreamSmart” education programs)
- Maine Department of Environmental Protection (funding)
- Maine Department of Marine Resources (prioritization, science)
- Maine Department of Inland Fisheries and Wildlife (prioritization)
- National Oceanic and Atmospheric Administration (funding, technical assistance)
- Natural Resource Conservation Service (funding)
- U.S. Army Corps of Engineers (Royal River studies)
- Maine Rivers and other NGOs (implementation)
- Maine Stream Connectivity Workgroup (prioritization)
- Governor's Office of Policy, Innovation, and the Future (climate vulnerability of community infrastructure)

*Location*

Streams and rivers throughout the Casco Bay watershed, prioritizing locations that reconnect tributaries Casco Bay, main stem rivers, and lakes that provide habitat for migratory fish.

### *Description*

As the region has developed, the rivers and streams that flow to Casco Bay have become fragmented and disconnected from the Bay through the construction of dams, roads, railroads, and other structures. Consequently, anadromous fish such as alewife, blueback herring, shad, and rainbow smelt that depend on freshwater habitats to spawn experienced widespread population declines. Restoring anadromous fish to rivers is important to reestablishing inshore populations of cod and other large predatory species. For decades, the lack of these predatory fish in Casco Bay has diminished local fisheries and reduced the Bay's health and resilience. Furthermore, the habitat requirements of wild brook trout and other native aquatic organisms vary seasonally and are highly dependent on continuity between habitat types, including access to cold water refugia.

Projects designed to restore aquatic organism passage benefit anadromous and native fish communities and can provide numerous other habitat benefits by enhancing river continuity (the river processes and functions that enable transport of woody debris, sediment and water downstream, store floodwaters, and facilitate movement of aquatic and terrestrial organisms upstream and downstream). Projects that support these aquatic system functions further enhance the resilience of Casco Bay and its tributaries.

CBEP worked with Trout Unlimited chapters and the U.S. Fish and Wildlife Service Gulf of Maine Coastal Program (USFWS GOMCP) to create a *Casco Bay Fish Passage Atlas* to identify opportunities to increase habitat connectivity. The Atlas was incorporated into Maine's Stream Habitat Viewer, making the data widely available.

CBEP will extend this work in the coming years through continued efforts to restore fish passage at dam and culvert sites.

### **Major Dams**

In the Casco Bay watershed, 104 mapped dams block movement of anadromous fishes to entire watersheds and subwatersheds, including hundreds of miles of streams and thousands of acres of lake habitat. Dams diminish water quality as well. The lower main stem of the Presumpscot River fails to meet water quality standards in part due to dams creating a series of reservoirs that are vulnerable to low oxygen conditions and can no longer support riverine fish and invertebrate communities.

CBEP will continue working with partners to facilitate provision of effective fish passage at key dams. Dam removal is effective at achieving fish passage and other ecological outcomes and is preferred to other strategies such as construction of fishways. Even the best fish passage facilities act as partial barriers to fish migration and do little to reestablish river continuity. Where dam removal is a practical alternative, CBEP will provide technical assistance, funding, and other types of support. Dam removal is not always feasible due to conflicts with hydroelectric power production or maintenance of drinking water supplies, warranting consideration of alternative means of providing fish passage if benefits justify the investment.

Highest priority dams are those on main stem rivers that lack functional fish passage and are at or near head of tide along rivers and streams home to historic spawning habitat for anadromous fish. These include Bridge Street Dam owned by the Town of Yarmouth, Elm Street Dam also of Yarmouth, and the



Stroudwater Dam owned by the City of Portland. Mainstem dams on the Presumpscot are also a priority. After the successful restoration of anadromous fish past Saccarappa Falls, the Pleasant River constitutes the next major tributary that could provide substantial habitat for migratory fish, requiring fish passage at Mallison Falls Dam, Little Falls Dam, and Gambo Dam.

#### **Culverts, Small Dams, and Other Barriers**

USFWS GOMCP has twice analyzed Casco Bay fish passage data to produce lists of top fish passage restoration opportunities, sharing results that have helped catalyze fish passage improvement projects by Trout Unlimited, municipalities and others. Through its Stream Smart program, Maine Audubon offers training for landowners, contractors, and other professionals on constructing road stream crossings that maintain fish and wildlife habitat while protecting roads and public safety. These efforts provide a robust infrastructure that CBEP can help maintain and expand.

CBEP will continue to work with these organizations and others to facilitate replacement of undersized road crossing structures, giving priority to barriers on coastal streams and waterways in the lower watershed that block movement of diadromous species and that pose flooding risks. Barriers at or near the head of tide are of particular interest. The Partnership may also assist with high value opportunities elsewhere in the watershed, such as barriers to movement of brook trout to cold-water refugia like forested, spring-fed streams.)

#### *Resources*

Culvert replacement, construction of fishways at dams, and dam removal are time consuming and expensive efforts that typically require multiple organizations and significant external funding. Several CBEP partners are already working to improve fish passage and river continuity, including the USFWS GOMCP, Maine Department of Inland Fisheries and Wildlife, Maine Department of Marine Resources, Maine Department of Transportation, Trout Unlimited, and CCSWCD. Most regional fish passage improvement projects will advance under the leadership of CBEP partners, including land trusts, municipalities, watershed associations and state agencies.

Significant CBEP staff time (20% of an FTE) will be used to coordinate regional collaboration and facilitate project development and completion. Demand for assistance often exceeds regional capacity. CBEP will seek targeted grants to expand staff and partner capacity beyond current levels.

As with coastal restoration projects, upfront cash outlays (typically under \$15,000) are often required to cover technical analyses or development of preliminary designs. Core CBEP funds (including BIL funds) will be used to leverage additional funding for project implementation. Our BIL Spending Plan envisions dedicating about \$20,000 annually to these purposes beyond costs for staff. Spending under this Action often has close connections to flooding risk and community resilience (See Action 3.2.A).

Several partners have recently requested financial assistance with early project development costs. To address this growing need in an equitable manner, a portion of funds for fish passage improvements and river continuity will be made available as grants via a competitive RFP, with funding levels around \$20,000 a year through 2027.

*Outputs*

- Feasibility studies, engineering designs, site assessments
- Grant proposals raising funds for implementation
- Permits, grant reports, landowner agreements, public meetings
- Completed projects

*Outcomes*

**Short-term**

- Project implementation and monitoring
- Restoration of stream connectivity and fish passage

**Medium-term**

- Improvement of habitats, water quality, ecosystem function and integrity

**Long-term**

- Enhanced community resilience

*Metrics and Targets*

| <b>Metric</b>   | <b>Target</b>                   |
|---|---------------------------------|
| Number of studies or site assessments completed to support restoration                              | Three by 2029, eight by 2034    |
| Number of fish passage grant proposals written or projects funded for the watershed, annual average | One                             |
| Number of watershed connectivity projects implemented   | Three by 2029, eight by 2034    |
| Miles of stream reconnected to the Bay  | Five miles. By 2029             |
| Miles of stream reconnected to lakes and large rivers   | One- and one-half miles by 2029 |

Action 1.3.C Accelerate recovery of Casco Bay eelgrass to 2018 levels by reducing key stressors and conducting restoration

*Goal 1: Protect, restore, and enhance the key habitats that sustain ecosystem health of Casco Bay and its watershed for now and the future*

*Strategy 1.3: Enhance habitat resilience and restore connectivity of coastal wetlands, aquatic habitats, and shorelines*

*Purpose*

Facilitate recovery of eelgrass coverage in Casco Bay to a minimum of 5,000 acres by 2032.

*Timeline*

Begin in 2024

*Lead Implementers*

- Casco Bay Estuary Partnership (funding, permitting and project development)
- Maine Department of Environmental Protection (Eelgrass surveys, long-term eelgrass monitoring)
- New England National Estuary Programs (regional coordination and resource sharing)
- U.S. Environmental Protection Agency (technical assistance)
- Friends of Casco Bay (water quality and light data; boat access)
- Manomet (green crab data)
- Team Zostera/COBALT (Phenology of seed set, seed collection, seeding trials)

*Other Collaborators*

- Casco Bay Eelgrass Consortium (regional coordination)
- Portland Harbor Commission (Conservation moorings and removing moorings from eelgrass beds)
- The Nature Conservancy—Maine (prioritization, funding, state-level coordination)
- U.S. Fish and Wildlife Service Gulf of Maine Coastal Program (technical assistance)
- Local governments (implementation, cooperation and access to town lands and waters)
- Maine Blue Carbon Network (blue carbon science)
- Academic institutions (research assistance)

*Location*

Casco Bay eelgrass beds and sites that have supported eelgrass beds in the past 20 years.

*Description*

Eelgrass is an essential and vulnerable resource. As a habitat, eelgrass provides food for migratory winter waterfowl and serves as nursery habitat for fish and shellfish. Eelgrass helps sustain and improve water quality, and beds remove carbon dioxide from the water and sequester organic carbon in marine sediments. Eelgrass thus both ameliorates coastal acidification and slows accumulation of CO<sub>2</sub> in the atmosphere. Eelgrass meadows help dampen wave energy and reduce sediment resuspension and

shoreline erosion. They are also sensitive indicators of ecosystem health and because of their visibility and significance, offer opportunities for public outreach and engagement.

Historically, Casco Bay's sheltered inner embayments have hosted extensive eelgrass beds but in recent decades, eelgrass coverage has been highly variable. The most recent data from 2022 documented a 54 percent decline in eelgrass coverage from 2018 levels, with localized losses in some embayments close to 100 percent. Even where eelgrass remains, density has often declined. The *Maquoit and Middle Bay Focus Area of Statewide Ecological Significance* (an established CBEP geographic priority) includes documented eelgrass meadows in the Harraseeket River, Maquoit Bay, and Middle Bay that have seen significant losses, where solutions are urgently needed.

Eelgrass beds are threatened by multiple stressors including nutrient pollution; sediment loads, invasive species, warming waters, sea level rise, and direct impact from human activities such as commercial fishing, aquaculture, and construction of docks and piers. The impacts of some stressors are not well understood. We lack consistent data on green crab distribution and abundance, making it difficult to know when eelgrass is at risk from green crab bioturbation. Our understanding of the tolerance of Maine's eelgrass populations to warming waters is limited. The relationship between eelgrass beds and aquaculture facilities is also poorly understood.

CBEP is committed to collaborating with key partners with the goal of returning eelgrass coverage to 2018 levels (about 5,000 acres) by 2032 (when another State round of eelgrass mapping is planned). Unfortunately, the path to achieving those goals is unclear. Restoration of eelgrass meadows has a mixed track record in New England, making it difficult to evaluate when and where active restoration would be beneficial. Control of green crabs offers a potential strategy for restoration, but few methods for green crab control have been shown to be effective except in semi-enclosed bays or other restricted waters. Research into methods for eelgrass protection, restoration and enhancement in Maine is needed to guide activities.

CBEP will convene the Casco Bay Eelgrass Consortium several times a year to serve as a hub for discussions about eelgrass monitoring and research. Together, we will conduct a regional effort to evaluate the relative importance of key eelgrass stressors, including temperature, nutrient pollution, light availability, and green crab impacts as contributors towards eelgrass decline. Better understanding of causes of declines is essential for ensuring long-term persistence of Casco Bay eelgrass. The Consortium will identify other research priorities, such as identification of resilient eelgrass beds or genotypes, developing methods to determine site suitability for eelgrass protection and restoration, and developing methods to evaluate the ability of beds to adapt to emerging conditions, among others. The Consortium will learn from and engage with wider east coast US and Canada eelgrass research and restoration networks on activities such as common garden and assisted migration efforts.

DEP plans to map eelgrass in Casco Bay in 2027 and 2032 and conduct more intensive monitoring at selected Casco Bay locations. DEP's monitoring activities are an essential foundation for understanding Casco Bay eelgrass and should be supplemented and expanded as resources allow.

CBEP will work with a coalition of New England National Estuary Programs, EPA Region 1, and Team Zostera/COBALT to test methods for restoring eelgrass by harvesting seed to be released to boost eelgrass populations. We will work together to better understand the timing of eelgrass flowering and seed production. We will develop and evaluate strategies and develop new partnerships to harvest, handle, and store eelgrass seed to support seeding operations. When and if warranted, we will work to implement pilot studies to test restoration methods or implement proven approaches. Short-term tests and trials, however, will not prove sufficient, we must also build long-term institutions or coalitions able to support adaptive management and restoration of seagrass meadows in Casco Bay.

### *Resources*

While eelgrass populations have shown significant declines in recent years, and several stressors have been linked to loss of eelgrass, the relative importance and cumulative effect of stressors is not yet entirely clear, making estimation of resources needs to achieve recovery and restoration impossible. A robust coalition already exists working together to accelerate eelgrass recovery.

CBEP's Staff Scientist will provide staff support for regional coordination, evaluate stressors, and test restoration methods.

CBEP may provide partial funding (up to \$50,000) for research studies or demonstration projects that address priorities identified by the Casco Bay Eelgrass Consortium. However, external funding will be essential to this effort. External grants (as much as \$500,000 over a period of 5 years) will be needed both to support ongoing activities like research, public engagement, and restoration and to fund scientific studies.

### *Outputs*

- Report or reports documenting flowering and seed production in eelgrass beds in Casco Bay
- Data on flowering and seed set submitted to CBEP and regional eelgrass initiative leaders
- Communications and outreach products to inspire community engagement and stewardship
- Meetings of the Casco Bay Eelgrass Consortium
- Tests of restoration methods
- Data on location, extent, and density of eelgrass beds in Casco Bay (mapping expected in 2028 and 2032)

### *Outcomes*

#### **Short-term**

- Understanding of local eelgrass seed availability
- Understanding of stressors to eelgrass beds to evaluate restoration potential
- Strengthened relationships with eelgrass restoration community in New England and surrounding states
- Increased public awareness of and engagement in seagrass conservation and restoration
- Tests of value of eelgrass seeding as a method for restoring or subsidizing eelgrass beds and populations in Casco Bay

**Medium-term**

- Restoration or enhancement of Casco Bay eelgrass using seeding methods
- Increased frequency of eelgrass mapping and monitoring in Casco Bay
- Opportunities for the public (residents and tourists) to engage with conservation and restoration of seagrass meadows

**Long-term**

- Enhanced resilience of Casco Bay’s habitats, water quality, ecosystem function and integrity
- Better understanding of mechanisms of persistence and resilience of eelgrass meadows in the face of frequent disturbance and interacting stressors
- Integration with current and emerging sensor technologies, the Casco Bay Regional Ocean Model, and emerging coastal models to strengthen understanding of carbon dynamics in coastal waters

*Metrics and Targets*

| <b>Metric</b>                                 | <b>Target</b>                            |
|---|--|
| Meetings of the Casco Bay Eelgrass Consortium | Two meetings a year                      |
| Pilot studies on restoration methods          | Two by 2029                              |
| Updated Casco Bay Eelgrass maps               | Based on 2027 and 2032 flights           |
| Acreage of eelgrass beds                      | 3000 acres by 2027<br>5000 acres by 2032 |

## *GOAL 2: Address the cumulative water quality impacts of human activity in the Casco Bay watershed*

Casco Bay's still mostly forested watershed and the Bay's large tides help reduce the impacts of human activity on the Bay. But human activity and urbanization still threaten water quality, especially in Casco Bay's semi-enclosed embayments, and the watershed's lakes and streams.

Human activity affects water quality in many ways, most evidently when pollutants enter our waterways, but also when loss of forest, destruction of wetlands and construction of impervious surfaces like roads and parking lots alter how water moves through the landscape. What we do on land directly affects the health of our waters.

Certain pollutants are of specific concern. While nutrients like nitrogen and phosphorus are essential for plant growth, elevated levels can trigger a cascade of negative consequences in our waters—such as algal blooms, low dissolved oxygen, and even fish kills. Human health is put at risk when pathogens from human or animal wastes reach swimming or shellfish harvesting areas. Growing use of winter deicing products (road salt) harms fish and other aquatic organisms when chlorides and other salts enter our streams via snow melt, runoff, and groundwater.

CBEP will continue efforts to improve understanding of nutrient processes in Casco Bay, address key sources of water pollution like stormwater runoff, combined sewer overflows and septic tanks, and strengthen local efforts to address water quality challenges.

### *Strategy 2.1: Develop the scientific basis for managing nutrient pollution in Casco Bay*

A fully validated, high-resolution forecast model of Casco Bay is expected to be available by mid-2024. CBEP will complete development of that model, coordinate preparation of data products and create interconnected models that strengthen understanding of the Bay, inform permitting decisions, and improve management of Casco Bay. The models and insights derived from them will also highlight data gaps, guide design of monitoring activities, and enable robust analysis of data on the condition of Casco Bay. Where feasible, these models will also be leveraged to address other community needs.

## Action 2.1.A Develop Casco Bay model infrastructure

*Goal 2: Address the cumulative water quality impacts of human activity in the Casco Bay watershed*

*Strategy 2.1: Develop the scientific basis for managing nutrient pollution in Casco Bay*

### *Purpose*

Create interconnected model infrastructure for Casco Bay by 2029 that informs permitting decisions and supports policy evaluation. Where feasible, leverage models to address other community needs. Improve understanding of physical and ecological processes that affect the health of Casco Bay.

