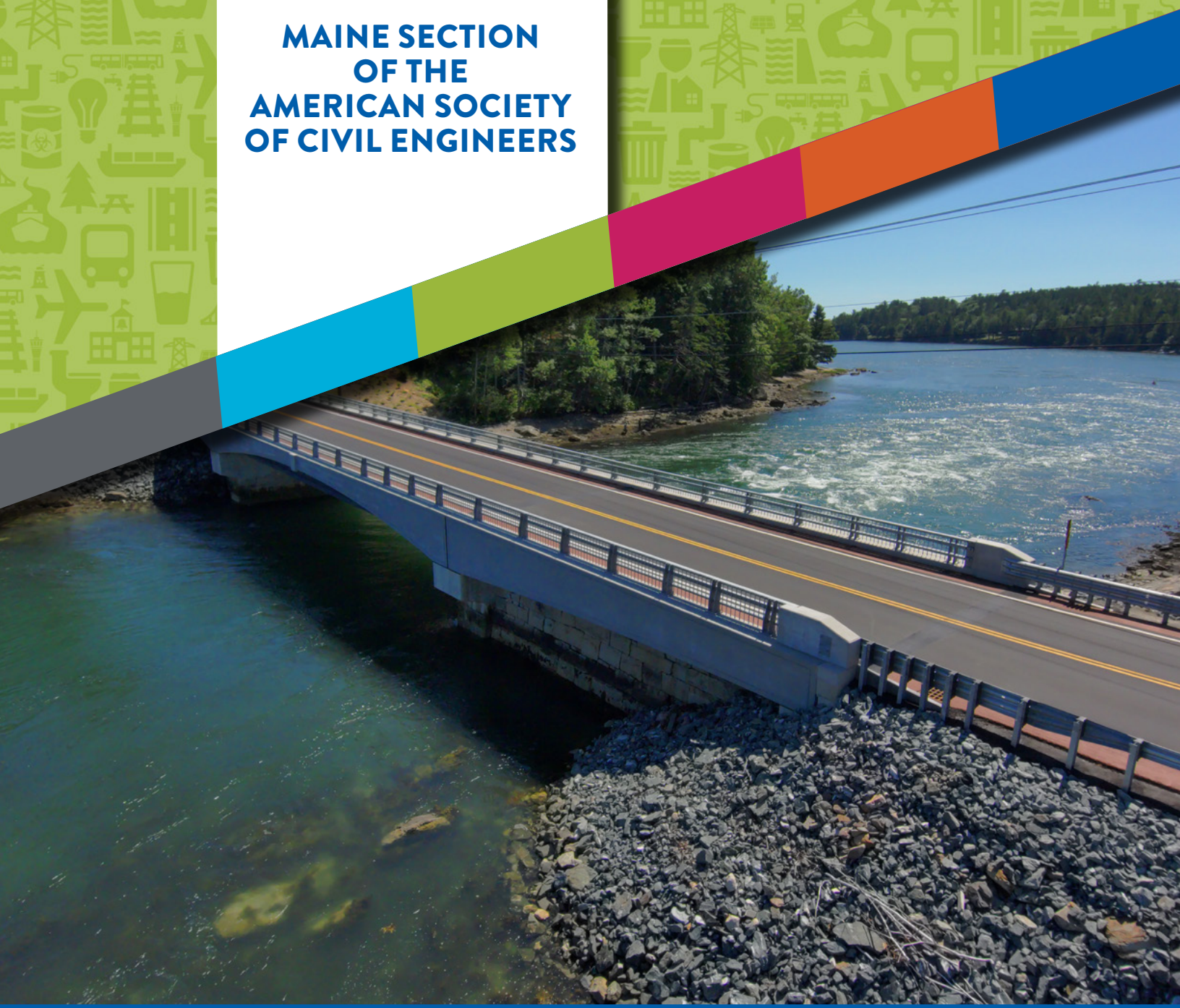
2024 REPORT CARD FOR MAINE'S INFRASTRUCTURE

MAINE SECTION OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS



ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

INFRASTRUCTUREREPORTCARD.ORG/MAINE


25

Table of Contents

We thank each infrastructure professional for contributing to

THE 2024 REPORT CARD FOR MAINE'S INFRASTRUCTURE.

Nate Baert, PE

Daniel Bouchard, PE, M.ASCE, *Section Past-President*

Mackenzie E. Bowe, PE, M.ASCE

Paul Bradbury, PE, AAE

Kevin Brayley, PE

Timothy S. Bryant, PE, M.ASCE

Timothy R. Cote, PE, M.ASCE

David C. Dargie, PE, M.ASCE

Ervin Deck

Craig Douglas, PE

Gordon M. Edington, PE, M.ASCE

Kenneth J. Fortier, PE, M.ASCE

Bret R. Grenier, PE, M.ASCE

Kerem Gungor, Ph.D, PE, M.ASCE

William C. Haskell, PE, M.ASCE, *Section Past-President*

Heather N. Hayes, PE, M.ASCE

Kyle S. Jacobson, PE, AM.ASCE

John D. Kuchinski, PE, F.ASCE, *Section Past-President*

Alan D. Lambert

Gary R. McAllister, PE, M.ASCE

Peter S. Merfeld, PE, M.ASCE, Chair, *Section Past-President, Region 1 Governor*

Timothy W. Merritt, PE, M.ASCE, *Section Past-President*

Nicholas Messina, PE, M.ASCE

Craig R. Morin, PE, M.ASCE

Ellen K. O'Brien, PE, LG, M.ASCE, *Section Past-President*

Paul Porada, PE

McKenzie Parker, PE

Eric W. Petersson, PE

Greg J. Pellerin, PE

Nathan D. Powelson, PE, M.ASCE, *Section Past-President*

T.C. Schofield, PE, M.ASCE

Isabel V. (Be) Schonewald, PE, M.ASCE, *Section Past-President*

Benjamin B. Shaw, EI, AM.ASCE, *Section Vice-President 2024-25*

Stephen Spear, Jr, PE, M.ASCE

Nathan Strout, PE, M.ASCE, *Section President 2024-25*

Lauren J. Swett, PE, M.ASCE, *Section Past-President, Region 1 Past-Governor, Past Chair of the Leader* Training Committee

Richard Tetreault, PE

Helen Watts, PE, M.ASCE

Erik J. Wiberg, PE, M.ASCE, *Section Past-President*

James L. Woidt, PE, M.ASCE

Justin F. Yaitanes, PE, M.ASCE, *Section President-Elect 2024-25*

Infrastructure area leads are in **bold**

PE is a licensed Professional Engineer, EIT is Engineer-In-Training

M. ASCE is a member of ASCE, AM.ASCE is an Associate Member of ASCE

2024 Maine Report Card Executive Summary

The *2024 Report Card for Maine's Infrastructure* marks the fifth evaluation of its kind, consistently awarding the state an overall grade of C. The Maine Section of the American Society of Civil Engineers (Maine Section ASCE) analyzed fundamental components of each infrastructure area: Condition, Capacity, Operations & Maintenance, Innovation, Resiliency, Public Safety, Funding, and Future Needs. Of the 16 categories, only three infrastructure categories are in good condition (B or B-), nine categories ranged in the fair to mediocre range (C+, C or C-), and four categories were in poor condition (D+ or D). Five areas are struggling due to age and lack of attention, while the others are seeing improvements or holding steady through dedicated investments such as one-time infusions of state and federal funds, federal grants, private funds, and user fees.

In 2024, 41 ASCE infrastructure leaders and industry experts volunteered countless hours to review publicly available data and provide an overview of the state of infrastructure in Maine. The team analyzed the current conditions and needs to assign a simple A to F letter grade to 16 infrastructure categories. The maintenance and improvement of Maine's infrastructure is vital to our economy, health, safety, security, and environmental sustainability. Decisions regarding public infrastructure, which are paid for through user fees, taxes, and private investments, must be guided by long-term comprehensive planning, with sustainable and reliable funding sources.

The *Report Card on Maine's Infrastructure* aims to raise public awareness of the importance of modern and well-maintained infrastructure. It highlights that Maine's infrastructure requires on-going maintenance and strategic planning. We believe discussing the issues detailed in this Report Card will lead to a greater understanding of our state's current and future needs, encouraging community leaders, the state legislature, and our congressional delegation to formulate policies and provide the necessary funding to address these critical infrastructure needs. Civil engineering is a broad field dealing with the planning, design, construction, maintenance, and management of infrastructure networks and the resulting vitality and safety of the public. The Maine Section of ASCE represents over 700 civil engineering professionals who live and work in Maine.

About The Report Card for America's Infrastructure

In addition to the Maine report card, every four years, America's civil engineers provide a comprehensive assessment of the nation's 17 major infrastructure categories in ASCE's Report Card for America's Infrastructure. Using a simple A to F school report card format, the Report Card examines current infrastructure conditions and needs, assigning grades and making recommendations to raise them.

The ASCE Committee on America's Infrastructure, made up of 31 dedicated civil engineers from across the country with decades of expertise in all categories, volunteers their time to work with ASCE Infrastructure Initiatives staff to prepare the Report Card. The Committee assesses all relevant data and reports, consults with technical and industry experts, and assigns grades using the following criteria:

Methodology

CAPACITY
Does the infrastructure's capacity meet current and future demands?

CONDITION
What is the infrastructure's existing and near-future physical condition?

FUNDING
What is the current level of funding from all levels of government for the infrastructure category as compared to the estimated funding need?

FUTURE NEED
What is the cost to improve the infrastructure? Will future funding prospects address the need?

OPERATION AND MAINTENANCE
What is the owners' ability to operate and maintain the infrastructure properly? Is the infrastructure in compliance with government regulations?

PUBLIC SAFETY
To what extent is the public's safety jeopardized by the condition of the infrastructure and what could be the consequences of failure?

RESILIENCE
What is the infrastructure system's capability to prevent or protect against significant multi-hazard threats and incidents? How able is it to quickly recover and reconstitute critical services with minimum consequences for public safety and health, the economy, and national security?

INNOVATION
What new and innovative techniques, materials, technologies, and delivery methods are being implemented to improve the infrastructure?

In addition to this national Report Card, ASCE's sections and branches also prepare state reports on a rolling basis. Visit **InfrastructureReportCard.org** to learn about your state's infrastructure.

2024 Report Card for Maine's Infrastructure

G.P.A.

C

AVIATION — B	PUBLIC PARKS — C
BRIDGES — D+	RAIL — B-
DAMS — D+	ROADS — C-
DRINKING WATER — C-	SCHOOLS — C+
ENERGY — C-	SOLID WASTE — C-
HAZARDOUS WASTE — C-	STORMWATER — C
LEVEES — D+	TRANSIT — D+
PORTS — B-	WASTEWATER — C-

Recommendations to Raise the Grade

1) **Prioritize Public Safety:** Prioritize funding for statewide dam and levee needs, PFAS remediation, and reducing traffic fatalities. There are significant hazards posed by dam or levee failures, including risks to public safety, property, infrastructure, and the environment. Additionally, increasing investment will be required for Maine's efforts to address PFAS contamination in the environment, including soil and groundwater assessments and remediation measures. Traffic crashes typically cause over 150 fatalities on Maine roads annually. Investing in recommendations in the state's highway strategic safety plan will save lives.

2) **Implement Climate Resilience.** In recent years, the increasing frequency of severe storms has significantly impacted Maine's infrastructure. With our state's "Maine Won't Wait" plan for future maintenance and improvements, it's essential to strategically invest in enhancing the resiliency of our state's infrastructure. This will ultimately reduce long-term costs for users. All projects should consider climate impacts in their decision-making process regarding infrastructure investments. As an example, increasing investments in transit to attract more to users will help reduce greenhouse gas emissions.

3) **Create sustainable funding sources.** A continued reliance on federal grants, non-indexed user fees, and one-time increases in funding is not sustainable. Infrastructure projects require extensive time to plan, design, and permit. While transportation has historically benefited from the fuel tax and state bonding, its purchasing power has diminished over the years. To address rising construction costs and accommodate the shift to electric vehicles, we must grow user fees, such as the Passenger Facility Charge (PFC), and identify new funding sources to replace the declining fuel tax.

4) **Set responsible, resilient utility rates and user fees.** User fees should accurately reflect the true costs of using, maintaining, and improving our infrastructure. While many infrastructure owners can evaluate their own needs and set appropriate fees or bonding plans, a sustained educational initiative is crucial to inform the public about fee changes and assist smaller or resource-constrained utilities in financing options and outreach strategies. The public's willingness to accept increased user fees for necessary infrastructure upgrades is essential, particularly when significant investments are needed.

5) **Educate and Innovate:** Maine has an aging population possessing a wealth of expertise and practical knowledge that must be harnessed and shared to cultivate a skilled workforce for the future. The industry must adapt to the next generation to foster a dynamic and resilient work environment. By investing and embracing innovation and new technologies, opportunities exist to empower the workforce and ensure its ability to thrive and adapt in the years to come.

Aviation

B

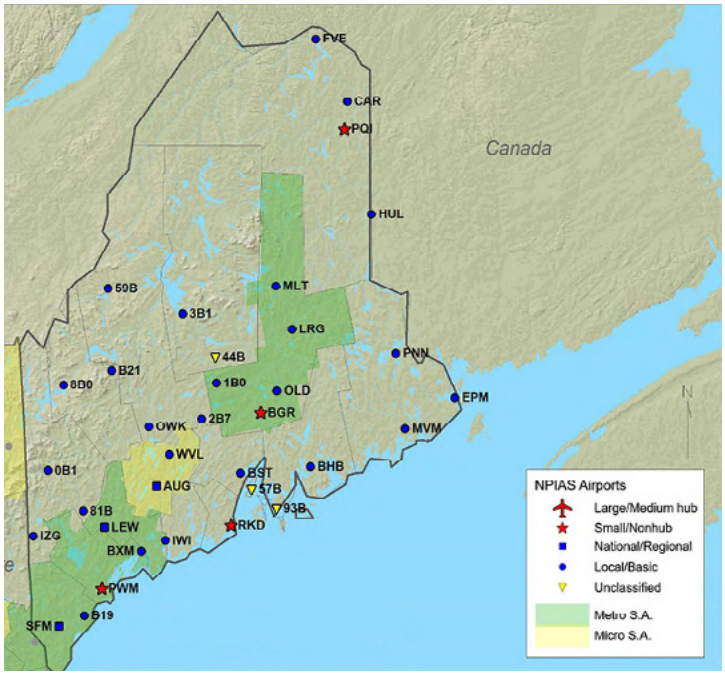
EXECUTIVE SUMMARY

Maine airports have undergone significant improvements in the past four years, from rehabilitation of airport pavement and commitments to installing weather reporting stations and remote surveillance cameras among other upgrades. While the state's two largest airports have minor landside capacity issues in terminal space and vehicle parking, airside and airspace capacity is not an issue statewide. However, revenue from the Airport Improvement Program (AIP) entitlement and Passenger Facility Charge (PFC), essential infrastructure project resources, are struggling to keep pace with inflation. The need for relief with these funding constraints is urgent. Without it, maintaining Maine airports at a high level will become increasingly difficult.

BACKGROUND

Maine has a total of 74 classified airports. Approximately half of these, 39, are private airports open to the public. At the same time, the remaining 35 are recognized by the Federal Aviation Administration (FAA) under the National Plan of Integrated Airport Systems (NPIAS).[1] The NPIAS airports are categorized as Commercial Service (Primary and Non-Primary)[2], Reliever[3], and General Aviation.[4] Figure 1 illustrates the NPIAS and non-NPIAS airports in Maine. Figure 2 illustrates the breakout of NPIAS airports in the state. Maine's network of airports plays a crucial role in the U.S. aviation system, particularly in economic development.

FIGURE 1. MAINE AIRPORTS

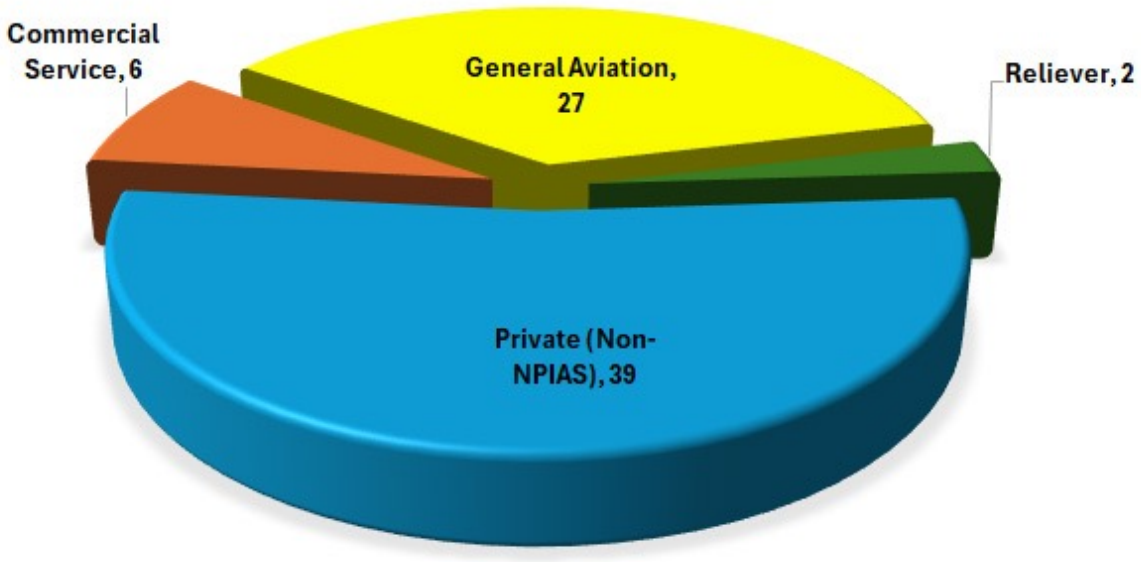


Source: FAA NPIAS Report (2023-2027)

The FAA, through NPIAS, contributes significantly to

strategic planning, fund allocation, safety enhancement, connectivity, emergency preparedness, and infrastructure investment. These benefits align with the overall state of infrastructure in Maine and across the country, forming the foundation of this report card. The pivotal role of Maine's airports in economic development is a testament to their importance and the need for continued improvement.

FIGURE 2. BREAKOUT OF MAINE'S NPIAS AND NON-NPIAS AIRPORTS BY SERVICE LEVEL



Source: FAA NPIAS Report (2025-2029)

CAPACITY

Airport capacity refers to a wide range of factors, from the airspace around the airport to the runway and taxiway system, aircraft parking on the airside, vehicular parking on the landside, and access via roads. It also includes terminal capacity and passenger processing. In the case of Maine's airports, there are no airside capacity concerns, primarily because 95% of the state's airports are generally low-activity airfields with ample capacity to meet all air and landside operations. Airside capacity is not an issue at larger, commercial service airports like Portland International Jetport and Bangor International Airport. However, there is a growing need for more hangars as aircraft owners increasingly seek better shelter and security for their aircraft, which continue to increase in value. The Maine Department of Transportation (MaineDOT) has made progress in building hangars at several general aviation airports. Still, the demand for additional hangar capacity remains high.

Landside issues are also not a problem at most of Maine's airports. However, the two largest commercial airports in Portland and Bangor are experiencing landside capacity issues. Portland International Jetport is experiencing capacity constraints in public vehicle parking, aircraft terminal gates, and gate concourse amenities such as seating, restroom availability, and size. Bangor International Airport is also experiencing terminal capacity issues with boarding gate availability (A. Thibodeau, personal communication, April 17, 2024). Portland and Bangor have realized a 17% increase in passenger enplanements, from 606,000 in 2019 to 708,000 in 2023.

CONDITION

Several areas were examined for the report card, including pavement condition, runway length, instrument approach procedures, and weather reporting capabilities. Pavement condition is assessed based on the Pavement Condition Index (PCI), a methodology widely used in civil engineering to indicate the general pavement condition. In 2020, the PCI for all airports was reported as unchanged from 2016. However, the 2020 report was based on a 2018 assessment, the last one conducted. The next statewide assessment is planned for 2025, so a PCI update is not readily available for this report. While the overall PCI naturally drops over time, several runways, taxiways, and aircraft parking aprons have been reconstructed or rehabilitated since the previous report.[5] In summary, it is generally felt that overall pavement condition has remained unchanged but is stable. See the Public Safety section below for a discussion on runway length and weather reporting procedures.

Of significance is the availability of federal funding for large-scale projects such as runway, taxiway, and apron reconstruction efforts. These projects usually require discretionary funds to offset annual entitlements.

OPERATIONS AND MAINTENANCE

Overall, the repair and upkeep at each of the 35 NPIAS airports is excellent. Some weaknesses, such as available funding at all levels, are identified and addressed regularly. Sponsors (owners) of NPIAS airports maintain facilities to the greatest extent possible with limited local, state, and federal funding. MaineDOT site inspections, with assistance from individual engineering consultants, help ensure each airport complies with government regulations. MaineDOT holds annual Airport Capital Improvement Program (ACIP) meetings with each airport and its consultant, during which future projects are discussed and prioritized. MaineDOT then meets separately with the FAA to prioritize the system consistent with available funding. Of significance is the availability of federal funding for large-scale projects such as runway, taxiway, and apron reconstruction efforts. These projects usually require discretionary funds to offset annual entitlements. The FAA makes investment decisions using structured selection and eligibility criteria to determine the most critical airport development needs within AIP funding limits set by Congress through its authorization and appropriation processes.

Another noteworthy entity is the Maine Aeronautical Advisory Board (MAAB), a MaineDOT-sponsored program with volunteer appointees approved by the department. This 15-member board meets quarterly to address aviation and airport-related issues, including operations and maintenance issues faced individually and collectively by airports. Findings are presented to the State Commissioner of Transportation for inclusion in reports to the State Legislature.

FUNDING/FUTURE NEED

Future needs can be summed up in one word: funding. The Passenger Facility Charge (PFC) levied on each enplaning passenger at a commercial airport has had a federally mandated cap of $4.50 for over two decades. Unfortunately, due to inflation, the PFC has seen its purchasing power plummet, negatively impacting airports' ability to address their growing list of needed improvements. The PFC allows the collection of charges up to $4.50 for

every eligible passenger at commercial airports controlled by public agencies. PFCs are capped at $4.50 per flight segment, with a maximum of two PFCs charged on a one-way trip or four PFCs on a round trip, for a maximum of $18 total. Alternatives to the PFC are inferior from airport revenue collection and consumer welfare perspectives. Herein lies the long-term funding problem. The dollar had an average inflation rate of 2.53% per year between 2000 and 2024, producing a cumulative price increase of 82.08%. The $150,000 of capital improvements or maintenance in 2000 dollars is $273,125 today, and $1 million in 2000 costs $1.8 million today.[6]

Regarding funding, for Fiscal Year (FY) 2023, Maine received $38.7 million in federal funding for airport projects. In matching funds for those aviation projects, MaineDOT provided $2.5 million. PFC collections are about $6 million annually. However, funding remains a top priority for Maine's airports.

On the positive side, funding at the federal level since COVID-19 has resulted in additional grants through the American Rescue Plan Act (ARRA) of 2021[7] and an $8 billion infusion in airport funds. While this impacted every NPIAS airport nationwide, Maine received more than its fair share – notably, an $18 million grant to the Knox County Regional Airport (RKD) in Owls Head. These grant funds were used to repair or reconstruct several critical pavement areas and promote a significant future revenue stream by constructing a new hangar/office complex, a crew house for visiting pilots, and a solar farm.

The FAA Reauthorization Act of 2024 increased funding for the Airport Improvement Program (AIP) to $4 billion per year, an increase from the level of $3.35 billion per year that had previously been in place.

Maine's NPIAS airports also received additional funding through two other programs under the Infrastructure Investment and Jobs Act (IIJA), which included the Airport Infrastructure Grants (AIG) and the Airport Terminal Program (ATP). These two programs resulted in a significant infusion of money for various operations and maintenance projects and a new small terminal building for the Dexter Regional Airport. While the IIJA programs have been used, authorization will sunset in 2026, meaning airports must rely solely on funds through the AIP and, for some, the PFC Program. Neither program provides the necessary funding for the increased cost of infrastructure projects, particularly since the pandemic.

Federal funding through grants has a great impact on airports and the communities they serve. They help pay to pave runways and taxiways, clear safety hazard obstructions, and expand facilities. However, the possibility of sunsetting of recent funding increases from the 2024 Reauthorization Act will result in a return to the status quo, with a return to chronic underfunding on America's aviation infrastructure, with greatest impact to rural airports where communities struggle with budget allocation to roads, schools, public service, and airports, which often are a low priority.

PUBLIC SAFETY

The only shortfall in infrastructure and public safety remains in the state's remote areas. With a population shy of 1.4 million, covering an area of 35,400 square miles, Maine is the 7th least populated state in the nation, with 61% of the population living in the lower 15% of the state by land mass.[8] The remoteness places a heavier-than-normal burden on airports, and this is why organizations like LifeFlight have pressed for greater access to airports with improved facilities, such as longer runways and enhanced weather systems. LifeFlight is a non-profit organization that transports critically ill or injured patients via helicopter and fixed-wing aircraft needing specialized care beyond what can be provided by local hospitals.

Several general aviation airport runways have been extended or reconstructed during the past four years. These include a 1,100-foot runway extension at the Stephen A. Bean Municipal Airport (8B0) in Rangeley and a 701-foot extension of the single runway at Newton Field Airport (59B) in Jackman, which was widened from 60 to 75 feet. Both major projects, funded by the FAA, resulted from an initiative brought on by LifeFlight of Maine in support of air medical transportation needs (J. Dickson, Director of Aviation, LifeFlight Aviation Services (personal communications, April 22, 2024)).

In 2020, the need for advanced weather reporting

systems was addressed by initiating an Automatic Weather Observation System (AWOS) funding program. An AWOS is a computerized system that automatically measures one or more weather parameters (wind speed/direction, cloud height, visibility, temperature, etc.), analyzes the data, prepares a weather observation that consists of the parameter(s) measured, provides dissemination of the observations, and broadcasts the observation via radio, telephone, and the internet. A detailed study and site assessment of each deficient airport was undertaken. As a result, the state will receive nine AWOS III units via the FAA's Airport Improvement Program, installed in phases starting this year.[9]

RESILIENCE/INNOVATION

In the past four years, Maine's airports have begun to embrace green initiatives, such as developing solar farms on land not required for aeronautical development, to address FAA airport design and safety compliance issues. These issues include changes in airport infrastructure implemented during the past several years and obstructions to protected airspace. Several airports, including Wiscasset Municipal Airport, Knox County Regional Airport, and Portland International Jetport, have installed solar farms to offset electricity costs or augment revenue. The Jetport also have EV vehicle chargers in the visitor and employee lots that include 23 Level 2 chargers and 8 Level 1 chargers. In addition, the airport partnered with United Airlines to install its first electric push back aircraft tug.[1]

These initiatives address compliance issues, reduce environmental footprints, and serve as strategic components of the airports' long-term prosperity and success. Since 2020, five additional airports have or have plans to install solar farms, bringing the total to six since the last Report Card. This proactive step helps reduce their energy needs or increases their revenue stream, showcasing the airports' commitment to a sustainable, ecological, and financial future.

MaineDOT is monitoring developments in emerging aviation technology. This expertise includes planning for aircraft operations that incorporate sustainable fuel sources, are composed of lightweight, high-strength aircraft materials, operate with autonomous guidance systems, and generate very low noise ratings. The airport infrastructure to operate these new aircraft must stress sustainability, support enhanced navigation operations, and provide operational resiliency in our airports. One airport, Knox County Regional, is taking the lead in installing electric charging stations in anticipation of the increased use of electric aircraft and vehicles. The Knox County aircraft charging station was installed to support Cape Air Airlines' intent to purchase 75 all-electric Eviation Alice commuter aircraft.

One innovation that has significantly improved public safety is the installation of remotely controlled cameras at airports (NPIAS and non-NPIAS) across the state. These high-resolution (1080p) pannable cameras, advocated by LifeFlight of Maine, allow pilots, including LifeFlight aircrew, to look at runway conditions in real time. This technology, operated by LifeFlight of Maine, is more specific than weather radar and precipitation sensors on AWOS. This type of airport access is critical in pilot pre- and mid-flight planning, particularly during winter weather when runway conditions are challenging to determine at airports that are not staffed around the clock.

The University of Maine at Augusta (UMA) has one of a few nationally FAA-certified Airframe and Powerplant (A&P) schools offering students an Aircraft Maintenance Technician School (AMTS) Certificate.[10] Innovation-wise, in addition to the A&P certification, UMA offers programs in pilot training, unmanned aircraft systems (UAS) design, assembly, and maintenance of fixed-wing aircraft, as well as UAS operations (drone pilots), with plans on the near horizon of offering air traffic controller training, another FAA-certificated program.

[1] There are three types, or "levels," of EV charging stations available as of this writing: type 1, type 2, and type 3. Type 1 is the slowest, while type 3 can charge an EV's battery most of the way in about an hour.

Aviation

B

RECOMMENDATIONS TO RAISE THE GRADE

ASCE makes the following recommendations to raise the grade:

- Review recommendations of the anticipated 2024 Maine Aviation Plan;
- Substantially increasing the AIP funding entitlement fun from $150,000 to at least $250,000 (general aviation and non-primary airports) and from $1 million to $1.7 million for primary airports;
- The FAA Reauthorization Act of 2024 increased federal funding for non-primary general aviation airports from 90% to 95% for fiscal years 2025 and 2026. However, this level of funding must become permanent.[11] This 5% adjustment would substantially relieve municipal governments, particularly those with a small tax base and an airport they must maintain under their grant assurances.
- The FAA Reauthorization Act of 2024 did not include an increase in the PFC cap. Now, Congress must raise the PFC cap from $4.50 to, at minimum, $8.00 to promote local airport self-sufficiency, airport productivity, and reduced airfares through enhanced carrier competition. The last adjustment was in 2000.
- Renew IIJA discretionary grant programs in order to off set inflationary pressures;
- Continue to maintain airport pavement conditions at a high level;
- Increase state funding for airports by providing alternative funding for non-AIP-eligible projects, such as mowing, brush clearing, and snow removal equipment that cannot meet the Federal “Buy American” requirement.

Aviation

SOURCES

1. Wikipedia, List of airports in Maine.
2. A primary airport has 10,000 or more annual enplanements (paying passengers), and a non-primary has fewer than 10,000 enplanements.
3. A reliever airport is an airport that is built or designated to provide relief or additional capacity to an area when the primary commercial airport(s) requires additional capacity on a long-term or temporary basis. In Maine, the two reliever airports support the Portland International Jetport.
4. General Aviation Airports are public-use airports that do not have scheduled service or have less than 2,500 annual passenger boardings
5. Rehabilitation is defined as replacing a portion of the pavement structural layers, whereas, reconstruction is the replacement of the main structural elements of the pavement, such as the subbase. Source: FAA Advisory Circular (AC) 150/5320-6G, Airport Pavement Design and Evaluation (June 17, 2021).
6. https://www.in2013dollars.com
7. H.R. 1319, Public Law 117-2.
8. World Population Review (2024).
9. There are 11 levels of AWOS capable of sensing and reporting varying levels of meterological data. The AWOS III has parameters that suite the weather conditions pilots typically need in Maine.
10. Program: Aircraft Maintenance Training School (AMTS) Certificate - University of Maine Augusta - ACALOG ACMSTM. (n.d.). http://catalog.uma.edu/preview_program.php?catoid=5&poid=1172&returnto=185
https://transportation.house.gov/faa-reauthorization/

Bridges

D+

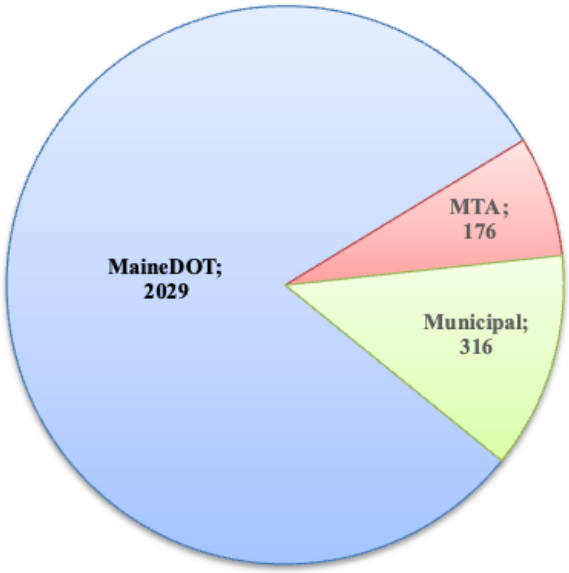
EXECUTIVE SUMMARY

Maine's highway system includes a total of 2,521 bridges, more than half of which are over 50 years old. Historic funding levels have been insufficient to replace bridges before they exceed their design life and nearly one out of every seven Maine bridges (15%) is in poor condition. In recent years, the state's bridge funding outlook has significantly improved, thanks to increased state and federal funding. According to MaineDOT, this has enabled substantial progress in bridge investment and many projects are now underway. The benefits of this additional investment won't be fully realized for several years considering the time required to advance projects from funding implementation to construction completion. Looking ahead, the expiration of the current federal infrastructure funding allocation program in 2026 and the need to maintain sustainable funding sources at the state level will be primary factors in maintaining funding to support much-needed bridge improvements in Maine.

BACKGROUND

Maine's bridges play a vital role in facilitating transportation across this rural state. The transportation system supports a small population (1.4 million people) spread over a relatively large area, while traversing an extensive network of natural waterbodies and manmade infrastructure. Overall, the bridges throughout the state are owned by the Maine Department of Transportation (MaineDOT), the Maine Turnpike Authority (MTA), and municipalities as shown in Figure 1. The bridge inventory in Maine includes 2,521 bridges (2023 Data[1]). These structures, defined as bridges by the Federal Highway Administration's (FHWA), are 20 feet or more in length. There are approximately 1,300 additional structures MaineDOT classifies as minor spans, which are between 10 feet and 20 feet in length. FHWA only compiles condition data for bridges, not minor spans, which is the data used for this Report Card. In terms of route importance, Maine's bridge inventory comprises 531 bridges on the National Highway System (NHS), which includes the Interstate Highway System and vital roads for the nation's economy, defense, and mobility.

Figure 1:
Maine Bridges by Owner (2023)



All Maine bridges are regularly inspected in accordance with the FHWA's National Bridge Inspection Standards (NBIS), which incorporate by reference the Specifications for the National Bridge Inventory (SNBI). MaineDOT inspects most state and municipal bridges every two years. MTA bridges are inspected annually. Inspection data includes an assessment of bridge condition and is the basis for this report's evaluation of the state's bridge condition. Based on FHWA-required reporting measures, all bridges are assessed on a good, fair, and poor condition rating scale. Bridges with major structural components that receive a condition rating of 4 or lower are classified as poor. Although bridges classified as poor are safe for continued use, the bridge may be posted for lower weight limits, or closed, if conditions warrant such action. In Maine, approximately 5% of the bridges are currently either posted or closed. This figure is notably lower than the national average, which stands at 11%. Poor and posted bridges are typically prioritized for rehabilitation or replacement.

CAPACITY AND CONDITION

The FHWA National Bridge Inventory data[1], shows that Maine's bridge infrastructure has an average bridge age of approximately 55 years, a significant figure considering many of these structures were originally designed for a lifespan of 50 years before needing substantial repair or replacement. About half of Maine's bridges have surpassed this age threshold, posing a significant challenge for infrastructure management[2]. Maine's 372 poor-condition bridges have an average age of 75 years. For context modern bridges are typically designed for 75 to 100 years of service.

Historic funding levels for bridges in Maine have been insufficient to allow for significant repairs or replacements before their conditions deteriorate, leading to many bridges falling into poor condition. Although the funding deficit in recent years has improved, many of the resulting projects remain in design or construction and, therefore, the NBI data will take a few years to reflect improvement.

Figures 2 and summarizes the condition of Maine's bridges by age and over time, respectively. The figures highlight the impact of longstanding funding shortfalls. Over time, the percentage of bridge area classified as fair and poor condition has increased, with the percentage of good condition bridges decreasing. As Maine's bridge inventory ages, the number of bridges transitioning from fair to poor condition each year could increase over time and requires monitoring. Sustained investment in bridge repair and replacement is essential to address this issue and prevent fair condition bridges from becoming poor condition bridges.