### *Timeline*

Underway. The Casco Bay Coastal Ocean Model (CBCOM) is under development. A validated model is expected by summer 2024. Development of model products to address permitting priorities will begin in mid-2024, with functional products expected in 2025.

### *Lead Implementers*

- Casco Bay Estuary Partnership (funding, stakeholder engagement, product specification)
- University of Massachusetts-Dartmouth (model development)
- Northeastern Regional Association of Coastal Ocean Observing Systems (NERACOOS; daily forecasts, long-term model operation)
- University of Maine (oversight of model extensions)
- Maine Department of Environmental Protection (key user of model output, nutrient loading models, water quality criteria)
- Portland Water District (key user of model output)

### *Other Collaborators*

- Friends of Casco Bay (integration with water quality monitoring)
- Maine Coastal Program (coordination with state-wide efforts)
- Portland Waterfront Alliance (Connections to Portland Harbor community).
- Southern Maine Community College (educational uses of model products)
- University of Southern Maine (educational uses of model products)

### *Location*

The model extends from Boothbay in the north and east to Saco Bay in the south and west and about 12 miles offshore. The broad geographic scope ensures forecasts of conditions in Casco Bay address the influence of the Kennebec River on Casco Bay hydrodynamics and links with the existing Saco Bay model for computational efficiency.

### *Description*

In May 2011, CBEP hosted a workshop for coastal scientists and resource managers to identify key data collection and modeling actions that could enhance understanding of Casco Bay circulation patterns and improve coastal management. Workshop participants recommended development of a high-resolution hydrodynamic model of Casco Bay, but funding for model development was not available. Just over a



decade later, in 2022, the Casco Bay Nutrient Council and the Casco Bay Monitoring Network also endorsed development of a Casco Bay hydrodynamic model.

Improved understanding of water movement can heighten understanding of Casco Bay and lead to better coastal policy. Models of severe events can help us understand community vulnerabilities and prepare for future storms. Understanding water movement in enclosed embayments could reveal which parts of the Bay are most vulnerable to pollution. Understanding Bay-wide water movement could reveal transport dynamics of lobster and clam larvae. Community members have identified dozens of other potential uses for high-resolution hydrodynamic data, from enhancing search and rescue operations to helping harvesters locate fish and shellfish.

In late 2022, CBEP tapped Bipartisan Infrastructure Law funds to assemble a high-resolution ocean model of Casco Bay. The model, which was subsequently developed by the University of Massachusetts-Dartmouth, provides forecasts of ocean conditions, including ocean height, wave state, current velocity, temperature, and salinity. Through a partnership with NERACOOS, the model will be run daily to produce three-day hourly forecasts.

This new model is a key step, but addressing our needs will demand additional modeling, to be conducted over the next few years and beyond. Three-day forecasts can help prepare for tomorrow, but they are less useful for long-term planning. We also need to understand worst case scenarios like floods or droughts, estimate risks and describe typical conditions.

Casco Bay's "model infrastructure" will consist of interconnected models that inform Casco Bay science, monitoring, and policy. We envision not a static product, but a group of interlinked tools that will be updated as better data or tools become available. The core model infrastructure would include:

- A hydrodynamic model (How does water move in and around the Bay? How could that change as sea level rises?);
- A nutrient loading model (Where are nutrients coming from? How are loads changing? What can we do to reduce those loads?);
- An ecosystem model (What are the ecological implications of pollutant loads, especially nutrients? How might Casco Bay change with increased loads? Under climate change?).

The high-resolution hydrodynamic model enables ecosystem modeling. A coastal ecosystem model combines information on water movement with data on nutrient loads and understanding of ecological processes to evaluate water quality (and other) conditions. These models offer insight into nutrient processes, phytoplankton abundance, water clarity, dissolved oxygen, and carbonate chemistry. Spatially explicit ecosystem models can identify areas of Casco Bay most at risk for water quality problems or highlight areas that may become more vulnerable due to climate change and coastal acidification.

The models will provide the framework for future decisions regarding climate adaptation, permitting of wastewater and stormwater discharges, and design of monitoring programs. The process of developing models will test our understanding of the Bay, and point to information gaps, thus providing guidance

for future monitoring and scientific studies. We will also work to improve access to model outputs such as short-term forecasts and characterization of risk to community users (see Action 4.1.A).

CBEP's modeling efforts will be overseen by a new Model Infrastructure Working Group. Membership will be drawn from users of model outputs (such as permitting agencies, wastewater dischargers, or aquaculture operators), coastal scientists, and interested community members.

*Resources*

NERACOOS has committed to hosting and running the Casco Bay Coastal Ocean Model once it is developed and validated. University of Maine and University of Southern Maine scientists will assist with developing additional add-on model products to address community needs.

Funding for development of the CBCOM was allocated from BIL funds in 2022. CBEP anticipates spending about \$75,000 annually through 2029 to fund model applications and extensions.

In addition, we expect that as much as 30% of CBEP’s staff scientist’s time will go towards coordinating model development. We will continue to seek grant funds to develop methods for making model output more accessible to community members.

*Outputs*

- The Casco Bay Regional Ocean Model, a high resolution predictive hydrodynamic model of Casco Bay and the nearby coastal ocean
- Model outputs that address water quality concerns, such as model runs that simulate extreme events, or estimates of probability and risk
- Application of nutrient loading model or models to the Casco Bay watershed
- Ecosystem or water quality model of Casco Bay

*Outcomes*

**Short-term**

- Improved scientific and technical understanding of water movement in Casco Bay

**Medium-term**

- Greater understanding of how circulation patterns may affect transport of nutrients and other pollutants
- Improved ability to evaluate risks to water quality from increasing nutrient loads and changing climate

*Metrics and Targets*

| <b>Metric</b>  | <b>Target</b>  |
|--|----------------|
| Completed and validated high resolution hydrodynamic model of Casco Bay and surrounding coastal ocean  | By summer 2024 |
| Initial model runs and other products that can help advance water quality permitting discussions for major dischargers in the Portland metropolitan area | By summer 2025 |
| Casco Bay Ecosystem model completed  | By 2029        |

## Strategy 2.2: Work collaboratively to reduce key sources of water pollution throughout the watershed

We will work to strengthen policies to reduce cumulative impacts of urbanization and other land use changes, support ongoing regional efforts to reduce combined sewer overflows, and work to better understand and eventually reduce pollutants – especially bacteria, nitrogen, and phosphorus – entering our waters from septic tanks and other onsite wastewater treatment systems.

Action 2.2.A Strengthen planning policies, site design requirements, and land use practices that protect and restore natural hydrology and reduce pollution from stormwater

*Goal 2: Address the cumulative water quality impacts of human activity in the Casco Bay watershed*

### *Strategy 2.2: Work collaboratively to reduce key sources of water pollution throughout the watershed*

#### *Purpose*

Encourage and implement state and local policies and practices that encourage use of planning, land use policies, and site design requirements and engineered structures to protect aquatic ecosystems from the impacts of urbanization and suburbanization.

#### *Timeline*

This is an ongoing activity, but several opportunities to engage in development of relevant policies are expected in 2024. For example, the Maine Department of Environmental Protection (DEP) recently began revising the state’s “Chapter 500” rules regarding stormwater requirements for new development. Communities subject to the clean water act’s Municipal Separate Storm Sewer System (MS4) permitting requirements are in the early phases of implementing Low Impact Development (LID) policies under Maine’s MS4 General Permit. The final MS4 permit, however, has been appealed and remanded back to DEP for further consideration, likely leading to additional delays.

#### *Lead Implementers*

- Maine Department of Environmental Protection (updates on “Chapter 500” rules and oversight of MS4 permits)
- Cumberland County Soil and Water Conservation District (leadership of ISWG, staff for LCWMD, relationships with municipalities)
- Friends of Casco Bay (legal and policy review and advocacy)
- Casco Bay Estuary Partnership (technical assistance, participation in State policy working groups, coordination)
- Local governments (implement MS4 permits, update comprehensive plans, ordinance review)

#### *Other Collaborators*

- Interlocal Stormwater Working Group (coordinating implementation of MS4 permits)
- New England Environmental Finance Center (New England-wide connections, creative solutions, finance strategies)
- U.S. Environmental Protection Agency (oversight of delegated permitting programs, including MS4 permits)

- Maine Water Environment Association Stormwater Committee (coordination and policy development)
- Maine Department of Environmental Protection's Nonpoint Source Training Center (training)
- Greater Portland Council of Governments (relationships with municipalities, planning expertise)

#### *Location*

Municipalities in the Casco Bay watershed, especially those in the middle and lower watershed with more extensive urban and suburban areas.

#### *Description*

Certain land uses, especially urbanization, pose pervasive threats to water quality due to increased runoff containing non-point source pollutants from impervious surfaces and developed areas. Historically, Maine's low population and modest agricultural economy have limited the extent of problems, but that is changing. A growing population in the Portland area, as well as expanding suburban areas to the north and west of the City (likely to be exacerbated by construction of the Gorham Connector) put more lakes and streams at risk and could increase nutrient loads flowing to Casco Bay. These challenges are most acute in the Portland region; a recent review by Maine DEP of changes in impervious cover over a period of 20 years identified the Fore River watershed as the region with the largest increase in impervious cover in Maine.

Runoff can carry a variety of pollutants into our streams, lakes, and the Bay. As urbanization intensifies, wetlands are often filled or drained, riverbank forests are cut down, and road crossings block the movement of water, woods, sediment, and aquatic organisms. Instead of soaking into the ground and being intercepted by vegetation, rainfall falls on roofs, parking lots, driveways, and roadways, surging into nearby streams. Cumulatively, these effects reduce water quality, damage aquatic habitat, and eliminate all but the most pollution tolerant aquatic insects and fish.

Methods exist to reduce both pollutants and impacts, but they are underutilized. These tools have many names (Green Infrastructure, Low Impact Development, Best Management Practices, etc.). Regardless of what you call them, they aim to address a few important principles that together can protect watershed health and resilience of aquatic ecosystems, such as:

- Minimize disruption of hydrological processes (including infiltration and groundwater flows);
- Filter runoff and treat stormwater before it reaches rivers and streams;
- Minimize and reduce impervious surfaces;
- Minimize the use of deicing salts and prevent infiltration of high chloride meltwater;
- Protect natural wetlands and riparian (stream bank and lakeshore) areas and floodplains;
- Manage and maintain, and when necessary, replace poorly functioning devices and piped infrastructure intended to reduce water quality impacts and flooding;
- Implement water quality protection methods responsive to the needs of downstream waters and to the probable stressors affecting aquatic ecosystems.

Many towns in our region are taking steps to reduce water quality impacts of runoff, such as adopting local ordinances restricting use of synthetic pesticides and fertilizers, or conducting public outreach and education efforts around pet waste, landscaping practices, and more (see also Action 2.3.B)

While agriculture is not as widespread in the watershed as urban and suburban areas, it can have important water quality impacts. Agriculture can be an especially important source of water pollution, such as sediment (due to soil erosion), nutrients (from fertilizer and animal wastes), and bacteria (from animal waste). In our region, small-scale agriculture (both “hobby farms” and high value-added, small-acreage specialty producers) sometimes lack access to information about how to reduce water quality impacts. Reducing water quality impacts of agriculture therefore may require outreach and education efforts and development of local policies.

CBEP and allied organizations will work to strengthen state and local policies and educate policy makers, local officials, design professionals, and contractors about the relationship between land use and water quality and methods for reducing those impacts. Together, we will do this principally by:

- Engaging in stormwater-related policy development, like the upcoming revisions to Maine’s “Chapter 500” rules addressing stormwater discharges from new construction (See Action 4.1.A);
- Providing information, assistance and training to local officials and state legislators, including through presentations, training events and other educational materials (see Action 3.2.B);
- Working with town councils and state legislatures to establish dedicated funding for stormwater infrastructure maintenance, repair, and replacement.

It has become increasingly clear that protecting water quality in urban and suburban landscapes requires protecting hydrology of entire watersheds. That links this Action with habitat conservation activities under Strategy 1.1 (Permanently protect habitats that support resilience of aquatic ecosystems and protect water quality). Protecting water quality has long been a principal aim of our habitat conservation programs. This Action can complement Goal 1 Actions by engaging with communities, local governments, and landowners to improve policies and practices that preserve important hydrologic features where fee acquisition or conservation easements are unlikely or impossible.

#### *Resources*

This Action builds on efforts already underway by several organizations, especially the Cumberland County Soil and Water Conservation District, the Interlocal Stormwater Working Group, and local governments.

The role of CBEP’s existing staff will be to support partner-led initiatives by participating in policy discussions and coordinating among CBEP partners, and serving on advisory panels, Boards and Commissions.

When resources permit, CBEP may provide partial funding (between \$5,000 and \$20,000) for outreach and education activities.

#### *Outputs*

- Updates Maine stormwater rules

- Adoption of low impact development ordinances
- Delivery of technical assistance on stormwater and water infrastructure to communities
- Presentations to local government audiences; related outreach documents (See also, Action 3.2.B)
- Participation in state, regional and local working groups, stakeholder meetings and rulemaking processes to support policy development

*Outcomes*

**Short-term**

- Increased community awareness of methods to reduce water quality impacts of new construction and land use change

**Medium-term**

- Adoption of state and local policies (laws, ordinances, rules, etc.) to reduce water quality impacts of urbanization and protect water quality

**Long-term**

- Improved water quality due to decreases in stormwater runoff and related hydrologic changes
- Improved water quality in Casco Bay

*Metrics and Targets*

| <b>Metric</b>  | <b>Target</b>  |
|--|--|
| Updated “Chapter 500” stormwater management and site development rules   | 2025   |
| Adoption of local low impact development ordinances  | Ten town in the region by 2029                                     |
| Presentations to local leaders or civic groups by CBEP staff   | Average of two per year through 2034                               |
| Provide tools and training to enable municipalities to make more informed decisions regarding stormwater and land use  | Reach 50% of Casco Bay watershed municipalities annually by 2029   |
| Teach municipal and legislative leaders about stormwater, the water quality impact of land use practices, and local policies that can help protect water quality | 25% of Casco Bay watershed towns (about 12 towns) reached annually |

Action 2.2.B Reduce combined sewer overflow discharges

*Goal 2: Address the cumulative water quality impacts of human activity in the Casco Bay watershed.*

*Strategy 2.2: Work collaboratively to reduce key sources of water pollution throughout the watershed.*

*Purpose*

Continue regional progress reducing Combined Sewer Overflow (CSO) discharges to reduce pathogens and nutrients loads entering the Presumpscot River and the Bay.

*Timeline*

Ongoing

*Lead Implementers*

- City of Portland (CSO permit applicant / implementor of sewer separation and CSO storage projects)
- City of South Portland (CSO permit applicant / implementor of sewer separation projects and CSO mitigation projects)
- Portland Water District (PWD; operator of sewer collection system and major WWTFs)
- Maine Department of Environmental Protection (CSO permits, state program, funding)
- Environmental Protection Agency (oversight of state permit programs)

*Other Collaborators*

- Friends of Casco Bay (legal and policy analysis, advocacy)
- Town of Cape Elizabeth (one remaining CSO outfall)
- City of Westbrook (several remaining CSO outfalls)
- Communities with Municipal Separate Storm Sewer System (MS4) Permits (dry weather monitoring, remediation of sanitary to storm sewer cross-connections)

*Location*

Portland, South Portland, and Westbrook.

*Description*

Antiquated sewer systems with underground pipes that carry both sewage and stormwater can lead to the direct discharge of untreated sewage into Casco Bay during heavy rains. Portland, South Portland, and Cape Elizabeth still have combined stormwater/sewer infrastructure that discharges into Casco Bay, while Westbrook's discharges into the Presumpscot River. (A closely related issue occurs when raw sewage finds its way into storm sewers, through cross-connection, or due to leaks in aging underground infrastructure.)

All these communities have worked hard to eliminate Combined Sewer Overflow (CSO) discharge points (or outfalls). The number of active CSO discharge points has dropped from 80 in 1990 to 34 in 2022. Numerous projects are underway or have been completed that reduce discharges from remaining outfalls. Discharges have declined markedly both in absolute volume (cut by nearly  $\frac{3}{4}$  since 2000), and in annual discharge per inch of rainfall.

Despite decades of work, 166.5 million gallons of combined sewer effluent was discharged to Casco Bay waters in 2022 during some 64 CSO discharge “events.” (Illegal cross-connections and leakage of sewage from aging sewer lines into adjacent storm drains provides a less-well documented path for discharge of untreated human wastes to the Bay).

Reduction of CSO discharges is a priority for CBEP, but making progress requires continued leadership from CSO communities and regulatory agencies, often working in collaboration with Portland Water District, which by charter manages wastewater treatment plants, pump stations and interceptor sewers.

Regulators require CSO remediation, but the costs—which are substantial—rest with our communities. The regional sewer system operated by the City of Portland and Portland Water District (PWD) accounts for over 90 percent of CSO discharges in the region. Through the end of 2022, the City and PWD have spent over \$235 million on CSO abatement. The ten-year Integrated Plan - Phase 1, currently being implemented, calls for an additional \$110 million to be spent on CSO abatement. Inflation and changing engineering practice will increase actual costs substantially.

The need for prompt action on CSO control is becoming more acute as climate change triggers more extreme precipitation events. Work to control runoff volume and pollution in the face of more intense precipitation includes CSO abatement, increased use of green infrastructure and low impact development and innovative approaches to stormwater management (Action 2.2.A).