FIGURE 2: MAINE BRIDGES BY AGE AND CONDITION (2023)[1]

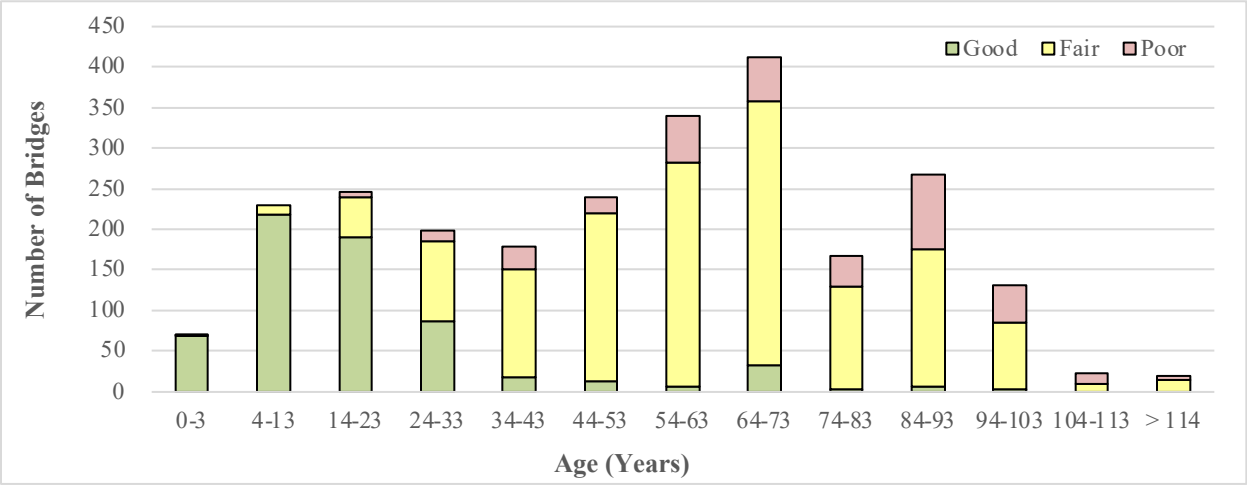


FIGURE 3: MAINE BRIDGE CONDITIONS OVER TIME[1]

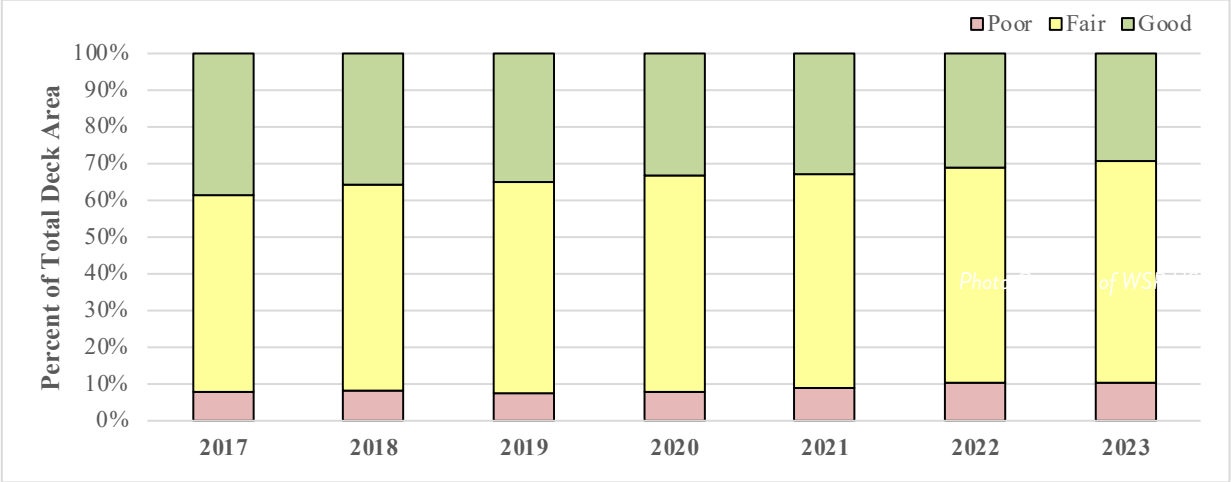


Table 1 provides a breakdown of Maine bridges classified as poor in 2023, detailing both the number of bridges and their total deck area. For comparison, bridge condition data for New England and the nation are also included. The data reveals that Maine's bridge inventory has significantly more poor condition bridges, both by count and area, compared to the national average. By bridge deck area, MaineDOT's percentage of poor condition bridges is similar to other New England states.

Recent funding increases have enabled MaineDOT to undertake more bridge projects. On a square foot basis, MaineDOT's current construction projects, along with those scheduled for advertisement by the end of 2024, are expected to reduce the percentage of deck area of poor condition bridges from 10% to 6%. This reflects a significant investment in bridges.

TABLE 1: MAINE BRIDGES BY CONDITION (2023)[1]

ALL BRIDGES (SPANS > 20 FEET)

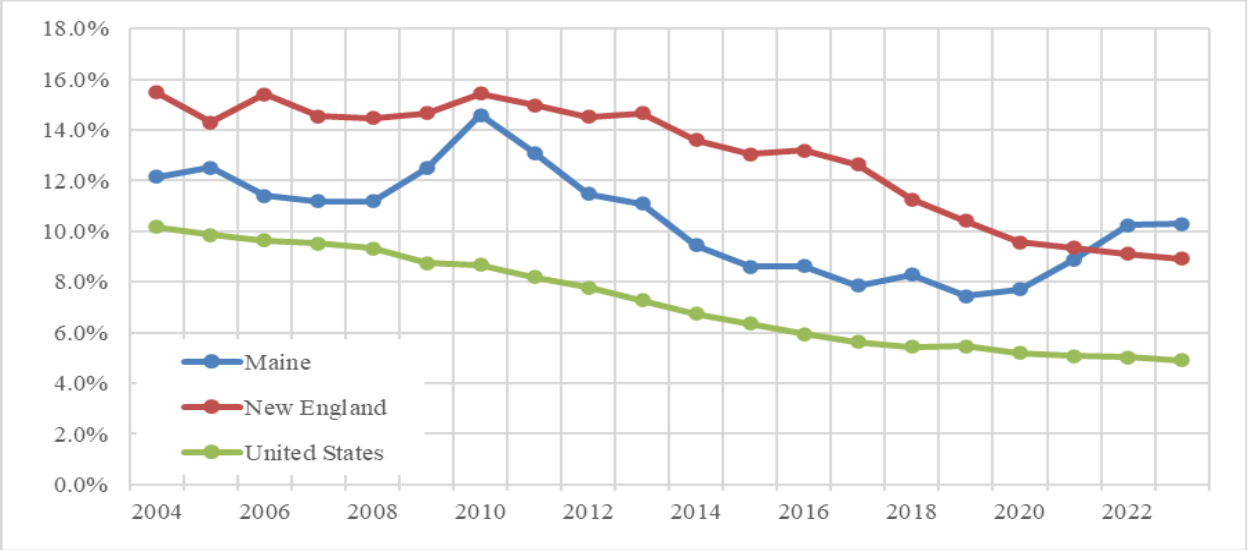
Owner	Bridges by Count (Ea.)			Bridges by Deck Area (Sq. Meters)		
	Total	Poor Condition	%	Total	Poor Condition	%
Maine	2,521	372	15%	1,278,501	131,603	10%
New England	18,339	1,429	8%	11,714,831	1,045,390	9%
United States	621,581	42,404	7%	403,488,432	19,834,101	5%

Table 1 shows that approximately one out of every seven Maine bridges (15%) is in poor condition. According to the American Road & Transportation Builders Association, this translates to approximately 1.5 million trips[3] across poor bridges each day in Maine.

Maine's most vital bridges, those located on the NHS, are in generally better condition than the average Maine bridge. When measured in terms of total deck area (bridge length multiplied by bridge width), approximately 7% of Maine's NHS bridges are poor compared to the average of 10% for all Maine bridges. The smaller percentage of deficient bridges on Maine's NHS roadways indicate Maine's bridge owners have been successful in prioritizing the maintenance and replacement of our state's most critical structures.

Figure 4 presents a comparative analysis of the condition of Maine's bridges against regional and national averages. It is noteworthy that Maine consistently exhibits a higher percentage of poor bridges relative to the national average; however, this is consistent with New England states.

FIGURE 4: POOR BRIDGES (DECK AREA % OF TOTAL) COMPARISON OF MAINE, NEW ENGLAND, & UNITED STATES



From 2010 to 2020, Maine made significant progress in infrastructure management, steadily reducing the percentage of poor condition bridges by approximately 1% each year. This consistent decrease underscores the state's commitment to improving its bridge infrastructure. However, in 2020, this positive trend unexpectedly reversed due to an increase in aging bridges previously considered to be in fair condition. The exact cause remains uncertain but is likely a combination of several factors. In addition to the aging infrastructure, other potential contributing factors to this trend reversal could include escalating construction costs and labor shortages, which result in less construction productivity.

OPERATIONS AND MAINTENANCE

MaineDOT strives to implement a balanced approach to bridge replacement, maintenance, and preservation, thereby extending bridge service life and delaying more costly repair or rehabilitation work. Allocating funding for preservation projects is a strategic investment of transportation dollars intended to reduce overall life-cycle costs. For decades, operations and maintenance needs have outpaced available funding and, as a result, MaineDOT has used an inventive approach to the resources available. The MaineDOT work plan4 identified a need of $4.74 billion, in which highway and bridge operations funding makes up approximately 13% of that total. More specifically, bridge operations and maintenance and infrastructure inspections make up approximately 6% of MaineDOT's program, averaging approximately $25.9 million dollars per year. The percentage of poor bridges over the past four years has risen from 7% to 10%, indicating more funding and focus on operations and maintenance is required than has been available. Some of the increase in poor bridges is attributed to large multi-year bridge projects that are still under construction and not yet updated in the inspection reports, a subject that is discussed further in the Capacity and Condition section of this report.

Similar to MaineDOT, the MTA has focused a significant portion of its capital improvement program over the past decade on bridge preservation and rehabilitation. In 2019, this initiative culminated in the elimination of all poor bridges from the MTA's inventory. With these significant improvements achieved, the authority's focus is transitioning to keeping its bridges in a state of good repair. MTA completes inspections of their bridges each year and develops an operations and maintenance report to determine the amount of funding required for the proper maintenance, repair, and operation of the

Turnpike. The data collected during the annual inspection is used to manage the MTA capital plan, which provides a roadmap for all the required work to maintain the Turnpike over a 30-year period and compares that to the available funding.

RESILIENCE, INNOVATION, AND PUBLIC SAFETY

Maine has recently experienced significant storms and flooding, causing substantial damage to its transportation infrastructure. Considering the recent damage, MaineDOT is in the process of providing updated design guidance with infrastructure resiliency in mind. For instance, during the design of coastal bridges, there is increased emphasis on the potential for sea level rise and larger, more frequent storm events with an aim to strengthen the existing bridge and culvert infrastructure throughout the state.

Maine is taking proactive steps to address these challenges. Gov. Janet Mills has established a new commission that will develop the state's first plan for long-term infrastructure resilience. This commission is charged with reviewing and evaluating Maine's response to the recent storms, identifying crucial areas for near-term investment and policy needs, and developing the state's first long-term infrastructure plan to ensure that Maine is ready for the harsh storms ahead.

Innovative strategies and technologies are being implemented to minimize project impacts on the public and the environment, and to maximize the return on their infrastructure investments. Accelerated Bridge Construction (ABC) methods are being used statewide to minimize construction time and traffic disruptions. Innovations such as composite bridge drains, hybrid composite bridge girder systems, corrosion-resistant steel, improved coatings, and geosynthetic reinforced soil-integrated bridge systems are providing cost-effective, durable solutions that extend the service life of new bridges to 100 years or more.

These innovations not only benefit the state's infrastructure but also ensure the safety of the travelling public by reducing traffic disruptions and potential hazards during construction. Maine ASCE encourages the continuation of this strategic approach to sustainability, innovation, and public safety.

FUNDING & FUTURE NEED

For decades, Maine's transportation needs have consistently exceeded available funding. However, this trend has recently been reversed. The 2024 edition of MaineDOT's Three-Year Work Plan[4], issued on January 18, 2024, highlights a significant shift: MaineDOT is transitioning from coping with persistent funding shortfalls to making substantial progress in light of increases in state and federal funding. The Three-Year Work Plan, which covers 2024-2026, states "this is the best fiscal situation for transportation that the state has seen in years."

This progress has been facilitated by enhanced transportation funding at both federal and state levels. In 2023, state lawmakers allocated 40% of the sales tax collected from automotive dealers and the sales and use tax collected by the Bureau of Motor Vehicles to the Highway Fund on a perennial basis. Furthermore, the passage of the Infrastructure Investment and Jobs Act (IIJA) has enabled MaineDOT to compete for federal grant funding, potentially doubling the federal transportation funding coming to Maine.

Traditional funding sources, such as the gas tax, have dwindled due to the increased fuel efficiency of vehicles and the rise of electric vehicles, while construction costs have surged by over 50% since the COVID-19 pandemic due to inflation and workforce availability[2]. This makes state and federal funding instrumental to improving the condition of MaineDOT's bridge inventory. Previously, MaineDOT's bridge funding relied heavily on bonds, which are a one-time, less flexible funding source. Now, instead of merely maintaining the status quo of the state's existing infrastructure, MaineDOT has been able to significantly improve safety, revitalize downtown areas, boost economic prosperity, plan for future climate change challenges, and enhance the quality of life. These improvements would not have been possible without the funding available for the replacement and maintenance of MaineDOT's bridges.

The funding generated by the sales tax collected from automotive dealers and the sales and use tax collected by the Bureau of Motor Vehicles amounts to $100 million annually. However, this falls $100 million short of the minimum unmet state capital transportation funding need of $200 million. To bridge this gap, MaineDOT has resorted to using revenue bonds, but should continue to seek alternative, more sustainable funding sources.

Looking ahead, MaineDOT should collaborate with policymakers to ensure the continuation of enhanced infrastructure funding in the state. The IIJA is set to expire in 2026, necessitating the passage of a new infrastructure bill to maintain adequate funding levels. The allocation to the highway fund from automotive sales will also need to be sustained.

Lastly, the MTA's four-year capital improvement program[5] includes an average funding of approximately $7.6 million per year for repairing and rehabbing MTA owned bridges from 2024 to 2027. Turnpike toll revenue has rebounded over the past four years, exceeding pre-COVID-19 pandemic levels, and is expected to provide sufficient funding to keep MTA bridges in a state of good repair.

Bridges

RECOMMENDATIONS TO RAISE THE GRADE

For the continued safety of our bridges, the Maine Section of ASCE recommends the following actions:

- Identify alternative funding mechanisms for the $100 million Highway General Fund shortfall by collaborating with state policymakers to sustain allocations from auto dealers and sales tax, extend federal support under the IIJA, and boost existing and new funding sources such as fuel taxes, state bonds, tolls, car fees, and vehicle miles traveled (VMT) systems;
- Continue a systematic approach to bonding;
- Fully fund MaineDOT's bridge maintenance and capital improvement programs to meet established goals;
- Create a state funding mechanism for municipal bridges and encourage municipalities to establish capital reserves for repair;
- Maintain a healthy blend of maintenance, preservation, and capital improvement work;
- Invest in innovations for cost-effective project delivery and extend bridge service life; and
- Engage contractors to enhance construction contracting, aiming to reduce construction costs and strengthen the labor workforce.

SOURCES

Information for this report was obtained from several sources, including MaineDOT, the Federal Highway Administration (FHWA), the Maine Turnpike Authority, the Maine Better Transportation Association, and TRIP.

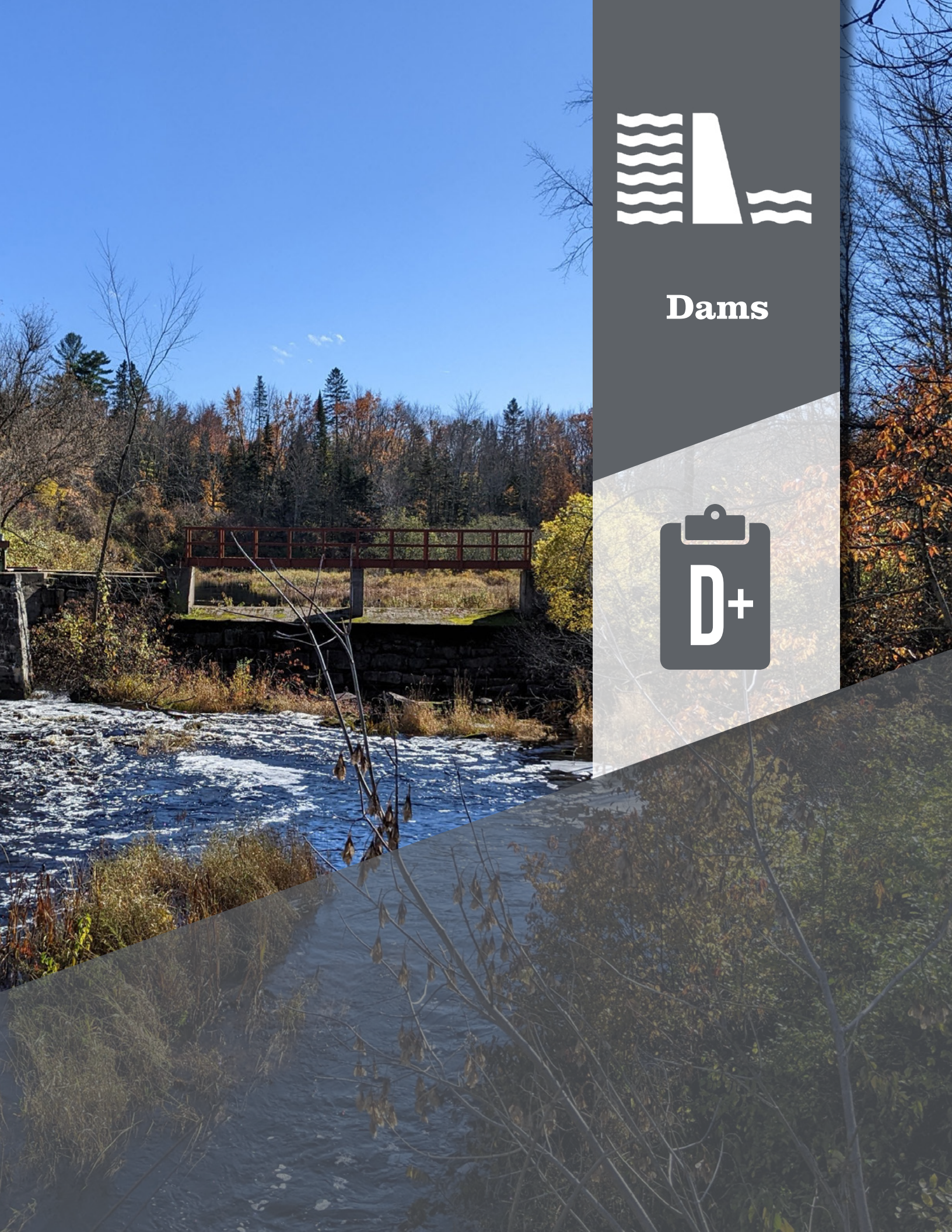
1: FHWA, Bridges & Structures Website, National Bridge Inventory, 2023 Data (https://www.fhwa.dot.gov/bridge/britab.cfm)

2: "Key Facts about Maine's Surface Transportation System", TRIP, May 2024

3: "Maine Transportation by the Numbers", TRIP, February 2021

4: "MaineDOT Three Year Work Plan, 2024 Edition", MaineDOT, January 18, 2024

5: "4-year Capital Investment Plan (2024-2027)", Maine Turnpike Authority, December 21, 2023



Dams

D+

EXECUTIVE SUMMARY

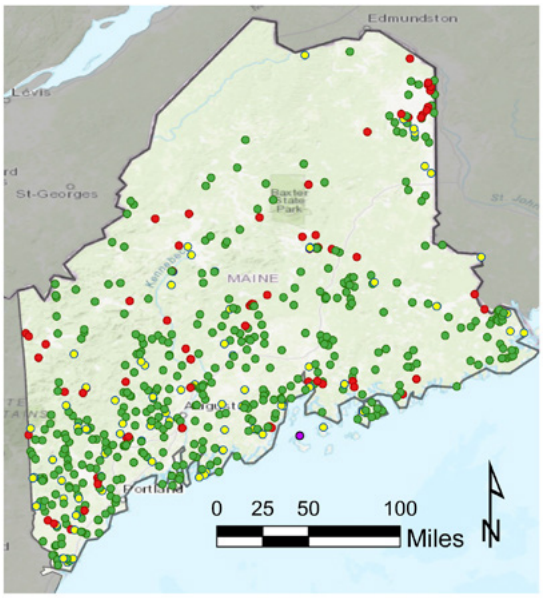
The average age of Maine's 672 dams is 108 years; of the 54% of these dams whose conditions have been assessed, half are in satisfactory condition. Overall, 159 Maine dams are classified as significant- and high-hazard potential dams, meaning failure would result in considerable damage and/or loss of life. Unfortunately, a quarter of these high-hazard dams are in poor or unsatisfactory condition. Despite inconsistent funding and three years without a State Dam Safety Inspector, the Maine Dam Safety Program has achieved 100% compliance with emergency action plans for significant- and high-hazard dams, exceeding the national average of 75%. However, to raise the grade, the Maine Dam Safety Program needs increased and dedicated funding, additional staff, and increased authority to continue ensuring public safety and oversee nearly $1 billion of estimated repairs to improve the condition of Maine's dams.

BACKGROUND

Dams are artificial barriers built across rivers, streams, or lake outlets to impound or divert water. In Maine, dams are operated for a variety of purposes, but hydropower (39%), recreation (21%), and flood control (11%) are the most often-cited[1]. Maine's dams range from small, empirically designed dams built in the 18th and 19th centuries to modern, engineered hydropower dams largely constructed between 1900 and 1960[2]. Nearly half (48%) of Maine's dams are privately owned (e.g., lake associations, farms, energy producers); the remaining dams are owned by public utilities (6%) and federal (4%), state (8%), or local (25%) governments[1].

A total of 672 dams in Maine are regulated[3] based on their size being 1) greater than 25 feet in height with a storage capacity greater than 15 acre-feet (5 million gallons) or 2) greater than 6 feet in height with a storage capacity greater than 50 acre-feet (16 million gallons)[4]. Of these 672 dams, the Federal Energy Regulatory Commission (FERC) regulates most hydropower facilities including 149 dams[4]. The Maine Emergency Management Agency (MEMA) regulates the remaining 523 dams, including two co-regulated with the International Joint Commission[3].

FIGURE 1: HAZARD POTENTIAL OF MAINE'S DAMS[1]



CAPACITY

Although 672 dams are subject to regulation in Maine, there are over 1,001 dams in Maine (Figure 1) when 322 non-jurisdictional and 7 dams with unclassified hazards are included[3]. However, the true number of dams is unknown as a state statute requiring registration of dams was repealed in 1993[5]. Although the true number of dams is unknown, there is a trend towards dam removal in recent decades: whereas three dams have been built since 2000[1], all for recreation, 41 dams have been removed in Maine during that same time[6]. Combined with the fact that dams cannot be abandoned in Maine and MEMA's observation that many owners of non-revenue producing dams neglect their dams[2], the need to remove unsafe dams that have outlived their economic lives is presently greater than the need to build additional dams in the state.

CONDITION

The average Maine dam is 108 years old[1]. Some of these dams may have been constructed before the establishment of formal dam engineering practices and many of Maine's dams are showing signs of deterioration. As documented in Table 1, of the 316 dams having condition assessments in the US Army Corps of Engineers' National Inventory of Dams (NID), only half were in satisfactory condition and almost a quarter, were in poor or unsatisfactory condition[1]. Also presented in Table 1 is the condition of dams relative to the number of low-, significant-, and high-hazard potential dams which are determined by assessing the potential adverse consequences of the dam if it were to fail or be misoperated[4]. Reviewing Table 1, there are 15 High-hazard dams in poor or unsatisfactory condition in which loss of human life is probable if the dam were to fail or misoperate[4]. Also, regular inspection of low-hazard dams is not required under Maine law (only verification of their hazard potential once every 12 years)[4] so many low-hazard dams, and almost half of all regulated dams in Maine, have little to no data on their condition.

TABLE 1 SUMMARY CONDITION OF MAINE DAMS[1]

Hazard Potential	Assessed Condition					
	Satisfactory	Fair	Poor	Unsatisfactory	Not Rated	Total a
Undetermined	-	-	-	-	1	1
Low [b]	96	35	28	1	270	430
Significant [c]	33	21	25	3	2	84
High [d]	41	18	9	6	1	75
Total	170	74	62	10	274	590

a Per National Inventory of Dams which does not have data for all the 672 dams cataloged by MEMA

b No probable loss of human life and low economic losses or environmental damage if the dam fails/misoperates[4]

c No probable loss of human life but major economic losses or environmental damage if the dam fails/misoperates[4]

d Probable loss of human life if the dam fails/misoperates[4]

PUBLIC SAFETY

A sudden failure of a dam can pose significant hazards to downstream public safety. A failure of a dam can damage downstream property and infrastructure, degrade the environment, increase response time for emergency responders in the case of road closures, and in the case of high-hazard dams, cause the loss of lives. Dam failures can and have occurred in Maine: in the past 30 years, there have been nine failures of dams in Maine[2]. Combined, these dam failures have caused over $2.5 million in downstream damages (2024 dollars), affected a public water supply, and required additional funds to repair[2]. As of 2021, four dam owners have been ordered to reduce water levels at their dams due to dam safety concerns[2].

To help avoid and, otherwise, mitigate some of the impacts of dam failures, FERC regulations and Maine laws require owners of all significant- and high-hazard potential dams in Maine to prepare Emergency Action Plans (EAPs) for their dams[4]. EAPs are used to assess the impact of a potential dam failure or malfunction and to prepare emergency responders to address such an incident. Typical components of an EAP include a map of areas that would be flooded if the dam were to fail, identification of access routes that may be inaccessible to emergency responders, and identification of potentially affected property owners. With MEMA staff directly supporting dam owners, 100% of significant- and high-hazard potential dams in Maine have active EAPs[1], outperforming the national average of 75%[1]. MEMA has also invested significant effort to make sure EAPs are "living documents" that are reviewed and practiced regularly with emergency responders[7].

OPERATION AND MAINTENANCE

In general, the condition of Maine dams is correlated to their ability to generate revenues for their owners: most revenue-producing dams (including hydropower dams) are in better condition than non-revenue producing dams[2]. Most hydropower dams are regulated by FERC, and their inspection, operation, and maintenance are highly regulated. The inspection frequency of FERC-regulated dams is generally less than three years and for many dams, required annually[1]. Inspection of FERC-regulated dams is the responsibility of the dam owner but must comply with strict standards and be submitted to FERC for review. Safe operation of the dam is usually critical to the hydropower operations and revenue-producing function of such dams. FERC also has minimum maintenance and safety requirements which if not complied with could result in the revocation of an owner's license to operate a hydropower facility.

In contrast to FERC-regulated dams, MEMA is responsible for inspecting significant and high-hazard dams every six years[4]. MEMA is not statutorily required to inspect low-hazard dams4. These inspection cycles are less than the 1-, 2-, and 5-year frequency recommended in the Association of State Dam Safety Officials (ASDSO) *Model Dam Safety Program Manual* for high-, significant-, and low-hazard dams, respectively[8]. The low frequency of dam inspections are symptomatic of inadequate funding to the Maine Dam Safety Program (MDSP): in response to inadequate state funding for the MDSP to maintain staffing levels to complete the previously mandated inspection frequencies, the Maine Legislature reduced dam inspection frequencies in 2013[4]. Regular inspection and maintenance of dams is further challenged by the lack of rules establishing design standards and maintenance requirements and the lack of MEMA authority to order maintenance or repairs except in those situations where the dam hazard constitutes an emergency threatening life or property[7].

FUNDING

The MDSP is currently run by 1.5 full-time staff and a contract employee that manages the high-hazard dams until a new State Dam Safety Inspector is found. In their peer review of the MDSP, ASDSO recommended that to adequately administer a dam safety program consistent with the Model Dam Safety Program, the MDSP should have 14 to 15 full-time staff[7]. An agreement with the Natural Resources Conservation Service (NRCS) allowing NRCS to assist MEMA with the inspection and oversight of 14 dams originally designed and/or funded by NRCS provides modest progress towards this staffing goal[2]. However, re-deployment of MDSP staff to respond to other emergency response efforts administered by MEMA, such as response to the COVID-19 pandemic, further strains the MDSP.

While the MDSP has been efficient in using available funding to reduce the risk to the public downstream of the state's dams, the MDSP has historically been under-funded almost since its inception[2]. In a 2021 white paper[2] on the MDSP, MEMA's Director of Operations and Response succinctly summarized the challenge:

The Maine Dam Safety Program is in a dire situation, the current environment and status of the program is and has been caused by no dedicated funding stream. The program has relied upon other grants and not its own self supportive funding. For the program to be effective and to protect property and lives, the program needs to have a constant source of funding as well as a complete wage increase for the positions. Multiple studies have shown that this program was expected to fail and struggle unless funding was secured.

Until recently, the MDSP's program budget was funded via FEMA's National Dam Safety Program (NDSP) State Assistance Grant, the amounts of which are variable and their timely receipt is not guaranteed[2], and more general grants including FEMA's Emergency Management Performance Grant shared across MEMA[2]. To this end, the Maine Legislature has fully funded the employment of the State Dam Safety Inspector and Assistant State Dam Safety Inspector. However, salary and benefit packages for MDSP staff have historically been inadequate to attract qualified candidates: MDSP's sole position requiring a licensed Professional Engineer, the State Dam Safety Inspector, has sat vacant since the former State Dam Safety Inspector retired in 2021. While positive, additional consistent and reliable funding from the Maine Legislature and/or the FEMA's NDSP State Assistance Grant is needed to build and retain a skilled and effective MDSP to meet ASDSO's recommended staffing level and increase MDSP's capacity to inspect dams, identify and mitigate potential risks to public safety, and administer Maine's dam safety program. Increased staffing levels would allow the MDSP to undertake multi-year efforts and pursue Federal grants that require state match[9].

FUTURE NEED

In 2023, ASDSO estimated the cost of repairing or rehabilitating 560 (currently 574[1]) of Maine's regulated, non-Federal dams to be $920 million[10.] This estimate does not include costs for Maine's 16 Federally owned dams[1]. Some funding opportunities exist to undertake these repairs: Federal grant funding is available through the *Water Infrastructure Improvements for the Nation Act (WIIN Act)*. Section 5006 of the WIIN Act provides funds, including $185.1 million allocated in 2024 through the *Bi-partisan Infrastructure Investment and Jobs Act*, for the removal, repair, or rehabilitation of non-Federal high-hazard dams. Currently, fourteen dams in Maine are eligible to apply for this grant[1] and one-third of dedicated funding is to be distributed equally to all states that submit applications (approximately one million per state if all states submit applications). Few grants are available to repair or rehabilitate low- and significant-hazard dams. Some such dams that no longer serve their purpose might more cost-effectively be removed and there are grant opportunities to fund removal of dams that benefit the passage of Atlantic salmon, other anadromous fish species, and brook trout.

Beyond these grant programs, funding this future need is expected to be the responsibility of dam owners. The

Dam Repair and Reconstruction Fund, a revolving fund to loan municipalities and quasi-municipalities low-interest funds to maintain, upgrade, and repair their dams, was dissolved in 2023[9]. A similar grant, but one that can only be used for dams that are used for water supply, the *Drinking Water State Revolving Fund*, also provides low-interest loans for the removal or repair of dams but has been under-utilized for dam safety[9].

A further limitation to upgrading Maine's dams is the lack of compliance and enforcement policies and procedures[7]; this includes a lack of defined compliance criteria for existing dams, rehabilitated dams, and new dams that provide owners clear direction, tools, and guidance to ensure that owners understand their responsibilities and voluntarily stay within compliance[7]. In the event that owners do not voluntarily maintain their dam in compliance, the Department also lacks an enforcement mechanism to compel dam owners to undertake dam improvements to reduce the risk to the public except in the cases where there is an emergency situation[7].

INNOVATION & RESILIENCE

As funding is generally unavailable to maintain dam infrastructure in a satisfactory condition for today's needs, more effective use of limited funding is important to maintain or improve Maine's dam infrastructure. To that end, the *Providing Research and Estimates of Changes in Precipitation (PRECIP) Act* will update Probable Maximum Precipitation studies across the nation that were last developed in the 1970s. Improved estimates of the Probable Maximum Precipitation can provide improved estimates of design floods and more efficiently use limited funds. At the state level, an Executive Order from Governor Mills has established a commission on infrastructure rebuilding and resilience that is charged with reviewing Maine's response to recent severe weather events, identifying crucial areas for near-term investment and policy needs, and developing the state's first long-term infrastructure plan to be ready for future storms.

Dams

RECOMMENDATIONS TO RAISE THE GRADE

Maine ASCE makes the following recommendations:

- Fill the State Dam Safety Inspector position as soon as possible;
- Re-organize the Maine Dam Safety Program as an independent MEMA division to allow direct communication with the MEMA State Director and reduce re-allocation of program staff to non-dam emergency responses;
- Appropriate $800,000 annually through the Maine Legislature for the Maine Dam Safety Program as previously requested by MEMA's Director of Operations and Response; the funding would allow increased staffing levels, hiring of a second licensed professional engineer to collaborate with the State Dam Safety Inspector, and provide stable funding levels to undertake multi-year efforts to benefit the Maine Dam Safety Program;
- Encourage the Maine Infrastructure Rebuilding and Resilience Commission to include dams in its long-term plan;
- Establish sustainable funding mechanisms to fund the Maine Dam Safety Program at appropriate staffing levels; the Maine Legislature may consider the establishment of dam registration fees to fund the dam safety program instead of the General Fund – such registration fees would provide a constant source of funding that is collected from those that most directly benefit from MDSP services;
- Apply for Section 5006 funding under the *Water Infrastructure Improvements for the Nation Act (WIIN Act)* to repair, remove, or rehabilitate qualifying non-Federal, high-hazard potential dams, noting that even an unsuccessful application will entitle Maine's program to a portion of available funding;
- Update Maine's Revised Statutes to require registration and regular inspections of all dams; dam safety inspection frequencies should be consistent with ASDSO's Model Dam Safety program: every year, two years, and five years, respectively, for high-, significant-, and low- hazard potential dams; and,
- Develop and implement a Compliance and Enforcement policy and procedure that encourages dam owners to voluntarily maintain their dams in compliance with to-be-established rules or, if necessary, enforce compliance.

Dams

SOURCES

1. US Army of Engineers (USACE), National Inventory of Dams, Accessed Mar 11, 2024.
2. Maine Emergency Management Agency (MEMA), Maine Dam Safety White Paper, Oct 2021.
3. Maine Emergency Management Agency (MEMA), Maine Dam Safety Program, Accessed Jun 19, 2024.
4. Maine Revised Statutes, Title 37-B, Chapter 24 “Dam Safety”
5. Maine Revised Statutes, Title 38, Chapter 5, Subchapter 1 “Mills and Dams”
6. American Rivers, American Rivers Dam Removal Database, Accessed May 5, 2024.
7. Association of State Dam Safety Officials (ASDSO). ASDSO Peer Review Report of Maine Emergency Management Agency, Nov 2023.
8. Federal Emergency Management Agency & Association of State Dam Safety Officials, Model State Dam Safety Program Manual, Sep 2022.
9. Maine Emergency Management Agency (MEMA) Director of Operations and Response Division, June 2024.
10. Association of State Dam Safety Officials (ASDSO) The Cost of Rehabilitating our Nation’s Dams, February 2023

Drinking Water

C-

EXECUTIVE SUMMARY

An estimated two-thirds of Maine residents are served by public drinking water systems. Aging water mains continue to be a serious issue as utilities miss the 1% annual replacement rate, effectively adding 10-50 years to the existing 100-year replacement cycle. The issue is largely due to project funding needs exceeding the resources available at the state and local levels. The Drinking Water Program estimates $60 million per year is needed over the next 20 years for drinking water infrastructure projects which equates to an annual $27.7 million shortfall in funding. Considering the impending U.S. Environmental Protection Agency (EPA) PFAS limits, the shortfall will grow by another $150 million in the next five years.

BACKGROUND

An estimated two-thirds of Maine residents are served by public drinking water systems. Other than the Portland Water District, Maine's Community Water Systems rates are regulated by the Maine Public Utilities Commission (PUC). As of 2024, Maine had approximately 2,000 active drinking water supply systems, which range from large systems supplying entire communities to small systems that provide water to seasonal facilities such as campgrounds, hotels and restaurants, all of which are classified as "public". This report applies specifically to the water systems regulated by the PUC. This report does not pertain to non-PUC regulated systems or the private wells used by the balance of Maine's residents.

The Drinking Water Program (DWP), which is part of the Maine Center for Disease Control and Prevention (CDC), within the Department of Health and Human Services (DHHS), is responsible for ensuring all public water systems comply with federal and state regulations on drinking water. In 1976, the DWP began administering the federal Safe Drinking Water Act (SDWA) in Maine. Despite variations in facilities, regulatory oversight of Maine's public systems is firmly rooted in the SDWA; new public water systems are required to have sufficient capacity to meet federally mandated drinking water requirements. A primary responsibility of the DWP is overseeing compliance with and enforcement of EPA National Primary Drinking Water Standards.

CONDITION AND CAPACITY

The condition of drinking water infrastructure has a direct correlation to the quality of water received by the public. A well-maintained public drinking water infrastructure is critical for public health and strong businesses. Maine generally has a sufficient supply of water. Localized areas have experienced shortages, but generally Maine has not experienced state-wide shortages even during droughts in the peak of the tourism season. Regional water councils supported by the utilities work collaboratively to ensure that utilities can support each other during droughts and extreme weather events. Maine utilities continue to make plans and build infrastructure, including interconnections to provide redundancy and resiliency. Maine's regulatory and water rights regime is based on sustainability of the resource rather than a water allocation structure, thus mandating capacity of a source of supply be limited to what the resource can sustainably provide. This has helped to prevent overutilization of water resources in Maine.

Aged underground water pipes remain the most serious issue for Maine's water utilities. The minimum annual target replacement rate is 1%, which would keep all mains less than 100 years old. The replacement rate in Maine has remained under 1% for the past 20 years, which reflects a 100-150 year replacement cycle.

PUBLIC SAFETY

Most systems are in full compliance and provide high quality water to customers. No outbreaks of water borne diseases regulated by the SDWA have been attributed to these systems since the early 1980s. State and national attention are focused on Per- and polyfluoroalkyl substances (PFAS) and lead in drinking water. Following the EPA's assessment of lead service lines, Maine's municipal water systems are completing service inventories and only a few known lead service lines in distribution lines have been located in Maine. The vast majority of systems in Maine have no known lead service lines.

Maine is among the top states on addressing PFAS in the environment and in drinking water. PFAS substances are the toxic chemicals found in non-stick pans, cleaning products, toothbrushes, food packaging, cosmetics, firefighting foam, and other products. The chemicals are linked to cancers and low infant birthweights. Maine along with a handful of other states passed a law to limit PFAS to 20ppt by the end of 2022. EPA in 2024 further dropped the limit for PFOA and PFOS to 4ppt to be effective in 2029. There are 66 systems with at least one result above the Maine limit. That is projected to rise to 130, when EPA's rule comes into effect. Already throughout the State systems have either changed sources, added treatment systems or are designing systems to meet the lower limits, so these numbers are already dropping. Initial estimates are this will cost Maine water utilities $100 million.

WATER MAIN BREAK, 2023

Photo courtesy of Portland Water District

FUNDING AND FUTURE NEED

From 2020 to 2023, available federal and state funding has totaled approximately $192 million. Unfortunately, about $67 million of this funding comes from limited time programs, which would need to be renewed by Congress. Additionally, aging distribution system infrastructure is not being replaced at an adequate rate in many systems. The Drinking Water Program estimates $60 million per year is needed over the next twenty years for drinking water infrastructure projects. Over the past four years, the State has averaged $48.1 million per year, but when the ARPA, RD-ARPA, lead service, and emerging contaminant funding falls away, the state will have a $27.7 million shortfall. This is in addition to the estimated more than $150 million total needed to address the PFAS issue for water systems.