CBEP staff will support communities and regulators in efforts to solve financial and technical challenges, to educate area residents about what they can do to reduce combined sewer discharges (for example, by removing sump pumps and roof leaders), and to publicize regional efforts to address CSOs.

### *Resources*

This Action will be implemented primarily by PWD and our CSO communities, especially Portland, South Portland, and Westbrook. Costs for remaining work addressing CSOs are substantial and growing.

CBEP staff will play a supporting role for CSO implementation, principally by helping communicate about community CSO abatement efforts and the importance of continued reductions in discharges.

### *Outputs*

- CSO remediation projects
- Repair or lining of leaking sewer pipe, reducing flow of untreated sewage to stormwater conveyances
- CBEP staff continues to support regional efforts and highlight regional successes reducing discharges

### *Outcomes*

#### **Short-term**

- Reduced volume of CSO discharges
- Reduced numbers of active CSOs



**Medium-term**

- Local improvements in water quality

**Long-term**

- Improved water quality in Casco Bay

*Metrics and Targets*

| <b>Metric</b>  | <b>Target</b>   |
|--|---|
| Number of remaining active CSO discharge locations   | Under 30 by 2029, with additional reductions by 2034                          |
| Volume of CSO discharges per inch of annual rainfall<br>2022 Baseline = 3,512,570 gallons per inch of rainfall       | 20% decline by 2029 from 2022 baseline with continued reductions through 2034 |
| Total volume of CSO discharges per inch of annual rainfall<br>2019 Baseline = 4,878,400 gallons per inch of rainfall | 2019 baseline exceeded no more than twice through 2034                        |

Action 2.2.C Address pollution from on-site wastewater treatment systems like septic tanks

*Goal 2: Address the cumulative water quality impacts of human activity in the Casco Bay watershed*

*Strategy 2.2: Work collaboratively to reduce key sources of water pollution throughout the watershed*

#### *Purpose*

Develop plans and begin to implement projects to reduce nutrient and pathogen pollution entering our waters from on-site wastewater treatment systems like septic tanks and overboard discharges.

#### *Timeline*

This Action will begin in 2024. A report on water quality impacts of on-site wastewater systems and recommended approaches to reduce them will be completed by the end of 2025. Further efforts will depend on findings from the first two years' work.

#### *Lead Implementers*

- Cumberland County Soil and Water Conservation District (studies and implementation)
- Maine Department of Environmental Protection (funding)
- Casco Bay Estuary Partnership (funding, coordination)
- Casco Bay Regional Shellfish Working Group (access to existing data and data tools)
- Greater Portland Council of Governments (connections with municipalities)
- Maine Department of Marine Resources (access to data on area closures)

#### *Other Cooperators*

- Friends of Casco Bay (legal and policy analysis)
- Subsurface Wastewater Program, Maine Department of Health and Human Services (technical assistance)
- Local governments (ordinance review and implementation)

#### *Location*

Casco Bay watershed, especially coastal areas and lakeshores in rural and suburban communities that lack municipal sewer systems.

#### *Description*

Onsite wastewater systems can have significant impacts on water quality both in coastal waters and inland areas. Anecdotal evidence and results of water quality monitoring suggest that septic tanks and "overboard discharges" are sources of bacterial and nutrient contamination of Casco Bay, rivers and streams, and lakes.

Addressing pollution from inadequate or failing on-site wastewater systems could reduce bacterial contamination of lakes and coastal waters, allow reopening of some clam flats, and reduce nutrient loading to lakes and the Bay. However, we are only generally aware of the location and condition of onsite wastewater treatment systems in the region. Maine's Shellfish Advisory Council has recently flagged poorly maintained septic tanks and overboard discharges as a top statewide concern for the shellfish industry.

Most of our larger cities and towns are served by the Portland Water District's wastewater systems. Several mid-sized communities have dedicated municipal wastewater treatment systems. But most towns in the watershed lack sewers, so businesses and residents depend on on-site treatment, usually septic tanks. Even in towns and cities that do have wastewater systems, service often does not extend to all residents, especially those living further from town centers or in isolated areas.

Maine has among the oldest housing stock in the nation, so many on-site wastewater treatment systems are aging. Maintenance is often deferred. Most lakeshore "camps" and coastal "cottages" rely on septic tanks or other on-site wastewater treatment systems. While Maine law requires septic tank inspections when property in the shoreland zone is transferred, septic systems on older homes may not have been inspected or maintained for decades. Many systems do not function as intended and may pose a threat to water quality. Even well-maintained septic systems have cumulative water quality impacts because septic tanks (and most other on-site wastewater systems) are not designed to reduce nitrogen pollution, a particular concern in marine waters. While numbers have been declining for years, just under one hundred permitted "overboard discharges" or "OBDs" remain that discharge lightly treated wastewater to Casco Bay waters. Simple outhouses are still found on some Casco Bay islands. When poorly maintained they also can result in shellfish closures.

Towns have records going back decades about septic systems, including information on when they were constructed, where they are located, and how many people they were designed for. (Older systems may be undocumented or incompletely documented). While some of these records have been scanned and are available online, many are available only in paper form. Transferring data to electronic formats for mapping and analysis often requires hand digitization. The Casco Bay Regional Shellfish Working Group's "Community Intertidal Data Portal" includes a tool to help transfer, organize, and display data from either town records or on-site observations.

This multi-year Action will focus on understanding local and regional impacts of onsite wastewater treatment systems and developing strategies to address them. Over the next two years, we will gather data on the distribution, age, and condition of septic tanks and permitted overboard discharges. We will identify locations where aging or failing septic tanks are most likely to have significant effects on water quality (in both lakes and the Bay), assess strategies, and evaluate costs. This effort will culminate in a regional meeting (a "Septic Tank Summit") to discuss the study's findings, share ideas and information, and establish priorities for next steps.

#### *Resources*

COSWCD will lead this Action, with funding and other assistance from CBEP.

CBEP will allocate about \$50,000 in BIL funds annually to this Action from 2023-2024 through 2026-2027. Additional funds (under \$5,000) may be used to help cover costs associated with planned events, such as a "Septic Tank Summit." Allocations may increase in 2026 and 2027, if resources allow, as we shift towards implementation priority strategies to reduce pollution from septic tanks.

#### *Outputs*

- Data on location and age of septic tanks and other on-site wastewater systems

- Identification of locations most at risk from on-site wastewater systems
- Report on strategies to reduce impacts
- “Septic Tank Summit” meeting

*Outcomes*

**Short-term**

- Develop strategies for reducing pathogen and nutrient pollution from aging or failed septic tanks

**Medium-term**

- Reduce pathogen and nutrient pollution from aging or failed septic tanks and overboard discharges

**Long-term**

- Improved water quality in affected waters
- Prevention of further deterioration or improvement of water quality in impaired waters

*Metrics and Targets*

| <b>Metric</b>  | <b>Target</b>  |
|--|----------------|
| Data on location and condition of septic tanks assembled | By end of 2024 |
| Report on onsite wastewater treatment systems            | By end of 2025 |
| “Septic Tank Summit”                                     | 2025           |
| Stakeholder groups attending Septic Tank Summit          | Ten            |

### Strategy 2.3: Develop and implement local efforts to address water quality challenges

While land use changes and a growing human population are common drivers of water quality problems, the way those causes play out varies from place to place. Water quality solutions need to reflect local sources and site-specific information. CBEP will address local and site-specific water quality challenges by facilitating development of watershed-based plans and working to improve water quality in impaired and urban streams.

Action 2.3.A Increase data gathering and stressor assessments to accelerate development of watershed management plans

*Goal 2: Address the cumulative water quality impacts of human activity in the Casco Bay watershed*

#### *Strategy 2.3: Develop and implement local efforts to address water quality challenges*

##### *Purpose*

Accelerate development of watershed management plans, create plans more likely to address water body impairments due to better access to data, and ensure eligibility for Section 319 funding.

##### *Timeline*

This Action will kick off in 2024. The initial focus will be on a) identifying and addressing information bottlenecks that impede development of and updates to watershed management plans and b) identifying priority water bodies for stressor assessments and plan development. In subsequent years, the effort will emphasize data collection, stressor assessment, and plan development for priority waters.

##### *Lead Implementers*

- Cumberland County Soil and Water Conservation District (needs assessment, watershed plan development)
- Casco Bay Estuary Partnership (funding, oversight)
- Maine Department of Environmental Protection (funding through “Section 319” grants and State Revolving Fund, oversight of watershed planning, guidance on identification of key stressors, oversight of watershed planning and approval of completed Plans)

##### *Other Collaborators*

- Portland Water District (data on lake water quality and land use)
- Watershed groups (local knowledge and assistance)
- Local governments (local assistance, data access)
- Friends of Casco Bay (prioritization)
- Greater Portland Council of Governments (connections with municipalities)

##### *Location*

Watershed wide, with additional work in priority watersheds. Priority watersheds will be determined based on review of available information, and opportunities to improve water quality.

##### *Description*

DEP-approved Watershed-based Management Plans (WBPs) identify priorities for water quality improvement based on watershed surveys, stream stressor identification, geospatial analysis, and

community priorities. In Maine, formal WBPs (either “Nine Element Watershed Based Plans” or “Lake Watershed Based Protection Plans”) are usually required to access EPA/DEP implementation funding for nonpoint source pollution protection and watershed restoration projects.

Funding for Watershed-based Management Plan development has been in short supply for a decade resulting in a decline in the number of approved WBPs. As of mid-2023, there were only three (3) active and approved Nine Element Plans, and six (6) Lake Plans, throughout the Casco Bay watershed. Other WBPs will expire in the next few years.

Costs of developing WBPs have grown, due both to inflation and the need for more in-depth “stressor assessments” that evaluate causes of water quality impairment. Some recently completed WBPs have cost over \$100,000, but most still cost less. Lack of available funding and rising costs have become a serious barrier to updating old or developing new WBPs. Opportunities may exist for cost reductions, especially by coordinating Plan development practices, gathering or collecting data needed for Plan development, and simplifying access to environmental data.

We will collaborate to develop a shared regional approach to developing WBPs that will:

- Assemble a working group (or other coordinating structure) to oversee the Action;
- Identify priority locations for updating or developing WBPs;
- Develop procedures and tools to streamline preparation of WBPs that meet EPA requirements;
- Accelerate data collection and development of stressor assessments;
- Work together to seek supplementary funds to prepare plans; and
- Complete priority plans.

Priorities for watershed plans will be based on local needs and community input, as well as by reference to lists of impaired and threatened waters, such as Maine’s list of Priority Watersheds, Maine’s Impervious Cover TMDL, and the most recent available “303(d)” list of impaired waters.

#### *Resources*

CCSWCD will lead implementation of this Action, with funding provided by CBEP.

We anticipate allocating about \$50,000 in BIL funds to this Action annually from 2023-2024 through 2026-2027.

A key purpose of this Action is to seek efficiencies to reduce cost of watershed management plans. Available CBEP BIL funds are insufficient to fund all the watershed plans needed in our region. While costs vary depending on location and issues, typical Plans are likely to cost over \$50,000. Therefore, significant external funds will be needed to advance next steps and develop priority watershed plans.

CBEP and CCSWCD will work in association with plan sponsors (often municipalities or lake associations) to seek additional funds to support plan development.

### *Outputs*

- Report outlining steps to reduce regional costs of watershed plan development through economies of scale, simplifying data access, increasing data collection, or standardizing processes
- Tools, checklists, and data archives that help implement report recommendations
- List of priority locations for watershed planning that identifies for each watershed primary needs such as updated watershed surveys or better stressor assessment
- Plans for data collection and stream stressor assessment for priority watersheds
- Data collection to support stream stressor assessments
- Annual update report (2024 through 2028) on data collection, stressor assessments and watershed plan development for priority watersheds
- Completed stressor assessments
- Proposals submitted for funding of development of watershed plans
- Completion and approval of Watershed Management Plans

### *Outcomes*

#### **Short-term**

- Establish priorities for Watershed Management Plan development

#### **Medium-term**

- Implement strategies to reduce cost of watershed plans
- Develop approved watershed plans
- Improved strategies for watershed protection based on detailed assessment of local conditions and needs

#### **Long-term**

- Additional Section 319 implementation grants awarded for projects based on new or updated WBPs
- Additional non-point source *projects* implemented to help improve water quality
- Improved water quality and resilience of aquatic ecosystems

*Metrics and Targets*

| <b>Metric</b>  | <b>Target</b>  |
|--|--|
| Convene a working group to identify data collection needs and establish priorities for stressor assessments and watershed plan development within the Casco Bay region | By September of 2024   |
| Completed plans for data collection and stream stressor assessment for priority watersheds   | Minimum of one per year 2025 through 2028, with a goal of six total plans prepared by 2028 |
| Data collection to support stressor assessment for priority watersheds   | Data collection occurring in two watersheds each year 2025 through 2028                    |
| New or updated stressor assessments completed  | Six watersheds by 2028   |
| Grant proposals submitted to support creation of WBPs  | One per year 2026 through 2028   |
| Complete or update first new or updated Watershed Based Management   | One by 2028  |



Action 2.3.B Improve water quality in impaired and urban streams

*Goal 2: Address the cumulative water quality impacts of human activity in the Casco Bay watershed*

*Strategy 2.3: Develop and implement local efforts to address water quality challenges*

#### *Purpose*

Focus regional effort on the challenges of managing water quality, especially in urban and suburban watersheds, to protect water quality, improve aquatic habitats, reduce nutrient and pathogen pollution, and ameliorate the impacts of road salt on streams.

#### *Timeline*

This action continues and calls attention to existing activities that address water quality in some of our most impacted and vulnerable watersheds. These activities are already underway and will continue through 2034.

#### *Lead Implementers*

- Long Creek Watershed Management District (implementation in Long Creek Watershed Management Plan and SWiM program to reduce use of winter deicing products)
- Maine Department of Environmental Protection (funding, data collection, designation of impaired waters, Impervious Cover TMDL, oversight of MS4 programs, watershed programs)
- Interlocal Stormwater Working Group (ISWG; implement MS4 programs)
- Cumberland County Soil and Water Conservation District (leadership of ISWG, implementation, especially site visits, inspections, and engineering)

#### *Other Cooperators*

- Casco Bay Estuary Partnership (funding, coordination)
- Friends of Casco Bay (advocacy and assistance with monitoring)
- City of Portland (implementation in several urban impaired stream watersheds)
- City of South Portland (implementation in several urban impaired stream watersheds)
- Local governments (implement MS4 programs, comprehensive plans, local ordinances)
- Maine Department of Transportation (implement strategies to reduce use of winter deicing products)

#### *Location*

Urban and impaired streams in the Casco Bay watershed such as the urban stream of the lower watershed and tributaries to the Presumpscot River.

#### *Description*

This Action highlights ongoing efforts to address water quality challenges in our most impacted and vulnerable watersheds, in both urbanized and rural areas with persistent water quality problems.

Several long-standing regional efforts have been established to address the water quality challenges associated with urbanization. These ongoing initiatives will continue in coming years.

- The Interlocal Stormwater Working Group (ISWG) is a regional coalition of communities that work collaboratively to implement the MS4 permit in the Casco Bay region. The group acts as a clearinghouse on information and ideas and assists towns with permit compliance.
- The Long Creek Watershed Management District (LCWMD) works to protect water quality in the Long Creek Watershed on behalf of about 140 landowners. The effort is important not only as a novel public-private partnership, but also as a testbed for solutions to some of our most intractable water quality challenges. Extensive monitoring has helped highlight the importance of the impacts of chlorides (derived from winter deicing products), heat, and drought on the health of our streams. Urban stream restoration projects have demonstrated that it is possible to improve habitat quality even in sites that no longer support natural hydrologic regimes. Investments in parcel inspections, street sweeping, and other ongoing activities have shown the benefits of robust operations and maintenance programs to address the impacts of urbanized areas and their negative impacts on watersheds and water quality.
- The Maine Stormwater Conference, held every two years, offers opportunities for Maine engineers, designers, local officials, and others to hear from each other and from national experts.
- Winter deicing products (“road salt”) pose one of the most intractable challenges to the health of Maine streams. Dissolved salt finds its way to our streams via runoff and groundwater. In some streams, related exposure thresholds are exceeded for weeks or months at a time. Salt is toxic to many freshwater organisms, so elevated levels leave streams with degraded insect and fish communities. Unfortunately, it has proved difficult to remove salt from the water, so the primary way to reduce impacts of salt on our streams is to reduce use of salts in the first place. That poses legal, economic, and even cultural challenges that will require ongoing effort from many members of the Partnership to address. LCWMD is piloting efforts to reduce salt use through its Sustainable Winter Management (SWiM) program. Legislative outreach efforts are underway by several partners to support legislation to limit liability winter maintenance operators following approved methods.

Other problems remain and will require new and expanded efforts to address them. For example, tributaries to the Presumpscot River in the rural and urbanizing portions of its watershed show persistent water quality problems, such as low dissolved oxygen and elevated bacteria levels. Monitoring suggests these problems are getting more widespread and persistent. Elevated sediment loads on the Pleasant River may be harming the brook floater (a state Threatened freshwater mussel). Development activities in the Stroudwater watershed are pushing local land use past thresholds where water quality and ecological impacts are likely. Monitoring has been more limited than on the Presumpscot, but water quality on the river is already problematic. Bacteria levels regularly violate applicable water quality criteria.

#### *Resources*

These activities will continue to be led by partners, especially DEP, ISWG, CCSWCD, and local governments.

CBEP’s existing staff has and will continue to support these and related efforts by participating on boards and working groups (CBEP Director) and offering technical assistance (Director and Staff Scientist). Time commitment varies year to year between about 10% and 20% of an FTE.

CBEP will also seek opportunities to play a catalytic role convening regional conversations around emerging issues (See Action 4.2.A) or funding demonstration projects via relevant grant programs (described elsewhere).

*Outputs*

- Bimonthly ISWG Meetings (6 per year)
- Implementation of MS4 permits by local communities
- Service of CBEP staff on the LCWMD Board of Directors
- Updated Long Creek General permit
- Completion of the “Hannaford Plaza” constructed wetland project in the Long Creek Watershed
- Implementation of the Long Creek Watershed Management Plan
- Biennial Stormwater Conferences
- Exploration of approaches to reducing impact of road salts on water quality
- Legislative outreach in support of limited liability legislation to reduce incentives for over application of salt by winter maintenance contractors

*Outcomes*

**Short-term**

- Better implementation of MS4 permits

**Medium-term**

- Improved water quality in Long Creek
- Innovative approaches to reducing impact of road salts on stream health

**Long-term**

- Improved water quality in urban streams
- Prevention of further deterioration or improvement of water quality in impaired waters

*Metrics and Targets*

| <b>Metric</b>   | <b>Target</b>   |
|---|-----------------|
| Long Creek General Permit                                       | By 2026         |
| Completion of the “Hannaford Plaza” constructed wetland project | By 2025         |
| Maine Stormwater Conferences                                    | Every two years |

### Strategy 2.4: Track emerging threats to water quality

We need to both address long-standing water quality challenges and remain alert for new and emerging threats to water quality. CBEP plays a key role gathering information on new, hypothesized, or emerging threats to water quality, and evaluating their impact on Casco Bay and the waters of the Casco Bay watershed.

#### Action 2.4.A Study the prevalence of PFAS in Casco Bay

*Goal 2: Address the cumulative water quality impacts of human activity in the Casco Bay watershed*

#### *Strategy 2.4: Track emerging threats to water quality*

##### *Purpose*

Coordinate with, and where necessary, supplement ongoing efforts to evaluate the presence and potential sources of PFAS in Casco Bay waters, sediments, fish, and shellfish.

##### *Timeline*

Data collection by DEP, wastewater plant operators and FOCB has already begun.

##### *Lead Implementers*

- Friends of Casco Bay (implementor, boat access, coordination, and stakeholder engagement)
- Bigelow Center for Ocean Sciences (sample handling, laboratory analysis and science)
- Maine Department of Environmental Protection (collect data on PFAS, including concentrations in soils and sediment, shellfish tissue, wastewater treatment facility sludge and discharges)

##### *Other Cooperators*

- U.S. Environmental Protection Agency (regional context and support)
- Wastewater treatment plant operators (sample collection)

##### *Location*

Casco Bay wide. Specific sample locations will be selected based on requirements of state programs and evaluation of pathways for PFAS delivery to Casco Bay.

##### *Description*

PFAS (Per- and Polyfluorinated Substances) pollution is a significant and growing problem. For decades, PFAS compounds have been used in a wide range of consumer goods and industrial products. They are environmentally persistent and readily find their way into the environment. PFAS carried in wastewater poses challenges for wastewater treatment systems, which act as conduits of PFAS between consumer uses and the environment. Land-based disposal of sewage sludge, for example, has led some Maine agricultural lands to become contaminated with PFAS. This soil contamination has led to contaminated wells, a deer consumption advisory and agricultural lands taken out of production. Available alternatives for disposal of sludge have caused significant logistical challenges and increased costs for wastewater treatment.

In 2021, the Maine legislature passed several laws addressing PFAS contamination. These included a law, “An Act To Stop Perfluoroalkyl and Polyfluoroalkyl Substances Pollution” that effectively bans sale of all

products containing “intentionally added” PFAS compounds by 2030. Another law requires manufacturers of pesticides registered in the state (beginning this year) to attest whether the formulation contains PFAS compounds or has ever been stored in a fluorinated HDPE container (a potential source of PFAS contamination).

The Biodiversity Research Institute, back in 2009, conducted a survey of toxic contaminants in sixteen osprey eggs from Casco Bay. Eleven of sixteen eggs showed PFOS (Perfluorooctane sulfonic acid) at levels above a published adverse effects threshold for chickens. One egg contained a concentration of PFOS over 2500 nanograms per gram, more than twenty times greater than the applicable levels of concern. At the time that was the highest recorded concentration from Maine wildlife. More recently (2021), DEP’s Surface Water Ambient Toxics (SWAT) program found low levels of PFAS from some sites within Casco Bay, including from Portland Harbor. Early in 2023, Maine CDC issued fish consumption advisories for freshwater fish in portions of the Presumpscot River, where testing has shown elevated PFAS levels. PFAS are finding their way into aquatic organisms, and bioaccumulating and posing a risk to piscivorous birds, such as osprey, bald eagle, and kingfisher.

Unfortunately, we have, until recently, had little information to help determine how these compounds are entering the Casco Bay food webs. In 2022, the Maine legislature passed LD 1911, which required monthly PFAS testing of licensed discharges in 2022 and 2023. DEP also maintains a map of state PFAS investigations, showing sites where soils or groundwater have been tested for PFAS, as well as known locations of previous land disposal of potentially contaminated sewage sludge or septage. As these data accumulate, they can be leveraged to help focus PFAS monitoring efforts.

Measurement of the prevalence of these compounds in Casco Bay waters, sediments and biota can shed additional light on where PFAS are found and help infer how they found their way to the Bay. Data collected in the next few years can provide a baseline to allow us to evaluate the effectiveness of PFAS control strategies, including the effectiveness of Maine’s first of its kind law to ban most consumer goods containing PFAS compounds by 2030.

In 2023, Friends of Casco Bay and Bigelow Center for Ocean Sciences began sampling Casco Bay at established monitoring sites along the coast and extending to Broad Sound. This study will provide information regarding levels of PFAS compounds throughout the Bay, and hopefully set the stage for more detailed studies to identify sources of PFAS in the Bay. DEP’s SWAT program has expanded efforts across the state to identify PFAS in fish and shellfish. Future studies (by these or other groups) may expand to search for PFAS in other organisms. But studying organic contaminants like PFAS is costly. Costs of sample collection and laboratory analyses can run into the many hundreds or even thousands of dollars per sample. Comprehensive studies are likely to run into the hundreds of thousands of dollars.

The Partnership will support these emerging efforts, especially by helping to identify funding sources and assisting with raising funds. CBEP staff can assist as well, by participating in discussions about research priorities or study designs, by working with Friends of Casco Bay and Bigelow, and engaging in their efforts to draw together stakeholders to identify and explore addressing coastal sources of PFAS contamination. All this work is contingent upon funding for this emerging science and policy issue.

*Resources*

PFAS studies will be led by Friends of Casco Bay, Bigelow Laboratory, and the Department of Environmental Protection. Ongoing state efforts to study PFAS will be a key component of the overall effort, while FOCB and Bigelow have already successfully raised funds for and begun field sampling, with a focus on collecting data complementary to the information collected by state agencies.

Comprehensive studies on PFAS in Casco Bay will likely cost hundreds of thousands of dollars, so CBEP staff and partners will continue efforts to raise dedicated funds to study PFAS in Casco Bay.

This Action will require limited time from existing CBEP staff (Director and Staff Scientist) to support the efforts of the partners by participating in stakeholder meetings and assisting with site selection and data analysis.

*Outputs*

- Studies of presence, prevalence, and concentration of PFAS compound in the waters and sediments of Casco Bay and its tributaries that will complement current studies focused on fish and shellfish tissue sampling to give a more complete picture of PFAS distribution.
- Report on sources of PFAS contamination to Casco Bay
- Actions to help address PFAS loading and contamination in Casco Bay, as supported by improved understanding of prevalence and sources

*Outcomes*

**Short-term**

- Understanding of prevalence and distribution of PFAS in Casco Bay

**Medium-term**

- Evaluation of sources of PFAS entering coastal waters

**Long Term**

- Management actions and policies to reduce sources of PFAS to Casco Bay from PFAS
- Reduced prevalence and concentrations of PFAS in the living organisms of Casco Bay including shellfish, fish, birds, and marine mammals
- Analysis of PFAS trends following policy changes

*Metrics and Targets*

| <b>Metric</b>  | <b>Target</b>    |
|--|------------------|
| Initial pilot-scale study of PFAS in Casco Bay sediments and waters, designed to inform design of future studies | By 2026          |
| Additional follow-up studies   | One more by 2029 |

### *GOAL 3: Engage communities and provide information and tools to support decisions to protect and restore Casco Bay*

Casco Bay is an anchor for the region's cultural identity and a valued national asset, yet the Casco Bay watershed continues to face some of Maine's more intense growth and development pressure as well as numerous impacts from climate change. Through community engagement activities, the Partnership can build relationships with partners, communities, and community leaders, and collaborate with them in the work of stewarding and protecting Casco Bay and its watershed. CBEP can play a significant role in increasing community pride and connection to the Bay through public outreach initiatives that illuminate the region's ecological assets, and help citizens and leaders prepare for climate disruptions. CBEP can also drive community engagement efforts that expand our reach to better reflect and serve the growing diversity of communities within the watershed.

*Strategy 3.1: Engage residents and visitors with stewardship of our waters, by highlighting the watershed's importance and sharing information on how to protect it*

Watershed residents who enjoy a sense of pride in place and understand Bay-related issues are more likely to adopt practices and actions that benefit the Bay and watershed. CBEP will work with partners to develop and deliver consistent and compelling messages that can help inspire and motivate bay residents, visitors, and other target audiences to care about and participate in protecting and restoring Casco Bay. CBEP will also support educational programming and community science programs that foster long-term connection and stewardship.

Action 3.1.A Provide information and outreach to target audiences in the Casco Bay region  
*Goal 3: Engage communities and provide information and tools to support decisions to protect and restore Casco Bay*

*Strategy 3.1 Engage residents and visitors with stewardship of our waters, by highlighting the watershed's importance and sharing information on how to protect it*

*Purpose*

Communicate effectively and creatively to old and new audiences about the values of and issues facing Casco Bay, through updated branding and targeted messaging. Better informed residents and visitors will become better Bay stewards and take steps to protect Casco Bay and its waters.

*Timeline*

Ongoing from 2023.

*Lead Implementers*

- Casco Bay Estuary Partnership (coordination, outreach materials, events)
- Nongovernmental organizations (both target audience and outreach)

*Other Collaborators*

- Regional planning agencies (outreach implementation)
- State and federal agencies (outreach implementation)
- Higher education institutions (outreach implementation)
- Local governments (target audience)
- K-12 Institutions (target audience)
- Community leaders (target audience)
- New underserved and under-represented communities (target audience, see Strategy 3.3)
- Businesses (target audience, outreach partner)

*Location*

Watershed- wide.

*Description*

Community engagement is central to CBEP's mission to protect and restore Casco Bay. Watershed residents and visitors who appreciate the many assets of Casco Bay and enjoy a strong sense of place are more likely to adopt practices that benefit the Bay and become good environmental stewards.

CBEP will continue to work with partner organizations to update and deliver Bay and watershed related information via CBEP's website and e-newsletter as well as other publications and social media venues. Staff will also increase the use of these communication strategies to amplify the work of the staff and increase the reach and visibility of the work of our partners. Staff will produce a body of general (i.e., not time-sensitive) informational and educational content to be deployed on social media channels when there is less current project news to report on.



To strengthen CBEP's role as a communications hub, increase public awareness of the Partnership, and reach new underserved and underrepresented (UU) audiences, including inland and rural communities, CBEP will evaluate the effectiveness of various community engagement tools and messages in reaching new and target audiences. Once we have evaluated these tools and messages (by the end of 2024), CBEP will revise its brand with the aim of increasing public awareness of the Partnership, reaching new audiences, and strengthening CBEP's role as a communications hub.

On the surface, the branding exercise will update the look of CBEP outreach and communications materials, such as our logo, tag lines, web pages, and e-newsletter. But on a deeper level, the exercise will craft a relatable, compelling story that expresses who we are. The new story will express CBEP's purpose and values, align with partner messaging, and support efforts to engage new target audiences. Efforts to reach new audiences will include making information and messaging accessible to more people using well-established practices like expanding use of human stories, developing infographics to convey important ideas at a glance, and editing written materials to ensure readability for a wide audience.

### *Resources*

Ongoing public education and outreach efforts will require significant CBEP staff capacity in coming years. Fully implementing this Action (along with other outreach and community engagement Actions) is likely to require additional staff capacity. We anticipate hiring additional staff to assist with this and other communications and outreach tasks. Long-term (more than three years) funding for a position, however, cannot be guaranteed. CBEP will continue to seek novel partnership and funding approaches that can support outreach, communications, and community engagement needs.

Core NEP funding (up to \$30,000) will be used in 2024 to work with a communications consultant on a rebranding effort. Annual expenses for communications products such as our website, newsletter, social media accounts and annual report are expected to run on the order of \$5,000 to \$10,000 per year, with additional costs required in some years for special publications.

### *Outputs*

- Evaluate periodically and deliver CBEP outreach products, including e-newsletter, annual report, and other products, for relevancy to new audiences and organizational program changes
- Produce new creative and accessible outreach content disseminated primarily through digital and social media
- Collect data on and conduct evaluation of website, e-newsletter, and social media effectiveness and consumption
- Develop a new Casco Bay "brand" that includes a new mission statement, logo, and other design elements

### *Outcomes*

#### **Short-term**

- Increased knowledge of Casco Bay resources and priority issues
- An increased personal connection to Casco Bay and its watershed

**Medium-term**

- Increased understanding of our audiences
- A wider audience for CBEP and partner communications

**Long-term**

- Community support for policies and decisions that protect and restore the Bay and Watershed

*Metrics and Targets*

| <b>Metric</b>   | <b>Target</b>          |
|---|------------------------|
| Evaluate and update e-newsletter and annual report content and format   | Annually               |
| Produce digital and social media educational content about the Bay and Watershed and highlighting work of CBEP and partners | Twice a week           |
| Online communication metrics, including website visits, social media engagements, and email newsletter open rates           | Evaluated twice a year |
| New branding and outreach materials   | By end of 2024         |
| New strategies for effective delivery to under-targeted audiences   | 2025                   |

Action 3.1.B Promote and facilitate Bay and Watershed-focused community science activities  
*Goal 3: Engage communities and provide information and tools to support decisions to protect and restore Casco Bay*

*Strategy 3.1: Engage residents and visitors with stewardship of our waters, by highlighting their importance and by sharing information about how to protect them.*

#### *Purpose*

Promote and support community science activities in Casco Bay by providing technical assistance and establishing a regional network.

#### *Timeline*

Ongoing starting in 2024. Workshop and planning effort in 2025.

#### *Lead Implementers*

- Friends of Casco Bay (volunteers, data access, outreach)
- Wells National Estuarine Research Reserve and the Marine Invader Monitoring and Information Collaborative (MIMIC)
- Presumpscot Regional Land Trust (Presumpscot and Stroudwater water quality data collection; fish counts at Highland Lake dam)
- Maine Healthy Beaches (community water sample collectors at select beaches)
- Maine Department of Marine Resources (volunteer phytoplankton observers)
- Maine Department of Environmental Protection (Volunteer River Monitoring Program)
- Lake Stewards of Maine (lake monitoring programs)
- Casco Bay Estuary Partnership (grants, coordination, data quality assurance)

#### *Other Collaborators*

- Lake associations (lake monitoring)
- Lakes Environmental Association (lake monitoring)
- K-12 educational institutions (classroom science projects)
- Maine Environmental Education Association (connections to educators and other assistance)
- Cumberland County Soil and Water Conservation District (watershed education programs)
- Land trusts (community engagement activities)
- Higher educational institutions (technical assistance, study design, data analysis and training)

#### *Location*

Watershed wide.

#### *Description*

Community engagement with the natural world is a continuum that often begins with a pivotal outdoor experience and culminates with environmental action. CBEP and partners can use a variety of tools and programs to help people along that continuum. Community science can be an effective way to improve awareness of the natural world, increase knowledge of our waters, and encourage people to take action to protect the Bay.

“Community science” refers to a growing practice in which community members collaborate with practicing scientists or others with relevant knowledge or skills (including local, historical, or Indigenous knowledge) to conduct studies to address community priorities. Community members have a voice in determining what questions to ask, and participate in designing studies, gathering data, and interpreting results. Community science includes a wide range of different practices through which communities use scientific tools and methods to answer questions and see solutions to local challenges.

Several CBEP partners already manage programs that engage community members in science, observation, and data collection. Friends of Casco Bay runs the successful “Water Reporter” program that enlists volunteers to collect observational data about how the Bay is changing. The Wells National Estuarine Research Reserve works with Casco Bay island residents to document the presence of invasive marine species. Presumpscot Regional Land Trust coordinates volunteers who monitor the Presumpscot and Stroudwater rivers. Maine’s Department of Marine Resources engages volunteer observers to study the composition of the plankton and look for harmful algae species. Land trusts, towns and nonprofits enlist volunteers to take photographs or observe the timing of flowering of certain plants to show impacts of climate change and sea level rise. Many lake associations sponsor local water quality monitoring efforts. These ongoing monitoring programs are, and will continue to be, the backbone of volunteer-based monitoring of Casco Bay and the other waters of the watershed.