Even with this funding almost half the disadvantaged systems are still unable to access these funds. Without increases in utility rates or other funding, repairs and replacements will not catch up to need. There are many disadvantaged systems in Maine that rely on the low interest Drinking Water State Revolving Fund (DWSRF) loans and principal forgiveness to complete their projects.

	2020	2021	2022	2023	4-year Annual Average
Drinking Water State Revolving Fund (DWSRF)	$22,000,000	$14,200,000	$42,400,000	$34,800,000	$28,400,000
Maine Community Development Block Grant (CDBG)	$1,500,000	$ -	$500,000	$1,800,000	$1,000,000
USDA-Rural Development (RD)	$4,600,000	$3,300,000	$18,900,000	$ -	$6,700,000
American Rescue Plan Act (ARPA)	$ -	$ -	$9,000,000	$8,900,000	$4,500,000
Emerging Contaminants	$ -	$ -	$6,000,000	$6,100,000	$3,000,000
Lead Service Line Funds	$ -	$ -	$18,300,000	$ -	$4,600,000
Total Federal & State Funding Sources:	$ 28,100,000	$17,500,000	95,100,000	$51,600,000	$48,100,000

Over the past four years the "revolving nature" of the Maine DWSRF program has made an average of $28.4 million per year available in grants and loans to public water systems. Maine maintains the 20% level of matching funds necessary to access the Federal resources. However, the total project funding requests from public water systems for critically needed projects continue to exceed available money in this program. In recent years, only 55% of applicants were able to receive DWSRF funding.

Additional funding for public water systems includes:

- User fees collected by all public water systems, including private utilities and quasi-municipal water districts. These fees are regulated by the PUC and are required to be used for capital projects, repayment of loans, and funding an annual budget. Unfortunately, the depreciation calculation allowed under PUC rules is a percentage of the initial infrastructure cost, not its replacement cost. Average water bills in Maine are lower than the national average, indicating there is room for additional funding of infrastructure through full cost funding of assets.
- Property taxes, which pay a portion of public water system maintenance by way of public fire protection fees to municipalities.
- Infrastructure Reserve and Surcharges. These can be a significant source of funding when implemented for projects. When used by utilities this can offset, the depreciation shortfall described above. This can significantly increase the available funds for replacements in today's dollars.

OPERATIONS & MAINTENANCE

The post-COVID labor shortage has hit water utilities particularly hard. Water Districts compete with public works, sewer utilities, defense contractors and private contractors for the limited pool of technical labor. The situation has been exacerbated by the federal rule changes implemented in 2022 by the federal motor carrier safety administration. For example, certain utility staff require a Commercial Driver License (CDL) for which costs have increased from $500 per driver to $8,000, plus additional travel and employee time commitments.

With Maine's public water systems facing significant financial and operational challenges in the delivery of essential water service, it is important for industry leaders, policy makers, regulators, and water system managers to understand and communicate the current financial and asset conditions of individual utilities and the water industry. Multiple state agencies overseeing infrastructure compete for limited funding and require the advocacy of stakeholders.

RESILIENCE AND INNOVATION

The Maine Water/Wastewater Agency Response Network (MEWARN) founded in 2008, plays a central role in providing resiliency throughout the state for water/wastewater agencies. The MEWARN system conducts annual drills, maintains cooperative agreements and maintains backup equipment inventories, allowing the network to provide critical labor, parts and equipment when a member utility is impacted by a disaster. Regional Water Utility Councils play a huge role planning for future resiliency. The councils and other utility cooperatives have commissioned reports looking at how infrastructure upgrades can be planned to support present and future interconnections to increase utilities abilities to move potable water throughout the State.

Many utilities are considering AI and other innovative technologies for predicting main breaks and asset renewal programs. One such program at the Portland Water District (PWD) looks to maximize value of the replacement projects. PWD is working with a third-party vendor to establish a predictive model that will assist in identifying Likelihood of Failure and Consequence of Failure for the 1,000+ miles of distribution and transmission mains in its service area. The model weighs differing pipe parameters, including age of pipe, material of pipe, history of failure (leak history), soils and other factors to predict failures before they occur. Ultimately, PWD plans to use this data within their planning process in order to meet level of service goals, and maintain healthy condition within the overall distribution system. These efforts are notable as failure rates are often linked to other factors in addition to pipe age, innovative technologies are able to consider many other elements when planning where to spend limited infrastructure funding.

Many utilities are considering AI and other innovative technologies for predicting main breaks and asset renewal programs.

Drinking Water

RECOMMENDATIONS TO RAISE THE GRADE

Maine ASCE makes the following recommendations:

- Support full cost user fees (including operation, maintenance and capital costs) and educate the public on sustainable operations through self-funding;
- Continue to work with the federal government and Congress to increase funding levels for the Drinking Water State Revolving Fund and the USDA-Rural Development programs;
- Continue providing a sustainable funding method for the required 20% State match to access the federal DWSRF funds;
- Continue coordination among funding agencies (MMBB, USDA-RD, CDBG, DWSRF, CWSRF);
- Advocate for collaborative efforts among water systems for sharing of resources, equipment, and personnel to reduce operating costs, such as regionalization of utility management and systems;
- Maintain the terms and conditions of grants or loans, require timely updating of Comprehensive System Facilities Plans (CSFP), and all operational performance measures including asset management, water audits, and leak detection programs;
- Encourage water systems to explore innovative main replacement and analysis techniques. Encourage a goal of developing a long-term database of key financial and operational metrics for drinking water systems;
- Support technical training and vocational education to expand labor pool for water system operators; and
- Provide flexibility in contracting requirements at the federal level.

Drinking Water

SOURCES

Maine Drinking Water Program – 2020, 2021, 2022, 2023 DWSRF Intended Use Plan

https://www.maine.gov/dhhs/mecdc/environmental-health/dwp/pws/srf.shtml

Maine Drinking Water Program – 2020, 2021, 2022 Construction Project Reports
https://www.maine.gov/dhhs/mecdc/environmental-health/dwp/pws/srf.shtml

Public Water System Violations - Annual Compliance Report 2022

https://www.maine.gov/dhhs/mecdc/environmental-health/dwp/cet/documents/Annual_Report_Narrative_MEDWP-2022_08092023.pdf

Maine Drinking Water Program - PFAS in Maine Drinking Water Presentation 2024 and correspondence, https://www.maine.gov/dhhs/mecdc/environmental-health/dwp/pws/pfas.shtml

Drinking Water Infrastructure Needs Survey and Assessment 2023

https://www.epa.gov/dwsrf/epas-7th-drinking-water-infrastructure-needs-survey-and-assessment

What Climate Change Means for Maine

https://www.epa.gov/climateimpacts/state-and-regional-climate-impacts

Photo courtesy of Brunswick Topsham Water District

Photo courtesy of Portland Water District

Energy

C-

EXECUTIVE SUMMARY

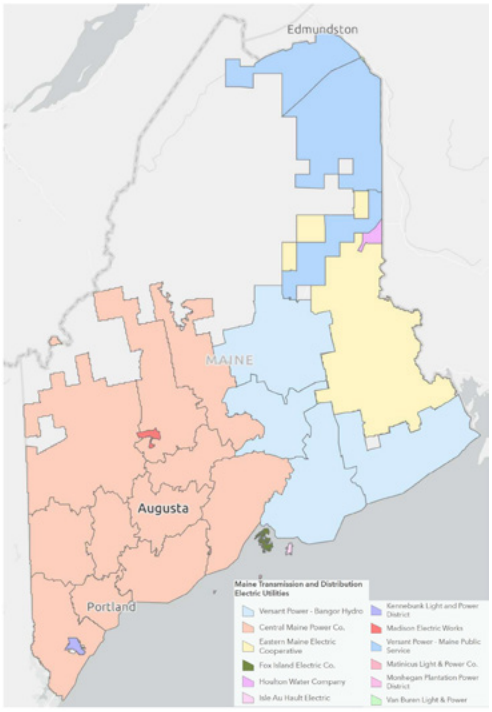
Maine is a leader in renewable energy and its current generation mix has sufficient electricity generation capacity to meet peak demands today. As older plants continue to retire, the renewable resources will be called on to meet increasingly challenging reliability and resilience needs, which is currently not technologically feasible. Until such a time that grid and/or storage technologies are capable of storing and dispatching several days of demand, Maine will continue to rely heavily on natural gas to maintain a reliable and cost-effective base load. In the near term, increased research, deep water ports, purpose-built vessels, and other infrastructure are needed to facilitate offshore wind; new transmission and distribution is needed to interconnect new renewables; and storage is needed to help meet peak demands and improve system efficiency. For the near future, additional improvements of more than $2 billion annually will be required to meet these needs.

BACKGROUND

Ninety-five percent of Maine's electricity is delivered by two investor-owned utilities, Central Maine Power Company (CMP), a subsidiary of Spain-based Avangrid, and Versant Power (VP), which was acquired by Canada-based ENMAX in March 2020. Ten consumer-owned utilities deliver electricity to the remaining 5% of Maine's electric customers.[i] In a 2023 ballot referendum, Maine voters rejected a proposal to replace CMP and VP with a consumer-owned utility despite surveys showing high levels of dissatisfaction with the state's two largest utilities[ii].

Maine's electric grid is comprised of three general regions: the southern region, serviced primarily by CMP, the northeastern region serviced primarily by ENMAX and consumer owned utilities, and much of the northwestern region, which remains unelectrified. Figure 1 shows the geographic areas each utility serves, with CMP (light red) and Versant (light and dark blue) serving ~95% of the State's electricity customers. Approximately 1/4 of the State's land area is not serviced by electric utilities.[i]

FIGURE 1 – MAINE'S ELECTRIC SERVICE TERRITORIES



From the Maine Yankee Nuclear Power Plant in 1972 to the Charles Monte Hydroelectric Station in 1990, a wave of large power plants came on-line requiring a significant build-out of transmission and distribution (T&D) networks during that time. This now 30- to 50-year-old T&D network has begun to reach its useful service life.[iii]

Maine is supplied by three natural gas transmission pipelines fed by upstream sources outside of New England. Maine's customers are served by four local distribution companies serving primarily the most populated communities covering approximately 7% of the State's land area[j]

CONDITION AND CAPACITY

Electricity Generation

In terms of current generation capacity, Maine has a total maximum output (nameplate) capacity of 5,292 megawatts (MW), which exceeds the average demand of 1,400 MW and summer peak demand of 2,000 MW.[i] In terms of electricity generated, the latest annual electricity generation mix by Maine and US power plants, is provided on Table 1.

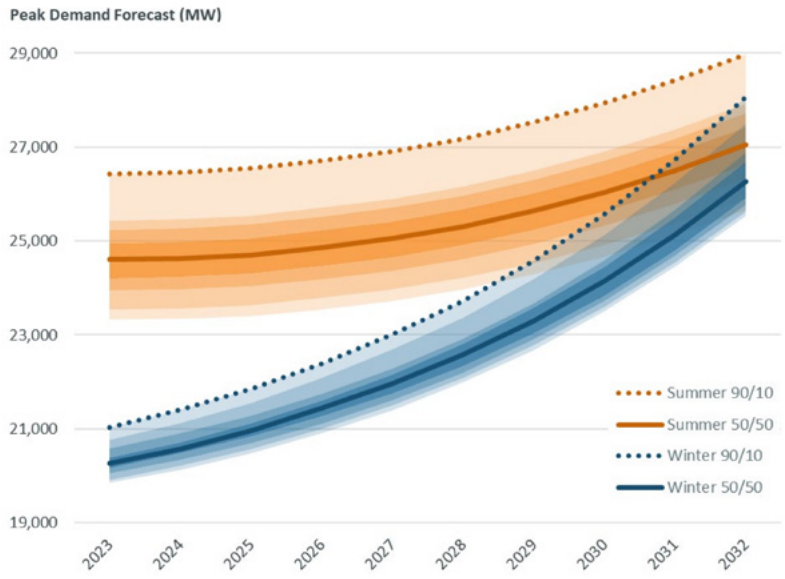
TABLE 1 - ELECTRICITY GENERATION BY FUEL TYPE FOR 2023[IV]

ENERGY SOURCE	ELECTRICITY GENERATION (Megawatt hours)		% OF GENERATION	
	ME	US	ME	US
Natural Gas	3,341,325	1,802,062,499	29.4%	43.1%
Hydroelectric Conventional	3,061,099	239,854,616	26.9%	5.7%
Wind	2,450,791	425,235,402	21.5%	10.2%
Wood and Wood Derived Fuels	1,478,901	31,438,922	13.0%	0.8%
Solar Thermal and Photovoltaic	582,213	164,501,574	5.1%	3.9%
Other	278,569	9,954,766	2.4%	0.2%
Other Biomass	73,989	16,024,919	0.7%	0.4%
Petroleum	62,875	16,471,657	0.6%	0.4%
Coal	43,204	675,263,624	0.4%	16.2%
Geothermal	-	16,461,765	0.0%	0.4%
Nuclear	-	775,347,151	0.0%	18.6%
Other Gases	-	11,450,813	0.0%	0.3%
Pumped Storage	-	(5,896,536)	0.0%	-0.1%
Total	11,372,972	4,178,171,177	100.0%	100.0%
Class I Renewable Energy	7,573,004	877,492,279	66.6%	21.0%

Notes: *Total Electric Power Industry.*
Class I renewables do not include Nuclear.

December 1, 2023 Maine's Governor's Office published that Maine has met 51% clean energy use indicating the positive impact of Maine's increasing number of community and residential solar installations.[v] This number is below that indicated on Table 1, reflecting the renewable energy credits (RECs) sold to meet the renewable portfolio standards (RPSs) of nearby states. Maine's primary electricity providers continue to deliver electricity supplied by energy companies who source most of their power from both in-state and out-of-state fossil generators, primarily natural gas.[vi]

FIGURE 2 - ISO NEW ENGLAND FORECAST



Recent state and regional fossil and nuclear retirements and increasing demand from new heat pump installations and EV charging (Fig. 2) put pressure on future system capacity requiring new and immediate electricity sources. Consistent base load plants such as small modular nuclear reactors are many years from commercialization and cleaner modern natural gas plants face steep public resistance to both the plants and the pipelines to feed them. As a result, increased focus and urgency turns to the development of renewables, which similarly face permitting, interconnection, and cost escalation hurdles as well as the need for complimentary-scale storage to meet base load and peak demands.

Despite Maine's northerly latitude, solar generation has been robust thanks in large part to legislation supporting community solar and net metering. Maine can also take advantage of recent federal funding including the Inflation Reduction Act credits to help meet the State's aggressive Renewable Portfolio Standards of 80 percent renewable energy by 2030 with a goal of 100 percent by 2040.

TABLE 2 - MAINE'S INSTALLED RENEWABLE GENERATION

Renewable Generation Source	Installed Nameplate Capacity (MW)[vii]	Estimated Capacity Factor [viii]	Theoretical Annual Generation (MW-h) [2]
Wind	1,183	34%	3,523,000
Solar [1]	445	24%	936,000
Battery Energy Storage System	64	--	--

Notes: *Utility solar installations; distributed generation not included.*
Annual generation based on 8,760 hours / year. Actual generation in 2023 was between 60% and 70% of theoretical.

In terms of reliability, intermittent renewable resources are reliant on increased utility-scale storage of sufficient scale and grid operations with sufficient flexibility to store excess energy during favorable sun and wind periods and to discharge and dispatch electricity to satisfy peak heating and cooling periods at load centers. Efficient and effective storage and grid operations are needed to increase energy capacity and reduce curtailment and dependence on carbon-emitting oil or natural gas peaker plants to meet both base load and peaking requirements.

Under the Northern Maine Renewable Energy Development Program, Maine PUC solicitated and subsequently selected a 1,000 MW onshore wind project and companion 345 kilovolt (kV) transmission line project to connect northern Maine wind resources to the grid. Both projects were scuttled in 2023 due to rising development costs of the transmission project.[i] Maine PUC is currently requesting proposals for the transmission and generation projects separately.[ix] CMP's Aroostook Renewable Project is intended to address the transmission need, with the aid of a $425M capacity contract from the Department of Energy (DOE) under the Bipartisan Infrastructure Law.[x]

Efficient and effective storage and grid operations are needed to increase energy capacity and reduce curtailment and dependence on fossil emitting oil or natural gas peaker plants to meet both base load and peaking requirements.

Maine established a state goal of 3,000 MW of offshore wind capacity installed by 2040.[xi] With the assistance of the DOE's Floating Offshore Wind Shot program, Maine is actively pursuing offshore wind supply chains, infrastructure, and workforce investments to tap into the large potential in the Gulf of Maine. In addition, Maine's offshore wind projects must overcome the logistical and economic challenges of floating wind platforms, limited port facilities and vessels, and distant interconnections.[xii]

Electricity Transmission and Distribution

The northeastern region shown on Figure 1 in darker blue, is connected to New Brunswick, Canada, and interfaces with the New Brunswick Power transmission in eastern Maine. This region of Maine's transmission is administered by Northern Maine Independent System Administrator and is not directly connected to the energy market in southern Maine and the rest of the United States, which is administered by the Independent System Administrator of New England (ISO-NE).[i]

In 2017, CMP filed a Petition for a Certificate of Public Convenience and Necessity for the New England Clean Energy Connect project - a proposed 145-mile, 1,200 MW HVDC transmission line from the Québec-Maine border to Lewiston to deliver Canadian hydroelectric resources to load centers in Massachusetts. The project encountered several legal challenges, ultimately receiving authorization to proceed in 2023.[xiii] Following a 2-year delay and 50% cost increase, the project is scheduled to be completed by end of 2025.[xiv]

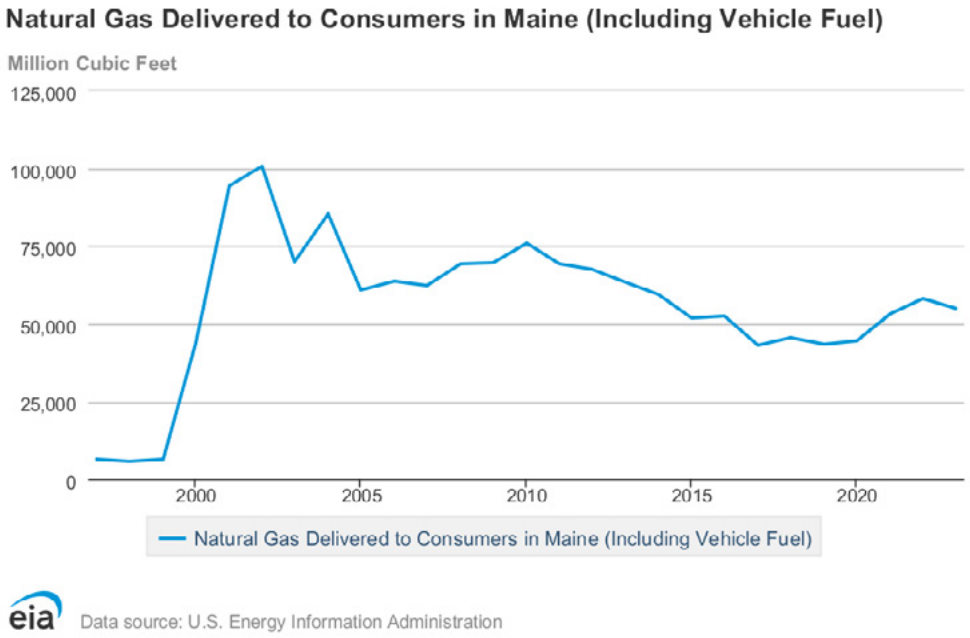
Maine passed legislation in 2022 requiring Maine's utilities to undergo an integrated grid planning process for developing a reliable electric grid that supports a transition to clean energy.[xv] Additionally, legislation enacted in 2023 directs the Maine Governor's Energy Office to conduct a two-part study regarding the establishment of a distribution system operator to reduce costs for customers, improve system reliability, and accelerate achievement of the State's climate goals.[xvi]

ISO-NE's Regional System plan project list for Maine includes 8 planned or proposed reliability upgrade projects totaling $167 million.[xvii] DOE's Grid Deployment Office administered two grants to Maine utilities via the Grid Resilience and Innovation Partnerships (GRIP) program. In 2023 a $30M grant was awarded to CMP to deploy Smart Grid technologies to reduce the frequency and impact of outages and a transmission supervisory control and data acquisition switch program to prevent faults and maximize benefits to disadvantaged communities.[xviii] In 2024, The Flexible Interconnections and Resilience for Maine, a collaboration between the State of Maine, CMP, and Versant, was awarded a $65 million grant to deploy cutting-edge software and hardware to enhance grid stability, regulate voltage, and increase transmission capacity on existing lines.[xix]

Natural Gas

With no reserves or significant stocks of natural gas, Maine relies solely on imports from nearby States and Provinces to serve its heating and electricity generating needs. In 2022, Maine consumed 57 billion cubic feet (BCF.)[xx] Of this amount, 42% was used for electric power, 37% for industrial use (heating and power), and 21% for residential and commercial heating. Maine's natural gas usage surged 15-fold from 1999 to 2002, trended downward nearly 50% to 2017, and increased 20% to 2022.

FIGURE 3 – MAINE'S NATURAL GAS CONSUMPTION



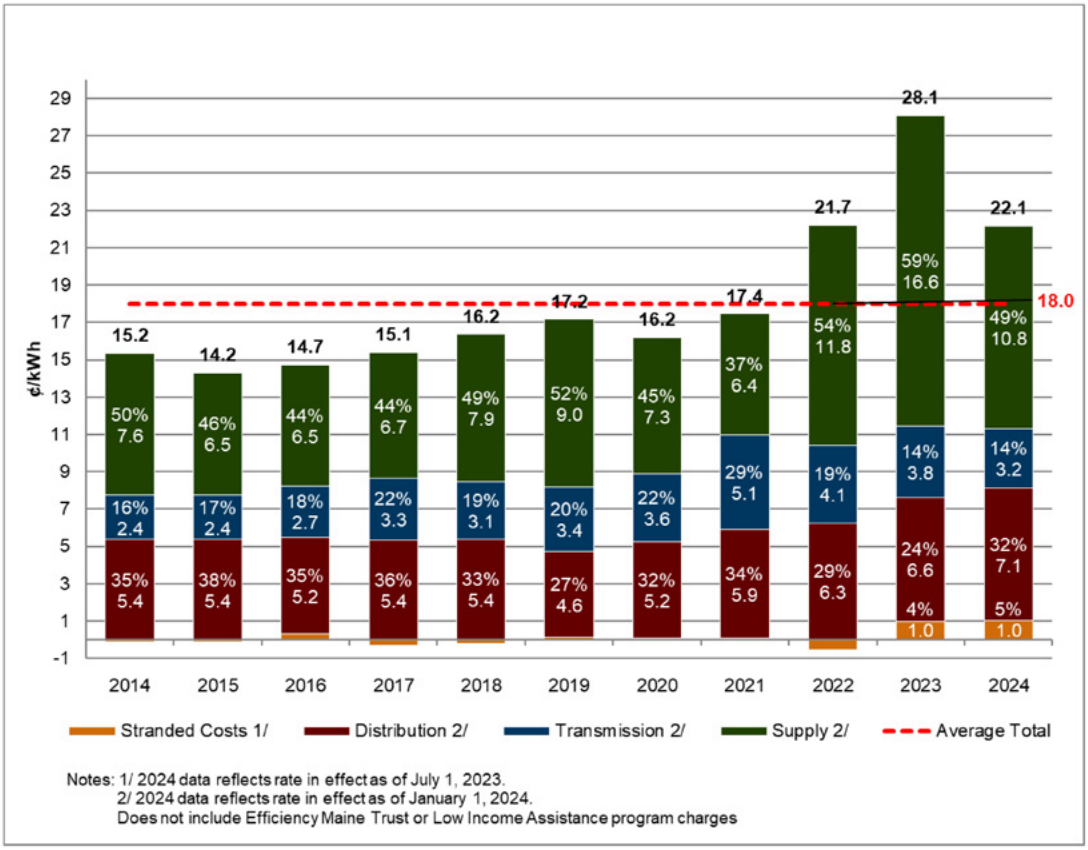
OPERATIONS AND MAINTENANCE; FUNDING AND FUTURE NEED

Generation costs in Maine are heavily tied to natural gas prices, which peaked in 2023 as illustrated in Fig. 3. The delivery charges are regulated by the MPUC and the Federal Energy Regulatory Commission (FERC).[i]

The most expensive electric rates in the contiguous U.S. are found in the New England states, averaging $0.205/kw-hour (all end-users) for 2022. Maine's electric rate payers paid $0.174/kw-hour, which is 18% less than the New England average, but 40% more than the national average of $0.124/kw-hour in 2022.[xxi]

In 2023, CMP received a $30 million grant from the DOE under the Bipartisan Infrastructure Law to strengthen grid reliability and decrease instances of power outages[xxii] The Inflation Reduction Act announced The Clean Energy Production Tax Credit and Clean Electricity Investment Tax Credit to replace the Production and Investment Tax Credits, respectively, applicable to all new zero-emission generation facilities.[xxiii]

FIGURE 4 - CMP PRICE HISTORY



PUBLIC SAFETY; RESILIENCE

Generation and T&D assets are operated and maintained by the energy companies and electric utilities to operate reliably, meet public safety standards and be sufficiently resilient against increasing natural and human-caused threats.

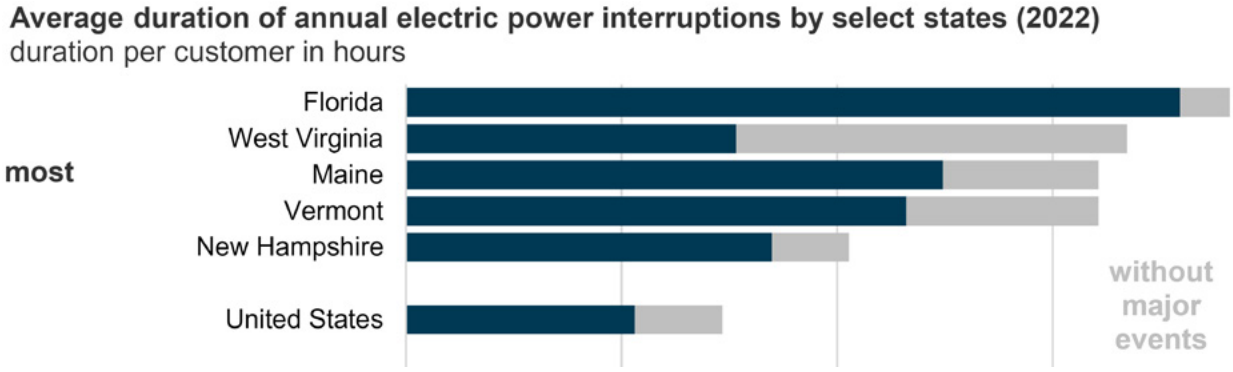
Wind blades and solar panels are more vulnerable to the effects of high winds, snow, and ice from Maine's harsh winters resulting in potentially extended outages. The increasing trends in both heating and transportation electrification as shown on Fig. 2 are forecasted to increase winter peak demand nearly 30% in 2033. Together, these further increase Maine's reliance on peaker plants for both system capacity and reliability until sufficient and effective storage is placed online.

Maine's limited supply of natural gas makes the State vulnerable to price spikes and potential brownouts. Renewables and large-scale storage must be integrated in a way to ensure security and resiliency, as renewable resources may not be as easily protected against human-caused threats and may not be available during extreme weather conditions or as responsive to emergencies on the system.

As regional and national leaders prepare resiliency plans and better address the risk of cascading failures across critical infrastructure affecting restoration and survival, individual utility- and state-wide efforts are needed to ensure the electric serviceability quickly recovers from black-sky events.

In 2022, Maine ranked 3rd in frequency of outages, at over twice the national average. The same year, Maine also ranked 3rd in longest average duration of outages in the United States, at 3 times the national average (Fig. 5).[xxiv]

FIGURE 5 - US EIA OUTAGES BY STATE, 2022



The J.D. Power 2022 Electric Utility Residential Customer Satisfaction Study surveyed over 100,000 residential customers on overall satisfaction with the 145 largest electric utilities nationwide regarding power quality and reliability, price, billing and payment, communications, corporate citizenship, and customer care. CMP and Versant both ranked last among the 18 large-size and 12 medium-size electric utilities in the Eastern Region, respectively..[xxv]

INNOVATION

The University of Maine's (UMaines) patented VoltrunUS+ concrete hull was designed to support offshore wind turbines in water depths of 45 meters or more. Funded through the DOEs Advanced Research Projects Agency (ARPA-e) grant, a VolturnUS+ prototype is currently being constructed in Maine and will be deployed and connected to the grid off the Maine coast in Q1 2025. The hull uses a unique internal motion-damping system to reduce size and weight reducing port requirements. The simplified cruciform hull allows for local industrialized fabrication, leading to a lower overall levelized cost of energy; reduced operation and maintenance costs; longer design life; improved motion resistance; and improved mobility for deployment, maintenance, or turbine upgrades.[xxvi] The UMaine Advanced Structures and Composites Center also broke its own world record for the largest 3D printer (set in 2019) by unveiling a 3-times larger and faster 3D printer called Factory of the Future 1.0 in April 2024. The machine will aid in the development of offshore wind technologies including blade tooling and possibly CTV vessels.[xxvii]

The University of Maine (UMaine) Advanced Structures and Composites Center also broke its own world record for largest 3D printer (set in 2019) by unveiling an even larger and faster 3D printer called Factory of the Future 1.0 in April 2024. The machine will aid in the development of offshore wind technologies.[xxvii]

Energy

RECOMMENDATIONS TO RAISE THE GRADE

Maine ASCE recommends the following to meet current and future electric needs:

- Expedite the permitting process to facilitate lower cost interconnection transmission.
- Incentivize an extension of the transmission backbone to northern Maine, accessing on-land wind resources and integrating the northeastern region into ISO-NE
- Partner with surrounding states and provinces to efficiently construct HVDC transmission connecting renewable resources to burgeoning load centers.
- Free up limitations on natural gas supplies to Maine and New England that are needed to provide resilient energy to meet growing power demand, particularly during the winter.
- Leverage improved technology and federal funding to facilitate integrated storage with renewables.
- Mandate increased inspection, maintenance, and upgrade of the transmission and distribution system including responsible vegetation management and modern technology to improve reliability and resilience; and
- Investments on the order of $2 billion to $4 billion annually will be needed to begin to meet the state's RPS and increase system reliability.

SOURCES

i *Maine Public Utilities Commission, 2023Annual Report, February 1, 2024.*

ii *Maine Public, Voters reject plan to buy out Maine electric companies to create consumer-owned utility, November 7, 2023.*

iii *Guide to the Central Maine Power Company Archival Collection, 1853-2001, Chuck Rand, CMP Project Archivist, Maine Historical Society, December 7, 2011.*

iv *U.S. Energy Information Administration, Maine EIA 923 Report, April 2024.*

v *Maine Climate Council Annual Report, December 1, 2023*

vi *Maine Public Utilities Commission, Residential And Small Non Residential Standard Offer Service Consumer Information About Your Electricity Supply for Central Maine Power Company, Emera Maine – Bangor Hydro District, and Emera Maine – Maine Public District, April 2024.*

vii *American Clean Power CleanpowerIQ Statistics, Downloaded June 2024.*

viii US EIA, Electric Power Monthly, Table 6.07.B. Capacity Factors for Utility Scale Generators Primarily Using Non-Fossil Fuels.

ix https://www.maine.gov/mpuc/regulated-utilities/electricity/rfp-awarded-contracts/northernmainerfp

Energy

SOURCES (cont.)

x https://www.avangrid.com/w/avangrid-awarded-425m-federal-capacity-contract-for-maine-transmission-project

xi Maine Governor's energy Office, https://www.maine.gov/governor/mills/news/governor-mills-signs-bill-create-jobs-advance-clean-energy-and-fight-climate-change-through

xii Maine Offshore Wind Roadmap, February 2023, Department of Energy, https://www.energy.gov/eere/wind/floating-offshore-wind-shot-progress-and-priorities

xiii New England Clean Energy Connect, https://www.necleanenergyconnect.org/benefits

xiv Work proceeds on utility corridor that was subject of fierce debate in Maine, July 3, 2024, https://www.newscentermaine.com/article/news/local/work-proceeds-on-utility-corridor-that-was-subject-of-debate-in-maine/97-6e20db05-face-461c-b0c4-bc12df3ef664.

xv ISO-NE 2023 Regional System Plan, November 1, 2023.

xvi Distribution System Operator Feasibility Study, https://www.maine.gov/energy/studies-reports-working-groups/current-studies-working-groups/distribution-system-operator-study

xvii ISO-NE, 2024-03-20 PAC A04 RSP Project List - March 2024 Update. xlsx,https://www.iso-ne.com/committees/planning/planning-advisory/

xviii U.S. DOE Grid Deployment Office, Fact Sheet https://infrastructurereportcard.org/cat-item/iija-energy/

xix https://www.maine.gov/energy/press-releases-firm-grant-announcement-oct-2024

xx US EIA, https://www.eia.gov/dnav/ng/hist/n3060me2A.htm.

xxi U.S. Energy Information Administration, Electric Power Annual 2022, October 2023.

xxii CMP Wins $30M Smart Grid Technology Grant - CMP (cmpco.com)

xxiii Summary of Inflation Reduction Act Provisions Related to Renewable Energy, https://www.epa.gov/green-power-markets/summary-inflation-reduction-act-provisions-related-renewable-energy#:~:text=Starting%20January%201%2C%20 2025%2C%20the,but%20is%20not%20technology%2Dspecific.

xxiv US EIA, U.S. electricity customers averaged five and one-half hours of power interruptions in 2022, January 25, 2024

xxv J.D. Power 2022 Electric Utility Residential Customer Satisfaction Study.

xxvi Volturnus - Advanced Structures & Composites Center - University of Maine (umaine.edu)

xxvii Maine Public, University of Maine unveils larger, faster 3D printer, April 23, 2024.

Hazardous Waste

EXECUTIVE SUMMARY

Funding for hazardous waste assessment and cleanup has increased significantly. Substantial progress has been made on contaminated sites, including the Portsmouth Naval Shipyard, Brooksville Callahan Mine Superfund site, and Orrington HoltraChem site. Even so, Maine faces several hazardous waste management challenges, including emerging contaminants, funding limitations, aging infrastructure, and climate resiliency. Polyfluoroalkyl substances (PFAS) contamination from septage sludge and landfill leachate in soil, groundwater, and flora/fauna is a critical issue. Proactive measures, such as new laws and impact studies, are underway. While remediation and affected landowner compensation costs are uncertain, they are both substantial and necessary. Additionally, the resilience of hazardous waste and petroleum sites to natural hazards is an increasing concern, despite the enactment of new regulations. The Maine DEP's remediation sites database has grown since 2016 and 2020, with more sites entering through the Voluntary Response Action Program and Brownfields program, indicating renewed interest in cleanup and redevelopment.

BACKGROUND

DEP and US Environmental Protection Agency (EPA) administer multiple programs that oversee contaminated site investigation, remediation, and redevelopment:

- Federal Facilities and Superfund Programs;
- Uncontrolled Sites Program;
- Resource Conservation and Recovery Act (RCRA) Corrective Action Program
- Petroleum Clean Up Program;
- Brownfields Program;
- Voluntary Response Action Program (VRAP); and
- Landfill Closure and Remediation Program

In June 2021, Maine legislatively recognized two types of polyfluoroalkyl substances (PFAS), perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate acid (PFOS), as hazardous substances and included their remediation under DEP's Uncontrolled Sites Program. In September 2022, the U.S. Environmental Protection Agency (EPA) proposed rulemaking designating these same PFAS substances as CERCLA Hazardous Substances. The designation enables the EPA to respond to and clean up contamination related to these substances.

The EPA's PFAS hazardous substance designation became effective in July 2024. PFAS compounds don't breakdown over time, are prevalent in the environment, bioaccumulate in humans and animals, and are linked to harmful health effects. PFAS contamination is often associated with landfill leachate and wastewater treatment plant sludge; the latter having been licensed by the state with EPA oversight under beneficial reuse for landspreading to fertilize farm fields before 2019. PFAS has since been found in game and fish from near these fields.

CONDITION AND CAPACITY

Federal Facilities and Superfund Programs.

Through the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), commonly called Superfund, sites are placed on the EPA's National Priority List (NPL). As of March 2024, 10 of the nation's active 1,340 NPL sites are in Maine. Six Maine sites have been deleted from the NPL, the most recent being the Portsmouth Naval Shipyard site in February 2024. The Callahan Mine in Brooksville, designated a Superfund site over two decades ago, received significant recent funding to complete remediation activities and close out the project within the next three years. The accelerated effort is a part of the Bipartisan Infrastructure Law to reduce the backlog of Superfund work nationwide.

Superfund law also requires the federal government to identify and address environmental problems from past activities at current and former military installations, even when the environmental issue is ineligible for the NPL. As of June 2024, DEP's remediation sites list included 44 Federal Facility sites undergoing environmental cleanup or remediation efforts (i.e. "active" sites), of which 14 require further investigation, funding, or technical support to complete their cleanup or remediation (i.e., active site awaiting resources), compared to 6 of 66 active sites awaiting resources in 2020.

Created in 1983, Maine's Uncontrolled Sites Program is Maine's equivalent of the federal Superfund program. This legislation authorizes the DEP order potentially responsible parties to conduct DEP-approved clean-up actions. This table illustrates trends in active sites and those awaiting resources. The DEP hadn't formally designated or required a responsible party to remediate an uncontrolled hazardous substance site associated with PFAS.