Proposals to CBEP’s Community Engagement Grant program frequently include requests for funding for community science projects (often submitted by classroom teachers). These proposals demonstrate persistent interest in science that address community concerns. CBEP staff and other partners help with study design and development of data quality assurance practices when resources permit, but much more could be done to engage and empower communities through collaborative science.

Over the next few years, CBEP will work to expand support for community science (including volunteer monitoring) in our region. This effort will begin small, with targeted grants and increased technical assistance from CBEP staff (made possible by additional outreach and science staff capacity). This phase will include:

- Funding to support locally driven projects through Monitoring Infrastructure Grants (Action 4.3.A) and Community Engagement Grants (Action 3.1.D);
- Assistance with methods and research design, as resources permit; and
- Support (financial and technical) for and assistance with development of Quality Assurance Project Plans (QAPPs) (which are required whenever data collection is supported with NEP funds).

As the effort gets underway, CBEP staff will convene interested partners, evaluate community interest and capacity, and consider what further role CBEP can play in facilitating volunteer monitoring and community science initiatives. CBEP could, for example, offer a clearinghouse to connect community-based organizations with people and organizations with relevant expertise, help community science project leaders spread the word about their efforts, develop a list of ways to fund community science projects, or host periodic events for highlighting community science successes and challenges.

Special attention should be paid to prioritizing and/or making accessible community science opportunities and funding for underserved communities.

*Resources*

Multiple CBEP partners already support community-engaged science, such as volunteer monitoring programs and classroom science projects. This Action will be built on that foundation.

CBEP staff time will be allocated towards growing regional community science. CBEP outreach staff (approximately 10% to 20% of an FTE annually) will compile information on current community science programs, assess needs for a regional delivery framework, and establish a network or clearinghouse to support community science. CBEP Staff Scientist will allocate up to 10% of their time to assist with research planning and data quality assurance.

Proposed grant funding will initially be awarded through Monitoring Equipment and Community Grant programs described elsewhere. A dedicated Community Science grant fund (up to \$25,000 annually) may be created in the future if interest in community science grows and resources allow.

*Outputs*

- Grants in support of community science projects
- QAPPs developed to support community science projects
- A planning meeting or workshop for community-based groups and existing CBEP partner organizations to explore the development of community science programs
- Community science needs assessment
- Events that provide an opportunity for community science participants to share lessons learned, share data, and inspire others

*Outcomes*

**Short-term**

- Broader support for community science initiatives
- Wider range of opportunities, attracting a larger pool of prospective volunteers

**Medium-term**

- Students, teachers, local board members, and community leaders are better connected to professional scientists and resources
- Better coordination of and support for community science programs on Bay related activities

**Long-term**

- Widespread community engagement and stewardship on behalf of the Bay and watershed

*Metrics and Targets*

| <b>Metric</b>   | <b>Target</b> |
|---|---------------|
| Grants supporting community science for community-based organizations, municipalities, schools, and other audiences | Three by 2029 |

|   |   |
|---|---|
| QAPPs developed for community science efforts, on average   | One per year through 2029                                       |
| Number of participants involved with and collecting data through community science or citizen science efforts led by members of the Partnership | 10% increase by 2029 compared to 2024                           |
| Number of attendees at a community science planning meeting or workshop   | Five organizations attending                                    |
| New community science programs or projects in the watershed, on average   | Two programs or projects started every three years through 2034 |

Action 3.1.C Deliver Bay and Watershed-focused education programs to engage learners of all ages

*Goal 3: Engage communities and provide information and tools to support decisions to protect and restore Casco Bay*

*Strategy 3.1: Engage residents and visitors with stewardship of our waters, by highlighting their importance and by sharing information about how to protect them*

*Purpose*

Provide educational opportunities that inform students of all ages about the Bay and the Watershed and foster a sense of stewardship of our waters.

*Timeline*

Ongoing

*Lead Implementers*

- Cumberland County Soil and Water Conservation District (watershed education programs)
- Portland Water District (watershed education programs)
- Gulf of Maine Research Institute (marine education programs)
- Higher educational institutions (marine and coastal science and policy courses)

*Other Collaborators*

- K-12 schools (program recipient)
- Maine Environmental Educators Association (outreach, coordination, and support)
- Maine Mathematics and Science Alliance (outreach, coordination, and support)
- Maine Audubon (school programs, summer activities, adult events)
- Land trusts and other community-based organizations (community engagement activities)
- Casco Bay Estuary Partnership (coordination and assistance)

*Location*

Watershed-wide, but many programs focus on students in specific towns, such as our “MS4” communities, the Sebago Lake Watershed, or communities in the Portland Water District service area.

*Description*

Several partner organizations deliver educational opportunities focused on Bay and watershed topics. In-school and field programs for K-12 schools run by Cumberland County Soil and Water Conservation District and Portland Water District provide STEM-based lessons in compliance with Next Generation Science Standards (NGSS) and centered on student investigations. Maine Audubon delivers a variety of nature-themed programs for kindergarten through 12th grade, partnering with schools and community groups and specializing in outdoor/experiential learning, the NGSS, and multi-disciplinary curricula. They also offer a variety of educational walks, talks, and trips.

Gulf of Maine Research Institute offers middle school students from around the state a hands-on interactive investigation of the Gulf of Maine ecosystem in their Lab Venture program. Many local conservation organizations, such as land trusts and lake associations, provide Bay and Watershed

focused experiential education programming as well. On a statewide level, Maine Environmental Education Association and Maine Mathematics and Science Alliance provide resources, support, and convening services to educators.

Implementation of this Action falls principally to the partner organizations who deliver educational content to students on an ongoing basis, but the value of educational efforts is widely recognized by members of the Partnership, so many of them contribute. CBEP assists educational programs through indirect means (funding partner programs and sponsoring conferences), direct means (CBEP Community Grants - see Action 3.3.A; and organization of teacher training events). Staff and other partners also support these programs by promoting them, connecting schools with educators, and sharing expertise. Many members of the partnership support education programs or provide occasional educational opportunities by visiting K-12 classes, offering presentations to college classes, engaging public audiences, and leading educational field trips.

CBEP will continue to play a supporting role in Bay/water quality related curriculum and programming and be available for providing educational presentations occasionally when requested.

#### *Resources*

This Action will be implemented primarily by partner organizations that provide educational programming, including Portland Water District, CCSWCD, Southern Maine Community College and the University of Southern Maine. Available funding to support classroom education, however, is limited, posing challenges for expanding program delivery.

All CBEP staff contribute informally to regional education efforts by offering presentations and sharing expertise. Outreach staff support workshops and training events and assist with regional coordination.

CBEP also supports local education efforts through the CBEP Community Grants program (Action 3.1.D). Additional resources (likely under \$20,000 in any year) may be allocated from time to time through our annual workplan development process to address emerging needs, such as providing access to educational programs for underserved populations.

#### *Outputs*

- Cumberland County Soil and Water Conservation District educational programming to schools throughout the watershed
- Other educational programs and events
- CBEP staff continues to support partner organizations and deliver educational presentations

#### *Outcomes*

##### **Short-term**

- Greater understanding among students of all ages about Casco Bay and watershed ecosystems
- Better understanding by CBEP staff of regional environmental education activities
- Coordination among regional providers of environmental education



**Medium-term**

- Students of all ages develop an ethic of Bay stewardship

**Long-term**

- Stronger community support for actions that protect the Bay
- Bay focused learning in educational institutions of communities around Casco Bay

*Metrics and Targets*

| <b>Metric</b>  | <b>Target</b>   |
|--|-----------------|
| K-12 schools participating annually in Bay-focused units                           | Twelve per year |
| CBEP staff presentations to college and university classes                         | One per year    |
| Number of Bay-focused presentations or events by CBEP staff for a general audience | Three per year  |

Action 3.1.D Offer small grants for community-based projects

*Goal 3: Engage communities and provide information and tools to support decisions to protect and restore Casco Bay*

*Strategy 3.1: Engage residents and visitors with stewardship of our waters, by highlighting their importance and by sharing information about how to protect them*

*Purpose*

Fund small community-based projects that engage communities and community members with Casco Bay and the waters of the Casco Bay watershed or foster local environmental stewardship.

*Timeline*

Ongoing

*Lead Implementers*

- Casco Bay Estuary Partnership (grant program)

*Other Collaborators*

- Schools (grant recipient)
- Community-based organizations (grant recipient)
- Nongovernmental and civic groups (grant recipient)
- Land trusts (grant recipient)
- Local governments (grant recipient)

*Location*

Grants will be available for projects that benefit the Casco Bay watershed.

*Description*

CBEP offers a Community Grants program to encourage new partnerships and an array of innovative projects designed to engage communities with Casco Bay. Past projects have included school-based marine education projects, community science and stewardship initiatives, storytelling, and art projects, and other activities that build greater public appreciation for Casco Bay.

Proposals are welcome from educators, local governments, land trusts and other non-profit organizations. Fund recipients must be legally recognized entities but partnerships with civic and community-based groups are strongly encouraged. In the next few years, CBEP will put a greater emphasis on encouraging applicants to partner with community-based organizations. We will also modify our grant announcements, criteria, management, and marketing to reach a broader audience and make the program more equitable and accessible. We have been generating a few news stories every year around the Community Grant program and will continue to seek media coverage to spread the word about the program.

*Resources*

Minimal CBEP staff time is required to develop the Request for Proposals, manage annual grants competitions, promote media coverage, and manage reporting requirements.

Core CBEP funds allocated to this Action are expected to be about \$25,000 to \$40,000 annually, depending on other funding needs. Some community grant proposals may address community science, so this Action is related to, and may provide grants in support of Action 3.2.B.

*Outputs*

- Annual RFP and grant awards
- Projects completed
- Community Grant RFP and related grant procedures modified to address equity and access in the application process and funding priorities

*Outcomes*

**Short-term**

- Local groups carry out creative approaches to engaging people in environmental projects
- Local groups implement projects that encourage people to be good stewards
- Support for local efforts to address environmental and community needs
- Media coverage of environmental stewardship projects

**Medium-term**

- Building of new relationships and partnerships
- Cultivation of novel approaches to environmental stewardship

**Long-term**

- Community support for projects, policies and decisions that protect and restore the Bay and watershed

*Metrics and Targets*

| <b>Metric</b>  | <b>Target</b>           |
|--|-------------------------|
| Number of grants funded per year                                     | Five annually 2025-2029 |
| Number of applicants per year who have not applied in previous years | One annually 2025-2029  |
| Number of grant-related media stories generated per year             | Two annually 2025- 2029 |

### Strategy 3.2: Help coastal and watershed communities prepare for climate change and develop local policies and practices to protect our waters

Municipalities need assistance assembling and applying the best available science to become more resilient, and the additional support and capacity to develop, enact, and enforce ordinances that foster healthy water quality and ecosystems in Casco Bay. Sharing information, models, funding, and resources between communities and partners will help improve community planning for resilience.

Action 3.2.A Provide training, planning assistance and small grants to Casco Bay communities to protect aquatic ecosystems and support local resilience

*Goal 3: Engage communities and provide information and tools to support decisions to protect and restore Casco Bay*

*Strategy 3.2: Help coastal and watershed communities prepare for climate change and develop local policies and practices to protect our waters*

#### *Purpose*

Provide tools, training, and funding to help communities protect the health of streams, rivers, lakes and the Bay and adapt to water-related impacts of climate change.

#### *Timeline*

Technical assistance is ongoing. A new grant program is to be started in 2024.

#### *Lead Implementers*

- Regional planning agencies and Councils of Government (technical assistance, planning, relationships with municipalities; program delivery)
- Governor’s Office of Policy Innovation and the Future (GOPIF; funding, regional coordination)
- Maine Coastal Program (funding, coordination)
- Maine Sea Grant (program delivery, technical assistance)
- Casco Bay Estuary Partnership (funding, coordination, technical assistance, grant program, ocean model)
- Gulf of Maine Research Institute (local data collection, program delivery)
- Island Institute (technical assistance and training)
- Sebago Clean Waters (trusted local relationships; program delivery)
- Maine Audubon (training programs like StreamSmart)
- National Oceanic and Atmospheric Administration Coastal Services Center (training and educational resources)
- Land trusts (local trusted relationships; grant recipient)

#### *Other Collaborators*

- Academic institutions (maps and data products to support planning)
- Cumberland County Soil and Water Conservation District (program delivery, trusted relationships, technical assistance).
- Local governments (recipients of funding and assistance)

- Maine Department of Environmental Protection (education and training programs; grants)
- Maine Department of Transportation (coastal flood model, training and technical assistance, funding for infrastructure upgrade / repair)
- New England Environmental Finance Center (finance strategies)
- University of Southern Maine Muskie School (planning assistance)
- Watershed and nonprofit groups (local trusted relationships)
- Wells National Estuarine Research Reserve (program delivery)

#### *Location*

Watershed wide, especially communities disproportionately exposed to water-related hazards, including island, peninsula, coastal, and river communities. Online training events draw audience members from across the state and beyond.

#### *Description*

With the help of Bipartisan Infrastructure Law funding, the Partnership will expand engagement with communities, especially smaller inland and island communities, on water quality, habitat protection and community resilience. Local policies and programs in areas such as open space planning, stormwater management, road construction and maintenance, and shoreland zoning can profoundly affect both aquatic ecosystems and community resilience. Yet many communities are challenged to act, due to limited community capacity, rapid land use change, aging infrastructure, and impacts from climate change.

The Action, which builds on existing programs led by partners, will have several components, including:

- Assisting municipalities with identifying and addressing community needs related to flooding, water quality and aquatic ecosystems via community engagement, planning assistance and technical analysis;
- Working within the structure of GOPIF's Climate Resilience Partnership Program to fill in gaps in technical assistance and funding for community climate preparedness grant proposals and project implementation;
- Sharing expertise on interconnected resilience, water and habitat issues with communities, regional partners and local leaders through events, training, and coordination;
- Facilitating water-, habitat- and resilience-related outreach and education programs aimed at smaller communities (through venues such as Casco Bay Coastal Academy and GOPIF);
- Initiating a municipal grant program to assist local government with costs of water-related initiatives, including community engagement, planning, education, and design.

CBEP staff will support and enhance efforts at the-local municipal level by offering scientific information, technical assistance, and funding so municipalities can make more informed decisions. The staff will partner with organizations like Community Resilience Partnership collaborators and regional planning agencies to organize workshops and training for municipal board members, staff, and volunteers. Staff will aid in community vulnerability assessments and open space and water resources planning. Staff will also connect communities with resource providers and deliver resources like case studies, model ordinances and examples from neighboring communities.

Efforts are well underway, in part due to leadership from GOPIF, to engage every community in Maine on climate resilience. The initial emphasis of this Action will be on smaller communities (islands, towns in the upper watershed) with limited planning and staff capacity, as well as municipalities in the Presumpscot and Stroudwater watersheds with impaired rivers and streams (See also Action 2.3.B).

### *Resources*

Many partners already engage towns and cities with resilience- or water-related planning or offer related funding, training, or assistance. Important partners include GOPIF, Maine Sea Grant, the Maine Coastal Program, and Regional Planning organizations like GPCOG. Other state and federal programs offer training and grants for local efforts to address water quality and habitat protection.

Demand for services, however, exceeds available capacity, and is growing as communities respond to extreme storms and other events that increase the salience of these issues to local communities. CBEP will provide resources drawn largely from BIL funds to expand capacity to support local needs. That capacity may take the form of additional CBEP staff, shared staff positions with other organizations, or subawards to local partners who already have strong relationships with target communities. We anticipate spending approximately \$100,000 to \$150,000 annually to expand regional capacity while BIL funds are available. CBEP staff will also seek additional funds to address regional needs.

The small grant program described here will be funded through BIL, with total annual awards of about \$50,000 through 2027. Limited CBEP funds may also cover some in-person meeting costs or provide stipends for members of underserved and underrepresented communities to attend events.

### *Outputs*

- Direct engagement with two or more communities per year on climate resilience planning or implementation of local resilience projects
- Two climate resilience grant funded projects per year

### *Outcomes*

#### **Short-term**

- Better municipal access to information, assistance, and funding for to build water-related climate resilience

#### **Medium-term**

- Improved local decision-making and project implementation

#### **Long-term**

- More resilient coastal communities, particularly vulnerable populations
- Improved health of Casco Bay

*Metrics and Targets*

| <b>Metric</b>  | <b>Target</b>             |
|--|---------------------------|
| Provide technical assistance and capacity building on climate resilience to towns  | Assist five towns by 2029 |
| Contracted climate resilience or water-planning support services provided to towns | Assist five towns by 2029 |
| Provide training to municipalities, including associated guidance documents        | Assist five towns by 2029 |

### Strategy 3.3: Engage and empower new audiences and implement the CBEP Equity Strategy

CBEP and partner organizations' programming and engagement is not reaching or involving all communities in the watershed. In the next five years and beyond, CBEP will work with partners to ensure that we are inviting collaboration and providing equitable access to information and resources to a broader audience within our watershed.