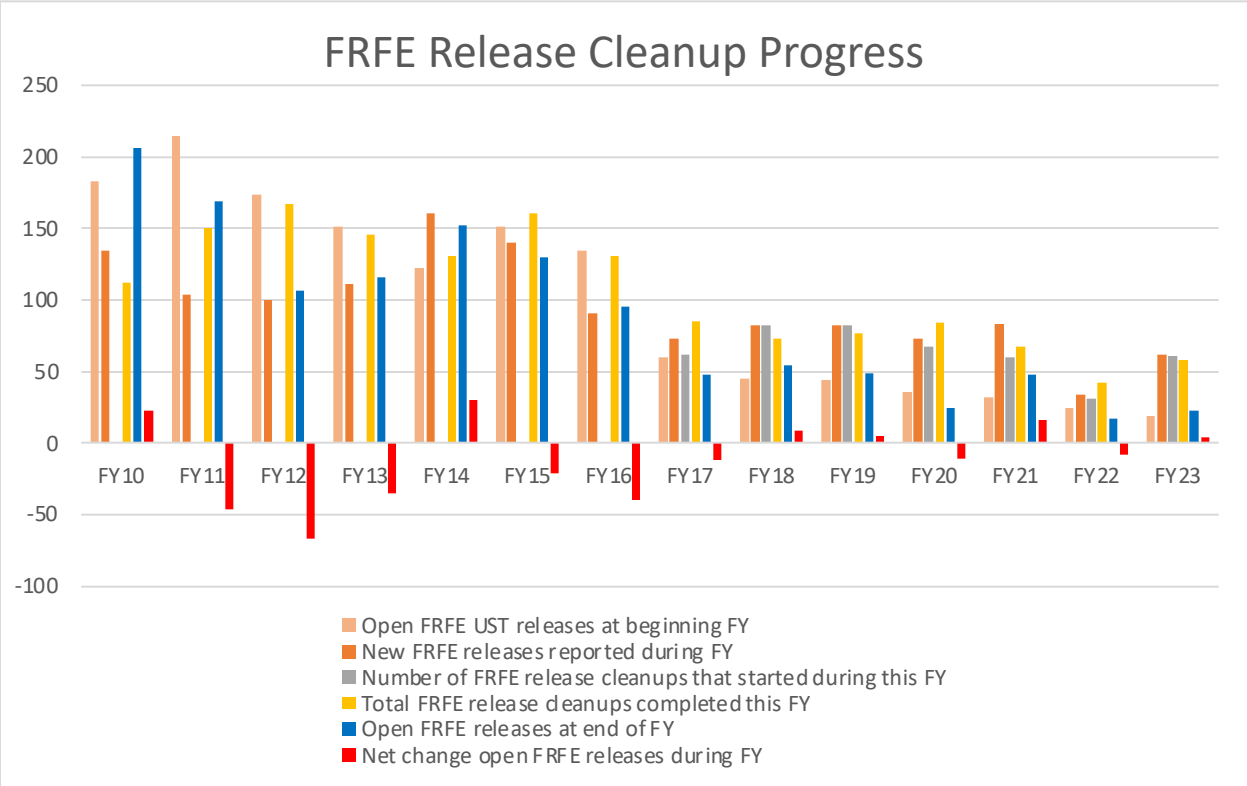
Active Uncontrolled Sites

Report Card Year	Active	Active Awaiting Resources
2016	181	28
2020	211	41
2024	119	57

DEP's Petroleum Clean-Up Program: There are 2,724 registered underground storage tanks (USTs) storing oil at 1,738 facilities in Maine. The DEP responds to an annual average of six to eight daily spills. Investigation and remediation of petroleum contamination are managed by DEP's Petroleum Clean-Up Program, established under the EPA's federal financial responsibility regulation. As of July 2022, the Long-Term Petroleum Remediation Priority List contains 413 petroleum-contaminated sites managed by DEP. The Maine Ground and Surface Waters Clean-up and Response Fund supports clean-up of petroleum releases and compensation to third parties for damages. Claims eligible for coverage of clean-up and third-party compensation costs ranged from 193 to 237 annually during the State's fiscal years 2019 through 2022.

The graph illustrates the progress made in the number of releases and subsequent clean-ups associated with the Clean-Up Fund that are financially responsible fund-eligible (FRFE). Replacement of obsolete tanks and improved tank technologies contribute to the overall positive trend.

There are 2,724 registered underground storage tanks (USTs) storing oil at 1,738 facilities in Maine. The DEP responds to an annual average of six to eight daily spills.



Brownfields and Voluntary Response Action Program (VRAP). Brownfield sites are property whose expansion, redevelopment, or reuse is impeded by real or perceived contamination; redevelopment of brownfield sites are environmentally and economically positive. The following table illustrates trends in the number of brownfield sites.

Active Brownfield Sites

Report Card Year	Active	Active Awaiting Resources
2016	214	47
2020	265	85
2024	444	91

In 1993, Maine legislation established VRAP, which encourages applicants to voluntarily investigate and remediate properties to DEP's standards in exchange for protection from DEP enforcement actions, including the uncontrolled and petroleum priority sites discussed above. Most brownfields redevelopment is done through the VRAP process. The number for VRAP sites in June 2024, excluding brownfields, in DEP's remediation site list compared to prior assessments is below:[1]

Active VRAP Sites

Report Card Year	Active	Active Awaiting Resources
2016	162	53
2020	228	90
2024	227	136

The VRAP program has been effective at facilitating redevelopment of brownfield sites. Unfortunately excess soil is often generated from redevelopment projects and can contain low levels of contamination that may not present a significant risk of harm to human health or the environment but would otherwise preclude them from unrestricted reuse. Redevelopment projects frequently must pay premium costs for material transport and disposal at solid waste facilities.

1 VRAP Sites are often also listed under more than one Program.

Maine's Landfill Closure and Remediation Program oversees post-closure remediation projects to address issues that have developed since a municipal landfill was closed. Many municipal landfills were poorly sited and improperly designed, constructed, and operated. The table illustrates trends in the number of closed (capped) landfill sites that require additional remediation:

Active Landfill Closure Sites Requiring Remediation

Report Card Year	Active	Active Awaiting Resources
2016	25	21
2020	26	20
2024	32	23

Contributing conditions to the increasing number of closed landfills requiring additional remediation include aging and deteriorating containment systems, stricter regulations and improved monitoring systems, identifying additional sites, and state extension of deadlines to encourage proactive municipal activities to address closure issues.

With PFOA and PFOS often associated with landfills, it is probable that closed landfill status will be reviewed and potentially require additional action at many facilities to protect human health and the environment.

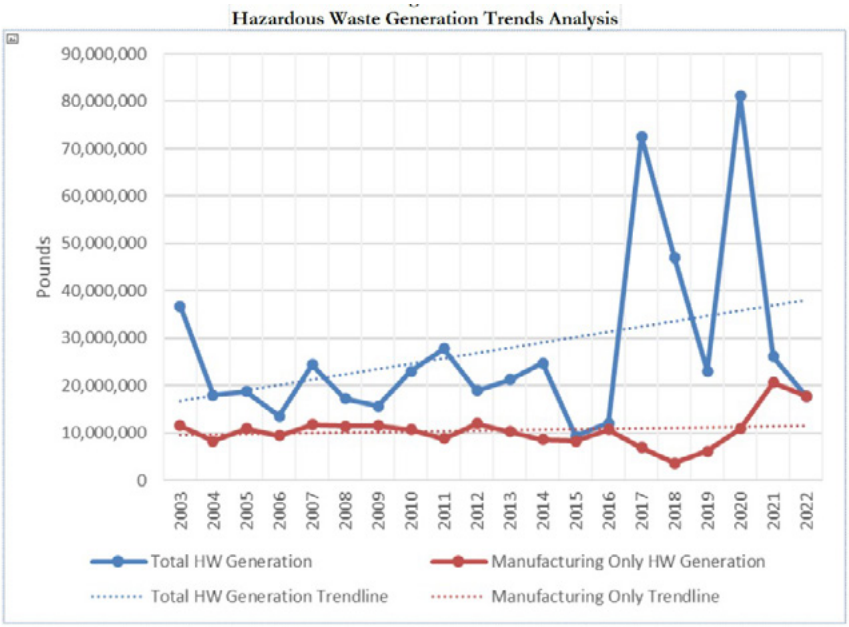
RCRA Corrective Action Program.

The primary purpose of the RCRA Corrective Action Program is to clean up releases of hazardous wastes that threaten human health or the environment. Corrective actions can result from spills or discharges discovered during a facility's operation or closure, investigations by or for the DEP, or enforcement actions. They can be voluntary or as part of a license or Administrative Order. Trends in active RCRA corrective action investigation sites are illustrated below:

RCRA Corrective Active Investigation Sites

Report Card Year	Active	Active Awaiting Resources
2016	28	2
2020	41	14
2024	54	19

The HoltraChem site in Orrington is one of the largest and most complex RCRA sites in Maine and is impacted by mercury and other contamination of land, groundwater, and the nearby Penobscot River. Significant remediation progress has been made to remove contaminated soil, close onsite landfills, and extract and treat groundwater. Between 2017 and August 2024, about 192,000 tons of hazardous soil (385M pounds) and 261,000 tons (522M pounds) of non-hazardous contaminated soil



were removed from the site. In 2022 a legal framework to comprehensively address mercury-related, river contamination was reached.

Hazardous Waste Generation/Management:

Maine's hazardous waste management rules include requirements for generating, transporting, and handling hazardous waste in Maine. Maine landfills are prohibited from accepting hazardous waste and require a permit for special waste[2]. Hazardous waste generation/disposal trends through 2022 are illustrated in the graph. The spikes in 2017 and 2020 are attributed to the remediation of Orrington's HoltraChem site. For 2017, 2019, 2020, and 2021, the 'total" generation balance was mostly attributed to removing oil residuals from a pipeline and PCB-contaminated materials from a Naval facility. Without those remediation projects, generation would have been 10M to 20M pounds. The lower trend line in the graph shows a gradually increasing amount of hazardous waste generated from manufacturing and commercial activities. Alcohol-based sanitizer manufacturing in response to COVID, waste accumulation during and post-COVID, and an improving economy also contributed to the post-2019 increase.

About 94 to 99 percent of hazardous waste generated between 2019 and 2022 were exported to other states or Canada, and the remaining was accepted at licensed treatment and storage facilities in Maine. The licensed facilities in Maine include the Portsmouth Naval Shipyard for military facility-generated waste and NRC Environmental of Maine in South Portland. As of December 2022, 38 facilities were licensed in Maine to handle, treat, and/or provide short-term hazardous waste storage.

OPERATIONS & MAINTENANCE, FUNDING, AND FUTURE NEEDS

The Bipartisan Infrastructure Law allocated $21 Million to accelerate remedial work at Callahan Mine Superfund Site. DEP's remediation sites list included 893 active sites, of which 450 await resources. The number of active sites has increased by 4 percent since 2020, and the number of sites awaiting resources has increased by 71 percent over 2020, indicating funding is inadequate. Funding for the various programs comes from many different sources, as described below.

DEP's Uncontrolled Sites Program (119 active sites; 57 awaiting resources) is funded primarily through voter-approved bonds, with the last bond referendum for contaminated site clean-up predating 2005. The VRAP remediation process is primarily privately funded. The EPA provides some funding for brownfield redevelopment through competitive grant programs that primarily benefit municipalities focused on economic development. Brownfield grants provided to Maine municipalities, regional planning and economic development organizations, and Tribal and State entities totaled $149.4 million between 1994 and June 2024. EPA grants by year from 2016 are provided below:

Year	EPA Brownfield Grant Obligation Totals by Year (Millions)
2016	$0.6
2017	$3.1
2018	$6.8
2019	$8.6
2020	$4.0
2021	$5.3
2022	$25.2
2023	$19.6

The substantial increase in grant obligations in 2022 and 2023 is attributed to the bipartisan Infrastructure Investment and Jobs Act.

DEP's Petroleum Clean-up Program. The Maine Ground and Surface Waters Clean-up and Response Fund[3] provides for the clean-up of petroleum releases and compensation of third parties. The Fund's income is derived from fees on petroleum imports to Maine, registration fees from oil storage facilities, fines, and

2 Special waste is any solid waste generated by sources other than household and typical commercial establishments that exists in an unusual quantity or in a chemical or physical state, or any combination, that may disrupt or impair effective waste management or threaten the public health, human safety or the environment and requires special handling, transportation and disposal procedures.

3 VRAP Sites are often also listed under more than one Program.

reimbursements (e.g., from potentially responsible parties). The Fund's main revenue sources are fees on each barrel of petroleum transferred into Maine by ship, road, or rail. A surcharge is imposed when the Fund's unencumbered cash balance (monies not allocated for a designated purpose) falls below $6M and is retired after the cash balance exceeds $18M. The surcharge has been in effect throughout the state fiscal years 2017 through 2023. The following table provides recent net income and year-ending cash balances:

Year	Net Income (millions)	Year-End nencumbered Cash Balance (millions)
2021	$13.0	$6.6
2022	$13.9	$5.3
2023	$14.1	$8.4

DEP has implemented strategies to reduce expenditures, prioritize spending, and control costs, such as targeting the removal of contaminated soils using health-based clean-up guidelines and considerations for the reuse of properties. Likewise, DEP has adopted regulations intended to reduce spills and, therefore, the demand on the Fund. About 12 to 17 percent of annual revenue is diverted to the state's General Fund for overhead costs.

DEP's Landfill Closure and Remediation Program: Some former municipal landfills capped to meet the standards of the day require remediation of contamination related to past landfilling activities, including landfilling of PFAS-containing substances. A program modification in 2015 extended cost-sharing for landfill closure-related costs until 2025. The goal was to continue to assist with remedial or corrective actions at these landfills that contaminate or threaten groundwater. Many such remediation projects are eligible for up to a 90 percent reimbursement. Given the prevalence of PFAS in waste streams received at landfills before issues were recognized, investigation and remediation costs associated with closed landfills will likely increase in upcoming years.

PUBLIC SAFETY, INNOVATION, AND RESILIENCE

In September 2019, Maine established the Climate Action Council, which is developing resiliency strategies as one of its goals. Little progress has been made in incorporating climate resilience into climate-vulnerable clean-up sites. DEP has modified rules related to the siting of oil terminals to include a natural hazard risk assessment and planning standard for coastal flooding and sea level rise.

Maine has taken steps to assess PFAS in the environment, identify and reduce pathways for PFAS to enter the environment, and enact measures to prevent the release of PFAS from licensed facilities. In October 2021, Maine's legislature required DEP to develop and implement a program to assess soil and groundwater for PFAS at locations licensed to land-apply wastewater treatment plant sludge before 2019, when it was considered a "beneficial reuse." Maine's four-year investigation of 1,100 fields where farmers used state-licensed sewage sludge to fertilize is expected to be completed in 2024. DEP is also investigating PFAS presence in the environment at active and closed solid waste landfills and remediation sites to remove or mitigate threats.

Several state agencies are working together to monitor and evaluate new technologies for PFAS treatment and destruction. Legislation in 2023 required the Bureau of General Services to evaluate and report on treatment options to remove multiple PFAS from landfill leachate at two state-owned landfills. The report concluded that foam fractionation is a promising technology for reducing PFAS concentrations in landfill leachate.

Hazardous Waste

RECOMMENDATIONS TO RAISE THE GRADE

Maine ASCE makes the following recommendations:

- Report findings into the proliferation, extent, and sources of PFAS in the environment. Enact measures to reduce and eliminate sources beyond licensed septage and sludge generation and disposal facilities. Pilot treatment technologies to address PFAS in landfill leachate and wastewater effluent.
- Extend the duration and supplement DEP's cost-sharing program for landfill closure-related costs, including PFAS source mitigation and treatment.
- Evaluate remediation site resiliency and incorporate plans to address long-term goals, best practices, and financing opportunities for sites in vulnerable climate change areas.
- Continue to determine the effective use of available funds using risk-based prioritization for sites identified across spills and site cleanup, VRAP, uncontrolled sites, and PFAS response programs.
- Reduce the petroleum clean-up program funds diverted to the General Fund. As oil consumption is projected to decrease and reduce clean-up funds, consider expanding the funding mechanism to include General Fund supplements, incentivized public-private partnerships, and brownfield grants,.
- While leveraging EPA cost-sharing opportunities, consider a bond for remediating sites in Maine.

SOURCES

Website of the United States Environmental Protection Agency (EPA) https://www.epa.gov/superfund/search-superfund-sites-where-you-live, https://cumulis.epa.gov/supercpad/CurSites/srchsites.cfm, https://www.epa.gov/superfund/questions-and-answers-about-designation-pfoa-and-pfos-hazardous-substances-under-cercla#requirements,] https://www.epa.gov/brownfields/maine-brownfields-funding-history, https://java.epa.gov/acrespub/gfs/) accessed June 2024.

Contaminated Site Database from the Maine Department of Environmental Protection Division of Remediation received 10 June 2024.

Report on the Designation of Uncontrolled Hazardous Substance Sites, January 15, 2023, Report to the Committee on the Environment and Natural Resources, 131st Legislature, First Session

Website of the Maine DEP (https://www.maine.gov/dep/spills/topics/pfas/maine-pfas.html#remediation accessed in June 2024.

Website of the Maine DEP (https://www.maine.gov/dep/spills/petroleum/index.html#gu) accessed in July 2024.

https://www.beyondholtrachem.com/reports-studies accessed October 2024.

Hazardous Waste

SOURCES (cont.)

Mallinckrodt US LLC August 2024 Progress Report, Orrington Remediation Site, Orrington, Maine

Biennial Report of the Clean-up and Response Fund Review Board. Report to the Joint Standing Committee on Environment and Natural Resources130th Legislature, First Regular Session. Maine Department of Environmental Protection, April 2021.

Portland Press Herald, Hundreds of Maine households are stranded in PFAS limbo, published 16 June 2024

Annual Number of Spills List received 21 June 2024 from Maine Department of Environmental Protection, Division of Response Services.

Biennial Hazardous Waste Activities Report to the Joint Standing Committee on Environment and Natural Resources 131st Legislature, First Session. 23 January 2023

USA Spending.gov US EPA brownfield grant awards, https://www.usaspending.gov/search/?hash=5b856741e7395a1ba339bea38df20294 accessed June 2024.

Biennial Report of the Clean-up and Response Fund Review Board to the Joint Standing Committee on Environment and Natural Resources, 130th Legislature, First Regular Session, April 2021

Biennial Report of the Clean-up and Response Fund Review Board to the Joint Standing Committee on Environment and Natural Resources, 131st Legislature, First Regular Session, April 2023

Maine Climate Council Annual Report dated 01 December 2023.

Chapter 478, H.P. 1189 - L.D. 1600, An Act To Investigate Perfluoroalkyl and Polyfluoroalkyl Substance Contamination of Land and Groundwater enacted 15 July 2021

Chapter 678, H.P. 1417 - L.D. 1911,An Act To Prevent the Further Contamination of the Soils and Waters of the State with So-called Forever Chemicals enacted 20 April 2022

Report titled “Study To Assess Treatment Alternatives for Reducing PFAS in Leachate from State-Owned Landfills” dated January 2023 prepared for State of Maine Department of Administrative and Financial Services, Bureau of General Services

Email communications with the Department of Environmental Protection received June and July 2024.

Report titled “PFAS in Deer Harvested in the Fairfield Area, Maine - Fall 2021 Targeted Sampling and Advisory Summary Report” dated 08 February 2022, Maine Department of Inland Fisheries and Wildlife and Maine Center for Disease Control and Prevention

Levees

D+

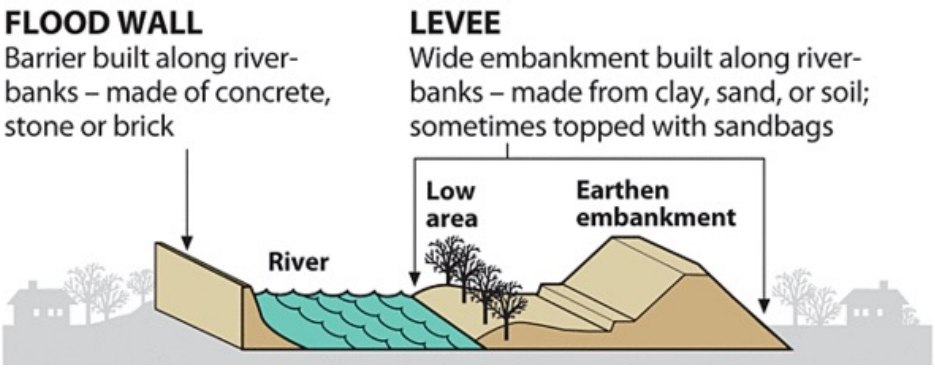
EXECUTIVE SUMMARY

The National Levee Database identifies five levees in Maine that protect 624 citizens and $133 million of property from flooding. While Federal regulators consider the risk associated with Maine's five levees to be "Low," this risk level is relative to levee systems nationwide. Maine's levees were not designed to be overtopped, even though an overtopping event is feasible. Overtopping could result in a breach that could be catastrophic to the communities they protect. Funding for the maintenance and improvement of Maine's levees is generally the burden of the local community and is often insufficient. Federal funding is available for the upgrade of levees but has historically been competitive or required local funding matches beyond the capacity of local communities. Maine has no Levee Safety Program, and the 2023 Maine State Hazard Mitigation Plan does not recognize levees as a potential hazard.

BACKGROUND

Levees are engineered earth embankments or floodwall structures used to contain, control, or divert the flow of water. Their purpose is to reduce the risk of temporary flooding. In contrast to dams, which store or slow down water to manage downstream water levels, levees are generally located parallel to a flooding source and are used to protect areas adjacent to the levee from flooding (Figure 1).

FIGURE 1: LEVEE AND FLOODWALL DIAGRAM[1]



The U.S. Army Corps of Engineers (USACE) National Levee Database (NLD) identifies five Maine levees operated and maintained by their respective municipalities/ tribal nations with support from USACE[2]. The NLD includes levees identified by The Federal Emergency Management Agency (FEMA) and USACE, the two Federal agencies responsible for certifying and accrediting levee systems, but the NLD may include only some levees within Maine. The FEMA and USACE certification and accreditation systems determine insurance requirements for properties the levee protects.

FIGURE 2: FEDERALLY SUPPORTED LEVEES IN MAINE[2]

CAPACITY

The five levees cataloged in the NLD have a total length of 1.5 miles. The levees protect 624 citizens and $133 million of property from flooding[2], based on the USACE's 2023 National Structure Inventory. The levee locations are identified in Figure 2 and protect residents of Old Town from flooding of the Penobscot River, Fort Kent residents from the Saint John River and Fish River, Hartland residents from the Sebasticook River and Sebasticook River/Moose Lake bypass channel (two separate levees), and Fort Fairfield residents from the Aroostook River[2].

CONDITION

According to the NLD, the five mapped levees in Maine were constructed between 1976 and 2001[2]. Between 2012 and 2014, the USACE evaluated Maine's levees to understand the risk to those living and working behind the levees. The current NLD does not provide a condition rating or categorize risk; instead, it summarizes performance and condition and is now assessing the levees based on their risk of overtopping or breaching during a flood event.

Based on the version of the NLD accessed for Maine's 2016 Infrastructure Report Card, Maine's levees had been assigned a condition rating of "minimally acceptable," except for the Sebasticook River Left Bank levee, which was assigned a condition rating of "unacceptable,"[3].

The following table provides the USACE's most recent performance and condition summaries of Maine's five levee systems:

TABLE 1 CONDITION SUMMARY OF MAINE'S LEVEES[2]

Levee System	Year Built	Last Assessment	USACE Performance and Condition Summary
Aroostook River, Right Bank Fort Fairfield	2001	4/2016	The levee is likely to withstand water to the top of the levee without breaching. However, it is essential to note that a breach is possible, and the system has only been loaded at greater than 25% of its capacity once in 2008, when the system was loaded at 38% of its capacity. The system is not designed to overtop even though an overtopping event is possible. Overtopping could result in erosion of the backside and create a breach. A breach could result in inundation, significant property damage, and potential loss of life.
Penobscot River, Indian Island Old Town	1976	12/2017	The levee is likely to withstand water to the top of the levee without breaching. The largest event since construction was in April 1987, when the project was loaded to 71% of its capacity. In December 2010, the project was loaded within a couple of feet of the crest. The system performed as intended with some clear seepage around the unapproved drainage culvert that was installed. The system is not designed to overtop even though an overtopping event is possible. Overtopping could result in a breach. A breach could result in inundation, significant property damage, and possible loss of life. An unapproved culvert was installed through the levee system, and the condition of the culvert is unknown. The conditions of other culverts through the levee system are also unknown.
Saint John and Fish Rivers Fort Kent	1977	1/2018	The levee is likely to withstand water to the top without breaching. However, there is a concern that if water were to flow over the levee, it could cause erosion on the backside and create a breach. It is important to note that overtopping is possible. The flow of the river can become restricted due to the amount of ice in the river, which could lead to a quick rise in water elevation. In 2008, the water elevation reached to within one foot of the top of the levee. The levee is not designed to be overtopped; to date, there has not been an overtopping event. Overtopping could result in a breach. A breach could result in inundation, significant property damage, and possible loss of life.
Sebasticook River / Moose Lake Bypass Hartland	1983	2/2017	The levee is likely to withstand water to the top of the levee without breaching. However, there has not been a flood event that has loaded the system more than 25% of its capacity, and therefore, there is little to no performance history during a flood event. It is important to note that a breach is possible. A breach could result in inundation, significant property damage, and possible loss of life.
Sebasticook River Left Bank Hartland	1983	2/2017	The levee is likely to withstand water to the top of the levee without breaching. In 1987, at least one section of floodwall was overtopped by surging floodwater, and the levee embankments were loaded within 1.5 feet of the crest. It is important to note that breach or overtopping is possible. The system is not designed to be overtopped. Overtopping could result in a breach. A breach could result in inundation, significant property damage, and possible loss of life. An unauthorized building was constructed over the floodwall and interior drainage system. There is also an unauthorized culvert alteration to the discharge culvert for the interior drainage system with no flap gate. As a result, there are some uncertainties about how the system will perform during a flood event.

PUBLIC SAFETY

FEMA has established levee certification and accreditation processes[4] that identify and map flood risk associated with levees. The certification process specifically deals with the design and physical condition of the levee system. The levee owner (municipality or tribal nation) is responsible for working with a professional engineer to certify their levee system meets the standards outlined in federal regulations. Once a levee is certified, FEMA can accredit the levee as providing adequate risk reduction if the certification demonstrates a certain reduction of risk associated with flooding. Of the five levee systems in Maine, as of 2020, the Old Town and Fort Kent levees are accredited; the Fort Fairfield and the Sebasticook River/ Moose Lake Bypass levees are non-accredited. FEMA's certification and accreditation processes relate to flood insurance risks and rates.

In April 2024, the USACE published the Draft First Edition of the National Levee Safety Guidelines[5]. The comprehensive publication sets forth the policies and procedures of its Levee Safety Program. The publication discusses managing flood risks, estimating and managing levee risks, engaging the community, designing, constructing, operating, and maintaining levees, managing levee emergencies, and enhancing community resilience. The guidance is risk-based and is intended to consider the probability of levee failures, such as overtopping or breaching, and the assets that would be at risk in such a failure. Among numerous objectives, the primary intent of the risk-based approach is to better communicate all levees have a risk of failure due to controllable and uncontrollable factors. A key component of the National Levee Safety Guidelines is the implementation of state levee safety programs[5].

It is important to note that this risk-based assessment rating system is a relative scale implemented across the nation. In comparison to large levee systems protecting metropolitan areas in other parts of the United States, Maine's levees are considered lower risk. Maine's 1.5 miles of levees protect over 600 citizens and $133 million of property[2]. California has over 5,400 miles of levees that protect over $682.5B in property. Still, Maine's five levees are significant to the state and the communities they protect.

The five levee systems in Maine that are listed on the NLD were constructed with the support of the USACE and are owned, operated, and maintained by the local municipality or tribal nation. There is no clear regulatory authority overseeing the safety of Maine's levee systems. MEMA does not regulate levees. The USACE routinely inspects the levees, but the NLD indicates the latest assessments (presumably including inspections) predate January 2018[2].

Despite the potential risks of a levee failure, public awareness of Maine's levees is low. Even amongst hazard mitigation professionals, awareness of Maine's levees is low. Of the 462 pages comprising the 2023 Maine State Hazard Mitigation Plan, there was only one mention of any of Maine's five levee systems and no mention of the need to maintain or improve Maine's levees or to establish a Maine Levee Safety Progam[6] following the USACE/FEMA guidance document.

FUNDING; OPERATIONS AND MAINTENANCE

Historically, funding for the operation and maintenance of locally operated levees such as those in Maine has been the burden of the municipality/ tribal nation, though USACE does provide inspection assistance[3]. Local funding has historically been insufficient to properly maintain the levee systems[3]. The passage of the Water Resources Reform and Development Act (WRRDA) in 2014 created a new National Levee Safety Initiative that was intended to address some of these funding challenges by developing consistent levee safety standards, completing the National Levee Database, and funding states to establish levee safety programs. However, funding for WRRDA was not appropriated for several years. Despite an appropriation of $15 million in 2020, funding remains inadequate to the point that a bipartisan group of 60 US Congressional representatives signed a letter requesting increased funding for this program in 2021[7].

Funding opportunities for the upgrade of existing levee systems are also limited but more available than funding for maintenance. Federal agencies, including FEMA, USACE, and the Department of Housing and Urban Development, all have funding opportunities for the upgrade of levees. However, funding is generally restricted to those projects that provide economic opportunity to disadvantaged communities or demonstrate that expenditure of Federal funds will have a greater return on investment than other water resource projects including navigation projects. Even for those projects with competitive benefit-cost ratios, local match requirements limit the ability of many communities to compete for Federal funding. Until a dedicated funding stream can be established at local or federal levels, limited funding will continue to stifle the maintenance and improvement activities for Maine's levee systems.

RESILIENCE AND FUTURE NEED

In 2008, following the Town of Fort Kent's emergency actions to limit damage to public infrastructure and private property caused by flooding on the St. John and Fish Rivers, the Town began a six-year process to procure funding and extend its levee system to avoid future damages. The Town's project, completed in 2019, extended the existing levee system upstream 800 feet to protect historic structures, private property, and public infrastructure from floods such as that in 2008.

While the upgrade of the Fort Kent levee is an improvement, in its assessment of Maine's levees, the USACE cautioned that none of Maine's levees were designed to be overtopped2. In the event of a flood overtopping a levee, erosion could occur and lead to the breach of the levee and subsequent catastrophic inundation of protected areas. As climate change is anticipated to increase the intensity of floods in Maine[8] and thus increase the likelihood of a flood occurring that overtops some of Maine's levees, overtopping and catastrophic failure of Maine's levee systems are more significant risks now than when the levees were first constructed. The potential failure of Maine's levees during an overtopping event demonstrates the lack of resilience in Maine's levee systems and the possible need for additional improvements to maintain a suitable level of protection in light of increasing storm intensity.

Recognizing both this risk and the challenges for local communities to mitigate this risk, Maine's Climate Action Plan[9] established enhanced assistance and funding to improve the resiliency of communities by providing actionable climate change projections, guidance to develop and assess resilient mitigation actions, and incentivizing and funding resilience activities. New funding sources to support infrastructure resiliency at the municipal and tribal level include the Maine Infrastructure Adaptation Fund, which is administered by the Maine Department of Transportation (MaineDOT) ($22M awarded to 12 communities in 2022)[10] and FEMA's Building Resilient Infrastructure and Communities (BRIC) grants that are administered by the Maine Emergency Management Agency (MEMA)[11].

Levees

RECOMMENDATIONS TO RAISE THE GRADE

- At the local, state, and national levels, investigate and establish dedicated funding streams to support levee owners to adequately maintain Maine's levee systems and adapt them to be resilient to anticipated future conditions;
- Implement an outreach program to community members and officials protected by Maine's levees that increases their awareness of the benefits and risks associated with Maine's levee systems;
- Similar to dams, establish Emergency Action Plans for Maine's levees that identify potential levee failure scenarios and populations at risk and establish procedures for emergency responders and affected community members to minimize the loss of life and property if a levee were to fail;
- Adequately fund MEMA to implement a Maine Levee Safety Program.

SOURCES

1. Landscape-a-Design Methods of Flood Control, Accessed June 20, 2020
2. US Army Corps of Engineers (USACE) National Levee Database, Accessed September 2024.
3. US Army Corps of Engineers (USACE) National Levee Database, Accessed August 2016.
4. Federal Emergency Management Agency (FEMA) Levee Certification and Accreditation website, Accessed September 2024
5. US Army Corps of Engineers (USACE) and Federal Emergency Management Agency (FEMA), "National Levee Safety Guidelines," Draft First Edition, April 2024 and supporting National Levee Safety Program website, Accessed September 2024.
6. Maine Emergency Management Agency (MEMA), "2023 Maine State Hazard Mitigation Plan," 2023.
7. American Society of Civil Engineers (ASCE) News and Information from ASCE Government Relations, March 20, 2020.
8. US Environmental Protection Agency "What Climate Change Means for Maine," August 2016.
9. Maine Climate Council "Maine Won't Wait," Maine Climate Action Plan, December 2020.
10. Maine Climate Council "2023 Annual Report, Maine Won't Wait, Maine Climate Action Plan," December 2023.
11. Maine Emergency Management Agency (MEMA) website, information sheet


EIMSKIP
EIMSKIP
EIMSKIP
EIMSKIP
EIMSKIP
EIMSKIP
EIMSKIP
EIMSKIP
EIMSKIP
EIMSKIP
MAERSK
MOL

Ports

B-

EXECUTIVE SUMMARY

Maine's ports are in good condition but are starting to show signs of wear that requires attention. More than $130 million in state, federal, and private funds have been invested in ports over the last eight years, $102 million of which were committed in the last four years alone. Focus has been on growth in freight traffic, cold storage, and tourism, with nearly half of the recent investments from private funds. The Portland International Marine Terminal (IMT) continues to see growth in container shipping, while tourism and cruise ship calls remain strong throughout the state. Over $170 million in future investments are needed to realize continued growth.

BACKGROUND

FIGURE 1: PORTS AND HARBORS OF MAINE

Maine Ports and Harbor
1. Kennebunkport
2. Portland
3. Freeport
4. Bath
5. Boothbay Harbor
6. Rockland
7. Camden
8. Belfast & Searsport
9. Bucksport
10. Bangor
11. Bar Harbor
12. Eastport
13. Lubec

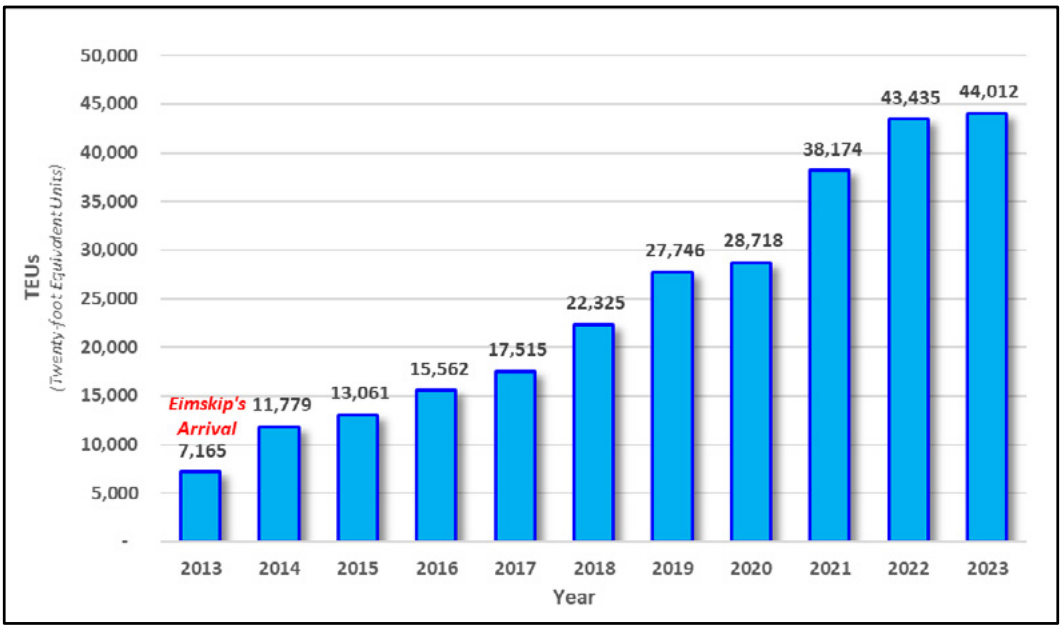
Maine has over 3,500 miles of coastline and 13 significant ports and harbors as shown in Figure 1. Three of these ports, Portland, Searsport, and Eastport include robust industrial facilities as well as recreational amenities, hence covering a wide array of waterfront attributes. All three are well-suited to handle the requirements of most standard cargo vessels. The shipping and cruise ship industries are strong throughout the state. The remaining

ports serve local commercial fisherman, recreational boating, and tourism activities.

Portland, which operates the IMT, has emerged as the state's primary container terminal while maintaining a strong tourism industry through its cruise ship facility at Ocean Gateway and its working waterfront comprised of fishing piers and restaurants. Searsport continues to rely on oil imports but is diversifying its attention toward offshore wind and offering new port opportunities. Eastport's waterfront infrastructure is robust, but the region continues to struggle finding a consistent import/export program that utilizes its waterfront facilities at the downtown Breakwater Terminal and the outer industrial terminal at Estes Head.

Portland and Searsport continue to support liquid petroleum shipments due to the state's high reliance on heating oil. Imports have leveled off from the high of 100 million barrels in 2012 and the low of 8 million barrels in 2016 and have averaged 40 million barrels per year over the last four years[i]. The use of heat pumps and the growth of renewable energy sources such as wind, wood, solar and wood pellets have reduced oil dependency. Nonetheless, Maine's waterfront infrastructure which supports the oil industry remains a vital part of Maine's economy.