Action 3.3.A Continue efforts to make the Partnership more inclusive and build mutually beneficial relationships with community-based organizations

*Goal 3: Engage communities and provide information and tools to support decisions to protect and restore Casco Bay*

#### *Strategy 3.3: Engage and empower new audiences and implement the CBEP Equity Strategy*

##### *Purpose*

Make CBEP more accessible to the communities we serve, strengthen equity and inclusion in program delivery, welcome new voices to the Partnership and strengthen connections with underserved and underrepresented communities.

##### *Timeline*

CBEP began work on environmental justice and equity in 2021. Outreach to underserved communities and other efforts to make our programs more accessible has begun. A formal equity review of CBEP programs and practices was completed in 2023. Recommendations from the review were shared with the Management Committee late in 2023.

##### *Lead Implementers*

- Casco Bay Estuary Partnership (implementation and continuous improvement)
- CBEP Management Committee (direction, oversight, and assistance)
- University of Southern Maine (host institution)

##### *Other Collaborators*

- Regional nonprofit organizations that work with underserved community members (e.g., RippleEffect and Sail Maine; connector organization)
- Organizations that serve smaller community-based organizations (e.g., Maine Initiatives and United Way; connector organization)
- Public health organizations (connector organization)
- Housing organizations (connector organization)
- Land trusts (connector organization)
- Municipalities and public entities (e.g., local libraries; connector organization)

##### *Location*

Programmatic action, so Bay and watershed wide.



*Description*

CBEP has been working with its Management Committee for the last several years to understand and address issues of equity in the Partnership. CBEP's Management Committee adopted a Diversity, Equity, Inclusion and Justice (DEIJ) statement in September of 2022 (See <https://www.cascobayestuary.org/about-us/our-deij-commitment/>).

That statement reflects a commitment by the organization to addressing environmental justice needs of marginalized groups in the watershed, including but not limited to people of color, the Wabanaki peoples of Maine, low-income communities, people with disabilities and the LGBTQIA+ community. It also calls on CBEP to evaluate and address inequities within our policies and practices to build a more welcoming organization and interact with new partners on the same basis of equality and respect we extend to our current partners.

In June 2023, we submitted a formal "Equity Strategy" to EPA, as required by President Biden's "Justice40" initiative under Executive Orders 14008 and 13985. The Strategy identifies underserved and underrepresented communities in our region and documents actions to work more effectively with those communities.

Our history, structure, policies, and procedures have shaped who we collaborate with, excluded voices from our discussions, and determined organizational priorities. Like most NEPs, CBEP's structure emphasizes relationships with organizations with ties to state and federal government, or with missions related to water quality or the Bay. That shapes who we speak with on a regular basis and how we think about coastal issues. We need to broaden our circle of communication to invite new voices to the Partnership and improve our ability to understand and serve our increasingly complex region and varied communities.

CBEP will work to expand our knowledge of and connections with underserved and underrepresented communities through outreach to community-based organizations. Each of these organizations (including many that are not part of Maine's environmental or conservation communities) is a potential starting point for listening and conversation, and thus broadening CBEP's understanding of issues affecting underserved and underrepresented communities. CBEP will also connect with adjacent organizations that work in intersecting disciplines, like housing, public health, social justice, and workforce development to learn about the populations they serve.

Over the next few years, this Action will require attention from CBEP staff and leadership to shift organizational culture, while remaining true to CBEP's core mission to protect and restore the health of Casco Bay. We will:

- Align CBEP hiring, contracting, grantmaking and recruitment processes to establish an inclusive workplace culture committed to environmental justice;
- Increase opportunities for meaningful engagement by underserved and under-represented communities on matters of importance to them;
- Actively encourage and invite communities of color and other marginalized groups to lend their voices and narratives to our planning efforts, work groups, and programs.

Facilitating meaningful engagement with CBEP activities, especially by underserved and underrepresented communities requires addressing practical and financial barriers to participation.

- CBEP will aim to adjust meeting times and locations to reduce barriers and enable equitable access to programming and information. This may include increasing opportunities for virtual participation.
- Using NEP funds to reduce barriers to participation in events, especially for people of limited financial means. This could include covering travel costs, providing meals at events or offering childcare. When actively seeking community input, we will evaluate whether to offer stipends to members of underserved or underrepresented communities for their participation.
- CBEP will explore use of translators at events and environmental education programs to improve access for people with limited English language proficiency.
- Beginning in the 2024-2025 Workplan, we will set aside funds to cover transportation and material costs if lack of those funds would otherwise prevent schools and other groups from underserved and under-represented communities from participating in educational or field programs run by CBEP partners.

#### *Resources*

Implementing this Action involves both attention to governance and outreach to develop new relationships with organizations that serve underrepresented and underserved communities.

Significant CBEP staff time (about 25% to 35% of an FTE) will be needed to participate in events, attend community-based organization meetings and build new relationships. Additional capacity is likely to be needed to advance this Action. Funding is available for the next few years (through 2027) to address this and other communications needs, but no long-term model for funding increased capacity has yet been identified.

Modest funding will be required to help cover increased meeting costs (typically under \$500 per event). Providing participant stipends could increase costs. We expect to request no more than \$5,000 annually to help cover transportation and materials costs for Bay-related programs for underserved communities.

#### *Outputs*

- Develop methods for identifying organizations that engage with target underserved communities that already have relationships with CBEP or our partners
- New relationships with community-based organizations
- Meetings with leaders of community-based organizations that engage with underserved communities
- Support educational program transportation and materials costs for underserved communities
- Management Committee approval of governance changes to increase accessibility of CBEP activities and programs
- Update CBEP Operating Guidelines if necessary
- Implement University policies on access to online materials for people with visual or hearing impairments

*Outcomes*

**Short-term**

- CBEP learns more about community-based organizations in the watershed
- Community-based organizations learn more about CBEP
- CBEP policies and procedures are more welcoming to varied perspectives and interests

**Medium-term**

- Establishment of working relationships that broaden the network of people and organizations who participate in the Partnership
- Better representation of community perspectives in CBEP governance, as shown by more diverse participation in CBEP working groups, committees, and the Management Committee

**Long-term**

- A stronger organization that reflects the interests and addresses needs of a broader cross-section of people
- Greater community involvement, leadership in, and support for, policies and decisions that protect the Bay, its watershed, and its people
- A stronger Partnership that better reflects community priorities and needs

*Metrics and Targets*

| <b>Metric</b>   | <b>Target</b>  |
|---|--|
| Community group meetings attended by CBEP Staff, on average   | One per month through 2025   |
| New connections and collaborations established  | Two per year through 2029  |
| New working relationships with underserved and underrepresented communities, as demonstrated by collaborative projects, shared activities, or participation in CBEP working groups, or committees | Five new relationships by 2029, developing one long-term partnership by 2034 |

Action 3.3.B: Engage with aquaculture operators and shellfish harvesters to support shellfish fisheries and encourage community stewardship of shellfish resources

*Goal 3: Engage communities and provide information and tools to support decisions to protect and restore Casco Bay*

*Strategy 3.3: Engage and empower new audiences and implement the CBEP Equity Strategy*

*Purpose*

Engage shellfish harvesters in protecting clean water and strengthen ties to Maine shellfish and aquaculture industries.

*Timeline*

Beginning in 2024, but built on existing relationships

*Lead Implementers*

- Casco Bay Regional Shellfish Working Group (regional coordination, priorities, relationships with harvesters and town shellfish commissions))
- Downeast Institute (shellfish science, relationships with harvesters and shellfish commissions)
- Manomet Center for Conservation Sciences (engagement with harvesters on science, gathering community knowledge)
- Maine Sea Grant (funding, community engagement, especially with aquaculture operators)

*Other Collaborators*

- Casco Bay Estuary Partnership (funding, technical assistance, coordination)
- Shellfish Harvesters (communications target)
- Aquaculture Operators (communications target)
- Maine Department of Marine Resources (regional biologists, relationships with harvesters, data access)
- Town Shellfish and Marine Resources Committees (implementation)
- Aquaculture Advisory Council (coordination and relationships with local growers)
- Harbormasters (coordination with local harvesters and other community members)
- Maine Shellfish Learning Network at the University of Maine (program delivery)
- Island Institute (community connections with island communities)
- Northeast Coastal Acidification Network (NECAN)

*Location*

Bay-wide. Waters near Portland and South Portland are closed to harvesting to protect public health. Aquaculture is concentrated in eastern and northern Casco Bay. Wild shellfish harvesting occurs principally in the towns of Yarmouth, Freeport, Brunswick, Harpswell and Phippsburg.

*Description*

The original 1996 Casco Bay Plan highlighted concerns about the impact of bacterial contamination on shellfish harvests. That issue remained of significant concern when the Plan was updated in 2006 and worries about red tides had increased. When the Plan was last revised, in 2016, the shellfish industry

was slowly recovering from the impact of a boom in green crabs in 2012 and 2013, so concerns about invasive species were paramount. At that time, CBEP decided to step back from working with shellfish harvesters, but we also committed to reevaluating that decision when we next updated the Casco Bay Plan.

Shellfish harvesting has been an important cultural and economic activity in Casco Bay for millennia. Clams, quahogs, and mussels have been harvested from Casco Bay waters for generations. While wild American oysters are too sparse today to be widely harvested, shell middens on the shores of the Bay document that Indigenous people harvested them in abundance. Commercially viable shellfish harvests continue to be an important marker of the ecological health of Casco Bay.

In recent years, the number of aquaculture operators in Casco Bay has climbed sharply. As of mid-2023, there were 49 full-scale aquaculture leases (33 growing shellfish), and 284 “Limited Purpose Aquaculture” (LPA) permits in Casco Bay (256 licensed to grow shellfish).

Both wild-harvest and aquaculture-based shellfish industries are dependent on clean water. Clams, oysters, mussels, and other bivalve shellfish are filter feeders. As they feed, they can concentrate toxic chemicals or pathogens from the environment. Thus, bacterial contamination or harmful algae blooms can make shellfish unsafe to eat.

These industries, especially the wild fishery, are affected by climate change and sea level rise. Warming waters have contributed to a shift in dominant shellfish on some tidal flats, with quahogs replacing softshell clams. All bivalves build their shells out of carbonate minerals, so they are vulnerable to coastal acidification. Warming conditions have made the Bay’s waters more hospitable to invasive species like green crabs, which feed on commercial shellfish. Predation by invasives can all but eliminate recruitment of clams and has contributed to the disappearance of mussel bars and reefs from our waters. Most wild shellfish harvests in Casco Bay occur on our intertidal flats, but those habitats are vulnerable to rising seas. There may simply be less intertidal area to harvest in future years.

One response to these pervasive ecological changes has been increased reliance on aquaculture to produce shellfish in commercially viable quantities. But coastal acidification and warming waters affect aquaculture as well. Some Maine aquaculture operations already test water quality on a regular basis so they can take steps to reduce the impact of acidification on operations.

CBEP will engage with harvesters and aquaculture operators via the Casco Bay Regional Shellfish Working Group (CBRSWG) and other organizations that already engage with shellfish and aquaculture industries. CBEP has been assisting the CBRSWG since 2019, principally by hosting an AmeriCorps Fellow for several years to support the organization’s work, such as development of the “Community Intertidal Data Portal” (<https://community-intertidal-data-portal-gpcog.hub.arcgis.com/>). Other key relationships include the Downeast Institute, Manomet Center for Conservation Sciences, Maine Sea Grant, the University of Maine, and Running Tide (an aquaculture firm headquartered in Portland).

*Resources*

This effort will be led by CBEP partners, especially the CBRSWG and FOCB, with the assistance of Manomet, Maine Sea Grant, and the Maine Department of Marine Resources.

CBEP staff provides a variety of assistance and support for these efforts, especially by participating in meetings and other events, assisting with planning and coordination, and with efforts to raise funds for program delivery. As CBRSWG is not an independent 501(C)(3) nonprofit, CBEP may act as a fiscal agent on their behalf from time to time, such as by sponsoring GPCOG Resilience Fellows to provide the organization with additional capacity.

CBRSWG has generally been successful at raising funds to support its operation. CBEP may from time to time provide funding of up to \$25,000 in any given year to fill in short-term gaps in funding and support leadership of the working group.

*Outputs*

- Regular meetings of the CBRSWG
- Participate in CBRSWG events and meetings
- Sponsor an AmeriCorps Resilience Fellow to assist the Casco Bay Shellfish Working Group

*Outcomes*

**Short-term**

- Improve CBEP understanding of issues affecting shellfish populations, harvesters, regulators, and fisheries

**Medium-term**

- Strengthen ties to Maine shellfish industry and harvesters
- Support work by shellfish harvesters to protect coastal water quality and coastal ecosystem health

**Long-term**

- More resilient coastal communities and coastal economies
- Enhance climate resilience of Casco Bay wild mollusk harvests

*Metrics and Targets*

| <b>Metric</b>  | <b>Target</b>                                 |
|--|---|
| Participating in CBRSWG meetings   | One per year                                  |
| Provide funding and technical support for CBRSWG event participation and initiatives | In 2024 and 2025; as funds allow through 2034 |

*GOAL 4: Mobilize knowledge and resources to support regional collaboration and action on behalf of Casco Bay, the watershed, and our communities*

CBEP serves as a convener, helping regional entities launch and sustain collaborative Bay related initiatives. The Partnership coordinates an active “community of practice,” leveraging support and maximizing resources so that residents throughout the watershed can better address the complex and evolving challenges facing Casco Bay.

*Strategy 4.1: Serve as an information hub on Casco Bay issues and initiatives*

CBEP mobilizes scientific, political, financial, and human resources to address the needs of Casco Bay and its watershed by gathering, organizing, and systematically sharing information.

### Action 4.1.A Gather and share Casco Bay-related science

*Goal 4: Mobilize knowledge and resources to support regional collaboration on behalf of Casco Bay, the watershed, and our communities*

*Strategy 4.1: Serve as an information hub on Casco Bay issues and initiatives*

#### *Purpose*

Share what we know about Casco Bay and the Casco Bay watershed to strengthen Casco Bay science, inform policy development, and protect Casco Bay Estuary Partnership's role as a trusted source of information about the Bay.

#### *Timeline*

Ongoing

#### *Lead Implementers*

- Casco Bay Monitoring Network (prioritization, data, and information sharing)
- Friends of Casco Bay (data collection, active web site content)
- Maine Department of Marine Resources (ongoing monitoring and web content, including access to maps and data)
- Maine Department of Environmental Protection (ongoing monitoring, online access to data)
- Research community (ongoing research, access to recent scientific studies, scientific and technical advice)
- Casco Bay Estuary Partnership (coordination, information sharing)

#### *Other Collaborators*

- University of Southern Maine (collaboration with faculty and students)
- University of Maine System (collaboration with faculty and students)
- Bowdoin College Schiller Coastal Studies Center (collaboration with faculty and students)
- State and federal agencies (technical assistance and support)

#### *Location*

Programmatic Action, so Bay and watershed wide.

#### *Description*

Casco Bay Estuary Partnership has provided trusted information on Casco Bay for decades. We strive to be a source of credible knowledge about the Bay and its watershed. We provide technical information to many audiences, including the public, academic researchers, and policy makers.

This Action reaffirms our commitment to scientific rigor as we seek solutions to the Bay's environmental challenges. It complements Action 3.1.A, which describes our outreach practices, by focusing on our role as a source of local knowledge and technical expertise.

#### **Information Sharing**

CBEP, through its Management Committee, Monitoring Network, and other working groups, offers a forum for exchange of information and ideas. The Partnership fosters an ethic of open communication



by providing opportunities for participants to describe achievements, announce new initiatives, and share observations. CBEP strives to ensure that meetings and events are welcoming to all, and to build trust and respect among people and organizations with varied backgrounds and perspectives.

### **Supporting Sound Policies**

CBEP is neither a regulator nor a regulated entity but works constructively with both groups. CBEP has long-standing relationships with federal and state agencies, local governments, and a wide range of nonprofit organizations. These connections enable CBEP to serve as a valued informational resource for decision makers. When CBEP engages in policy, we strive to provide accurate technical information, local knowledge, and regional context rather than advocate for particular outcomes. (CBEP takes policy positions rarely, and only when supported by consensus of the Partnership. See also Action 2.2.A.)

### **Data Access**

Over the last several years, CBEP staff and members of the Partnership increased availability of scientific data and reports in many ways, including:

- CBEP scanned paper documents about Casco Bay going back to the early 1990s and posted electronic copies online in a searchable database of Casco Bay studies and reports;
- State of the Bay data (and related data analysis code) from our most recent State of The Bay report was released to the public via GitHub;
- Maine’s Department of Marine Resources and Department of Environmental Protection have each made considerable progress releasing data collected by the agency to the public; and
- Friends of Casco Bay and Presumpscot Regional Land Trust each developed new web pages which share results of monitoring programs with public audiences.

We will continue efforts to make data and scientific information more accessible to everyone.

### **Historical Data**

Climate change and technological advances have increased the potential value of archival data. CBEP staff will continue efforts to find, recover, and archive data collected by or on behalf of CBEP in the 1990s and early 2000s, before establishment of modern data archiving policies and practices.

### **Open Science**

CBEP will work where possible to model “Open Science” practices that support equitable access to data and science and encourage our Partners to do the same. Open Science strives to make scientific research more accessible to everyone, by providing open (free, equitable) access to publications and data, engaging with communities through community-engaged science, and engaging with Indigenous and local knowledge. As one example, the “FAIR” data principles call for data to be Findable, Accessible, Interoperable, and Reusable with the aim of making data as accessible and reusable as possible.