FIGURE 2: PORTLAND IMT CONTAINER THROUGHPUT (2013-2023)



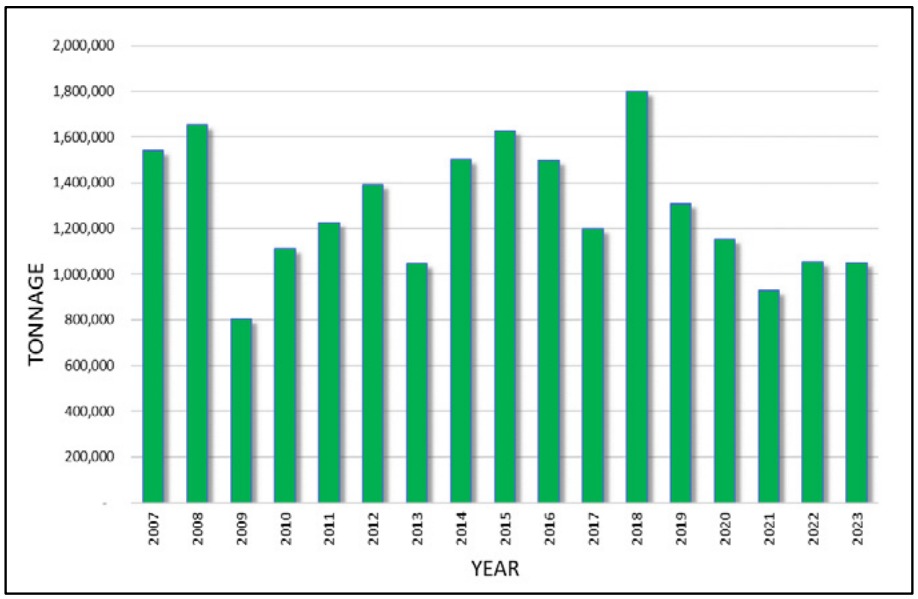
Maine's investments in its port facilities continue to fuel growth throughout the state. At Portland's IMT, the Icelandic shipping company, Eimskip, continues to produce increased throughput year-over-year of containers from 7,165 twenty foot equivalent units (TEU's) in 2013 to over 44,000 TEU's in 2023 (see Figure 2). Ship visits have increased in frequency and volume from one ship every two weeks in 2013 using the 625 TEU *Skogafoss* to now weekly shipments using vessels as large as the 1,025-TEU *Bakkafoss*. The average annual increase in container throughput has historically been around 20% since 2013 but has slowed recently to just 11% since 2020[ii].

Maine's annual dry cargo tonnage has fluctuated greatly over the last two decades ranging from 1 to 1.6 million tons through 2008. After the dip in 2009 to 800,000 tons, dry cargo tonnage has leveled to numbers just above 1 million as shown in Figure 3[iii]. The datapoint in 2018 is an anomaly from an unverified source.

CONDITION AND CAPACITY

Maine's ports are fortuitously situated along the northern end of the East Coast, which results in shorter shipping times to European ports. New sea routes through the Arctic Circle have generated interest in new shipping channels and cruise ship voyages. Maine stands poised to benefit from these opportunities and is currently participating in international councils to better understand the future possibilities in transportation.

FIGURE 3: DRY CARGO TONNAGE THROUGH MAINE PORTS (2007 - 2023)



In Portland, the IMT has undergone major renovations since 2012 and is in relatively good condition, although it is beginning to show wear. Several expansion projects have transpired over the last 12 years including improvements to the upland container storage areas; the development of offices and Maintenance and Operations buildings; over 20,000 square feet of wharf expansion; dual 2,750-foot railroad tracks with sidings; a concrete loading slab; and an internal heavy-haul road. The growth of the refrigerated container throughput has fostered a need for onsite cold storage capacity which led to the construction of a 107,000 square foot cold storage building anticipated to be complete by 2025. The building will store up to 21,750 pallets and create an efficient cross dock operation for assembling local shipments of frozen seafood. In conjunction with cold storage, a new site layout for storing 420 refrigerated containers in a racked system is currently underway and will be online by 2025. Based on latest schedule, this date could be pushed to 2026.

Maine International Cold Storage Facility

The aging condition of some waterfront elements at the Portland IMT may be an indicator that a routine maintenance program is warranted over further growth and expansion. Approximately 2 acres of pavement is in poor condition and requires replacement, and approximately half of the mooring bollards along the wharf are severely corroded. The state's acquisition of the Portland IMT in 2021 as part of a land swap with the City of Portland should help streamline future rehabilitation projects. Ideally, both a routine maintenance program as well as future growth plans would be achieved simultaneously and become the baseline approach to maintenance and operations.

Portland IMT Waterfront

In Searsport, the dry cargo pier at Mack Point is constructed of steel pipe piles and a concrete deck, both of which are in relatively good condition. However, the state has relinquished ownership of the pier to a private entity in a lease to own agreement. While the loss of the pier at Mack Point is a disadvantage to the state, there is a current initiative to create a new port facility on nearby Sears Island to support offshore wind development. Eastport maintains two waterfront structures that serve eastern Maine: the downtown Breakwater Terminal and Estes Head Terminal. In 2017, the downtown Breakwater Terminal was rehabilitated to address deficiencies. The Estes Head Terminal has a conveyor system to move bulk goods such as salt, aggregate, and forest products. The wharf lies in naturally deep waters and is constructed of steel pipe piles and a concrete deck all of which are in relatively good condition.

Maine's cruise ship industry is seeing a strong rebound in numbers after the pandemic halted all cruises in 2020. In 2023, over 454,000 passengers visited Maine on 379 ships. Passenger numbers are nearly equal to pre-pandemic levels, when 467,000 passengers visited Maine on 430 ships. Data indicates that passengers are returning to Maine in strong quantities and on larger ships. Maine needs to review its maximum water depths at its cruise ship ports to determine if special dredging should be completed at these areas, and the state should also review its port infrastructure to handle larger vessels and passenger processing. Bar Harbor has already expressed concerns about the number of passengers visiting the town during peak season and was granted a decision by the U.S. District Court to limit passengers to 1,000 per day. Portland, Rockland, and Eastport expect greater numbers of passengers because of the reductions to Bar Harbor. As cruise ships become larger, the structural capacity of the waterfront infrastructure and adjacent water depths should be evaluated.

Maine's fishing industry across all seafood landings continues to hold steady. The overall value of the fishing industry in 2023 was strong at $611 million but still lower than the high of $721 million in 2017[vii]. Higher unit prices have offset the reduced number of landings. The Maine lobster industry boasts 19 lobster cooperatives and is the strongest sector of the state's commercial fisheries. Elvers, clams, oysters, menhaden, and seaweed are also part of the fishing industry. Local infrastructure commonly includes timber piers, wharves, floating

docks, mooring fields, and boat launches, all of which receive routine funding through Maine's grant programs, the Small Harbor Improvement Program (SHIP) and the Boating Infrastructure Grant (BIG) Program. A new project in Lubec is supporting the fishing community through the design of a 900-foot-long breakwater, which will protect up to 35 fishing vessels and be designed with coastal resiliency in mind. This $50-million project is anticipated to be completed by 2027.

Maine has 14 state-owned ferry terminals: nine of which are operated by the Maine State Ferry Service (MSFS) and five of which are operated by Casco Bay Island Transit District (CBITD). Two other terminals in the Portland area are owned by the city, and there is one private pier in Diamond Cove. The ferry terminals at Vinalhaven and Islesboro received upgrades to fender systems in 2019. Similar upgrades are scheduled for Swans Island and Bass Harbor at a total cost of $8 million. Additional upgrades to the Lincolnville and Islesboro ferry terminals will include nearly $23 million in electrical infrastructure to charge the new plug-in hybrid ferry anticipated in 2027. Maine should be mindful to implement coastal resiliency measures to all its ferry terminals and carefully evaluate its facilities for rising sea levels and storm severity.

Vinalhaven Ferry Terminal

OPERATIONS AND MAINTENANCE

Dredging throughout the Fore River in Portland's federal navigational channel is necessary on a periodic basis and was last completed in 2015 by the U.S. Army Corps of Engineers (USACE). At that time, most of the 750,000 cubic yards were removed to achieve the required 35-foot channel depths; however, the side slopes and 2-foot over-dredge were not completed. Private waterfront owners will be required to dredge the immediate shoreline along their wharves to maintain usability. Maine sought federal assistance to supplement the state and private funding; however, the $7 million grant application in 2023 was unsuccessful.

In Searsport, the navigational channel has been maintained to a water depth of 35 feet since its oversight by USACE in the 1960s; however, the future prospect of deep-draft vessels and additional port activity has generated a need for a 40-foot channel. The state's offshore wind initiative is slated to be staged from either Sears Island or Mack Point, which will necessitate deeper waters to accommodate the larger vessels that will be used to accomplish the initiative. Both of Eastport's waterfront facilities are in naturally deep waters and do not require maintenance dredging.

FUNDING AND FUTURE NEED

Within the last four years, over $102 million was invested in Maine's ports and harbors. Investments include: $71 million for improvements to the Portland IMT and $31 million for state ferry terminals. Numerous other improvements have occurred through SHIP, BIG, and the Maine Department of Transportation (MaineDOT) Work Plan programs. State transportation bonds are overwhelmingly approved by voters on a routine basis, the latest of which was $100 million in 2021. Funding for improvements to Portland, Searsport and Eastport are at strong levels; however, funding has historically favored Portland. This approach has proven successful given the return on investments at the Portland IMT. Funding levels in Portland should remain strong, while increases should be made to Searsport and Eastport. More investments are needed to maintain the good working condition of the existing facilities and leverage this infrastructure for future markets in growing sectors.

The Portland IMT pier contains areas of industrial-strength load-carrying capacity of 1,000 pounds per square foot (psf). However, two pier areas of 450 psf capacity remain and should be replaced to enable efficient internal container circulation. The Portland IMT will need to improve its operational efficiency to handle the rising demand from containerized cargo, yet may be limited by its physical acreage unless additional upland options materialize.

As cruise ship sizes continue to increase by length and tonnage, Maine's ports need upgrades and expansions to keep up with the vessel sizes. Dredging in Portland achieved water depths of 35 feet within the navigational channel adjacent to Ocean Gateway; however, future maintenance dredging will be required to maintain adequate water depths as vessels increase in size.

In Searsport the state-owned dry cargo pier will soon be taken over by Sprague Energy as the 30-year lease-to-own agreement comes to maturity. While the state is losing an asset, it is poised to develop a new terminal on Sears Island in support of offshore wind. The proposed 100-acre port facility would utilize one-third of the 300 acres reserved for state development, while the remaining 600 acres on Sears Island are preserved for environmental conservation. Development of this proposed terminal would cost between $500 million to $1 billion over the next several years. The state submitted a $456 million federal grant application through the FY24 Port Infrastructure Development Program (PIDP) to secure initial funding toward a floating offshore wind port[viii].

Eastport's infrastructure is in relatively good condition and has received its fair share of attention over the last eight years. Challenges with Eastport's economy lie outside of its port infrastructure. For Eastport to remain competitive and viable in Maine's port system, improvements to the regional rail and highway systems are needed. A revisit of Maine's Three-Port Strategy, which categorizes the optimum functionality for each port based on location, local infrastructure, and regional commodities, should flush out a suitable future for this port.

While great strides have been achieved toward improving Maine's port infrastructure, more work is needed to upgrade facilities, expand waterfront utilization, and leverage renewable energy sources. Work is needed at the three primary ports and each of the aforementioned harbors within the state, which rely on tourism and recreation. In total, Maine ports and harbors require $170 million in short-term funding to maintain a level of good standing, as outlined in Figure 4.

FIGURE 4: SUMMARY OF FUNDING NEEDS FOR MAINE PORTS

Maine Ports & Harbors Short-Term Funding Needs			Notes
Portland Fore River - Dredging ($34M)	$34	million	Dredging along shores of Fore River.
State-Wide Programs - Ferry Terminals Electrification ($20M)	$20	million	Similar electrification at Rockland & Vinalhaven.
State-Wide Programs - SHIP & BIG Grants ($4M)	$4	million	Say $1M per year over 4 years.
Eastport Breakwater - Extension ($11M)	$11	million	Extend the breakwater by 97 ft.
Eastport Fish Pier - Rehabilitation ($2M)	$2	million	Structural repairs to the Fish Pier.
Lubec Harbor - Breakwater Development ($50M)	$50	million	New 900-ft breakwater in Johnson Bay.
Portland IMT - Wharf Expansions ($35M)	$35	million	Wharf Infills: East End $10M; Finger Pier $25M.
Portland IMT - Wharf Maintenance ($2M)	$2	million	Bollards, anodes, steel pile coatings, deck seal.
Portland IMT - East Terminal Improvements ($3M)	$3	million	Pavement and drainage upgrades.
Portland IMT - Main Terminal Improvements ($5M)	$5	million	Building demo and yard raising/upgrades.
Portland IMT - Purchase RTG ($4M)	$4	million	Rubber Tire Gantry (RTG) for container operations.
TOTAL	**$170**	**million**	
Maine Ports & Harbors Long-Term Initiatives			**Notes**
Coastal Resiliency of Public Assets	$200	million	Assume $10M for 10 towns and $20M for 5 cities.
Searsport OSW Port Development	$500	million	Preliminary estimate for OSW initiative.
TOTAL	**$700**	**million**	

PUBLIC SAFETY AND RESILIENCY

While some projects have considered the effects of climate change, more action needs to be taken to implement coastal resiliency measures against severe storms and rising sea levels. Governor Janet Mills has emphasized the need to bolster Maine's waterfront and infrastructure. Recent coastal evaluations by Rockland in 2020, for example, identified a need of over $4 million to implement coastal resiliency measures[ix]. Statewide, public assets in areas with equal or greater population centers will soon require protection. More severe storms will continue, and Maine should implement a state-wide coastal resiliency strategy for its municipalities and state-owned infrastructure, including port facilities, ferry terminals, and cruise ship terminals. Coastal engineering is a major topic among America's coastal communities. Increasingly severe storms are producing higher winds, larger waves, and higher water elevations due to storm surge. Maine should focus more attention on this topic by modifying its existing waterfronts and developing its future waterfronts with an eye towards coastal resiliency.

The prospect of a wind farm off Maine's mid-coast will bring over 15 gigawatts of renewable electricity to southern Maine.

INNOVATION

Maine is leveraging electric infrastructure to reduce carbon emissions and fulfill renewable energy goals. At the Portland IMT, an automated electrical system will monitor the power for 420 containers and switch on/off electricity to refrigerator containers in a systematic sequence that saves energy. A new plug-in hybrid vessel will replace the aged Margaret Chase Smith Ferry, removing approximately 900 metric tons of carbon dioxide annually[x]. The prospect of a wind farm off Maine's mid-coast will bring over 15 gigawatts of renewable electricity to southern Maine.

Ports

RECOMMENDATIONS TO RAISE THE GRADE

- In Portland: increase the wharf area at the IMT to foster efficient operations and increase container throughput.
- In Searsport: accelerate the development of an offshore wind port terminal to leverage renewable energy.
- Perform maintenance dredging along Maine's commercial fishing infrastructure.
- Develop a coastal resiliency plan to prevent increasingly severe effects from storms and surge.
- Develop a waterfront maintenance program with specific work items and budget allocations.
- Update Maine's Three-Port Strategy to define clear objectives, purposes, and uses for each terminal.

SOURCES

MaineDOT, Maine Port Authority, Cruise Maine USA, Portland Press Herald, and other publications as noted below.

i Maine Port Authority data spreadsheet, compiled by Jackson Larrabee, May 2024

ii Maine Port Authority data spreadsheet, compiled by Jackson Larrabee, May 2024.

iii Maine Port Authority data spreadsheet, compiled by Jackson Larrabee, May 2024.

iv Article: *Long-Awaited Cold Storage Warehouse to Break Ground Monday*, by Peter McGuire, Portland Press Herald, August 19, 2022.

v Article: *Maine Cruise Ship Season Underway, over 450,000 Passengers Expected to Visit State Ports*, by Ariana St. Piere, WGME, April 27, 2023.

vi Article: *Maine's Bar Harbor Starts Implementing Daily Limit of 1,000 Cruise Visitors*, by Andrea Zelinski, March 18, 2024.

vii Article: *Maine's Commercial Fisheries Landings Soar in 2023*, by Carli Stewart, News, March 14, 2024.

viii Article: State Applies for $456 Million Federal Grant to Build Wind Port on Sears Island, by Stephen Singer, Portland Press Herald, May 17, 2024.

ix Article: *Rising Seas Could Require $4.8 Million in Retrofits in Rockland Alone, Study Estimates*, by Stephen Betts, Courier-Gazette, January 15, 2020

x MaineDOT Grant Application, *Lincolnville/Islesboro Ferry Terminal Upgrades*, July 14, 2023.

Public Parks

C

EXECUTIVE SUMMARY

Maine's parks are a key contributor to tourism – one of Maine's top industries. Outdoor recreation contributes $3.3 billion to Maine's economy, representing 3.9% of Maine's overall economy, and 5% of all jobs in the state, more than 32,000 in total.[1] Despite this impact, Maine state parks have not seen substantial investment to maintain and improve parks in over fifteen years, leading to a maintenance backlog estimated at $75 million. Governor Janet Mills announced her Maine Jobs and Recovery Plan initiative in 2021, which designated $50 million to rebuild and improve park infrastructure across the state. The key objectives of the initiative were ensuring safety and stewardship, accommodating increased visitation, and boosting tourism and outdoor recreation. Despite the one-time surge in support, most projects remain in planning or design and their estimated construction costs often exceed previous budgets thanks to workforce challenges and input materials inflation. A long-term approach to funding, such as tourism revenue capture into dedicated accounts, is needed to improve and maintain the quality and safety of state parks, roads, and facilities.

BACKGROUND

Maine's public recreation backbone consists of 40 state parks and additional historic sites (See Figure 1). Maine state parks include coastal parks, lakeside parks, riverside and waterway parks, rolling hills and mountain parks and island parks, a list of these parks is shown in Table 1 below. These areas, except Baxter State Park, are managed by the Maine Department of Agriculture, Conservation, and Forestry (DACF) and its associated divisions including the Bureau of Parks and Lands (BP&L). Public lands and conservation easements and leases bring the total land area managed by the BP&L to over 2 million acres. Baxter State Park is managed by the Baxter State Park Authority, a three-person authority consisting of the Maine Attorney General, Director of Maine Forest Service, and the Commissioner of Inland Fisheries and Wildlife. The state also has numerous municipal recreation areas, one national park, Acadia National Park, one national monument, Katahdin Woods and Waters National Monument, and many other recreational activity areas.

TABLE 1. LIST OF ALL MAINE STATE PARKS

1. Allagash Wilderness Waterway	15. Lake St. George State Park	29. Rangeley Lakes State Park
2. Androscoggin Riverlands State Park	16. Lamoine State Park	30. Reid State Park
3. Aroostook State Park	17. Lily Bay State Park	31. Roque Bluffs State Park
4. Baxter State Park	18. Mackworth Island State Park Trail	32. Scarborough Beach State Park
5. Birch Point State Park	19. Moose Point State Park	33. Sebago Lake State Park
6. Bradbury Mountain State Park	20. Mount Blue State Park	34. Shackford Head State Park
7. Camden Hills State Park	21. Mount Kineo State Park	35. Swan's Falls Campground
8. Cobscook Bay State Park	22. Owls Head State Park	36. Swan Lake State Park
9. Crescent Beach State Park	23. Peaks-Kenny State Park	37. Two Lights State Park
10. Damariscotta Lake State Park	24. Penobscot Narrows Observatory	38. Vaughan Woods Memorial State Park
11. Ferry Beach State Park	25. Penobscot River Corridor	38. Warren Island State Park
12. Fort Point State Park	26. Popham Beach State Park	40. Wolfe's Neck Woods State Park
13. Grafton Notch State Park	27. Quoddy Head State Park	
14. Holbrook Island Sanctuary	28. Range Ponds State Park	

CONDITION AND CAPACITY

The Maine Office of Tourism reported that over 10 million people visited Maine between May and August of 2021 and 49% of those visitors cited enjoying the outdoors as the highlight of their trip to Maine. Visitors to Maine state parks have continued to rise over the past four years. 2021 was a record-breaking year with over 3.3 million visitors to state parks and over 315,000 campers to Maine state campgrounds, a 12% increase from the previous year. In 2021, state park campgrounds were running at near capacity during the core summer months of July and August[vii].

Despite the rise in visitors to state parks, it has been over fifteen years since any substantial investment has been made to maintain and improve state parks. The lack of funding has led to deferred maintenance of critical infrastructure such as roads and trail systems.

Acadia National Park averages 4 million visitors per year and is one of the top 10 most-visited national parks in the United States[ix]. Many popular areas in the park fill to capacity during the peak season from June to October. To help manage crowds, visitors are encouraged to use the free Island Explorer shuttle to access the most popular spots. A vehicle reservation system has also been implemented to help control crowds and manage parking at the summit of Cadillac Mountain.

There is no centralized database that tracks the condition and capacity of local municipal parks. The Maine DACF releases the Maine State Comprehensive Outdoor Recreation Plan (SCORP) every four years. The SCORP includes an evaluation of the overall demand and supply of outdoor recreation resources and facilities in the state and a program for implementing the outdoor

recreation plan. The document is required for the state to participate in the federal Land and Water Conservation Fund program (LWCF) which provides matching funds for outdoor recreation and planning. The most recent SCORP was released in December of 2019 for the 2020-2024 time period, the next SCORP, reviewing updates made in the past four years, is expected to be released within the next year.

OPERATIONS & MAINTENANCE

In 2004, the DACF commissioned a study to assess the condition of state parks' major infrastructure assets and develop a recommended capital improvement program. This study enabled the DACF to establish a baseline for prioritizing infrastructure improvements to the system. The assessment covered all state park facilities, including more than 200 buildings and multiple site facilities, with an emphasis on assets that would likely require more than $15,000 each to renovate or replace. A comprehensive team of engineers, planners, landscape architects, surveyors, and historical preservation consultants conducted the assessment and worked with the DACF to develop the capital improvements plan, however many projects and maintenance were deferred due to lack of funding.

Additional funding in 2021 has created the opportunity for a variety of maintenance and improvement projects. These projects, currently in the design and engineering phase, include upgrades such as paving access roads, replacing culverts, improving hiking trails, installing accessibility beach mats, replacing wave attenuation booms, installing new campground leach fields, upgrading entrance stations, replacing key bridges on access roads, and cleaning up seasonal storm damage.[xi]

FIGURE 2. NEW BRIDGE CONSTRUCTION TO GIFFITH'S HEAD IN REID STATE PARK[XI]

On the operations side, current park staff are highly well trained, experienced, and work diligently to operate and maintain the parks. However, in addition to funding needs, the state parks are experiencing difficulty in attracting and retaining qualified staff to apply for existing vacancies compared to previous years prior to 2020.[xii] In 2023, park managers wrote a letter in support of the passage of LD 1854 to reevaluate how state employees are compensated in hopes to alleviate the staffing shortages. Park managers shared that "without the workforce necessary to see to their upkeep, visitors will soon begin to encounter parks that are dirtier, less safe, and far below the standard that we, the park staff, want to maintain. Without the resources to rectify this, we fear an increase in accidents and injuries and a general lowered public perception of those spaces that have traditionally been clean, well-kept, and responsible for offering a safe and enjoyable recreational experience to the public."[xiii] LD 1854 did not pass, and a seasonal employment brochure[xiv] shows starting rates often less than local fast-food restaurants making it difficult to attract and retain employees.

FUNDING AND FUTURE NEED

Typical funding for Maine's state parks comes from several sources including gate fees, campground fees, the sale of wildlife loon license plates and grant programs such as the federal Land and Water Conservation Fund (LWCF) and the Maine Outdoor Heritage Fund (MOHF). The LWCF provides matching federal funds to states for statewide outdoor recreation and planning and for acquisition and development of public outdoor recreation areas and facilities. The MOHF provides grants through revenue generated by the sale of certain instant scratch lottery tickets.

The Baxter State Park Authority receives approximately 40% of the cost of park operations from fees and the remainder from trust funds established by former Governor Percival Baxter. The park also receives donations from independent trusts and organizations such as the Baxter Park Wilderness Fund and the Friends of Baxter Park, as well as individual donations.

Local municipal parks are funding through sources including grants, revenue sharing funds, such as the Local Government Fund and the Disproportionate Tax Burden, and local budgets. Acadia National Park and the Katahdin Woods and Waters National Monument are funded by federal congressionally authorized budgets and through park entrance fees. The non-profit, Friends of Katahdin Woods and Waters provides additional private funding to the National Monument.

In 2018, the Natural Resources Council of Maine cited a $50 million maintenance backlog for Maine state parks and recommended that "$20 million in bond funding for State Parks' infrastructure is needed to make meaningful progress at decreasing this backlog and providing a high-quality experience for park visitors."[xvi] In response to the significant maintenance backlog and funding gap, Governor Janet Mills announced her Maine Jobs and Recovery Plan initiative in 2021 (funded by the federal American Rescue Plan Act), which designated $50 million to rebuild and improve park infrastructure across the state. The key objectives of the initiative are to ensure safety and stewardship, accommodate increased visitation and boost tourism and outdoor recreation.[xvii]

The Maine Jobs and Recovery Plan has dedicated a significant amount of funding to meet the needs of the pre-

viously cited maintenance backlog and numerous projects are currently in development. However, the current estimated value of deferred maintenance across state parks is $75 million. As projects are entering the design and engineering phase, the actual cost of the projects are proving to be much greater than originally estimated and will exceed the designated funding to address the slate of projects.[xix]

For a longer-term solution to the maintenance backlog, the Natural Resources Council of Maine supports dedicating a percentage of revenues generated from park visits to maintaining the quality and safety of state parks, roads, and facilities.[xx]

PUBLIC SAFETY

State parks have proven to be a valuable asset to public health in the State of Maine, by creating an environment that promotes spending time in the outdoors and exercising. Recent improvements have been made to make state parks more accessible to those with disabilities, such as the handicap accessible fishing pier at Sebago Lake State Park and the mobility pathway installed at Popham Beach State Park. Future projects in development include accessibility beach mats at Sebago Lake State Park and Range Pond State Park, accessibility trails at Mt. Battie in Camden Hills State Park, and general safety improvements. Several state parks have also received MOHF grants in the past four years to provide park staff with access to utility task vehicles (UTV) to assist with rule enforcement, overall safety, and rescue operations.[xxi]

While recent funding will help facilitate necessary park upgrades, the maintenance backlog and aging infrastructure in the state parks could create a potentially unsafe situation for park users if trail, stair, or facility safety projects do not continue to get funding to be maintained when necessary.

While recent funding will help facilitate necessary park upgrades, the maintenance backlog and aging infrastructure in the state parks could create a potentially unsafe situation for park users if trail, stair, or facility safety projects do not continue to get funding to be maintained when necessary. In addition, state park staff issues need to be resolved to maintain the safety of visitors in state parks.

RESILIENCE & INNOVATION

Climate change is a threat to many of Maine's state parks. Several of the state parks include beaches along the coast which are particularly vulnerable. Rising sea levels and more frequent powerful storms are contributing to severe damage of infrastructure and natural features found at Maine's seacoast parks. One example of this is the creation of quicksand at Popham Beach State Park. A series of winter storms rerouted a river that outlets into the ocean, softening the sand in an area where visitors are apt to walk. This required park staff to place warning signs in the area after a visitor fell waist deep into the soft sand.[xxii]

To adapt to climate change, many state parks are including resiliency measures in their future planning and budgeting. Some parks are implementing infrastructure improvement projects, such as upsizing culverts to handle higher volume storms, creating more durable trails, building splash pads, and shaded areas for visitors. Other parks are investing in programs to help wildlife and natural ecosystems adapt to the changing environment.[viii] One example is the installation of pollinator gardens to support pollinators that play a fundamental role in Maine crops, wildflowers, trees and ecosystems.[xxiii] Another innovative project

includes the use of Christmas trees to help rebuild sand dunes and combat beachfront loss at Popham Beach State Park. The trees help keep sand in place allowing dune grass to grow and further stabilize the dune. More than 500 trees were donated and as of July 2024 the project is considered a success with defined rows of dunes and dune grass growing.[xxiv] In addition, the Maine Climate Council released a four year climate plan, Maine Won't Wait, to help reduce emissions and slow the effects of climate change.[xxv]

FIGURE 3. CHRISTMAS TREES LINING THE DUNES

Sean Vaillancourt Photo

To help users learn more about the parks and plan future trips, the DACF has created a list of Maine's state parks and historic sites on their website. This includes links to specific park information such as directions, parking, trails, rules, activities, events, services, and facilities. Users can filter their search by selecting a specific place, a location-based option for a "single gas tank trip", or by region, activity, and facility.[xxvii] Filtering trips by a single tank of gas could help encourage shorter trips and therefore fewer fossil fuel emissions. It also shows visitors how accessible the parks can be from anywhere in the state.[xxiiii] The geocaching program gives users even more to do at eight of the state parks, by providing a GPS-based scavenger hunt. These programs are helping to encourage a healthy lifestyle by promoting all the fun ways you can enjoy the great outdoors in Maine state parks.

Public Parks

RECOMMENDATIONS TO RAISE THE GRADE

Maine ASCE makes the following recommendations:

- Update the Bureau of Parks and Lands database to include recent investments and establish an updated baseline of where the inventory stands;
- Advance the Maine Climate Action Plan to reduce emissions and protect coastal parks from rising sea levels; and
- Increase funding for parks to continue to decrease the operations and maintenance backlog, increase park safety and increase wages to help attract and maintain park staff. Consider the potential revenue sources listed below:
    - Evaluate and leverage fee structures (resident, non-resident, etc.) to fund maintenance and improve key assets. User fees can potentially be leveraged further to assist with the funding process, resulting in more sustainable infrastructure. One potential option would be to increase user fees for non-resident visitors;
    - Dedicate a percentage of revenues generated from park visits to maintaining the quality and safety of state parks, roads, and facilities;
    - And, use public-private partnerships, charitable conservation organizations, and accessibility support groups to increase revenues for increased capital maintenance.

Public Parks

C

SOURCES

i Maine Outdoor Brands, 2023, 2023 Annual Report, https://online.fliphtml5.com/gkqg/dawb/#p=1. Accessed 2024.

ii *State Parks and Public Lands: Maine ACF*, apps.web.maine.gov/cgi-bin/online/doc/parksearch/index.pl. Accessed June 2024.

iii "About Us." *About Us: Bureau of Parks and Lands: Maine DACF*, 2013, www.maine.gov/dacf/parks/about/index.shtml.

iv "Organization." *Baxter State Park*, 4 Feb. 2020, baxterstatepark.org/shortcodes/organization/

v *State Parks and Public Lands: Maine ACF*, apps.web.maine.gov/cgi-bin/online/doc/parksearch/index.pl. Accessed June 2024.

vi *Maine State Parks Saw Low Foot Traffic in 2023, Due to Weather | Newscentermaine.Com*, www.newscentermaine.com/article/sports/outdoors/maine-state-parks-saw-dip-in-visitor-numbers-in-2023/97-18a80aec-5b27-40e2-b16a-dd7874de1287. Accessed June 2024.

vii "Maine's Public Lands & Ecological Reserves." Natural Resources Council of Maine, 1 July 2024, www.nrcm.org/programs/forests-wildlife/maines-public-lands-ecological-reserves/.

viii Fleming, Deirdre. "Maine State Park Campgrounds Break Attendance Records Again in 2021." Press Herald, 10 Nov. 2021, www.pressherald.com/2021/11/10/maine-state-park-campgrounds-break-attendance-records-in-2021-2/.

ix "Acadia National Park (U.S. National Park Service)." *National Parks Service*, U.S. Department of the Interior, www.nps.gov/acad/index.htm. Accessed 23 Oct. 2024.

x *Maine State Comprehensive Outdoor Recreation Plan, 2020-2024.* [PDF File] Maine Department of Agriculture, Conservation, and Forestry - Bureau of Parks and Lands, 2019, Maine State Comprehensive Outdoor Recreation Plan, 2020-2024, www.maine.gov/dacf/parks/publications_maps/docs/2020_ME_SCORP_final_1_2_2020.pdf.

xi "Infrastructure Projects Revitalizing Maine State Parks." *State Parks: About Us: Bureau of Parks and Lands: Maine DACF*, www.maine.gov/dacf/parks/about/msp-infrastructure-project.shtml. Accessed June 2024.

xii Email interview with Ron Hunt, Director of Operations, Bureau of Parks & Lands, *FW: Maine ASCE Report Card 2024 - State Parks*, 20 June 2024.

xiii Farkas, Tom. "SEIU Local 1989 - Maine State Parks Severely Understaffed Due to Low Pay; Support LD 1854 to Help Fix It, Park Managers Ask Legislators." MSEA, 30 May 2023, mseaseiu.org/2023/05/30/maine-state-parks-severely-understaffed-due-to-low-pay-support-ld-1854-to-help-fix-it-park-managers-ask-legislators/.

xiv *Seasonal Employment at Maine State Parks and Historic...*, www.maine.gov/dacf/parks/get_involved/docs/seasonal-brochure.pdf. Accessed 21 Oct. 2024.

Public Parks

C

SOURCES (cont.)

xv "Organization." *Baxter State Park,* 4 Feb. 2020, baxterstatepark.org/shortcodes/organization/

xvi "Defending Maine's Public Lands." *Natural Resources Council of Maine*, 30 Jan. 2020, www.nrcm.org/programs/forests-wildlife/defending-maines-public-lands/.

xvii Infrastructure Projects Revitalizing Maine State Parks." *State Parks: About Us: Bureau of Parks and Lands: Maine DACF*, www.maine.gov/dacf/parks/about/msp-infrastructure-project.shtml. Accessed June 2024.

xviii Hunt, Ron. "NASPD Survey for ASCE." 18 June 2024.

xix Email interview with Ron Hunt, Director of Operations, Bureau of Parks & Lands, *FW: Maine ASCE Report Card 2024 - State Parks*, 20 June 2024.

xx "Maine's Public Lands & Ecological Reserves." *Natural Resources Council of Maine*, 1 July 2024, www.nrcm.org/programs/forests-wildlife/maines-public-lands-ecological-reserves/.

xxi "Maine Outdoor Heritage Fund." *Maine Outdoor Heritage Fund: Grants: Programs & Resources: Maine Dept of Inland Fisheries and Wildlife*, www.maine.gov/ifw/programs-resources/grants/outdoor-heritage-fund.html. Accessed June 2024.

xxii "Quicksand Doesn't Just Happen in Hollywood. It Happened on a Maine Beach." AP News, *AP News*, 6 June 2024, apnews.com/article/maine-beach-quicksand-supersaturated-sand-4bd10fd737d283d939d99e026e209884.

xxiii "June 2022 Newsletter from the Maine Bureau of Parks and Lands." *Maine Department of Agriculture, Conservation and Forestry*, June 2022, content.govdelivery.com/accounts/MEDACF/bulletins/319811b.

xxiv Pike, Emily. "'The Project Is a Success': Maine Beach Using Christmas Trees to Restore Sand Dunes after Coastal Storms." *WMTW*, WMTW, 18 July 2024, www.wmtw.com/article/the-project-is-a-success-maine-beach-using-donated-christmas-trees-to-restore-sand-dunes-after-coastal-storms/61637486.

xxv *Maine Won't Wait - A Four-Year Plan for Climate Action,* Maine Climate Council, Dec. 2020, www.maine.gov/climateplan/sites/maine.gov.climateplan/files/inline-files/MaineWontWait_December2020_printable_12.1.20.pdf.

xxvi Sitterly, Laura. "Has Popham's Effort to Save Dunes with Christmas Trees Paid Off?" *Press Herald*, 3 July 2024, www.pressherald.com/2024/07/03/has-pophams-effort-to-save-dunes-with-christmas-trees-pay-off/.

xxvii *State Parks and Public Lands: Maine ACF*, apps.web.maine.gov/cgi-bin/online/doc/parksearch/index.pl. Accessed June 2024.

xxviii "Passport Program – Win Prizes for Visiting Maine State Parks!" *Passport Program: Maine State Parks and Public Lands: Maine DACF*, www.maine.gov/dacf/parks/discover_history_explore_nature/activities/passport_program.shtml. Accessed June 2024.

Rail

B-

EXECUTIVE SUMMARY

Maine has 1,320 miles of active railroad, with the largest rail customers being pulp and paper and lumber industries. In addition to freight rail service, the Amtrak Downeaster provides passenger service several times per day from Brunswick, Maine, to Boston – with plans to extend the northern terminus. Five federal grants in recent years have invested $94 million between rail infrastructure and inter-city rail programs, contributing to ongoing projects improving over 380 miles of track. These big projects come with $8.3 million in state support and $54 million from the private rail companies that own the corridors. State funding programs have also contributed smaller grants to improve freight access beyond the major thoroughfares. It will be critical to continue to build on these projects with consistent funding that deliver improvements to safety, operational capacity, and road congestion relief. MaineDOT has identified freight and passenger projects for the future: 17 for the short-term (2023-26) – some already in development – and 16 more projects identified as long-term (2027-2042).

BACKGROUND

Rail service is an important component of the transportation network in Maine. It serves as a cost-effective and energy-efficient option for moving high-volume commodities over long distances, as it minimizes heavy truck traffic on roads. In 2019, total rail volumes reached approximately 4.5 million tons of goods and materials, valued at $4.4 billion.

In 2023, Maine had 1,320 miles of active railroad, an increase of 24 miles since the 2020 Report Card. Almost 320 miles are owned by the state (25%), which is an increase from 293 miles in 2016.[1] Maine has converted 384 miles of inactive rail to 30 trails across the state. The state also owns an additional 252 miles of inactive rail right-of-way.

Maine is serviced by seven private railroads, five of which form the core of the regional rail network: CSX Transportation (formerly Pan Am Railways), Canadian Pacific Railway (CP), St. Lawrence & Atlantic Railroad (SLA), Eastern Maine Railway (EMR) and Maine Northern Railroad (MNR). The state leases some of its track to MNR, SLA, and smaller railroads. Railroads are classified nationally by class in accordance with Federal Regulation 49 CFR Part 1201 by total annual revenues, as follows:

- Class I – annual revenues greater than $900 million;
- Class II- annual revenues between $40.4 million and $900 million; and
- Class III- annual revenues under $40.4 million.
- CSX purchased Pan Am Railways in 2022, making them the second Class I railroad in Maine along with CP. EMR, MNR and SLA are all Class III railroads.

1 A complete Maine Rail map is available on page 13 of the 2023 Maine Rail Plan: https://www.maine.gov/mdot/ofps/docs/railplan/MaineDOT_Rail%20Plan_May23_ACCESSIBLE.pdf

The Northern New England Passenger Rail Authority (NNEPRA) is the oversight agency for the Amtrak Downeaster. The Amtrak Downeaster runs entirely on tracks owned and operated by CSX in Maine. In Fiscal Year (FY) 2024, the Downeaster ridership was 598,426, which was an increase of 10% from FY2023 ridership and eclipses the previous record ridership of 546,056 set in FY2019.