### **Sharing Science with Students and the Public**

CBEP will continue to offer public presentations, provide guest presentations in college and university classes, and lead field trips as time and resources allow. CBEP’s online resources often appear among

the top items in on-line searches for information regarding water-related topics in Casco Bay, offering an important entry point into understanding of Casco Bay for people without specialized training.

### *Resources*

The tasks discussed in this Action are a part of good scientific practice and are an evolving part of ongoing activities conducted by many CBEP partners, including state and federal agencies and Friends of Casco Bay.

As part of CBEP's commitment to transparency and open science, all CBEP staff, especially the Director and Staff Scientist, play a role in implementing the Action as part of their regular duties. Time commitments vary year to year. The action is expected to require less than 10% time from any CBEP staff member in most years.

This Action is connected to Actions 3.1.A (Provide information and outreach to target audiences), Action 4.1.B (Report on the State of the Bay) and Action 4.3.A (Implement the Monitoring Plan).

### *Outputs*

- Maintain CBEP's online publications library and continue to add relevant documents that become available
- Release new and historic data sets to the public
- Improve accessibility and usability of data about Casco Bay and the watershed
- Expand use of links on the CBEP website to partner data portals and offer suggestions about where users can find additional Casco Bay data and information
- Submit comments and testimony on proposed legislation, rules, or policies
- Give presentations to public audiences, classes, and professional audiences

### *Outcomes*

#### **Short-term**

- Improved access for scientists, managers and the public to Bay related data and reports
- Readily accessible bibliography of CBEP-archived materials
- Improved topical knowledge among policy makers
- Higher visibility for CBEP among key policy makers

#### **Medium-term**

- Archived information is incorporated into future Bay related research and studies
- Improved local, state, and federal rules and policies
- Increased Bay related research

#### **Long-term**

- Improved research, management and decision making due to the availability of better information
- Improved water quality due to sound management of coastal waters

*Metrics and Targets*

| <b>Metric</b>   | <b>Target</b>                              |
|---|--|
| Expand use of online data archives to host CBEP data and encourage Partners to submit data to searchable archives | By 2029                                    |
| Complete catalog of historic CBEP data, and connect data to related projects and reports                          | By end of 2025                             |
| Participate in policy discussions, stakeholder meetings or working groups   | Three times by 2029 and five times by 2034 |
| Draft testimony or offer formal public comment related to policy development at state and local levels            | Twice by 2029 and four times by 2034       |

### Action 4.1.B Report on the State of the Bay

*Goal 4: Mobilize knowledge and resources to support regional collaboration on behalf of Casco Bay, the watershed, and our communities*

*Strategy 4.1: Serve as an information hub on Casco Bay issues and initiatives*

#### *Purpose*

Provide regular updates on indicators of Casco Bay health to inform policy development. Encourage discussion of Bay science and management at periodic conferences.

#### *Timeline*

The next State of the Bay Report is due by 2026, with another expected in 2031.

#### *Lead Implementers*

- Casco Bay Estuary Partnership (preparation of State of The Bay reports, including gathering data, conducting analysis, and drafting report)
- Casco Bay Monitoring Network (data access and strategic direction)
- Friends of Casco Bay (principal source of water quality data)
- Maine Department of Environmental Protection (source of multiple data sets)
- Maine Department of Marine Resources (access to data on bacteria levels at shellfish harvesting locations, abundance of key fisheries resources, shellfish area closures, and more)
- U.S. Fish and Wildlife Service Gulf of Maine Coastal Program (technical assistance, especially on land use change, habitat condition and species of concern)

#### *Other Collaborators*

- Organizations that provide access to data
- Individuals who peer review each indicator
- Academic scientists who provide advice and insight
- Community voices providing local knowledge to supplement or complement technical and quantitative methods

#### *Location*

Casco Bay and watershed wide.

#### *Description*

The U.S. Environmental Protection Agency requires that each National Estuary Program provide periodic public reports (often based on a group of environmental indicators) summarizing conditions in its coastal waters. Casco Bay Estuary Partnership (CBEP) issues a State of The Bay Report every five years.

Most State of The Bay indicators are based on data collected by partner organizations (especially state and federal agencies and Friends of Casco Bay). CBEP staff or contractors act as data aggregators and analysts and draft each State of The Bay report.

CBEP staff will work with the Monitoring Network to identify data that is likely to be collected over the long term. We will work to identify how often fully reviewed and corrected data becomes available,

gather related metadata and data quality management documentation, and record data access procedures (which change often due to availability of emerging technologies).

Community science is an increasingly valuable source of data and information on the condition of Casco Bay and the watershed. CBEP will work to incorporate local knowledge and findings from community science into State of The Bay (see Action 3.1.D).

CBEP developed data analysis procedures and related code for many State of The Bay environmental indicators when preparing the most recent (2021) State of The Bay report. CBEP staff will continue to automate data access and analysis wherever possible to streamline report preparation. For indicators based on data that are updated annually or more frequently, we will explore the feasibility of producing annual updates analyzing selected State of the Bay indicators.

### *Resources*

The State of The Bay report requires a substantial time commitment from CBEP staff during the year when the report is being prepared. CBEP's Director and Staff Scientist will each spend as much as 30% of their time reaching out to coastal scientists, gathering data, conducting analyses, and drafting the report itself.

Preparation of the report also requires support from many CBEP partners, who provide advice, offer access to data, and provide chapter by chapter peer review. CBEP partners play an essential role in ensuring the quality of the Report and the underlying science.

Funding needs for preparation of maps and graphics, design and printing are significant. We estimate these services will cost between \$25,000 to \$40,000 for the next State of The Bay report. Funds will also be needed (\$20,000 or so) for outreach and engagement around release of the Report, and to cover costs of "State of The Bay" events.

### *Outputs*

- Streamlined data access and analysis procedures for select State of The Bay Indicators
- Incorporation of data from community science activities into State of The Bay reporting
- State of The Bay report

### *Outcomes*

#### **Short-term**

- Greater consistency in reporting and more frequent updates of select State of The Bay indicators
- Sharing of data and findings from community science efforts with the broader community

#### **Medium-term**

- Stronger collaborations around data monitoring and analysis
- Increased public understanding of Bay status and trends

#### **Long-term**

- Improved science and decision-making pertaining to the Bay and watershed

*Metrics and Targets*

| <b>Metric</b>                                    | <b>Target</b>  |
|--|--|
| State of The Bay reports completed               | 2026 and 2031  |
| State of The Bay meeting or conference           | 2026 and 2031  |
| Presentations based on State of The Bay analyses | Average of four per year,<br>with more in years<br>following each report |

### Strategy 4.2: Provide an organizational anchor for initiatives that benefit the Bay

CBEP has a long record of assisting groups and coalitions with organizing, project development, and grant seeking. It will continue traditional, grant-focused efforts to fund work that supports its mission and explore innovative funding mechanisms that align with CBEP priorities.

Action 4.2.A Host local and regional working groups on emerging issues

*Goal 4: Mobilize knowledge and resources to support regional collaboration on behalf of Casco Bay, the watershed, and our communities*

#### *Strategy 4.2: Provide an organizational anchor for initiatives that benefit the Bay*

##### *Purpose*

Foster formation of *ad hoc* working groups around emerging issues, shared interests, or geographic focus areas to encourage collaborative solutions.

##### *Timeline*

Ongoing

##### *Lead Implementers*

- Casco Bay Estuary Partnership (meeting organization and facilitation)

##### *Other Collaborators*

- Management Committee (prioritization, participants)
- State and federal natural resource agencies (prioritization, participants)
- Nongovernmental organizations (prioritization, participants)
- Researchers (participants)

##### *Location*

Programmatic Action, so Bay and watershed wide.

##### *Description*

Working groups are short-term, *ad hoc* groups that form around shared interests or emerging issues. Whether place- or issue- focused, they provide a flexible way to share information, identify shared concerns, and develop regional priorities. Working groups may gather for a single event or work together over a period of months or longer. Working groups support CBEP's mission and emerge when multiple partners identify a need for greater coordination, especially in the absence of an existing organization able to address that need.

CBEP staff often plays a strategic role participating in, convening, or facilitating these working groups. Past examples have looked at eelgrass monitoring and restoration, regional land conservation priorities, and place-based conversations focused on the Presumpscot River, New Meadows watershed, Long Creek, and Crooked River.

The ability to act as a trusted convenor is central to CBEP's effectiveness and constitutes one of the National Estuary Program's most important regional roles. This role depends on the strength of the

Partnership (especially strong relationships among members of the Management Committee) and the robust network of contacts it establishes.

CBEP will continue hosting or supporting *ad hoc* working groups to discuss and address emerging issues related to CBEP’s mission in Casco Bay and throughout the watershed.

Working groups sometimes evolve into larger, ongoing efforts, like the Casco Bay Monitoring Network or the Casco Bay Nutrient Council.

*Resources*

Working groups always depend on the active engagement of CBEP partners.

Working groups require limited time from CBEP staff. Staff support working groups by scheduling meetings, preparing agenda, taking notes, and preparing documents. The workload varies but is typically low (5% time for lead staff). Total staff time required to support working groups depends on the number of active working groups. In recent years, CBEP has managed one or two such groups a year.

Limited CBEP funds may be tapped to support incidental meeting costs or cover travel costs or stipends to enable participation by members of underserved or under resourced communities.

*Outputs*

- Periodic meetings of local and regional working groups, such as the Model Infrastructure Working Group or the Casco Bay Eelgrass Network
- Project deliverables, such as reports or data
- New forums for collaboration between researchers and organizational representatives

*Outcomes*

**Short-term**

- Increased frequency and scale of collaboration on topics of shared interest
- Formation of place-based collaborations with shared goals and priorities
- Greater efficiency and more comprehensive information and results

**Medium-term**

- Expanded, scientific knowledge base of Casco Bay and its watershed

**Long-term**

- Improved decision making on Bay related activities and policies

*Metrics and Targets*

| <b>Metric</b>                                   | <b>Target</b>            |
|---|--------------------------|
| Number of working groups active each year       | Three annually 2025-2029 |
| Number of working group meetings held each year | Six annually 20205-2029  |



Action 4.2.B Seek resources to support programs that benefit the Bay

*Goal 4: Mobilize knowledge and resources to support regional collaboration on behalf of Casco Bay, the watershed, and our communities*

*Strategy 4.2: Provide an organizational anchor for initiatives that benefit the Bay*

*Purpose*

Support the collaborative work of the Partnership by building organizational capacity to implement the Casco Bay Plan and increasing and diversifying funding sources.

*Timeline*

Ongoing

*Lead Implementers*

- Casco Bay Estuary Partnership (grant submissions, assistance with preparing proposals, letters of support)

*Other Collaborators*

- University of Southern Maine Research Service Center (support for proposal submission by CBEP)
- Management Committee members (ideas, prioritization)

*Location*

Programmatic Action, so Bay and watershed wide.

*Description*

EPA encourages National Estuary Programs to diversify and increase programmatic and leveraged funding by applying for grants from a variety of sources, including federal programs, state programs and foundations. Casco Bay Estuary Partnership (CBEP) has a long record of fundraising to support shared priorities.

CBEP core staff members also support other groups working on behalf of the Bay, ranging from local organizations to academic researchers, in their efforts to seek funds for specific projects. CBEP involvement may be significant (e.g., acting as fiscal agent) or minimal (e.g., a letter of support to accompany a grant proposal). Our designation as a National Estuary Program often carries extra weight when we or our partners are applying for federal or state funding.

The Bipartisan Infrastructure Law offers CBEP, like other National Estuary Programs, a significant short-term increase in federal funding. BIL and other recent federal legislation have also increased federal funds for infrastructure, climate resilience, and habitat restoration. However, these supplementary appropriations will run out in just a few years. The Partnership itself, as well as many partners need to prepare for when federal dollars are less available. Diversifying funding sources now can soften the impact of future declines in federal funds.

In seeking alternative sources of funding to support implementation of the Casco Bay Plan, CBEP will:

- collaborate with allied organizations to identify opportunities for obtaining and diversifying revenue sources;
- leverage local networks to attract federal funds (by identifying local sources of match); and
- pursue external funding resources to support Plan Actions.

*Resources*

Many CBEP partners raise funds to support programs that implement portions of the Casco Bay Plan.

CBEP staff put substantial time towards raising funds for CCMP implementation beyond EPA cooperative agreements and BIL workplans. Staff submit multiple grant proposals to federal, state, and philanthropic funders (including EPA) through the University of Southern Maine (USM) every year. Staff work with the USM’s Research Services Center to address reporting and other obligations. They also assist other organizations with proposal preparation and prepare letters of support endorsing proposals submitted by other organizations. These tasks cumulatively represent 10% to 15% of the time of the Director and the Program Manager, and under 5% of the time of other staff.

*Outputs*

- Pledged nonfederal match (cash and in kind)
- Completed and submitted grant proposals
- Funds raised for CBEP through our host organization
- Funds raised by partners to implement portions of the Casco Bay Plan

*Outcomes*

**Short-term**

- CBEP and others are better able to take advantage of suitable grant programs
- More numerous and competitive federal grant proposals submitted

**Medium-term**

- Increased local capacity for implementation; increased federal grant funding outside Section 320 U.S. Environmental Protection Agency funding

**Long-term**

- Improvements to Bay’s habitats, water quality, ecosystem function and integrity

*Metrics and Targets*

| <b>Metric</b>  | <b>Target</b>  |
|--|----------------|
| List of grant opportunities created in 2024 and updated annually   | Annual updates |
| Number of grant proposals submitted to fund CBEP programs or activities  | Four per year  |
| Number of collaborative proposals submitted with significant CBEP staff input or participation   | Two per year   |
| Number of applications to the National Estuary Program Watershed Grant program administered by Restore America’s Estuaries, on average | One per year   |
| Number of letters of support for proposals submitted by CBEP partners  | Six per year   |

### Strategy 4.3: Coordinate and expand Bay-related science and monitoring

Numerous groups monitor Casco Bay or its watershed (e.g., tracking water quality, invasive species, freshwater systems, biota and ocean acidification impacts and community responses), but many efforts operate in isolation with little coordination. The region would benefit from greater coordination to discuss long-term monitoring needs, identify key environmental indicators, advance a regional sentinel monitoring network, and develop consistent ways to share data and results of studies.

Action 4.3.A Work with the Monitoring Network to implement the Monitoring Plan and improve availability of up-to-date data on the condition of Casco Bay

*Goal 4: Mobilize knowledge and resources to support regional collaboration on behalf of Casco Bay, the watershed, and our communities*

#### *Strategy 4.3: Expand Bay-related science and monitoring*

##### *Purpose*

Convene and lead a Casco Bay Monitoring Network that identifies shared priorities and works to advance priorities identified in the Casco Bay Monitoring Plan.

##### *Timeline*

Ongoing

##### *Lead Implementers*

- Casco Bay Estuary Partnership (coordination, meeting facilitation)
- Friends of Casco Bay (anchor data source and member of the Network)
- Presumpscot Regional Land Trust (anchor data source and member of the Network)
- Wells National Estuarine Research Reserve (anchor data source and member of the Network)
- Maine Department of Environmental Protection (anchor data source and member of the Network)

##### *Other Collaborators*

- Lakes Environmental Association (data source and member of the Network)
- Lake Stewards of Maine (data source and member of the Network)
- Portland Water District (data source and member of the Network)
- NERACOOS (member of the network, source of ocean data, and data management and delivery)
- U.S. Geological Survey (Royal River gauge)
- Gulf of Maine Research Institute (data source and member of the Network)
- University of Southern Maine (member of the Network)
- Long Creek Watershed Management District (anchor source of data)
- U.S. Fish and Wildlife Service Gulf of Maine Coastal Program (member of the Network)
- Massachusetts Office of Coastal Zone Management (manages data for MIMIC and regional marine invasive species rapid assessment surveys)

##### *Location*

Casco Bay and watershed wide.

*Description*

CBEP established the Casco Bay Monitoring Network in 2016 to strengthen monitoring of Casco Bay. The group originally focused on monitoring Casco Bay itself but expanded to include freshwater monitoring in 2020. The group meets at least annually to share monitoring results, share monitoring plans, and discuss regional needs.

CBEP released our most recent Monitoring Plan (developed with input from the Monitoring Network) in 2020 (<https://www.cascobayestuary.org/strategic-planning/casco-bay-monitoring-plan/>). The Plan:

- Identifies three overarching research questions, focused on nutrients, habitat conditions and the Casco Bay food web;
- Highlights programmatic needs to support monitoring, including strengthening the monitoring network, seeking stable funding, simplifying ways to share data, and developing a hydrodynamic model of Casco Bay; and
- Emphasizes the need to protect key monitoring programs, while filling information gaps in freshwater conditions, fish community composition, eelgrass populations, and impacts of aquaculture.

A growing number of entities are monitoring the waters of Casco Bay. Core data on conditions in Casco Bay are gathered by Friends of Casco Bay, Maine Department of Environmental Protection (DEP), Maine Healthy Beaches Program, and Maine Department of Marine Resources. Friends of Casco Bay has established three automated water quality monitoring stations, in Cundy's Harbor, Portland Harbor, and off Cousins Island, in the center of the Bay. The presence of marine invasives is being tracked through programs run by the Wells National Estuarine Research Reserve and Massachusetts Office of Coastal Zone Management. The Gulf of Maine Research Institute gathers data on the fish community of Casco Bay. The Maine Coastal Program monitors elevation change in one Casco Bay tidal wetland using sediment elevation tables (rSETs).