In 2023, Maine had 1,320 miles of active railroad, an increase of 24 miles since the 2020 Report Card. Almost 320 miles are owned by the state (25%), which is an increase from 293 miles in 2016. Maine has converted 384 miles of inactive rail to 30 trails across the state. The state also owns an additional 252 miles of inactive rail right-of-way.

CONDITION AND CAPACITY

According to the Maine State Rail Plan (MSRP), Maine's sole Class 4 section of track (up to 60 mph freight, 80 mph passenger) is the CSX line between the New Hampshire border and Brunswick, which also carries the Amtrak Downeaster. Class 3 track conditions (up to 40 mph freight, 60 mph passenger) are present on the CP mainlines, the SLA, and MaineDOT's Rockland Branch. Class 2 track conditions (up to 25 mph freight, 30 mph passenger) are present on CSX's track between Portland and Waterville, as well as the EMR and portions of the MNR. Most of the remainder of the track network in Maine is classified as Class 1 (up to 10 mph freight, 15 mph passenger), including sections of track owned and operated by private railroads. A complete breakdown of track by class is not available for the private railroads, but the breakdown below summarizes the track speeds for state-owned track that is Class 2 or higher.

- Brunswick Subdivision (1.04 miles) – Class 4
- Rockland Branch (55.6 miles) – Class 2
- MNR Madawaska Subdivision (151 miles) – Class 2
- MNR Houlton Subdivision (17 miles) – Class 2
- MNR Presque Isle Subdivision (26 miles) – Class 2
- MNR Fort Fairfield Subdivision (19 miles) – Class 2

Through recent bridge upgrade programs, most of the mainline tracks in Maine have capacity to carry

286,000-pound rail cars. No railroad track in Maine is currently capacity-constrained by volume; however, there are some height and weight constraints. CSX is planning to make the necessary improvements to allow for double-stack intermodal clearance within the next 10 years, starting with the mainlines. Future planning and design efforts will be required to determine the priority of upgrades, impacts to non-rail infrastructure, and required funding. Once these improvements are made, CSX could provide service with double-stack clearance for shipping goods and materials down to New York and beyond.

OPERATION & MAINTENANCE, PUBLIC SAFETY

The Maine State Rail Plan (MSRP) was updated in 2023, as required by the Federal Railroad Administration (FRA). This plan includes overall planning for rail needs in Maine and ties into the National Rail Plan. The State Rail Plan is part of the Maine Department of Transportation's (MaineDOT) Family of Plans for multimodal and modal transportation, as is the Long-Range Transportation Plan (LRTP). The LRTP sets long-range policy and strategic direction for development of assets and system-specific actions, including the MSRP. The MSRP is intended to help understand modal needs and to plan projects that align with LRTP goals. Most rail facilities in Maine are privately owned or leased. The majority of the decisions surrounding maintenance and improvements, as well as the payments, are made by mostly private rail owners who are conducting business.

Track maintenance standards are those acceptable to the Federal Railroad Administration (FRA) and the MaineDOT and depend on the planned track usage. MaineDOT employs one full-time track inspector. The inspector reports directly to the FRA and the owners of the track.

Maintenance of active state-owned track is the responsibility of the rail companies leasing the track and improvements are funded by the operator, MaineDOT, and federal sources as available. MaineDOT's three-year work plan budgets $1.2 million annually in federal crossing safety funds for improving safety at highway-rail at-grade crossings. The Federal Highway Administration (FHWA) allocation is intended to fund four to five crossing improvement projects annually.

There are currently 771 active public at-grade crossings in Maine. There are 348 crossings with active protection features, with at least flashing lights. The cost to maintain the crossings is shared between the railroad owner and MaineDOT. The remaining 423 crossings are passively protected with signage only. There have been 15 accidents/incidents in the last four years (2020-2023), with one fatality. This trend is a slight increase compared to the 12 accidents/incidents that took place between 2016 and 2019.

In light of recent rail accidents throughout the United States and Canada, including the derailments of a runaway freight train in Lac-Magentic, Quebec, and a freight train in East Palestine, Ohio, oversight of the standard operating procedures of private rail companies has appropriately come under scrutiny. Regulations that address public safety and environmental protection are warranted as railroad companies streamline operations to increase profits through precision scheduled railroading. In April 2024, Maine Gov. Janet Mills signed Legislative Document (LD) 1937 into law, which is intended to increase public safety by creating a system of state oversight of freight rail activities that goes beyond what is required by the federal government. As part of this bill, railroads will be required to describe hazardous materials transported within the state, including the routes and frequency of shipments on those routes, and that information will be subject to public disclosure. This law was passed in response to a CP derailment near Rockwood in 2023 in which 20 cars derailed, including two carrying hazardous materials.

FUNDING & FUTURE NEED

Significant investments have been made over the past four years to tracks throughout Maine. Continued investment will be needed on mainline tracks to build upon past projects, make additional upgrades to speed and reliability, and keep the track in a state of good repair. Additionally, with many of the mainlines having been improved, future investment will now be needed for branch lines, siding tracks, and rail yards. These improvements will continue to help freight and passengers reach their destinations faster and more reliably.

There are a variety of federal, state, and private funding sources for rail improvements. Many projects have been funded through both public and private sources over the past four years. The federal sources include FRA funding through the Consolidated Rail Infrastructure and Safety Improvements (CRISI) program, the Federal-State Partnership for Intercity Passenger Rail (FSP) program, Federal Transit Administration (FTA) funding, and the Congestion Mitigation and Air Quality Improvement (CMAQ) program, which is primarily used for NNEPRA operating assistance and other transit projects. MaineDOT's funding sources include the Industrial Rail Access Program (IRAP), the MaineDOT Multimodal Program (for passenger rail), and specific bonds.

There are currently five large ongoing FRA-funded track upgrade projects in Maine. Four of these projects are funded through the CRISI program, while the fifth is funded through the FSP program. MaineDOT is the grantee for three of these projects; CRISI Mainline Upgrades and Rail Crossing Safety Improvements (Mainline Project), CRISI Pine Tree Corridor Project (Pine Tree Project), and the CRISI Maine Northern Rail Improvements Project (Maine Northern Project). NNEPRA is the grantee for the other two projects; CRISI Wells Area Improvement Project (Wells Project), and FSP Downeaster Corridor Track Improvement Project (Downeaster Project). These five projects are leveraging approximately $94 million in FRA funding to complete over $150 million in work. In addition to FRA funding, MaineDOT is contributing $8.3 million, and the host railroads are contributing $54 million. These projects are primarily focused on track upgrades and involve replacing worn rail, turnouts, and cross ties, placing ballast and surfacing track, and making upgrades and safety improvements at grade crossings. In total, these projects will make improvements to over 380 miles of rail, including:

- Replacement of over 85 miles of worn rail
- Replacement of 75 turnouts
- Replacement of over 200,000 cross ties, including ballast
- Upgrades and improvements at nearly 120 grade crossings
- Other improvements to bridge deck timbers and signal system upgrades

In addition to the upgrades to existing track, the Wells Project will extend the existing Wells Siding by approximately six miles and the Mainline Project will extend the existing New Gloucester Siding by approximately one mile. The Wells Project is also making significant improvements to the existing station in Wells by constructing a second platform and pedestrian access over the tracks so that the Downeaster can utilize both tracks at the station. This will improve operational efficiency and reduce scheduling conflicts between passenger trains and freight trains in this area.

In addition to the large, FRA-funded projects discussed above, the Industrial Rail Access Program (IRAP) provides funding through MaineDOT for Maine businesses to encourage economic development and increased use of rail transportation for new rail users. Shippers can apply for funding for access to freight rail transportation. IRAP provides up to a 50% match and the user provides the rest. MaineDOT's three-year work plan provides $2 million in state funding matched with $2 million in private funding annually for IRAP to encourage moving heavy freight off the roads, boost jobs, and keep Maine businesses competitive. One example is the 2024 project to support the pulp and paper company Sappi's $418 million capital project to convert Paper Machine No. 2 at its Somerset Mill in Skowhegan to the production of solid bleached sulfate board products. This $1.3 million rail project includes

rehabilitation of existing tracks and construction of new rail spurs in the yard to support the mill expansion.

NNEPRA provides approximately $1 million annually for state of good repair capital projects to the CSX track in areas where the Downeaster operates. The funding for this program comes from a variety of sources, including the FTA and the state. Since CSX purchased Pan Am Railways in 2022, they have also been making significant capital investments to upgrade tracks throughout Maine to improve the speed and reliability of their service. In addition to the annual funding, NNEPRA is in the planning stages of projects to add a passenger station in Falmouth and relocate the existing Portland Station. These projects are intended to reduce travel time, provide additional operational flexibility, and increase ridership.

It will be critical to continue to build on these projects with steady future funding to make more improvements to the speed and reliability of rail service throughout Maine. To that end, MaineDOT has also applied for two additional CRISI projects: a $19.5 million project with SLA to make track improvements to their tracks throughout Maine, New Hampshire, and Vermont (the Vermont Agency of Transportation is the primary applicant for this project), and a $66.6 million project with EMR for future rail improvements in northern Maine. The SLA project has been awarded and construction is anticipated to begin soon. The EMR project was also recently awarded in the fall of 2024. MaineDOT has also identified 33 freight projects that make up the Maine Rail Service and Investment Program (RSIP), which is summarized in the MSRP. The program includes 17 projects identified as "short-term" (2023-2026) and 16 projects identified as "long-term" (2027-2042). Some of the short-term projects are already under construction.

INNOVATION

A significant investment in technology and safety is underway in Maine with the installation of Positive Train Control (PTC). PTC is able to automatically control train movements and speeds and is designed to prevent train-to-train collisions, over-speed derailments, and incursions into an established work zone. Amtrak, NNEPRA, and CSX are partnering on a project to install PTC on over 100 miles of track between Brunswick and Haverhill, Massachusetts. Amtrak is providing the $50 million in funding for this project and CSX will be completing the work. Construction began in the spring of 2024 and is scheduled to be completed in the spring of 2026.

RESILIENCE

There has been no comprehensive survey of the rail system in Maine for resilience. However, many culvert crossings found under Maine rail lines are undersized and in poor condition. As rainstorm intensity increases due to climate change, these culverts have an increased risk of failure. Undersized culverts at stream crossings also impede fish and animal passage and impact watershed ecology. Culvert replacement is challenging on rail lines due to a lack of available detours, deep crossings, and steep slopes. Because of funding and logistical challenges, culverts are typically only replaced when failure is imminent or has already occurred. Proactively replacing culverts would reduce the risk of failures and restore aquatic species habitat.

Sea-level rise also threatens Maine rail infrastructure that is along the coastline. The MaineDOT-owned Rockland Branch runs from Brunswick to Rockland and includes several miles of track that are immediately adjacent to waters fed by the Atlantic Ocean.

Rail

RECOMMENDATIONS TO RAISE THE GRADE

The Maine Section of ASCE makes the following recommendations:

- Continue to pursue federal funding opportunities to make improvements to the speed and reliability of track throughout the state, including the branch lines, yards, terminals, and culverts;
- Continue to fund and promote the IRAP program so businesses can plan on using freight rail;
- Continue to invest in at-grade crossing improvements to improve safety for freight rail, highway vehicles, bicyclists, and pedestrians;
- With stakeholder input, develop regulations to address public safety and environmental protection;
- Develop policies to increase and improve intermodal freight transportation, including improving data collection;
- Perform a statewide review of the rail systems for resilience and climate change issues and, with stakeholder input, develop a plan to replace undersized culverts/trestles to increase resiliency of rail infrastructure and improve aquatic habitat.
- Continue to improve Amtrak station useability by relocating the Portland Station to mainline and constructing a new platform in Falmouth.

Rail

B-

SOURCES

2023 Maine State Rail Plan https://www.maine.gov/mdot/ofps/docs/railplan/MaineDOT_Rail%20Plan_May23_ACCESSIBLE.pdf

Interviews and emails with:

Nate Howard, Director, Rail Transportation, MaineDOT

Nate Moulton, Director, Office of Freight and Passenger Services, MaineDOT

Ted Krug, Assistant Regional Engineer, Bridges, Design & Construction, CSXT

Maine OFPS: https://www.maine.gov/mdot/ofps/

MaineDOT, 2024-2026 Capital Work Plan: https://www.maine.gov/mdot/projects/workplan/

Federal Railroad Administration Office of Safety Analysis www.fra.dot.gov

NNEPRA Projects: https://www.nnepra.com/projects/construction-projects/

MaineDOT CRISI Projects: https://www.maine.gov/mdot/grants/crisi/

Sappi IRAP Project: https://www.sappi.com/sappi-announces-418-million-paper-machine-rebuild-at-its-somerset-mill-in-skowhegan-maine

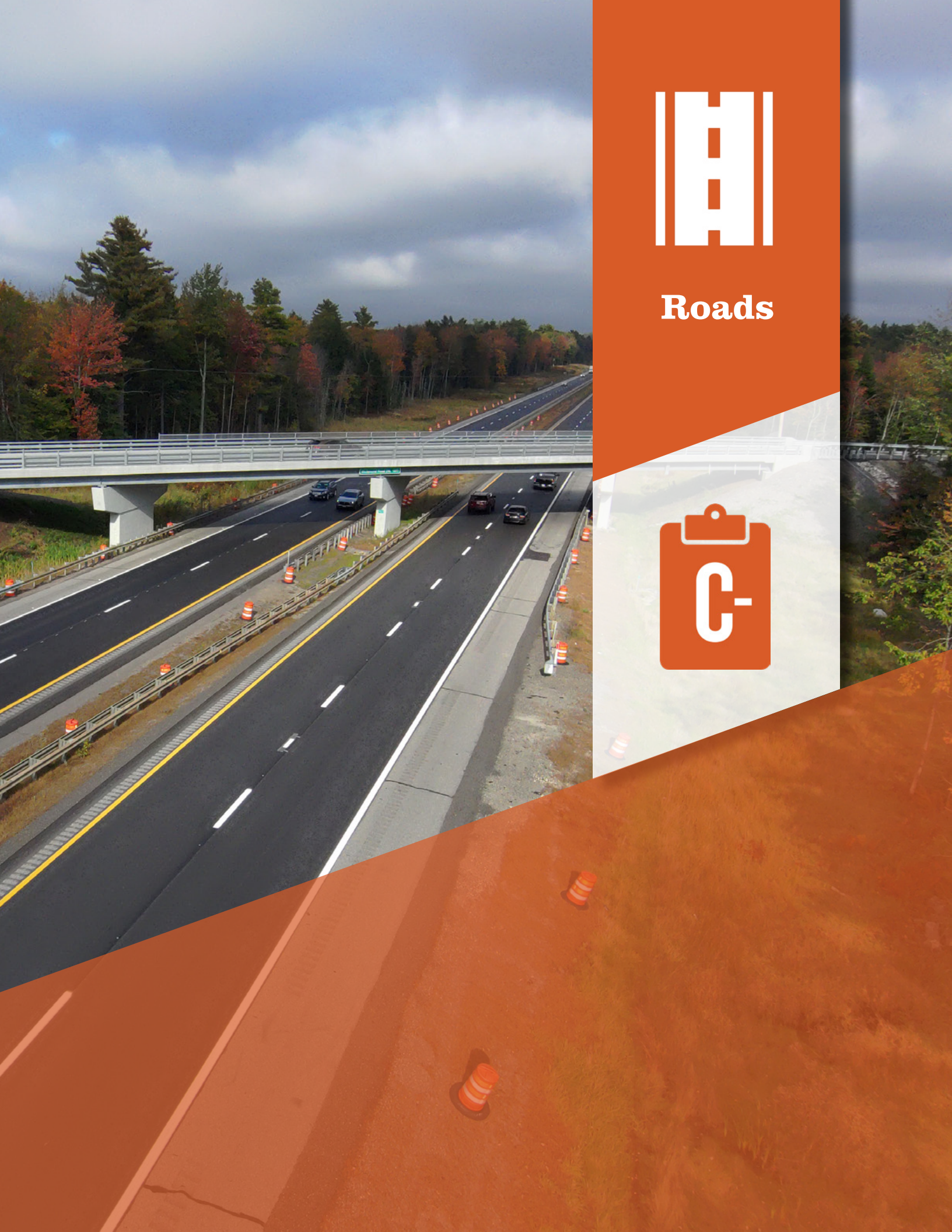
Maine now has greater oversight of freight railroads, but public access to data is limited: https://www.pressherald.com/2024/04/16/maine-now-has-greater-oversight-of-freight-railroads-but-public-access-to-data-is-limited/

Amtrak/NNEPRA/CSX PTC Project: https://media.amtrak.com/2024/06/amtrak-and-csx-partner-on-positive-train-control-installation-to-improve-safety-for-the-amtrak-downeaster/

Amtrak Downeaster Ridership: https://media.amtrak.com/wp-content/uploads/2023/11/Amtrak-Fiscal-Year-2023-Ridership.pdf

Amtrak Downeaster Achieves Record Ridership in 2019: https://media.amtrak.com/2020/01/amtrak-downeaster-achieves-record-ridership-in-2019/

Legislative Document (LD) 1937: https://legislature.maine.gov/legis/bills/display_ps.asp?LD=1937&snum=131



Roads

C-

EXECUTIVE SUMMARY

Maine's road performance has improved. 60% of state road pavement was inspected as good or excellent condition in 2012; that number grew to 74% by 2024. MaineDOT also evaluates roads by travel time reliability, and the state's roads aren't seriously stressed – though traffic in urban areas is growing compared to rural contexts. Safety, the third leg of statewide performance evaluations, is mixed. Total traffic deaths declined to 134 in 2023 – the lowest level since 2014 – and Maine's 0.89 fatality rate per 100 million VMT was well below the national average of 1.26. However, 2024's traffic fatality total was at 154 by October, and Maine's crash rate is higher than the national mark. MaineDOT's 2024-2026 project spending plan more than doubles its 2020-22 work, thanks to increased federal investment from formula and competitive grants. However, continued federal investments are uncertain. New state-level funding methods will need to supplement the fuel tax revenues losing value to inflation and fleet electrification.

BACKGROUND

Maine's highway system is a network of 22,843 miles of roads, with approximately 86% classified as rural and 14% as urban[1]. The roads are owned and maintained by the Maine Department of Transportation (MaineDOT), the Maine Turnpike Authority (MTA), county governments, local municipalities, and 162 miles of federal roads. The road network serves as the primary means of transportation for the state's 1.38[2] million residents and millions of visitors each year. Tourism-related trips contribute approximately $8.6[3] billion to the state's economy. Maine covers about the same land mass as the other five New England states combined yet is home to only 9.2% of the population of New England[4]. MaineDOT controls more than twice the mileage of any other New England state's transportation department while receiving the least apportionment per state-controlled mile through the Federal-aid Highway Program apportionments.

Maine's vehicle miles traveled (VMT) has remained consistent over the last 20 years; however, there has been a slight shift towards urban miles traveled versus rural miles traveled, see Figure 1[v]. MaineDOT categorizes Maine's highway assets into four levels of priorities called Highway Corridor Priorities (HCP). Each highway priority level has associated goals that match the priority level of the respective road system to funding[7]. MaineDOT measures priority level 1 through 4 roads in three areas called Customer Service Levels (CSLs). The CSLs are (1) Condition, (2) Safety, and (3) Service. With each measure, MaineDOT has applied an A to F grading: A is Excellent; B is Good; C is Fair, D is Poor and F is Unacceptable. This report focuses on roads that are priority level 1 through 4 which are maintained by state agencies and make up 87% of the vehicle miles traveled in the state.[8] This report does not focus on roadways which are maintained by local municipalities and make up only 13% of the vehicle miles traveled in the state.

TABLE 1: NEW ENGLAND'S ROADWAY SYSTEMS IN 2022[1]

State	Total System Mileage	State Highway Agency Owned and Maintained Mileage (A)	Percent State Highway Agency Owned and Maintained	Annual Vehicle Miles Traveled in Millions[5]	Estimated Federal-aid Highway Program apportionment in millions (M) FY2024[6]	Federal $ mill/ Mile (M/A)
MA	36,799	2,909	8	56,949	$837	$0.29
ME	22,843	8,327	36	14,651	$254	$0.03
CT	21,368	3,715	17	29,666	$692	$0.19
NH	16,247	3,890	24	13,281	$228	$0.06
VT	14,223	2,629	18	7,128	$280	$0.11
RI	6,531	1,120	17	7,531	$301	$0.27

FIGURE 1: MAINE ANNUAL VEHICLE–MILES (MILLIONS)

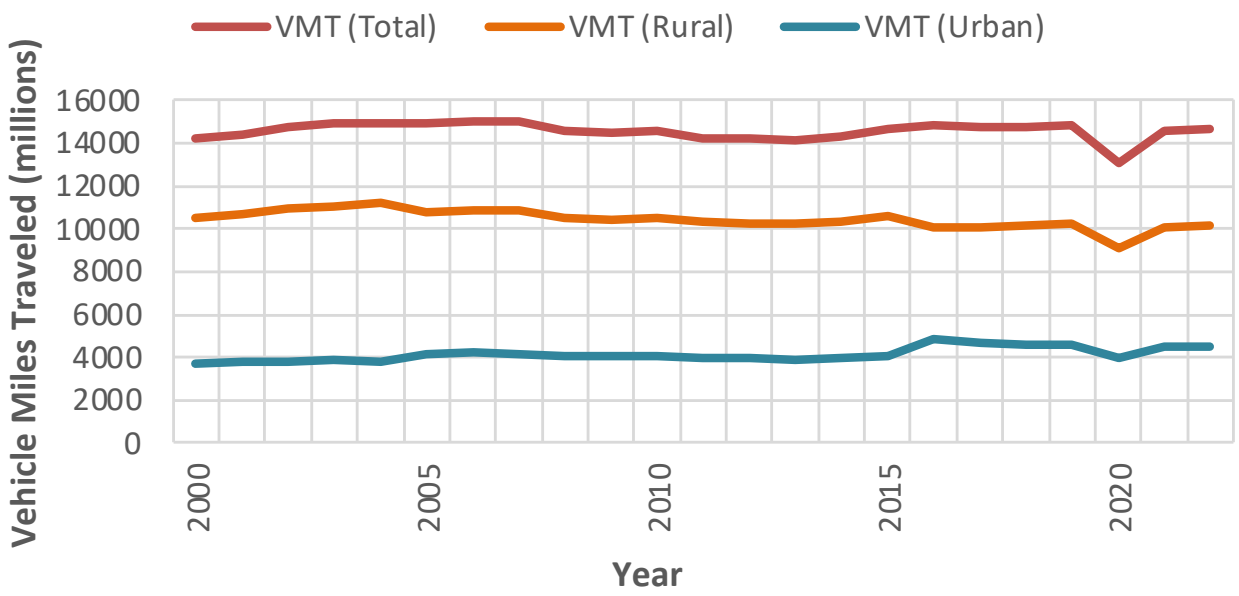
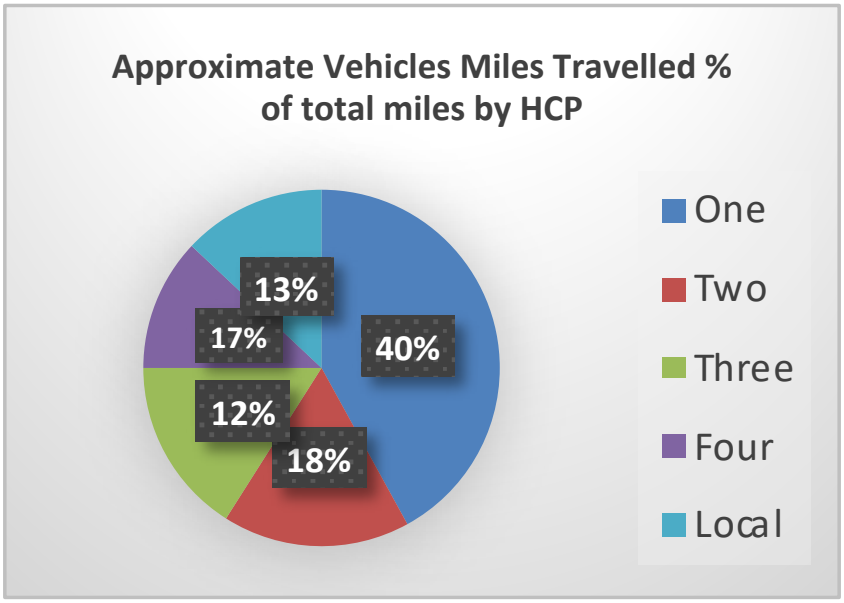


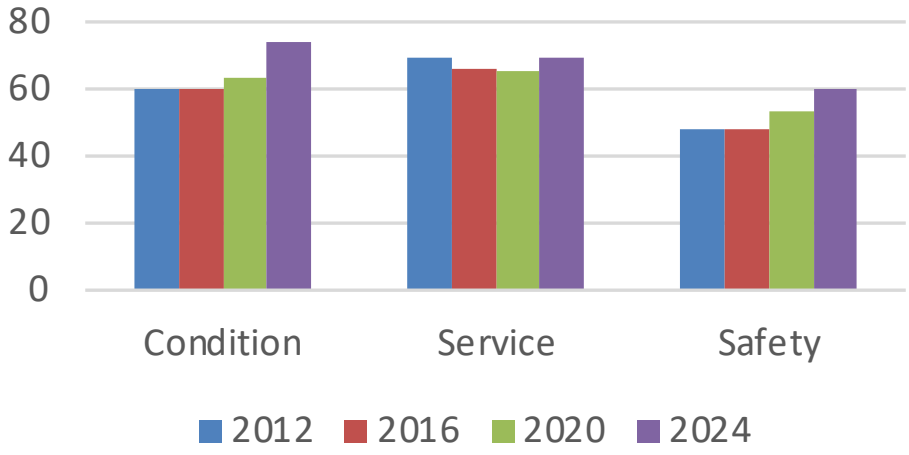
FIGURE 2: MAINE ROADS BROKEN UP BY HIGHWAY CORRIDOR PRIORITY MEASURES



CONDITION

MaineDOT looks at four measures when producing an overall condition rating: ride quality, pavement condition, roadway strength, and bridge condition. Figure 3 shows continued improvement, from 60% good and excellent in 2012 to 74% good and excellent in 2024[9].

FIGURE 3: PERCENT OF PRIORITY 1-4 RATED BY MAINEDOT AS GOOD/EXCELLENT

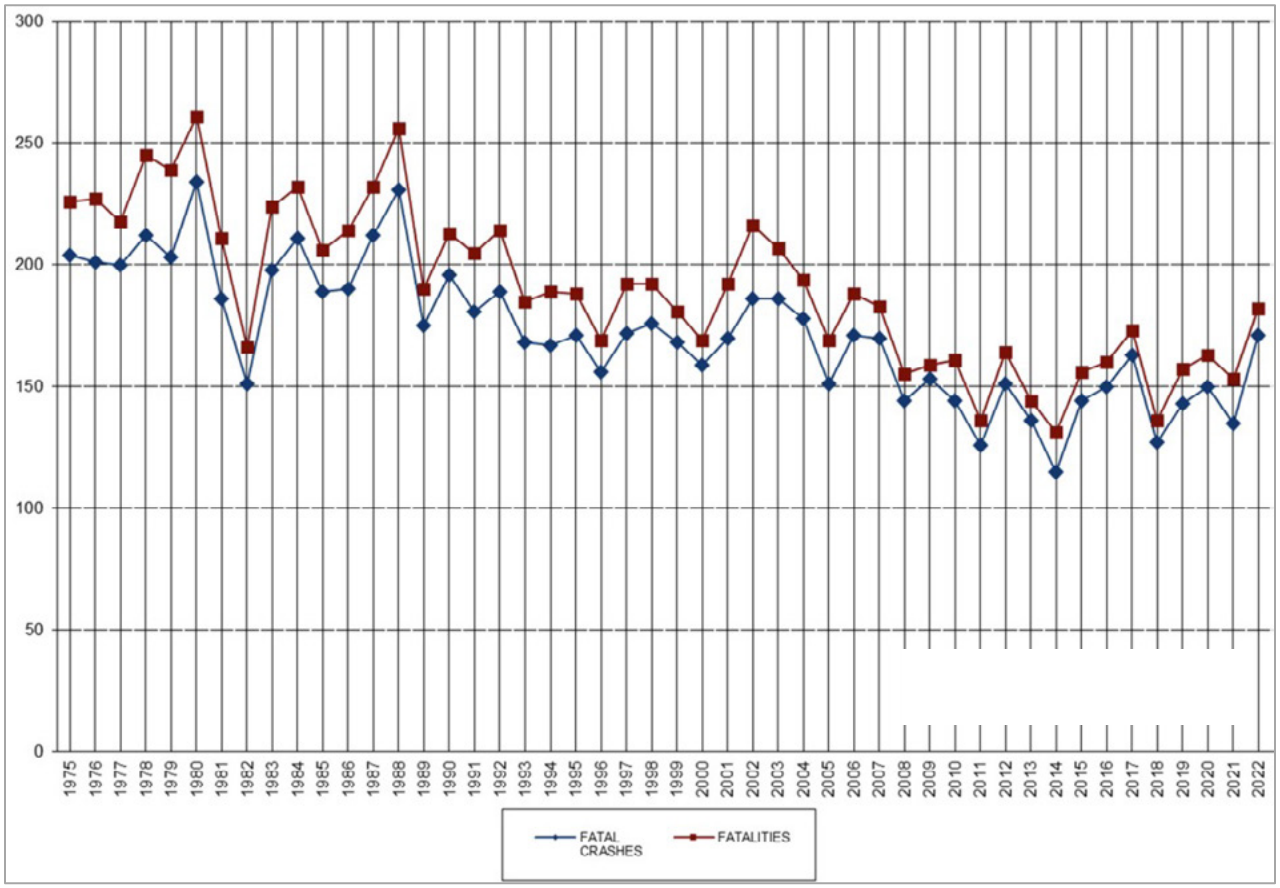


PUBLIC SAFETY

MaineDOT uses four measures to rate safety: crash history, pavement rutting, paved roadway width, and bridge reliability. Pavement rutting is the process of pavement becoming depressed in wheel paths, which can result in water ponding, hydroplaning, and icing in winter. In 2024, Figure 3 shows roads with good and excellent ratings for safety continuing to increase from the previous years.

The number of traffic fatalities in Maine declined to 134 in 2023[10]. This is the lowest annual fatality total the state has seen since 2014. Maine's fatality rate per 100 million VMT in 2023 was 0.89[11]. In comparison, the national average fatality rate was 1.26 in 2023[11]. Figure 4 shows a decreasing trend in fatalities, even without showing 2023, though 2024 will be right back up there including 3 people killed in a crash on October 30, 2024,[12] bringing 2024 total to 153 so far.[13] Maine's Bureau of Highway Safety coordinates with municipalities to increase road safety media messaging and works with law enforcement agencies to emphasize safe driving practices and the risks of impaired driving, speeding, and/or not wearing a seat belt[14]. In 2021, the national crash rate was 194.8 crashes per 100 million VMT, while Maine's crash rate was 224.2 crashes. Maine's crash rate is higher than the national average; however, it has decreased 4% since the previous Report Card (2017 data). The cost of crashes in Maine totaled approximately $1.9 billion (2023)[15].

FIGURE 4 – MAINE FATAL CRASHES AND FATALITIES (MAINE DOT)



In 2023, a group of all volunteer citizen led Mainers who are committed to creating safe streets for all, were engaged to help municipalities and state agencies develop strategies to reduce traffic fatalities. Vision Zero is a road safety initiative with the goal of reducing traffic fatalities and serious injuries by establishing policies and design practices for road systems that account for inevitable human error and protect all road users. In Maine, several municipalities and agencies, for example the Greater Portland Council of Governments (GPCOG), are adopting Vision Zero policies. Maine also has a strategic highway safety plan which outline projects and focus areas to reduce crashes and fatalities such as road safety audits. The Maine Transportation Safety Coalition (MTSC), a long-standing task force made up of agencies and advocates across the state, leads updates to the Strategic Highway Safety plan[16].

CAPACITY

Service (or capacity) consists of three measures: posted roads, posted bridges, and congestion. Posted roads and bridges have weight limits due to not meeting modern standards for design. Posted roads occur mostly in spring during freeze/thaw cycles. A majority of Maine roads provide fair to excellent service and did not have congestion. Figure 3 shows good and excellent service ratings have improved from 65% in 2020 to 69% in 2024.[17]

In spring 2024, MaineDOT posted over 1,400 miles of roads, leading to the diversion of truck traffic to alternative routes. This marks a decrease from previous years, although restrictions can vary depending on annual weather conditions. Notably, the highest postings in the past decade reached over 1,600 miles in both 2014 and 2019. It's important to note that these figures exclude postings for local roads.

MaineDOT developed the Interstate395/Route 9 Connector project to complete a "missing link" between I-395 and Route 9 in north central Maine, to be completed in 2025. MTA widened I-95 to six lanes from mile 44 to 49 in the Portland area, increasing vehicle mobility along this critical corridor. The project was substantially complete in 2023 and paid for completely with toll revenue. To ease congestion on I-95 over the Piscataqua River Bridge during peak travel periods, New Hampshire and Maine have agreed to allow the right shoulder of the road to be used as an open travel lane over the bridge and for several miles along each approach. This concept, completed in May 2024 and known as dynamic part-time shoulder use (PTSU), can be turned on and off as traffic conditions require, using signals to electronically indicate when the shoulder is open for travel[18].

Maine statute, which was amended in spring 2021, set performance levels for all priority road classifications. By 2022, Priority 1 & 2 roads shall be maintained so rated as fair or better in condition, safety, and service. In 2024, MaineDOT reported that just over 15% of Priority 2 roads were rated poor in condition and safety, while just over 15% of Priority 1 roads were rated poor in Safety an improvement from previous years.[19]

RESILIENCE AND INNOVATION

In December 2020, the Maine Climate Council released a climate action plan entitled Maine Won't Wait[20]. In addition, MaineDOT finalized a Carbon Reduction Strategy (CRS) in late 2022 to fulfill requirements of the federal 2021 Infrastructure Investment and Jobs Act.[21] The CRS identifies goals to reduce emissions and outlines how existing statewide initiatives started under Maine Won't Wait are aligned. Since single-passenger cars and heavy-duty trucks account for 49% of total greenhouse gas emissions in Maine, a major focus for MaineDOT is reducing emissions through electrification. A major focus has been the installation of electric vehicle charging stations across the state.

OPERATIONS & MAINTENANCE

MaineDOT administers the Municipal Partnership Initiative (MPI), which provides grants to municipalities around the state to help fund roadway projects on state and state-aid highways. The program requires municipalities to match at least 30% of the MPI grant, with MaineDOT matching up to 70% of the project cost[22]. The match percentage is determined by a three-tiered system based on the municipality's property valuation, ensuring that lesser-valued municipalities receive more funding assistance. The MPI program has allocated approximately $8 million in state funds to municipality roadway projects in 2024.[23]

The MaineDOT's Bureau of Maintenance and Operations was part of a committee that prioritized and selected the projects that were included in MaineDOT's 2024-2026 Work Plan. The Work Plan allocates $206 million annually for highway and bridge maintenance and operations, representing a 26% increase compared to the 2020-2022 Work Plan[2]. Funding has increased at both state and federal levels, allowing MaineDOT to "pivot from making due to making real progress,," and focus more on both preservation/maintenance projects and new construction projects than the department has in years past.

Of the $206 million annual budget for operations and maintenance, 25% is allocated towards winter maintenance. According to the nationally renowned research program for winter maintenance, Clear Roads, Maine ranks fifth in most severe winters.[24] Maine also ranks 3rd lowest in total lane miles (8,300 miles) that the DOT is responsible for maintaining during the winter but MaineDOT also ranks twelfth highest in terms of annual winter maintenance expenditures, showing the department's commitment to maintaining clear, safe roads through the winter. Municipalities are responsible for maintaining most of the remaining roughly 14,500 miles in the state. Some $155 million is spent on winter maintenance annually.[25] As a result, Maine's motor vehicle fatality rate during the 2022-2023 winter ranked the fifth lowest in the nation, according to the National Safety Council[26].

FUNDING

MaineDOT's 2024-2026 Work Plan includes 2,672 items that cost an estimated $4.74 billion.[27] This represents an increase of 83% over three-year Work Plan funding from 2020-2022. Of the $4.74 billion, 48% is from federal sources, 37% is from state sources, and the final 15% represents municipal shares and miscellaneous funding. The increase is due to two major factors: the federal Infrastructure Investment and Jobs Act of November 2021 and additional state funding in budgets passed in 2023. Some $1.7 billion of the total is for roads, including 98 miles per year of highway construction (a 67% increase in miles over 2020-2022 Work Plan), and 449 miles per year of preservation paving (57% more miles than the 2020-2022 Work Plan).

The Work Plan reflects a significant increase in federal funds, going from $969 million in the 2020-2022 Work Plan to $2.28 billion in the latest Work Plan. A critical aspect of this increase is MaineDOT's success with U.S. Department of Transportation competitive grant programs. The Work Plan includes $1.06 billion of competitive grant awards, which supports a range of projects, including significant investments in roadway reconstruction, safety, and mobility improvements for critical roadways.

MaineDOT and policymakers have made a concerted effort to increase state funding sources to address operating deficits in the state's Highway Fund, which historically has been funded through gas tax revenue and motor vehicle fees. Additional revenue sources reflected in the 2024-2026 Work Plan include proceeds from liquor sales, a portion of automotive sales and use tax revenue, revenue bonding, and from the General Fund.

The state gas tax is 18% of total funding in the 2024-2026 Work Plan, and the tax has not been increased in Maine since 2011. Maine's gas tax of $0.314/gallon is the 17th highest in the country (as of January 2024); however, is slightly below the national average of $0.326/gallon.[28] The federal gas tax has not been increased since 1993. MaineDOT also acknowledges the fragility of the gas tax revenue stream as vehicles become more fuel efficient and electric vehicles become more prevalent.

The MTA, which does not receive any state or federal funding, will generate $180 million in toll and service plaza revenue in 2024 to cover 100% of their maintenance, operations, capital projects and debt service. The Maine Turnpike is 110 miles of Interstate 95 from Kittery to Augusta and is the primary artery for tourism and commerce in and out of Maine.

Chargepoint EV chargers at Kennebunk Northbound Service plaza on I-95

FUTURE NEED

The increased funding in the latest Work Plan is positive news. However, to maximize the use of this funding, the state needs to increase the pool of skilled workers to plan, design, and construct these projects. Workforce participation and contractor availability are expected to be ongoing challenges in Maine. Although Maine is experiencing historically low unemployment levels, the state is also seeing lower-than-usual workforce participation rates. Maine has traditionally met or exceeded national workforce participation rates; however, in 2023, the state's rate of 58.8% fell short of the federal rate of 62.7%[2].

To combat these challenges, MaineDOT has identified a need to prioritize recruitment and communicate the message that work in this sector is important and meaningful. Additionally, Associated General Contractors (AGC) of Maine has created the Maine Construction Academy, which provides pre-apprenticeship, apprenticeship, and incumbent workforce upskilling, with the goal to support growth of the construction and transportation workforce.

Although transportation funding is higher than it has been in the recent past, challenges remain to secure consistent funding sources that allow for major long-term investments in the transportation network. With all these factors, there is a still a need to secure funding for unmet annual need, which currently is estimated at $100 million. In addition, the increase in construction inflation over past few years by 68% has added strain to current programs. From 2010 to 2020 the average vehicle fuel efficiency in the United States has increased 22.5%. This trend is expected to continue further making the fuel tax unstainable[29].

Roads

RECOMMENDATIONS TO RAISE THE GRADE

The Maine Section of ASCE makes the following additional recommendations:

- Fund the estimated $100 million in unmet annual need with future bonds or other state sources;
- While finding a long-term sustainable source of transportation funds, maximize existing sources of funding, such as fuel tax revenues, state general fund bonds, tolls, and car registration and title fees;
- Increase workforce development efforts across the industry;
- Support efforts to reduce greenhouse gas emissions from transportation and make infrastructure more resilient through updates to design standards;
- Continue to make improvements to road conditions, capacity and safety; and
- Continue to improve safety for road users by using techniques identified in the state's Strategic Highway Safety Plan.

SOURCES

1. Federal Highway Administration. (Accessed 4/1/2024). Highway Statistics 2022. *Table HM-10 Public Road Length – 2022.* https://www.fhwa.dot.gov/policyinformation/statistics/2022/pdf/hm10.pdf
2. Maine Department of Transportation. (2024). Three-Year Work Plan. https://www.maine.gov/mdot/projects/workplan/docs/2024/Work%20Plan%202024_2025_2026.pdf
3. Maine Office of Tourism. (Accessed 4/1/2024). 2022 Maine Office of Tourism Highlights. https://motpartners.com/wp-content/uploads/2023/03/MOT_GovCon_HighlightSheet_2022.pdf
4. United States Census Beureau (Accessed 4/1/2024). *QuickFacts Vermont; Rhode Island; New Hampshire; Maine; Massachusetts; Connecticut.* https://www.census.gov/quickfacts/fact/table/VT,RI,NH,ME,MA,CT/PST045222
5. Federal Highway Administration. (Accessed 4/1/2024). Highway Statistics 2022. *Table VM-2 Functional System Travel - 2022.* https://www.fhwa.dot.gov/policyinformation/statistics/2022/pdf/vm2.pdf
6. vi https://www.fhwa.dot.gov/bipartisan-infrastructure-law/docs/Est_FY_2022_026_Formula_Programs_Infrastructure_Investment_State-by-State_Year-by-Year.pdf
7. MaineDOT website. https://www.maine.gov/mdot/about/assets/hwy/
8. MaineDOT website https://www.maine.gov/mdot/about/assets/hwy/

Roads

SOURCES (cont.)

9. Data for Customer service levels in 2024 from email from Andrew Bickmore, MaineDOT 05/14/24
10. https://mixmaine.com/wp-content/uploads/2023-EOY-Press-Release.pdf
11. Keeping Maine Mobile, TRIP report October 2024 at TRIPNET.ORG
12. https://www.newscentermaine.com/article/news/local/public-safety/egypt-road-gray-raymond-maine-cumberland-county-crash/97-6f0def7a-0844-40e5-a6aa-e20ce3800005
13. https://www.maine.gov/dps/bhs
14. Bureau of Highway Safety press release 01/22/24
15. Keeping Maine Mobile, TRIP report October 2024 at TRIPNET.ORG
16. Testimony of Director Lauren V. Stewart on 05/17/2023 to the Joint Standing Committee of Transportation, 131st Legislature
17. Email & interview with Andrew Bickmore, MaineDOT
18. MaineDOT website
19. Andrew Bickmore, MaineDOT & http://www.mainelegislature.org/legis/bills/getPDF.asp?paper=SP0601&item=4&snum=125
20. Maine DOT website
21. MaineDOT 2024 work plan P. 22
22. https://www.maine.gov/mdot/pga/docs/2020/MPI2020.pdf
23. Maine Department of Transportation. (2024). Three-Year Work Plan. https://www.maine.gov/mdot/projects/workplan/docs/2024/Work%20Plan%202024_2025_2026.pdf
24. https://www.clearroads.org/winter-maintenance-survey/
25. MaineDOT website
26. https://www.fhwa.dot.gov/policyinformation/travel_monitoring/tvt.cfm
27. Maine Department of Transportation. (2024). Three-Year Work Plan. https://www.maine.gov/mdot/projects/workplan/docs/2024/Work%20Plan%202024_2025_2026.pdf
28. https://www.eia.gov/tools/faqs/faq.php?id=10&t=5
29. Maine Department of Transportation. (2024). Three-Year Work Plan. https://www.maine.gov/mdot/projects/workplan/docs/2024/Work%20Plan%202024_2025_2026.pdf

Schools

C+

EXECUTIVE SUMMARY

Approximately 173,000 students attend Maine's 600 schools in 540 buildings, from pre-kindergarten through high school. Public data on school facilities are scarce, but overall, school buildings are aging, and educational needs are changing. There are two primary state programs providing funding for infrastructure: the Major Capital Projects (MCP) program and the School Revolving Renovation Fund (SRRF). Infrastructure needs are partially met by consolidating schools into new facilities at $50 to 170 million each; but the consolidations are unpopular locally. Communities that do not receive state funding can self-fund buildings and repairs using bonds. The Maine Department of Education (DOE) has no information about the amount of self-funding underway and the DOE is doing a survey of school maintenance conditions statewide.

CAPACITY AND CONDITION

Enrollment statewide has held steady but is expected to decrease, especially from rural areas. Some increases with New Mainers are seen. The shrinking student population can be attributed to the state having the nation's oldest median age. Most losses are in rural parts of the state.

The ASCE schools condition assessment is now based on anecdotal evidence including communications with the Maine DOE. The DOE is collecting accurate data inventorying school conditions with Federal grants; this information is planned for a report in early 2025. The last incomplete data was collected in 2011.

School facilities have many infrastructure components such as parking lots, playing fields, security, and energy. Rural schools may also have water supply (potable and fire protection) and wastewater disposal. School infrastructure has a direct impact on students' health, particularly indoor air quality. Common public utilities are often not available to serve rural schools, specifically drinking water and wastewater disposal systems.

The DOE has three state-employed architects working for the program for oversight of major capital projects. All funded projects must meet the DOE standards, so a student in any part of the state can expect the same minimum facility requirements to be met, per Booklet 3, *Public School Standards and Construction Guidelines for New School Construction and Major Renovation Projects*, to ensure that all of the approved projects are of high quality, high performing, and affordable, and the design professionals and school boards have a consistent source of information in developing projects. These include the sizes of rooms for a given activity and class size, materials, site and environmental specifications, commissioning, security, life cycle cost evaluations, and also include standards for Career Technical Education (CTE) programs.

FUNDING AND FUTURE NEED

Most capital funding of schools is dependent on local funding through real estate taxes. Those schools with large property tax bases and supportive voters have more access to funding than otherwise.

The School Revolving Renovation Fund (SRRF) was created in 1998 to provide funding through loans and grants that would contribute to safe, healthy and adequate school facilities through renovation or smaller capital construction projects. The SRRF has five project categories:

Priority 1. This category is limited to health and safety projects. Specifically, Priority 1 addresses roofs, Americans with Disabilities Act compliance, air quality, asbestos and other health and safety issues.

Priority 2. This category covers projects that are not health and safety related. These include infrastructure issues, windows, doors, water and septic systems.

Priority 3. This category is limited to energy and water conservation projects. This priority was added in 2011.

Priority 4. This category is limited to the upgrade of learning space. This was "Priority 3" prior to 2011.

Priority 5. Other projects.

All of the funded projects have been Priority 1; funding for the other priorities has come from the communities so only Priority 1 projects are now requested. Some SRRF projects have been requested more than once. The last cycle had 143 requests, all Priority 1, and 23 requests were filled.

The SRRF is now funding projects up to $2 million, up from $1 million with 30 to 70% of the funding provided as grants; the remaining balance is paid back in 5 or 10 years at no interest. The SRRF funding available is currently $28.6 million. With higher costs, the same number of projects have been funded – 23 projects in 12 school administrative units. Assuming 120 unfunded projects, with the same average cost, the backlog is in excess of $10 million.

Major capital construction projects generally involve major renovations or new school facility construction. Selection for the Major Capital Projects program is a rigorous needs-based process including strict site selection requirements. The current selection process format has been in place since 1999 and has gone through five rating cycles between 1999 and 2019. The last cycle saw three school construction projects averaging around $100 million. The sixth funding cycle is now underway, with the finalized list expected in the end of 2025; 85 to 90 applications are expected. The debt limit is now $150 million – but the cost of construction has increased significantly since 2020. The DOE has allocated the funds up to the debt limit.

The cost of new schools has risen from $270/sf in 2015 to $661/sf in 2024, average, which reflects material cost increases, labor scarcity with limited bidding, and increased building complexity. The large increases in costs were due to the increased costs of the facilities for security, computer/technology, and sitework, but also the cost of special teaching facilities for technical school programs. These costs are mostly paid for by real estate taxes – or projects are unfunded locally and don't happen.

The technical schools are now on an even footing in requesting funding, and two projects including CTE schools were committed for funding in the last cycle. The new Windham Maine High School is priced at $170 million, though a more typical school costs $50 million.

NEW ENTRANCE, EDWARD LITTLE HIGH SCHOOL

Since 2010, 16 new schools have been built, resulting in the closing of 30 deficient facilities. As school populations decrease, local school districts have the option of consolidating some schools to remove deficient facilities. The funded projects often include combining the school populations of nearby schools that were requesting funding. This is unpopular, especially in rural communities as the school is a community hub, local control is reduced. As of the 2019 funding cycle, 74 new schools were applied for, and three were approved, addressing the requests of 22 of the applications. The remaining 52 projects are likely to reapply in future cycles; assuming $50 million per project, these give a backlog of $2.6 billion. Some of the non-approved projects have been locally funded without state subsidy, generally in relatively affluent communities in the southern part of the state. No information has been collected on these projects by the DOE. Also, around half of the combined schools have split back apart. In the last four years, more than three major projects were self-funded by communities not meeting the needs-based criteria for state funding. These include $10.6 million bonded in Gorham that will expand modular classrooms and a $58 million bonded for a facility in Bar Harbor in 2024. Cape Elizabeth voters rejected a bond to build a new middle and elementary school for $116 million; Scarborough voters failed a $160 million bond for a new elementary school for all the K-3 students and to renovate other facilities. Cumberland and North Yarmouth voters rejected a $73 million bond for an elementary school and renovations to another facility.

One-time Federal pandemic relief funding has provided almost $600 million in Maine, part of which was used for funding building renovations and providing modular buildings. The renovations included ventilation and filtration improvements.

Two schools have burned recently, in Frenchville and Bath, both involving arson. The school facilities are uninsured, which is typical, and state funding is unavailable outside of the regular Capital Projects funding, which would take around 7 years for a replacement, if accepted. No schools have Reserve Funding accounts, money set aside for known facility maintenance needs. There is no state-wide count of the number of modular buildings in use for schools, but they are in wide use and in most school districts.

Bid results for school projects have been around 30% over the anticipated budget in the last four years, resulting in less large projects funded. Some of these canceled projects became smaller renovation projects that were locally funded. Some CTE programs in the construction trades in Maine continue to be cut back but there are waiting lists to enter the programs.

Governor Mills has started The Governor's Commission on School Construction in October 2024 to look at these issues and provide policy recommendations on financing school infrastructure.

PUBLIC SAFETY, OPERATION AND MAINTENANCE

Many rural districts incur high costs associated with transportation. These costs are rising with school consolidation and longer bus routes. Maintenance is typically 1-2% of the operational budget of the schools.

Problems with drinking water are funded using the DHHS State Revolving Fund (SRF). LD 153 An Act to Strengthen Testing for Lead in School Drinking Water was signed in May of 2019. The Maine Drinking Water Program, which oversees all public water systems in the state, will cover the cost of lead analysis for up to 10 water samples from a school. Testing for PFAs (per-and polyfluoroalkyl substances) found contamination in 9 of 19 tested public water supplies, including the water supplies for three schools. All Maine schools has sampled for lead in all taps used for drinking and culinary purposes since the fall of 2020. Funding for subsequent testing, infrastructure maintenance, and routine repairs should be prioritized to keep the overall infrastructure costs down.

Many rural districts incur high costs associated with transportation. These costs are rising with school consolidation and longer bus routes. Maintenance is typically 1-2% of the operational budget of the schools.

INNOVATION AND RESILIENCE

Maine DOE has been preparing a regional school for grades 7-16 in the Upper St. John Valley that includes an integrated career technology and post-secondary education school in one facility; this has been halted to date by governance issues, and concern about long travel distances.

Some school districts are moving ahead with projects for geothermal, solar, and wind energy, as well as adding heat pumps and pellet boilers. Camden Rockport Elementary School's 2009 geothermal system is being replaced using a 1.9$ million bond with heat pumps. Efficiency Maine is providing some funding incentives and technical assistance. Maine has 11 ENERGY STAR certified schools, one Zero Energy school, and 8 LEED certified schools.

Some hybrid programs have evolved with remote teachers spreading courses to students.

Schools

RECOMMENDATIONS TO RAISE THE GRADE

Maine ASCE provides the following recommendations for additional budgeted funding:

- The debt ceiling limit for Major Capital Projects needs to be raised to keep up with inflation and the escalation observed in local construction costs, and the funding needs to be from a dedicated revenue source, and moving away from real estate taxation;
- Schools are major facility investments and should be inventoried every three years statewide;
- Increase the visibility of maintenance funding in the school districts as a vital part of keeping the capital cost of the education infrastructure down;
- Continue to support school districts who consolidate in order to remove deficient buildings where feasible, but develop plans to accommodate modern education in remote rural schools to limit consolidation;
- Increase the support for students considering or attending CTE programs, especially in construction; and
- The DOE should develop recommendations and standards for addressing resilience and climate change.

Schools

SOURCES

Interview: Scott Brown, Director of School Facilities, Maine DOE

Interview: Steven Bailey, Executive Director, Maine School Management Association, and Eileen King, Executive Director, Maine School Superintendents Association

https://www.maine.gov/doe/schools/facilities/srrf (SRRF)

https://www.maine.gov/doe/schools/facilities/mcscp (Major Capital School Construction Programs)

https://legislature.maine.gov/statutes/20-A/title20-A.pdf (Major capital school debt limit)

https://themainemonitor.org/with-many-projects-and-little-money-maine-has-a-school-infrastructure-problem/

https://wgme.com/news/crisis-in-the-classroom/cape-elizbeth-faces-tough-choice-whether-build-new-school-renovate-existing-schools-maine-bond-voters

https://www.pressherald.com/2024/04/21/scarborough-bond-failure-points-to-state-of-crowded-school-buildings-across-maine/

https://brewermaine.gov/news/brewer-awarded-another-2-7-million-quality-school-construction-bond/

https://www.bangordailynews.com/2023/06/13/hancock/bar-harbor-school-bond/

https://www.pressherald.com/2024/01/07/maine-school-districts-worry-about-fiscal-cliff-as-pandemic-relief-money-runs-out/#:~:text=The%20federal%20government%20flooded%20K,hire%20staff%20and%20update%20curriculums.

https://www.penbaypilot.com/article/cost-effective-reliable-solution-fix-camden-rockport-elementary-school-s-hvac-system/179460

https://thecounty.me/2023/11/27/education/after-elementary-school-fire-st-john-valley-district-faces-7-year-wait-for-new-prek-12-facility/

https://www.pressherald.com/2023/07/02/emergency-state-aid-for-bath-elementary-school-damaged-in-fire-unlikely-this-year/

https://www.efficiencymaine.com/at-work/education/

https://neep.org/schools-state/high-performance-schools-maine

https://www.maine.gov/governor/mills/official_documents/executive-orders/2024-10-executive-order-1-order-establishing-governors

Solid Waste

C-

EXECUTIVE SUMMARY

Solid waste disposal needs in Maine are growing faster than the state's population and recycling or other diversions have lost ground in the last decade. Per capita landfill waste was about equal to per capita diversion in 2013, and the former was two times the latter by 2023. This goes beyond the household kitchen: construction debris waste and wastewater treatment biosolids – landfilled instead of reused for soil improvement – drive increased demand. Capacity is moderate at Maine solid waste facilities relative to national averages; most at 20 years or less. Eastern Maine has more urgent needs but could be extended 15-20 years by expanding the State's Juniper Ridge landfill. That will be tough. A 2024 state report found that landfilling methods minimize operations and maintenance costs, but Maine hasn't approved a new facility in decades and reviews for upgrades to existing licensees are long and complex. With regulatory reviews enforcing environmental stewardships, state support is needed to break the cycle of landfilling as the default choice in solid waste streams and facility capacities decreasing.

BACKGROUND

Solid waste management in Maine consists of a comprehensive hierarchy policy of priorities put into law 38MRSA §2101 by the Maine Legislature in 1989 and amended in 2007. In 2013 the Legislature went further to implement the Solid Waste Management Hierarchy through regulations incorporating the hierarchy into the licensing of Solid Waste Facilities. State regulations cover all types of waste including municipal solid waste (MSW), construction demolition debris (CDD), agricultural wastes, land-clearing debris, compost, septage, special wastes, electronic wastes, mercury containing devices, and beverage containers. The Solid Waste Management Hierarchy includes six levels of priorities, with landfill at the lowest level, followed by disposal through waste-to-energy systems (referring to waste processing that reduces the volume of waste needing land disposal, including incineration), composting, recycling, reuse of waste, and reduction of waste generated at the source. The Maine Department of Environmental Protection (DEP), Bureau of Remediation and Waste Management, is the State agency responsible for regulating and monitoring the status of solid waste in Maine. The operational management of solid waste is primarily addressed by municipalities and private entities who own and operate various types of facilities around the state. The DEP works with these facilities to keep track of all waste volumes and disposal methods annually to understand the status of solid waste in Maine. (3)

While the hierarchy has been in place for over ten years, and landfilling sits at the bottom of the hierarchy of solid waste options, it still remains the most significant part of waste disposal in Maine. With this disposal methodology comes a number of other environmental considerations including groundwater, surface water, and air impacts due to waste decomposition. There are extensive regulatory

requirements in place to ensure that both existing and new facilities have adequate systems in place to reduce their impacts; however, as new concerns are raised with PFAS and other contaminants, these requirements are being reviewed and updated. In the past three years, legislative actions have updated various solid waste requirements in Maine. There is a lot of work currently in progress, laying the foundation for potential significant changes to solid waste management in Maine.

MAINE SOLID WASTE MANAGEMENT HIERARCHY (3)

CONDITION AND CAPACITY

The DEP develops regular reports on solid waste management in Maine based on annual reports generated by the State's disposal facilities. These reports were previously developed every two years, but a 2023 amendment to the regulations changed this reporting requirement to annual. Every five years, these reports are used to update the Maine Materials Management Plan. This Plan was most recently updated in 2024 and includes data collected primarily through the end of 2022. (3)

In Maine there were eight landfills that were accepting municipal solid waste in 2023 along with a number of smaller facilities that are licensed to accept specific other wastes like wood or construction debris. Of this group of landfills in Maine, one is owned by the State of Maine, Juniper Ridge located in Old Town. Based on current operational data, this facility receives just over half of all the waste landfilled in Maine.

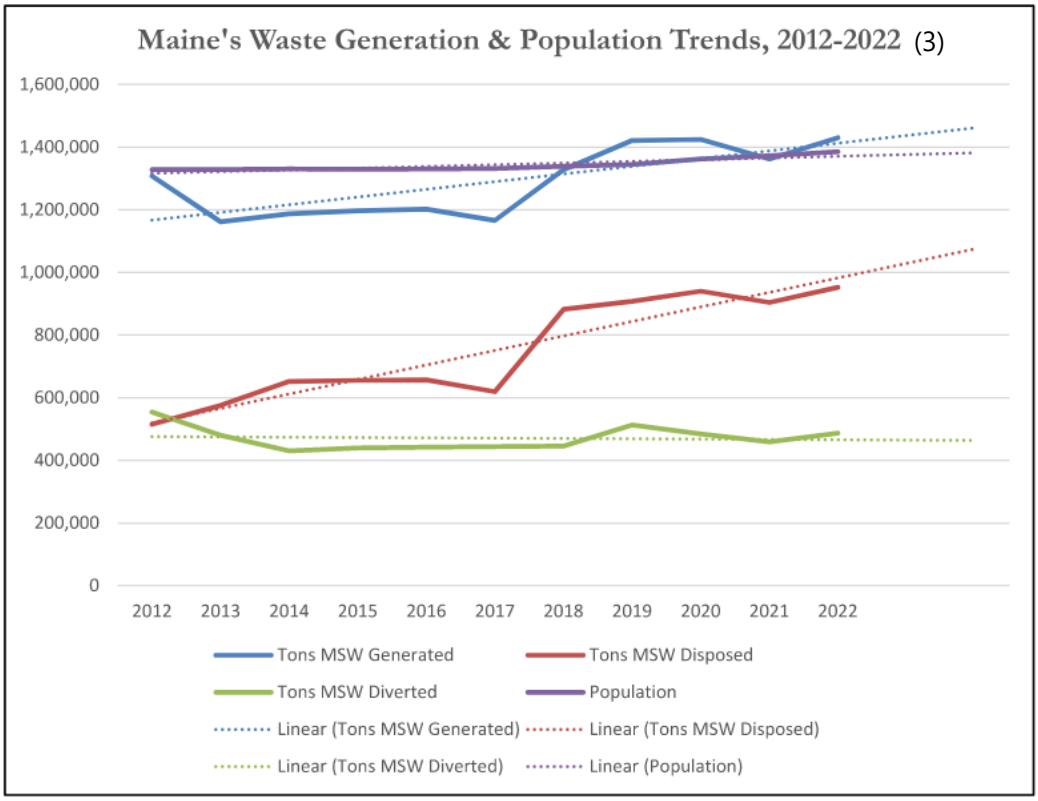
The state also has two operating waste-to-energy incinerators, ecomaine located in Portland and Mid-Maine Waste Action Corporation (MMWAC) located in Auburn. There are two additional waste management facilities that were previously utilized but in 2024 were not operating due to financial and technical challenges. The Garbage Recycling and Clean Energy Facility (GRACE) in Orrington and the Municipal Waste Solutions, LLC (MWS) facility in Hampden have both been storing waste or diverting to landfills instead of processing waste for energy or reuse as they were originally intended. The GRACE facility was sold to Eagle Point Energy Center (EPEC) in March 2024, and the new owners indicated that work was in progress to be able to re-open the facility; however in fall 2024 the facility experienced a fire that burned thousands of tons of stored trash for more than a week. The burned waste was delivered to Juniper Ridge, and EPEC maintained that it would restart operations in 2025. (7) (8). The Municipal Review Committee, Inc. owners of MWS in Hampden have ongoing efforts to reopen the facility and are evaluating plans to add an anerobic digestion system and production of renewable natural gas (RNG) from solid wastes (10).

Due to a number of factors, including the uncertainty surrounding some of the existing facilities, the ability to

accurately estimate the amount of capacity remaining for the entire State is a challenge. With facilities located in different areas of the state, transportation costs rising, and waste generators and haulers constantly reevaluating their costs, the amount of waste processed or disposed of at different facilities can vary from year to year. This impacts the ability to accurately evaluate capacity over an extended period of time.

One area of concern for capacity is in the Eastern Maine region. Both processing facilities that are currently diverting waste to landfill disposal are located in this eastern part of the state. Also needed is the licensing of an expansion at the State's Juniper Ridge landfill, which is located in this region as well. An expansion application could add 15-20 years of capacity. In October 2024, the MaineDEP issued a final Public Benefit Determination for the expansion of the Juniper Ridge Landfill, which paves the way for the completion of the expansion with the addition of requirements for PFAS treatment, odor analysis, gas analysis, and public information sharing about the facility's events. (9)

Most other areas of the state are supported by landfills with remaining capacities that are 20 years or less with some exceptions. The Hatch Hill landfill located in central Maine has submitted an application to the DEP for additional capacity that is currently in review by the State. Aroostook Waste Solutions, a quasi-municipal organization and owner of both the Tri-Community Recycling and Sanitary Landfill and the Presque Isle Landfill, serves northern Maine. The capacity of the Aroostook Waste Solutions landfills is in excess of 40 years at current disposal rates.



A review of the past ten years of MSW generation per capita in Maine demonstrates that the amount of MSW disposed of has been trending upwards, while the amount of MSW that is diverted from landfills (through recycling, reuse, composting, food rescue, etc.) has stayed consistent. While Maine's population is growing, the data indicates that solid waste increases are not just tied to more people in the State. In 2013, the amount of disposal and diversion were almost equal, but in 2022, per capita disposal was two times diversion.

A review of data presented in the DEP's 2024 report indicates that between 2018 and 2022, the average

increase in waste per year was roughly 1.3%, but the amount of landfilled waste increased by 7.8% per year. During that period of time, construction demolition debris wastes increased, related to changes in construction activities. In addition, a larger amount of wastewater treatment plant sludge was landfilled instead of land applied for soil improvement due to potential contaminants, including PFAS. But, ultimately, the increase in landfilled waste is attributed to the fact that the landfilling of waste is currently the most cost-effective disposal method for many waste generators, due in a large part to the location of facilities and the resulting cost of transportation. (3)

OPERATIONS AND MAINTENANCE; FUNDING AND FUTURE NEED

While State law includes a hierarchy that prioritizes all other forms of solid waste management over landfilling, the condition of the solid waste industry in Maine makes this a challenge. The responsibility of the management of municipal solid waste is assigned to each municipality by State Law, but no specific guidance is provided other than the Solid Waste Hierarchy. The State provides oversight with approvals for changes and regular inspections, but each municipality may choose how to meet its needs for dealing with its own waste. Similarly industrial and institutional facilities that generate waste also manage their own waste through private facilities or by contracting with commercial haulers who choose their own end-disposal options. Solid waste market failures in Maine and the high cost of transportation are driving the cost of waste management. In addition, the need for available workforce is an issue across a number of industries, and it impacting solid waste as well.

In its 2019 solid waste report the DEP identified the financial challenges with waste processing over landfilling, and in its 2024 report noted that this had not changed. Landfilling, while challenging from an operations and maintenance standpoint, has often been considered the most-cost effective method of waste disposal. This is not an ideal long-term solution, however, considering the challenges around licensing a new landfill, which has not happened in decades. The review and approval process around simply amending an existing license to add capacity in a facility is long and complex, as consideration needs to be made to all potential environmental impacts of any facility changes. (3)

PFAS

Significant concerns exist around the presence of per- and polyfluoroalkyl substances (PFAS) in products from regular household items to industrial systems. These are having an impact on solid waste in Maine. In August 2022, a new law from the Maine Legislature banned the land application, distribution, or sale of sludge and sludge-derived products. With this ban in place, these wastes

are primarily disposed of in the State's existing landfills. In addition to the sludge itself, the material typically requires bulking agents so that it can be workable within the landfill setting. The preferred bulking agent is other waste material like construction demolition debris or ash, but other materials that might not typically end up in the landfill, like soils, are also used. These materials were not anticipated for such wide landfill disposal just a few years ago, impacting capacity requirements.

In 2023, a majority of Publicly Owned Treatment Works (POTW) sludge was disposed of in landfills, with almost 90% going to the State-owned Juniper Ridge Landfill. During spring 2023, the amount accepted at this location was temporarily reduced. Other facilities continued to accept but had limited capacity. An evaluation of waste options to determine a more long-term solution is required.

A study was released at the end of 2023 "An Evaluation of Biosolids Management in Maine and Recommendations for the Future" that included an evaluation of sludge generation rates and disposal requirements. The study also included options for volume reduction that should be considered in Maine. There are also pilots being considered for PFAS destruction systems that could help to reduce the need for landfilling of sludge. Impacts from these pilots and programs are years away but are anticipated to have a significant impact on solid waste needs in the future. (1)

PFAS raises concerns not only on capacity, but also the same water quality concerns that resulted in the elimination of land-spreading of these wastes is being considered with leachate treatment. The recent addition of PFAS parameters for testing of landfill leachate and monitoring groundwater is just starting to provide data, but more information will be required to determine what else may need to be added to the existing processes. The uncertainty around PFAS is impacting many parts of

Maine's infrastructure including solid waste, and there is a need to develop a better plan for this emerging issue.

PUBLIC SAFETY; INNOVATION; RESILIENCE

The State's standards for landfill design and operations practices do keep in mind environmental concern to ensure that the facilities minimize their impacts. Facilities typically have composite liners; the operational areas within the landfills are reduced using intermediate covers; leachate management is a required part of facility operations; and groundwater monitoring is a license requirement for facilities. Many locations are also managing gas output from their facilities. A new landfill hasn't been licensed in many years, but as noted previously for Juniper Ridge, expansions have been reviewed in great detail and approved. Landfills have also been closed in recent years as well, with landfills in Brunswick and Rockland closed and capped in recent years.

In 2024, the State is in the process of contracting for a comprehensive statewide Waste Characterization Study. This audit of existing solid waste conditions will give a better understanding of what is needed to update regulations and programs moving forward. This study is being supported through a Solid Waste Infrastructure for Recycling grant from the United States Environmental Protection Agency (USEPA). The State has also undertaken a Food Loss and Waste Generation Study receiving funding from a Climate Pollution Reduction Grant, also from the USEPA. Currently 361,000 tons of food loss and waste is generated annually in Maine.

Maine has an existing Product Stewardship Law that mandates that manufacturers take responsibility for certain products throughout their lifecycles. Since 1978, 11 specific products have been addressed, including returnables, lead-acid and rechargeable batteries, mercury auto switches, thermostats, and lamps, electronic waste, cellular telephones, architectural paint, and pharmaceuticals. An update to this law that was put in place in 2021 requires that a product stewardship program be developed for packaging materials. This program is currently being developed, and associated with that work an assessment of Maine's recycling program is going

Solid Waste

to be completed, after 2026. Consideration is being given to future items for product stewardship including carpet, mattresses, gypsum wallboard, household hazardous waste, solar panels, and wind turbine blades. (5)

RECOMMENDATIONS TO RAISE THE GRADE

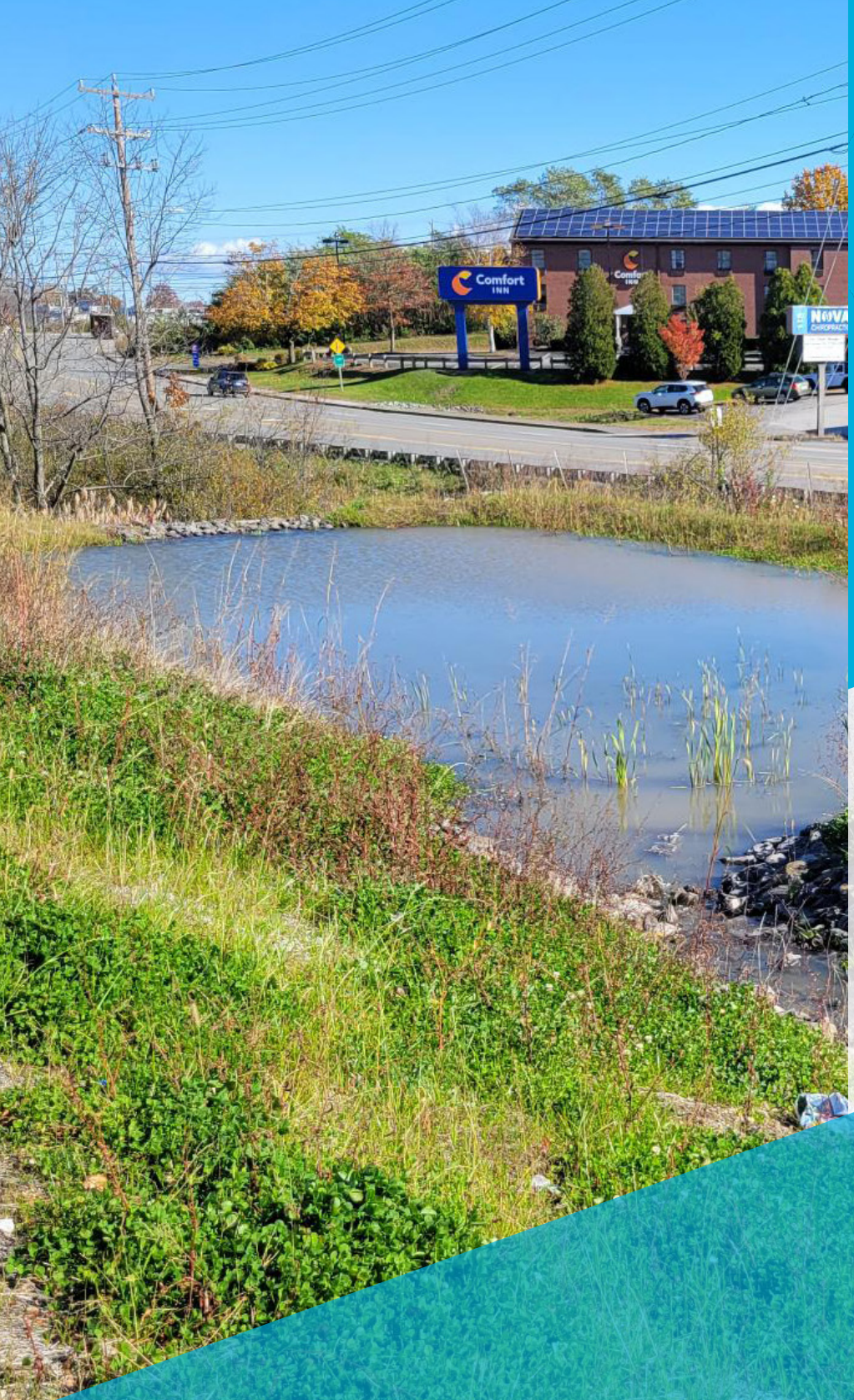
While the State currently has the capacity to manage the amount of solid waste that is being generated, this capacity continues to become more limited, and the amount of waste management through non-landfill options is not currently at the level that it should be. Reviewing solid waste conditions in Maine, there is a lot that is currently in flux and needs to be prioritized to ensure that the state does not suddenly have a significant problem, like the need to manage debris resulting from natural disaster. Recommendations to help raise the grade for solid waste in Maine include:

- Continue with, complete, and ultimately make use of the studies that are currently in place to gather data about Maine's solid waste. With this new information there may be a better understanding of what can be done to help change the way that solid waste can be managed in the State.
- Continue to promote waste reduction alternatives. This could be through expansion of existing programs and creation of new incentives for alternatives to landfilling of certain wastes. The cost of implementing new systems, or even bringing existing facilities back online are impeding change, and financial incentives may be needed to help this happen.
- Further develop and evaluate the biosolids management program now in place.
- Support the expansion of the Product Stewardship Program in the state, continuing to add more materials to help incentivize more sustainable management of materials before they become waste.

Solid Waste

SOURCES

1. Brown and Caldwell; Maine Water Environment Association. (December 2023). *An Evaluation of Biosolids Management in Maine and Recommendations for the Future.*
2. Maine Department of Environmental Protection. (January 2024). *Analysis of Sludge and State-Owned Landfills as Public Utilities.*
3. Maine Department of Environmental Protection. (January 2024). *Maine Materials Management Plan: 2024 State Waste Management and Recycling Plan Update and 2022 Waste Generation and Disposal Capacity Report.*
4. Maine Department of Environmental Protection. (January 2024). *Report on the Testing of Landfill Leachate for Perfluoroalkyl and Polyfluoroalkyl Substance Contamination.*
5. Maine Department of Environmental Protection. (February 2024). *Annual Product Stewardship Report.*
6. Brown and Caldwell. (February 2024). *Assessment of Landfill Capacity for Biosolids and Initial Evaluation of Leachate Treatment Approaches in Maine.*
7. Kaitlyn Budion, Maine Public. (August 2024). *Orrington facility to begin accepting trash, but not yet producing energy.* https://www.bangordailynews.com/2024/08/20/bangor/bangor-environment/orrington-maine-perc-trash-accepting-restart/
8. Drew Peters. (October 2024). *'Once-in-a-career incident': Orrington trash plant fire fully extinguished.* https://www.newscentermaine.com/article/news/local/public-safety/fire-at-orrington-trash-plant-fully-extinguished-perc/97-7369b1bc-3f6a-4eab-8761-f160d00847ed
9. Maine Department of Environmental Protection. (October 2024). *Maine DEP issues the final public benefit determination for the Juniper Ridge Landfill Expansion.* https://www.maine.gov/dep/news/news.html?id=13079798
10. Municipal Review Committee, Inc., (March 2024). *Waste Processing Facility Update.* https://www.mrcmaine.org/wp-content/uploads/2024/03/MWS-update-to-higher-authority-03-2024.pdf



Stormwater

C

EXECUTIVE SUMMARY

Maine has had a state law regulating stormwater peak flows for over five decades. The state has 30 municipal separate stormwater sewer system (MS4) communities, but comprehensive information on the capacity and condition of the state's stormwater infrastructure is not available. Urban stormwater disproportionately impacts Maine's surface water quality considering that only 2.8% of the state is developed land. Maine's stormwater needs are estimated to be $275 million in a 2022 needs survey. 87% of those needs are for natural or built systems that retain stormwater. Dedicated stormwater funding will be increasingly necessary to address the growing needs due to climate change and urban growth.