In 2020, the Network was expanded to include organizations collecting data on our rivers, lakes, and ponds. Water quality data is collected from more than thirty-five lakes and ponds in the watershed, often thanks to the efforts of DEP, Lakes Environmental Association, Lake Stewards of Maine, and dozens of volunteers. Portland Water District monitors conditions in Sebago Lake. Presumpscot Regional Land Trust now manages volunteer water quality monitoring throughout the lower Presumpscot River watershed and at several locations on the Stroudwater river (See Action 4.3.B). Regional interest in tracking stream temperatures has been growing for several years.

Under the Monitoring Plan, the Network provides a forum for communicating among individuals and organizations observing the Bay and the watershed and helps establish priorities for allocating CBEP resources (including both staff time and National Estuary Program funds) to support monitoring. CBEP staff supports the Network and implements the recommendations of the Network. In the next few years, the Network will meet at least twice a year, with increased staff support. While final priorities will be determined by the Monitoring Network, likely areas of focus include updating information cataloging monitoring programs, simplifying access to monitoring data, or organizing Casco Bay monitoring and science conferences or events.

A new subcommittee of the Network will meet at least annually to evaluate proposals requesting funding through the new Monitoring Infrastructure Grants program made possible by BIL. These grants will offer funding to expand monitoring in the region including such costs as purchasing new equipment, funding pilot studies, or developing data quality assurance documents. Because BIL funds will only be available for a few years, these grants will not be used to fund long-term monitoring expenses such as staff salaries, laboratory fees or consumables past an initial research or pilot phase.

### *Resources*

The costs of comprehensive Casco Bay monitoring far exceed CBEP's available funding. Monitoring must be a shared responsibility of the individuals and organizations with a stake in understanding the Bay. Indeed, state and federal agencies and Friends of Casco Bay fund most long-term monitoring of Casco Bay.

CBEP will allocate significant staff time (estimated at 25% of the time of the Staff Scientist) to coordinating and staffing the Monitoring Network and implementing Monitoring Network priorities. CBEP habitat program and science staff, as well as summer interns and volunteers conduct data collection in support of Monitoring Network Priorities, especially understanding changes in coastal habitats like tidal wetlands. This work (which complements data collecting in support of habitat restoration projects) adds no more than a few days in the field annually.

CBEP provides direct financial support for monitoring of Bay Water Quality (currently about \$30,000 per year to Friends of Casco Bay) and to support volunteer-based monitoring of marine invasive species (about \$5,000 annually to the MIMIC program, managed by Wells Estuarine Research Reserve). CBEP occasionally provides funding (up to about \$10,000) for other high-value data collection efforts, such as periodic Marine Invasive Species Rapid Assessments.

We anticipate allocating about \$75,000 annually in Bipartisan Infrastructure Law funds through 2027 to support the Monitoring Infrastructure Grants program.

### *Outputs*

- Meetings of the Casco Bay Monitoring Network
- Creation of a dedicated communications on-line platform to facilitate communication among members of the Casco Bay Monitoring Network
- Updated map and other data on ongoing monitoring programs
- Annual priorities for strengthening monitoring
- Annual Monitoring Infrastructure Grants awarded

### *Outcomes*

#### **Short-term**

- Improved communication among individuals and organizations monitoring Casco Bay
- New monitoring programs or improvements to existing programs

#### **Medium-term**

- Expanded monitoring of Casco Bay and the waters of the watershed

- Greater efficacy of monitoring work and increased sharing of Bay-related monitoring data

**Long-term**

- Better early detection of changes in Bay water quality and habitats

*Metrics and Targets*

| <b>Metric</b>  | <b>Target</b>             |
|--|---------------------------|
| Number of participants in Casco Bay Monitoring Network | Twenty organizations      |
| Monitoring Network meetings                            | Two per year              |
| Monitoring Infrastructure Grants awarded               | One per year through 2027 |

### Action 4.3.B Expand monitoring of Casco Bay tributaries

*Goal 4: Mobilize knowledge and resources to support regional collaboration on behalf of Casco Bay, the watershed, and our communities*

#### *Strategy 4.3: Expand Bay-related science and monitoring*

##### *Purpose*

Increase understanding of conditions in rivers and streams that may influence the health of Casco Bay.

##### *Timeline*

Ongoing

##### *Lead Implementers*

- Maine Department of Environmental Protection (biomonitoring, Volunteer River Monitoring Program)
- Long Creek Watershed Management District (comprehensive monitoring conditions in Long Creek and its tributaries)
- Presumpscot Regional Land Trust (volunteer water quality monitoring of the Presumpscot and Stroudwater rivers and their tributaries.
- U.S. Geological Survey (Royal River gauge)
- Lake Stewards of Maine (volunteer water quality and invasive species monitoring of lakes and ponds)
- Portland Water District (Sebago Lake water quality monitoring)

##### *Other Collaborators*

- Cumberland County Soil and Water Conservation District (work with lake and watershed associations)
- Local governments (locally sponsored freshwater monitoring programs on lakes, rivers, and streams; monitoring of stormwater outfalls)
- University of Southern Maine (technical assistance)
- U.S. Fish and Wildlife Service Gulf of Maine Coastal Program (stream temperature monitoring network)
- Lake and watershed associations (volunteer monitoring)
- Trout Unlimited (stream temperature monitoring network)

##### *Location*

Casco Bay watershed, including Casco Bay's coastal tributaries and tributaries to the Presumpscot and Royal Rivers.

##### *Description*

The watershed's rivers and streams act as funnels, carrying not only water but stormwater runoff, nutrients, pesticides, road salt, fecal waste, eroded sediment, litter and other contaminants to Casco Bay. Rivers and streams are also important aquatic ecosystems, facing combined threats from climate change and shifting land use.

Lack of capacity has long limited monitoring of rivers and streams to a handful of ongoing programs, so our perspective on the watershed's rivers and streams is selective:

- Presumpscot Regional Land Trust manages volunteer-led monitoring of dissolved oxygen, specific conductance, temperature, and bacteria in the Presumpscot watershed (and along the main stem of the Stroudwater).
- The Long Creek Watershed Management District conducts detailed hydrologic and water quality monitoring along Long Creek, an urban stream near the Portland Jetport and Maine Mall.
- Lakes Environmental Association, Lake Stewards of Maine, DEP, the Portland Water District, and many lake associations gather data on conditions in our lakes and ponds.
- The U.S. Geological Survey reestablished a river gauge on the Royal River several years ago, thus providing local data on flow from a river whose flow is not actively regulated.
- The Maine Department of Environmental Protection conducts biological monitoring at selected locations every five years and collects complementary data in response to management concerns.
- A regional coalition (locally led by the U.S. Fish and Wildlife Service's Gulf of Maine Coastal Program and Trout Unlimited Chapters), has begun collecting stream temperature data using inexpensive data loggers.
- Maine's current MS4 General Permit requires limited monitoring of stormwater outfalls. Some MS4 towns are conducting additional freshwater monitoring.

To improve our understanding of our rivers and streams, including how they affect Casco Bay, monitoring needs to be expanded to cover more locations and provide better temporal coverage. Existing piecemeal monitoring should be better integrated. We need to collect more types of data to address emerging policy concerns. Stream temperature data helps us understand the effects of climate change. Data on conductivity or chloride concentrations reflects the impact of road salt.

Interest in freshwater monitoring has increased, but the longevity of related efforts remains uncertain. In 2022, volunteers with the Royal River Alliance monitored portions of the Royal River for the first time in several decades and documented persistent low dissolved oxygen conditions above the Elm Street dam. Efforts to change the water quality classification of portions of the lower Presumpscot River (from Class C to more protective Class B) have inspired several years of focused data collection. Several towns have shown interest in collecting water quality data to understand the impacts of local policies.

National Estuary Program (NEP) resources will be used to support more river and stream monitoring in several ways:

- CBEP's BIL Spending Plan allocates funds for monitoring infrastructure. Most funds will be available through a competitive Monitoring Infrastructure Grants program. Funds can cover costs for purchasing equipment, developing QAPPs, pilot studies, and other start-up costs (See Action 4.3.A).
- CBEP will work with the Town of Brunswick and other towns to develop a QAPP for municipal water quality monitoring. A standard QAPP (approved by EPA and Maine DEP) will lower barriers to other towns conducting local monitoring.



- CBEP staff will assist as appropriate for developing river and stream monitoring programs, including development of QAPPs.
- CBEP owns and maintains monitoring equipment that supports Presumpscot River Monitoring. CBEP also has limited equipment that can be loaned out to support pilot studies or to temporarily replace malfunctioning equipment (See Action 2.3.B).
- The Casco Bay Monitoring Network offers a venue for sharing best practices and discussing freshwater monitoring priorities (See Action 4.3.A)
- CBEP will assist with development of community science programs that support freshwater monitoring (See Action 3.1.B)
- CBEP will assist with raising grant funds (See Action 4.2.B)

### *Resources*

This Actions hinges on commitments from CBEP partners to carry out monitoring. Monitoring of Casco Bay tributaries, however, remains less widespread and comprehensive than needed to guide management. But raising funds for long-term monitoring can be difficult, and available CBEP funds are insufficient to address all needs.

CBEP staff (especially the Director and the Staff Scientist) play supporting and catalytic roles assisting partners with freshwater monitoring. CBEP staff will assist with regional coordination, data sharing, data quality assurance planning, equipment purchases and repair, and fundraising. These supporting tasks should take no more than 10% of an FTE in most years.

CBEP provides funding (less than \$20,000 a year) to support volunteer-based water quality monitoring along the Presumpscot and Stroudwater Rivers. Those costs could increase substantially if either the geographic scope or comprehensiveness of stream and river monitoring expands in coming years. For the moment, however, no reliable long-term source of funding for expansion has been identified.

Approximately \$75,000 in BIL funds will be allocated annually to strengthening monitoring via Monitoring Infrastructure Grants (under Action 4.3.A), but only a portion of that will benefit freshwater programs.

### *Outputs*

- Enhanced QAPP for municipal monitoring of local rivers and streams that complements the existing Maine Volunteer River Monitoring Program QAPP
- Monitoring Infrastructure Grants Program
- Equipment loaner program
- Water quality data
- Grant proposals

### *Outcomes*

#### **Short-term**

- Coordination among monitoring organizations
- Strategic allocation of staff and funding resources toward expanded monitoring
- Grant funding

- Availability of freshwater monitoring data

**Medium-term/Long-term**

- Better understanding of water quality of rivers and streams in the Casco Bay watershed
- Better understanding of the impact of tributaries on the Bay’s health
- Improvements to the Bay’s habitats, water quality, ecosystem function and ecosystem integrity

*Metrics and Targets*

| <b>Metric</b>  | <b>Target</b>   |
|--|---|
| Long Creek Watershed Management District water quality reports | Annual  |
| Number of river and stream locations monitored                 | Increase in number of locations monitored by 2029 compared with 2024 levels |
| Number of river or stream monitoring programs                  | One new program by 2029 compared to 2024                                    |

### Strategy 4.4: Strengthen the Partnership and our shared sense of purpose

The “P” in CBEP stands for Partnership. Collectively, we accomplish more on behalf of Casco Bay than we would by working separately. To ensure the continued health of the Partnership, we must invest in the strength of our organization. That involves formal attention to organizational governance, as well as nurturing ties among new and existing members of the Partnership.

Action 4.4.A Evaluate and implement governance changes to strengthen the Partnership

*Goal 4: Mobilize knowledge and resources to support regional collaboration on behalf of Casco Bay, the watershed, and our communities*

#### *Strategy 4.4: Strengthen the Partnership and our shared sense of purpose*

##### *Purpose*

Update governance practices by 2025 to reinforce the sense of common purpose among all members of the Partnership and make CBEP more accessible to the communities we serve.

##### *Timeline*

CBEP conducted a review of governance practices in the fall of 2023. Recommendations were discussed with the full Management Committee at the March 2024 Management Committee meetings. New practices will be implemented no later than 2025.

##### *Lead Implementers*

- CBEP Management Committee (oversight and direction)
- University of Southern Maine (host institution)

##### *Other Collaborators*

- Other members of the Partnership (suggestions and comment)
- Community members not currently included in CBEP governance practices (potential beneficiaries)

##### *Location*

Programmatic Action, so Bay and watershed wide.

##### *Description*

Our “Operating Guidelines” (which function as our bylaws) have not been updated since 2017. During the January 2023 Management Committee retreat, a consensus emerged to conduct a review of CBEP’s governance. The main issue identified at the time was that CBEP governance emphasizes the roles and activity of the core staff, rather than establishing a genuine collaborative partnership. Several other changes in practices have also been suggested. A 2023 diversity, equity, and inclusion review of CBEP operations highlighted potential changes in governance to help broaden participation in CBEP programs and leadership.

Over the next two years, CBEP will review and update our governance practices and amend our Operating Guidelines as necessary to formalize proposed changes. All Management Committee members will be invited to participate, but the review will be led by a working group that will share

recommendations with the Management Committee. Any changes in our Operating Guidelines will be approved by the Management Committee. Changes in practices will be discussed by the Executive Committee or Management Committee, as appropriate.

*Resources*

Governance changes will be led by CBEP’s Executive Committee, and a working group drawn from the Management Committee. CBEP staff will provide logistical support and draft policies and any necessary changes to our Operating Guidelines.

The CBEP Director will serve as an ex officio member of the governance working groups. CBEP’s Program Coordinator and Community Engagement staff will also allocate time to strengthen CBEP governance.

*Outputs*

- Governance review meeting or meetings
- Recommendations to CBEP’s Management Committee
- Updated Operating Guidelines

*Outcomes*

**Short-term**

- CBEP policies and procedures are more welcoming to varied perspectives and interests

**Medium-term**

- Strengthened sense of common purpose among all members of the Partnership
- Better representation of community perspectives in CBEP governance

**Long-term**

- A stronger Partnership that better reflects community priorities and needs

*Metrics and Targets*

| <b>Metric</b>                               | <b>Target</b>     |
|---|-------------------|
| Recommendations to the Management Committee | By September 2024 |
| Updated Operating Guidelines adopted        | By March 2025     |

Action 4.4.B Provide shared learning and networking opportunities for people that work on behalf our waters

*Goal 4: Mobilize knowledge and resources to support regional collaboration on behalf of Casco Bay, the watershed, and our communities*

*Strategy 4.4: Strengthen the Partnership and our shared sense of purpose*

*Purpose*

Strengthen the sense of community and shared purpose among members of the Partnership, especially people who are not represented on the Management Committee. Create connections among people in the region who work on water quality, aquatic habitat, or related Casco Bay issues.

*Timeline*

Events will begin in 2024 and continue at least annually thereafter

*Lead Implementers*

- Casco Bay Estuary Partnership (event planning and implementation)
- CBEP Management Committee (event ideas and prioritization)

*Other Collaborators*

- Other members of the (extended) Partnership (participation and attendance)

*Location*

Programmatic Action, so Bay and watershed wide.

*Description*

The network of connections built by National Estuary Programs (including CBEP) has often been recognized as an important contribution to coastal management. Existing connections and trust among individuals can simplify negotiations, speed up project development, and improve response to unexpected or catastrophic events. Yet, restrictions on meeting in person that were in place from 2020 through 2022 and reliance on remote meeting technologies meant interpersonal connections among members of the Partnership suffered over the past few years.

CBEP will host events at least annually that bring together members of the Partnership and others to learn from each other, discuss their work, and get to know one another. Whenever possible, these Partnership events will be held at a venue that connects people directly to the Bay or our other waters.

We will also facilitate other, more frequent opportunities for colleagues to get together. Events may include training opportunities, field trips, celebrations of ongoing work or accomplishments, and scientific conferences, among others.

Events will be designed to broaden, as well as strengthen, relationships. We will invite people not part of CBEP's existing networks to attend, and welcome new voices and perspectives at long-standing gatherings. We will seek to create joint events with organizations not usually considered part of the environmental or conservation communities and reach out to underserved or underrepresented

communities. As an example, we will organize showcase gatherings for Community Grants, and invite community-based organizations to learn about the grant program, hear about past projects and discuss emerging project ideas.

*Resources*

This Action will require CBEP staff time to organize events. We anticipate these tasks will be taken on by existing CBEP staff as part of their regular duties.

Some events will require CBEP funds to pay for meeting venues, coffee, or meals. Federal restrictions on use of National Estuary Program Funds mean some events may need to be funded from other sources. These events will cost less than \$5,000 a year.

*Outputs*

- Events that offer opportunities for people to come together and learn about each other's work

*Outcomes*

**Short-term**

- A more interconnected network of communications among people who work on or are affected by issues related to Casco Bay

**Medium-term**

- A greater sense of shared purpose among members of the Partnership
- Innovative programs and projects that grow out of personal and professional connections

**Long-term**

- A stronger Partnership
- Improvements in health of Casco Bay

*Metrics and Targets*

| <b>Metric</b>                                     | <b>Target</b> |
|---|---------------|
| In person Management Committee meetings or events | Once per year |
| Larger community events                           | One per year  |
| Attendees at Partnership community events         | Forty people  |