BACKGROUND

Stormwater is the excess precipitation and snowmelt that runs off ground surfaces. Any natural or built system that conveys, detains, or retains stormwater constitutes stormwater infrastructure. Conventional structures (e.g., catch basins, pipes) designed for drainage and detention are categorized as grey infrastructure. Natural or built systems that retain stormwater constitute green infrastructure. Effective stormwater management provides tangible environmental, social, and economic benefits.

Urbanization results in hardscaped surfaces such as rooftops and pavements that have virtually no permeability. Creation of these impervious surfaces significantly affects water balance by reducing evapotranspiration and infiltration. For instance, impervious cover on highly permeable soils may result in a 100-fold increase in the annual average stormwater volume. Stormwater moves faster on impervious surfaces which increases the rate of stormwater. These increased water velocities allow stormwater to pick up and convey pollutants that build up on impervious surfaces and discharge them into downstream ecosystems.

Maine has EPA's delegated authority to issue National Pollutant Discharge Elimination System (NPDES) permits regulating stormwater discharges from municipal separate stormwater sewer systems (MS4), construction operations, industrial activities. Post-construction stormwater discharges into the impaired Long Creek are also regulated through a separate NPDES permit (1). The Stormwater Management Law of 1997 is the key state statute that calls for stormwater quality and quantity standards, i.e., "Stormwater Management Rules (Chapter 500)", for the organized areas of Maine (2, 3). Some municipalities in urban areas have stormwater ordinances meeting or exceeding Chapter 500 whereas rest of the municipalities solely rely on Chapter 500 (4).

Regulatory requirements, land development, and climate change increase demands on municipal stormwater management. For instance, the new MS4 general permit requires thirty municipalities to adopt a low impact development ordinance and implement three best management practices in their urban impaired stream watersheds (5).

CAPACITY

Separate and combined sewer systems drain the built environment. Surface water flooding occurs when hydraulic capacity of the sewers is exceeded under heavy rainfall. There is no mechanism tracking the surface water flooding incidents. Areas served by closed drainage systems are more prone to surface water flooding since these systems are typically designed using 10-year return period storms (3). Open drainage systems can usually handle storms up to 50-year return period. Structural measures built for stormwater quality treatment since 1997 have capacity to handle storms up to 10-year return period whereas the detention measures dating back to 1970s have capacity for 25-year return period storms (3). Undersized stream crossings having smaller spans than bankfull width constitute drainage pinch points and result in river flooding and road overtopping incidents.

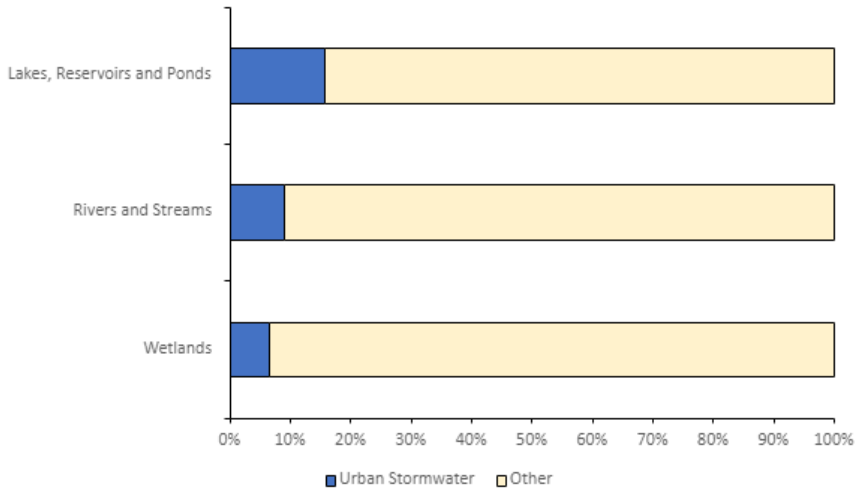
New stormwater infrastructure is constructed along with new development and redevelopment projects as mandated by the state's Chapter 500 program and/or municipal ordinances. This new infrastructure, which is primarily owned by private people, mitigates the impact of new development and redevelopment, specifically impervious cover, by providing stormwater treatment.

A statewide GIS analysis has shown that 28 municipalities experienced a relatively higher impervious cover growth (i.e., one or more percent point) between 2001 and 2019 as compared to the rest of the municipalities in the state (6). Seventy-five percent of these municipalities are in Cumberland, York, Kennebec, and Penobscot counties. Stormwater conveyance capacity of the existing sewers and culverts may not meet the growing demand in certain catchments where development has concentrated. Capacity assessment of existing separate storm sewers in growing urban areas is necessary but uncommon. Capacity of the storm conveyances mostly becomes a concern if they are frequently surcharged -due to urbanization and/or higher intensity storms- and result in nuisance flooding.

CONDITION

DEP recently assessed approximately 78% of the stream and river length, 16% of the freshwater wetland area, and all of the lake area in Maine and reported that approximately 4% of the assessed river and stream length, 9% of the assessed lake area, 6% of the assessed wetland area in Maine were impaired for the designated uses such as aquatic life support (7). Urban stormwater remains as a probable source disproportionately impacting Maine's surface water quality considering that only 2.8% of the state is developed land (Figure 1).

FIGURE 1. PERCENT OF THE IMPAIRED SURFACE WATERS HAVING "URBAN STORMWATER" AS PROBABLE SOURCE IN MAINE. "Other" stands for the waters impaired by the non-stormwater sources.



OPERATION AND MAINTENANCE (O&M)

The state's stormwater infrastructure is operated and maintained by the municipalities, MaineDOT, Maine Turnpike Authority, and other private/public entities ranging from homeowners' associations to corporations. Regular inspection and maintenance standards are in place for the infrastructure installed to comply with the state's stormwater regulations (3). The MS4 program requires annual inspection of the stormwater control measures (SCMs). The state regulations also mandate that the permittees regularly inspect the post-construction SCMs and certify that these SCMs are operating properly (e.g., no standing water in vegetated filter ponds 72 hours after a storm) every five years. Compliance with these regulatory requirements is not at desired levels, which indicates the possibility of many SCMs not being maintained properly.

Approximately one-third of Maine's developed land is regulated under MS4. Each MS4 community is required to have a map of their storm sewer system by the municipal MS4 general permit. Stormwater O&M spending of the major municipal MS4 permittees ranges between $250,000-$500,000 per fiscal year (9,10,11). MaineDOT will spend an average of $25 million annually for the maintenance of its drainage infrastructure between 2024 and 2026 (12).

Lewiston, Bangor, and Portland are the only MS4 communities that have stormwater utilities for the O&M and other stormwater related expenses. The other MS4s mainly use their general funds generated by the property taxes to address the stormwater O&M needs.

FUNDING

Sustainable funding is needed to operate, maintain, and improve the stormwater assets and meet the regulatory requirements. There are currently five stormwater utilities in Maine. Additional stormwater funding comes from all levels of government and private sector. Bonds and development impact fees are leveraged for stormwater funding. Certain land development projects in the urban impaired stream or lake watersheds are required to pay a compensation fee to be used by a DEP authorized administrator (3). Lewiston and Portland are planning on using approximately $2 million bond money per year for their stormwater projects in the near term (9,13).

Four stormwater utilities generate funding for the stormwater programs and capital improvement projects in Augusta, Bangor, Lewiston, and Portland. Stormwater utility fees are primarily assessed using the impervious area of the properties. The minimum annual stormwater fee, which is typically disbursed by the single-family residence fee payers, ranges between $22 and $90 in Maine. Approximately 25% of the nation's stormwater utilities charge single-family residences more than $90 annually; the median annual fee is $60 (14). The most recent annual revenues reported for the four utilities ranged between $1.2- $7.7 million (15,16,17,18). The Long Creek Watershed Management District also collects an impervious cover fee generating $1.5 million annually (1). The utilities can pay for their expenditures by the revenues they generate, and their financial statements are independently audited. Based on the budget and fiscal reports, these revenues seem to sufficiently fund annual budgets.

Dedicated funding for MS4s and watershed-scale stormwater management is an important need in Maine. The Clean Water State Revolving Fund (CWSRF) has been mostly used for the improvement of the wastewater infrastructure and combined sewer overflow abatement. In 2024, CWSRF program made $200,000 of planning funds available for stormwater and nonpoint source projects (19). Up to $50,000 was available for principal forgiveness for eligible projects that provide a 100% match. Four applications were received and funded. This funding opportunity is expected to continue in the coming years.

The EPA has recently released 2022 Clean Watersheds Needs Survey, (CWNS) which reports Maine's stormwater needs for the first time (20). Maine needs $275 million under the stormwater category consisting of green infrastructure ($239 million; 87% of the total), gray infrastructure ($20 million; 7% of the total), and general stormwater management ($15 million; 6% of the total) sub-categories. Since only seven entities including two MS4s, i.e., Lewiston and Portland, responded to CWNS with specific project information, a state-specific approach was used to estimate the gray and green infrastructure needs of the state's urban impaired stream watersheds. Therefore, the reported stormwater needs figures must be considered as conservative estimates.

Until 2024, DEP administered a competitive grant program for stream crossing upgrade projects, which improve stormwater drainage and alleviate surface water flooding issues. Funding for the grant program came from the bonds approved by the voters between 2015 and 2020. DEP awarded grants to 172 stream crossing projects which resulted in $34 million infrastructure investment (21). MaineDOT has taken over the program's administration and will award $4 million grant money made available through the 2021 transportation bond approved by the voters (22).

The state awarded $5.4 million grant money to 37 communities for the projects that will improve climate resiliency of the vulnerable infrastructure (e.g., insufficient storm sewers) in February 2024: $4 million for 20 culvert upgrade projects, $1.4 million for 19 projects most of which directly address public stormwater infrastructure (23). The state also awarded $25.2 million to 39 communities in August 2024; most of the awarded projects aim at improving the stormwater infrastructure through culvert and storm sewer upgrades (24). These grants were made available through a program administered by MaineDOT and funded by the Maine Infrastructure Adaptation Fund created in 2021.

In 2023, federal nonpoint source pollution grants funded best management practices (BMPs) in 9 watersheds delivering an estimated pollutant load reduction of 690 tons of sediment per year (25).

FUTURE NEED

Approximately half a million people will be living in Maine's MS4 communities by 2040, which is approximately 7% higher than the 2020 population (26). Portland, Lewiston, Bangor, and South Portland population will decrease by 2040 according to the same projection. Double digit population growth rates, 11-14%, are forecast for Washington, York, and Waldo counties (2020 vs. 2040). Stormwater funding will need to

increase commensurately to address the additional pollutant loading, runoff volume, and stormwater infrastructure associated with the new land development projects to occur in the urbanizing municipalities. Also, funding required for MS4 compliance is expected to increase due to the additional requirements that come with every new permit cycle. Total number of stormwater needs reported in CWNS for Maine is 71 (20). Maine has the lowest per capita stormwater need of $200 among the New England states. The state's stormwater needs are mostly likely to increase as more specific needs are submitted in response to the upcoming CWNS.

Total precipitation and extreme precipitation events are increasing in Maine (27). This increased volume and rainfall intensity will be a large factor increasing the future stormwater needs. Specifically, climate adaptation measures will be necessary to increase the resiliency of the stormwater detention and conveyance measures. With currently available public data, we are far from answering if general funds and property taxes are sufficient for current and future needs.

PUBLIC SAFETY & RESILIENCE

Since 2005, Maine's annual precipitation has averaged 6.6 inches more than 1895-2004 period (27). Most counties had an annual average of 1-1.9 days with 2 or more inches of precipitation between 1991 and 2020 (28). Year 2023 was the state's fifth wettest year which also had a record-breaking wet summer (29). Sea level is 7.5 inches higher than early 20th century Maine and rate of sea level rise has nearly doubled in the past three decades (27).

Seven federal disaster declarations were made due to severe storms and flooding in Maine in the past five years (30). Four of these declarations were for the incidents that occurred in 2023. Approximately $20 million of public assistance grants were obligated under five of the disaster declarations.

Under the changing climate, more frequently occurring high-intensity precipitation events will pressure the capacity of the stormwater infrastructure. The flooding risk will be exacerbated for the coastal communities where the rising sea levels and storm surge will create tailwater conditions hindering stormwater discharge at the outfalls. Several municipal ordinances require peak flow control for 50-year storm which is stricter than the state's standard requiring peak flow control up to and including 25-year storm (3). Many practitioners design closed drainage systems to withstand 25-year storm instead of 10-year storm required by the state agencies. Use of higher return period storms for the design of stormwater detention and conveyance structures provides additional capacity which presumably increases the climate resilience of the newly built stormwater infrastructure. However, stormwater facilities designed for more intense and longer duration storms can be more expensive, and public data do not appear sufficient for cost-benefit analysis of those higher initial project costs.

Upgrading stream crossings to safely pass the 100-year peak flows will contribute to the resiliency of the stormwater infrastructure, improve public safety, and reduce the emergency repair/replacement costs, which will only increase due to the climate trends explained above. MaineDOT requires the municipal stream crossing applicants to size their projects using 100-year peak flows (22).

INNOVATION

A new technique enabling simultaneous camera inspection and sampling of storm sewers for illicit discharge detection has been developed and field tested (31). MaineDOT is developing a novel smart system to control winter salt discharged in stormwater (32).

Stormwater

RECOMMENDATIONS TO RAISE THE GRADE

- Stormwater planning funds recently made available through the Clean Water State Revolving Fund (CWSRF) provide an incentive for stormwater utility development and stormwater asset management which are both important necessities. This funding opportunity should be continued, expanded, and highly publicized in the coming years to increase the state's stormwater utilities and identify specific stormwater infrastructure needs for the next Clean Watersheds Needs Survey, which can be ultimately funded through CWSRF.
- Considering Maine is having a wetter climate with more high-intensity precipitation events, the local and state standards for the design, regulations should require operation and maintenance of stormwater infrastructure to address current and forecasted climate variability.
- Establishment of a comprehensive database of stormwater infrastructure assets including condition, maintenance schedule, date of last maintenance/repair, probable year of replacement, and probable cost of replacement for more effective and efficient asset management is recommended.

SOURCES

1. Long Creek Watershed Management District. https://www.restorelongcreek.org/
2. Maine DEP Land Bureau Laws. https://www.maine.gov/dep/land/laws/index.html
3. Maine DEP Land Bureau Rules. Stormwater Management Rules (Chapter 500). https://www.maine.gov/dep/land/rules/index.html
4. Maine DEP Land Bureau. Municipal Capacity/Delegated Authority Status. https://www.maine.gov/dep/land/sitelaw/delegated-authority.pdf
5. Maine DEP Municipal Separate Storm Sewer Systems (MS4). https://www.maine.gov/dep/water/wd/ms4/index.html
6. Maine DEP GIS Maps and Other Data Files. NLCD Impervious Surface Change Tool for Stormwater Management. https://www.maine.gov/dep/gis/datamaps/
7. Maine DEP. Integrated Water Quality Monitoring and Assessment Reports. https://www.maine.gov/dep/water/monitoring/305b/index.html
8. National Academies of Sciences, Engineering, and Medicine 2014. Long-Term Performance and Life-Cycle Costs of Stormwater Best Management Practices. Washington, DC: The National Academies Press. https://doi.org/10.17226/22275
9. City of Lewiston. 2024. Lewiston Capital Improvement Program FY 2025. https://www.lewistonmaine.gov/ArchiveCenter/ViewFile/Item/5997
10. City of Bangor. 2024. Bangor FY 2025 Budget. https://www.bangormaine.gov/filestorage/1538/4808/45863/FINAL_-_2025_Approved_Budget.pdf

Stormwater

SOURCES (cont.)

11. City of Auburn. 2023. City Manager's Proposed FY24 CIP Plan. https://www.auburnmaine.gov/CMSContent/Budget/FY24/Final%20CIP%20Info%20for%20CIP%20Plan%20adoption%20033023.pdf
12. MaineDOT. Three-year Work Plan for 2024-2025-2026 Calendar Years. https://www.maine.gov/mdot/projects/workplan/docs/2024/2024_Work_Plan_Final.pdf
13. City of Portland. 2023. Portland Capital Improvement Plan FY2024-FY2028. https://content.civicplus.com/api/assets/79dbc344-13ba-4126-8fa1-19c0d5c05d7e?cache=1800
14. Campbell, Warren, "Western Kentucky University Stormwater Utility Survey 2022" (2022). SEAS Faculty Publications. Paper 6. https://digitalcommons.wku.edu/seas_faculty_pubs/6
15. Greater Augusta Utility District (GAUD). 2023. Audited Financial Statements for 2022 Calendar Year. https://bcms-files.s3.amazonaws.com/GeANpvML19-825/docs/2022_GAUD_audited_financial_statements.pdf
16. City of Bangor. 2023. Annual Comprehensive Financial Report FY 2023. https://www.bangormaine.gov/filestorage/422/424/952/954/2023.pdf
17. City of Lewiston. 2023. Annual Comprehensive Financial Report FY 2023. https://www.lewistonmaine.gov/Archive.aspx?AMID=38&Type=Recent
18. City of Portland. 2023. Annual Comprehensive Financial Report FY 2023. https://content.civicplus.com/api/assets/3541e22d-40a3-4507-92e9-a4fcb9c9e4e7?cache=1800
19. Maine DEP. Clean Water State Revolving Fund (CWSRF). Clean Water State Revolving Fund, Maine Department of Environmental Protection
20. US Environmental Protection Agency. Clean Watersheds Needs Survey (CWNS) – 2022 Report and Data. Retrieved from https://www.epa.gov/cwns/clean-watersheds-needs-survey-cwns-2022-report-and-data
21. Maine DEP. Municipal Stream Crossing Upgrade Grant Program. https://www.maine.gov/dep/land/grants/stream-crossing-upgrade.html
22. MaineDOT. Municipal Stream Crossing Program. https://www.maine.gov/mdot/grants/stream/
23. Maine Governor's Office. 2024. Governor Mills Announces $5.4 Million in Grant Awards to 37 Maine Communities to Protect Vulnerable Infrastructure from Flooding and Extreme Storms. https://www1.maine.gov/governor/mills/news/governor-mills-announces-54-million-grant-awards-37-maine-communities-protect-vulnerable-2024

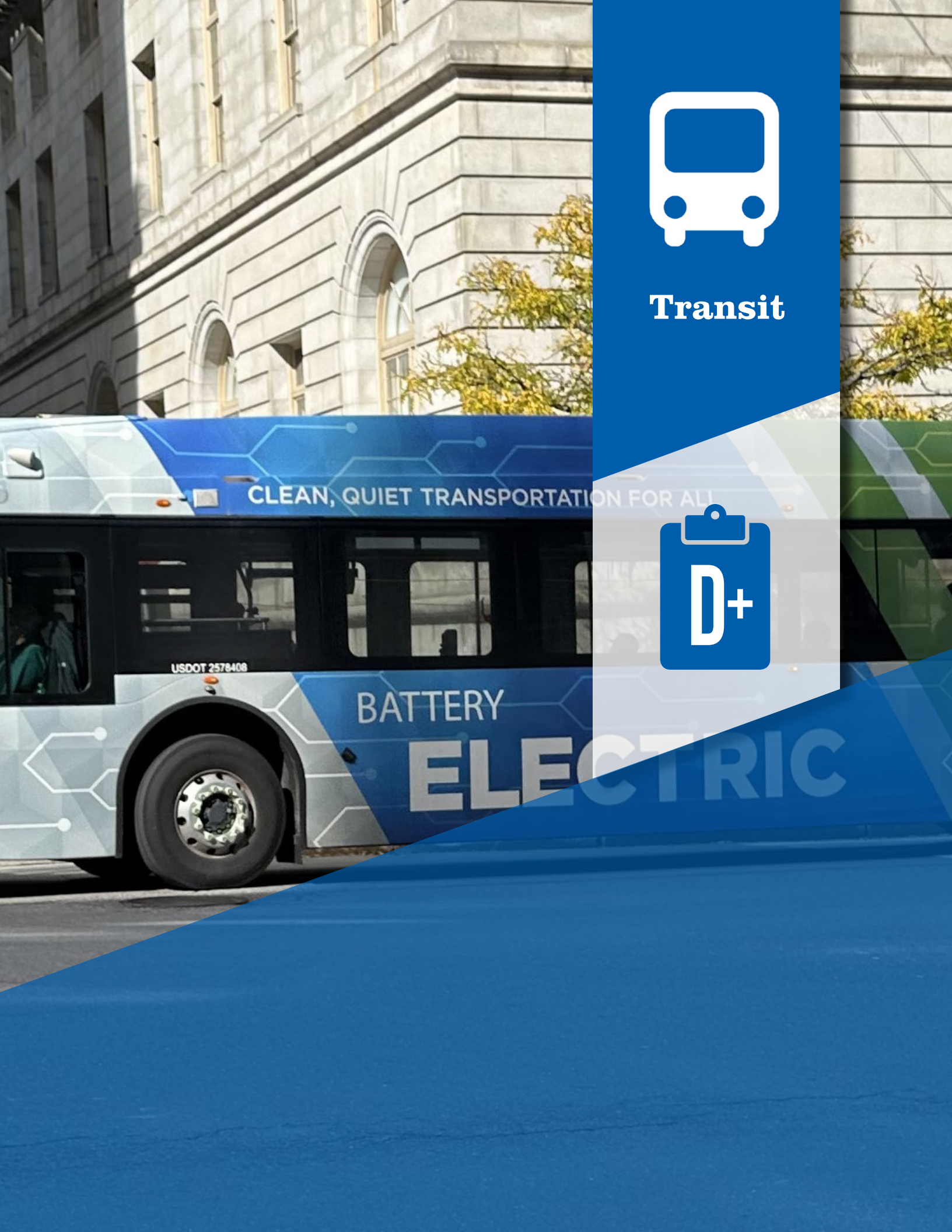
Stormwater

SOURCES (cont.)

24. Maine Governor's Office. 2024. Governor Mills Announces More Than $25 Million in Recovery & Resilience Grants to Help Rebuild 39 Maine Communities Following Devastating Winter Storms. https://www.maine.gov/governor/mills/news/governor-mills-announces-more-25-million-recovery-resilience-grants-help-rebuild-39-maine-2024
25. Maine DEP. Nonpoint Source Management Program 2023 Annual Report. https://www.maine.gov/dep/water/grants/319-documents/reports/2023/2023%20Annual%20Report%20FINAL.pdf
26. Maine State Economist. Demographic Projections. https://www.maine.gov/dafs/economist/demographic-projections
27. Runkle, J., K.E. Kunkel, S.M. Champion, R. Frankson, B.C. Stewart, A.T DeGaetano, and J. Spaccio, 2022: Maine State Climate Summary 2022. NOAA Technical Report NESDIS 150-ME. NOAA/NESDIS, Silver Spring, MD, 4 pp. Maine - State Climate Summaries 2022 (ncics.org)
28. Personal communication with Keith Eggleston, Regional Climatologist (Northeast Regional Climate Center).
29. MCC STS. 2024. Scientific Assessment of Climate Change and Its Effects in Maine - 2024 Update. A Report by the Scientific and Technical Subcommittee (STS) of the Maine Climate Council (MCC). Augusta, Maine. 268 pp. https://www.maine.gov/future/sites/maine.gov.future/files/inline-files/STS_2024_digital.pdf
30. FEMA. Disasters and Other Declarations. https://www.fema.gov/data-visualization/disaster-declarations-states-and-counties
31. Personal communication with Jeff Spaulding (Stillwater Environmental Engineering).
32. MaineDOT. Stormwater Management Plan. https://www.maine.gov/mdot/env/documents/2022/stormwater/MaineDOT%20SWMP%20compiled%20011122.pdf

ACKNOWLEDGMENTS

Aubrey Strause (Acorn Engineering), Wendy Garland (Maine DEP), Jeff Dennis (Maine DEP), Robert Hartley (Maine DEP), Stacy Benjamin (Maine LUPC), Audie Arbo (Maine LUPC), Frederick Dillon (City of South Portland), Keith Eggleston (NRCC), Jeff Spaulding (Stillwater Engineering)


CLEAN, QUIET TRANSPORTATION FOR ALL
USDOT 2578408
BATTERY
ELECTRIC

Transit

D+

EXECUTIVE SUMMARY

Maine has 23 transit systems that receive state or federal funding, with most areas in Maine not having the population density to support typical transit services. Though ridership declined during the COVID-19 pandemic, ridership is now rebounding. As Maine's population ages, transportation options will become increasingly important to provide quality of life and sustainability of the transportation network. The federal Infrastructure Investment and Jobs Act has provided the opportunity for more transit investment, especially for underserved and vulnerable populations. Additionally, the state has increased funding per capita, providing $20.24 annually per capita as an operational subsidy for transit services, ranking 18th in the nation, and exceeding neighboring states New Hampshire and Vermont.

BACKGROUND

Transit ridership in Maine is primarily composed of non-commuters. Non-commuters do not use transit for work purposes, but rather for tourism, shopping, medical appointments, or other reasons. The majority of people in Maine commuting to work use individual vehicles, and most drive alone. Only 0.8% reported using public transportation for commuting.[1] Maine ranked 11th in the country with 3.7% of all commuters biking and walking to work in 2023.[2]

In addition to 23 agencies that are considered transit services in Maine, such as Portland Metro, Casco Bay Island Transit District, Amtrak Downeaster or Western Maine Transportation. This report also includes the state ferry service, commuter ride share, and bicycle/pedestrian programs. MaineDOT is taking lead on State Agency Coordination.[3] Collaboration is needed to make transit more efficient and reliable. Regular meetings are scheduled with MaineDOT, Maine Department of Economic and Community Development, and several others. Coordination between state agencies will improve the transportation network and connectivity between different modes of transit.

The Maine Transit Association publishes a Directory of transit agencies in 8 regions throughout Maine to provide information to potential or current users. Moving Maine is a multi-sector statewide collaborative that works to improve transportation access and equity in Maine. The Moving Maine Network provides policy priorities including biking and walking safely, access to rides and affordable public transportation. They provide a forum to help Mainers get involved and communicate to policy makers where improvements need to made.[4]

CONDITION & CAPACITY

MaineDOT is responsible for 258 transit vehicles, consisting of vans, buses, and ferries, of which 114 (44%) have more than half of their useful life remaining. Of the 258 transit vehicles, 162 (63%) are in good condition, 42 (16%) are in fair condition, and 54 (21%) are in poor condition. MaineDOT is in the process of replacing 60 vehicles.[5]

The Northern New England Passenger Rail Authority (NNEPRA) is the oversight agency for the Amtrak Downeaster, which runs a passenger train from Brunswick, Maine to Boston. In Fiscal Year (FY) 2024, the Downeaster ridership was 598,426, beating the previous record of 546,056 passengers in FY 2018.[6]

There are 12 entities that offer year-round fixed route service including four intercity buses systems, five urban fixed-route bus systems, and three ferry systems. Fixed route systems operate according to a fixed schedule and a fare system. The state also has six seasonal bus systems and two bus systems on the Native American reservations in Washington County.

In 2018, Greater Portland Metro, the transit system for the greater Portland Area, expanded service to the west to better serve the University of Southern Maine system. Metro also started commuter bus service along Interstate 295 to Freeport in 2016 and extended one of its routes to the Portland Jetport and another to the Maine Mall. The Community Connector, Bangor's regional bus service, has extended operating hours and increased service to the University of Maine. As the result of a 2021 transit study,[7] the fixed-route Brunswick Link replaced the previous flex-route Brunswick Explorer with more stops and better connectivity with other regional transportation agencies.

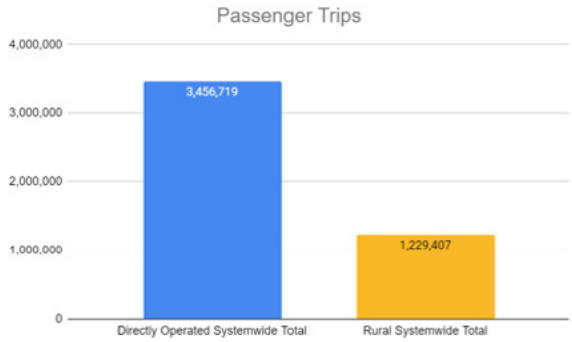
Ferries provide a critical service for a coastal state such as Maine. The Maine State Ferry Service (MSFS) provides service to over 450,000 passengers and more than 170,000 vehicles per year, with six ferries to Maine islands.[8] With their newest vessel coming into service in 2012, the age range for the fleet ranges from twelve to sixty-four years old. Even with a newer 2012 vessel, the average age of the fleet is 26.5 years and the two spare vessels used to replace an active vessel when there are breakdowns, annual maintenance work, or inspections are both over 31 years old. The 64-year-old spare ferry is scheduled to be retired this year when a new ferry is delivered. This places one vessel in excellent condition and the remaining one in fair or poor condition. The average useful life of a ferry is around 30 years. After this point, the costs to maintain the vehicle to a level at which it can obtain the annual certificates of inspection to operate are extensive.

The Casco Bay Island Transit District (CBITD), serving the islands off of Portland, completed terminal renovations in December 2023, increasing its capacity to better handle the passengers that use their service.[9] In 2022, CBITD served over one million passengers, rebounding back to 2019 numbers. The district is preparing for the 2025 arrival of a new 599-passenger/vehicle ferry called "Battery Steele" to replace the 37 year-old Machigonne II. CBITD is also advancing the design of a new hybrid vessel to replace the 30 year-old Maquoit II. This new vessel should be available for service in late 2027. The Bay Mist will be 40 years old in 2025, but works well as the spare. The other two ferries out of 5 total for CBTID are 19 and 11 years old.[10]

Maine has 11 agencies that directly operated services in the state and 15 agencies that provide demand-response and flex routes in the rural parts of the state. Demand response includes door to door service. Flex route transit is a public transit service that runs on a fixed schedule and has set stops, but may deviate to help riders who have difficulty getting to the bus stop or are disabled or elderly.

The most current year available for complete data is 2022. In 2022, the directly operated systems provided 3.5 million passengers with rides, which was a slight increase from the 2021 total of just under 3 million passenger rides. These numbers do not include NNEPRA. Portland Metro is Maine's largest public transportation system with just under 1.7 million trips in 2023, growing 67% since 2021, and over 80% of 2019.[11] In 2022, rural passenger rides totaled over 1.2 million, an increase from just under 800,000 in 2021. The Maine Department of Health and Human Services and the Maine Department of Transportation (MaineDOT) support each other to ensure non-emergency transportation of MaineCare members to medically necessary Medicaid-covered services. Similarly, rural demand response trips and flex route trips provide a critical transportation link for the rural areas to the urban centers.[12] There is an effort to coordinate and encourage volunteer driver programs with transit and rideshare programs to share information and resources.

The GO MAINE commuter program, funded by MaineDOT (75%) and the Maine Turnpike Authority (25%) encourages car and vanpooling, walking, biking, taking the bus, or telecommuting. In 2023, due to an increase in tele-commuters joining the program, there are over 11,500 GO MAINE members (an increase of over 40% since 2019). This program has reduced 2.3 million vehicle miles traveled (VMT) and kept 964 tons of carbon dioxide emissions in 2023. The numbers are on the increase since COVID but not quite back to pre-2020 levels.[13] MaineDOT and MTA also own and operate 56 Park & ride lots across the state.



According to Walk Score, the nine largest cities in Maine are not considered pedestrian friendly and have an average score of 39 out of 100.[14] In October 2024, the Greater Portland Council of Governments (GPCOG) announced a study to improve trail connectivity to provide more biking and walking opportunities in the greater Portland region.[15] Maine has continued to slip in rank as a bicycle-friendly state, from 9th in 2012 to20th in 2019 to 26th in 2022.[16] Micromobility options such as electric scooters or bikeshare programs began in the spring of 2022 in Portland. The Portland Bikeshare program, operated by Tandem Mobility, comprises 150 bicycles and 50 electric bicycles with over 40 stations throughout the city. Over 1,600 people used the bicycles in the first three months, August thru November, of the program.[17] In the summer of 2022, an electric scooter-share program began in Old Town and expanded to Orono in the summer of 2023 for a one-year pilot program.[18]

Computer Aided Dispatching coupled with automatic vehicle location systems provide real time locations to both the operators and the customers. Implementing statewide in the future is a major goal to improve the customer experience and drive increased usage or transit services.

FUTURE NEED

As ridership increases, transit officials in the greater Portland area are currently working with MaineDOT to study needs and determine priorities for increasing public transit infrastructure and accessibility. A joint bus rapid transit study, Gorham-Westbrook-Portland is got underway in 2024 with MaineDOT, Metro and Maine Turnpike Authority participating.[19]

While GoMaine was relaunched in 2022, universal implementation of a consistent platform for transit data would provide users with better planning tools and make the service more attractive. MaineDOT hired a consultant to manage the GoMaine trip planning software platform and is looking to incorporate digital mapping and other features into the trip planner.

Computer Aided Dispatching coupled with automatic vehicle location systems provide real time locations to both the operators and the customers. Implementing statewide in the future is a major goal to improve the customer experience and drive increased usage or transit services.

Expanding transit services to Maine's underserved populations in rural areas is a major part of Maine's transit vision.[20] This will require supporting volunteer driver networks and coordinating resources of many different agencies.

OPERATIONS & MAINTENANCE, AND FUNDING

The IIJA, signed into law in November 2021 will provide over $251 million over 5 years for public transportation in Maine. Transit formula funds received a 33% increase over previous years, with a total of $48 million per year. These funds were incorporated into the MaineDOT 3-year work plan in 2022.[21]

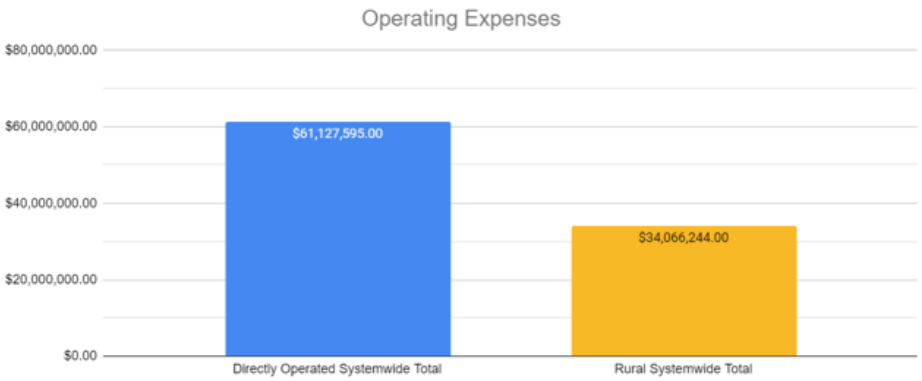
In early 2020, the Portland Area Comprehensive Transportation System (PACTS) received approximately $53 million in CARES act funding to support the transit industry as well as $8.1 million in ARPA funding.[22]

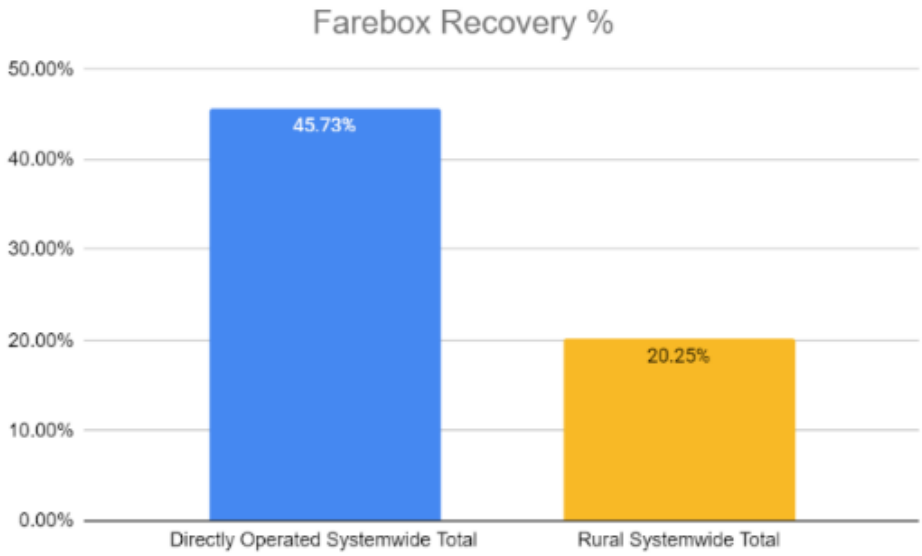
The 2023 Public Transit Advisory Council reported that state support for the operation of Maine's local/regional transit providers is very low in comparison to other state public transit subsidies. According to an American Association of State Highway and Transportation Officials (AASHTO) survey, the 2020 average level of state support, including the District of Columbia, was $60 per capita, while Maine's level has increased from $10.81 per capita in 2020 to $20.24 in 2022.[23] In 2022, state support for neighboring northern New England states Vermont and New Hampshire was $6.35 and $0.22 per capita, respectively.

NNEPRA collected a record of over $13 million in operating revenue in FY24, growing by over 25% from FY23.[24] Cost recovery from operating revenues increased to 54% in FY24. The remainder of came from MaineDOT, FTA formula funds and FHWA CMAQ funds converted to FTA.[25]

In 2022, operations and maintenance costs for the urban fixed-route bus systems totaled $61 million. The farebox recovery rate, the amount that is collected in ticket sales was just over 45% of total costs. The fixed-route urban bus service receives funding from the Federal Transit Administration (FTA), local municipalities, and MaineDOT.[26] In 2022, operations and maintenance costs for the rural systems totaled $34 million. The farebox recovery rate was 20.25%. The rural systems receive FTA funding, local funding, state funding, and funding through Medicare.[27]

MSFS has a new ferry nearing completion and plans to be delivered at the end of 2024. Funding has been secured for another new ferry, which is in the design stage and planned for delivery in late 2026. This will significantly reduce the average age of the MSFS fleet and raise the condition rating of regular service vessels. The spare vessels will still be beyond their expected useful life, but the need for their service will be minimized. New ferries, two of which will be hybrid for CBITD & MSFS are being constructed for the Peaks Island, Islesboro, and Matinicus routes. The MSFS also implemented an 18.3% fare hike on August 1, 2024, the first since 2019.[28] CBITD raised ticket prices up to 82% for round-trip tickets in June 2024 for first time in 15 years.[29]



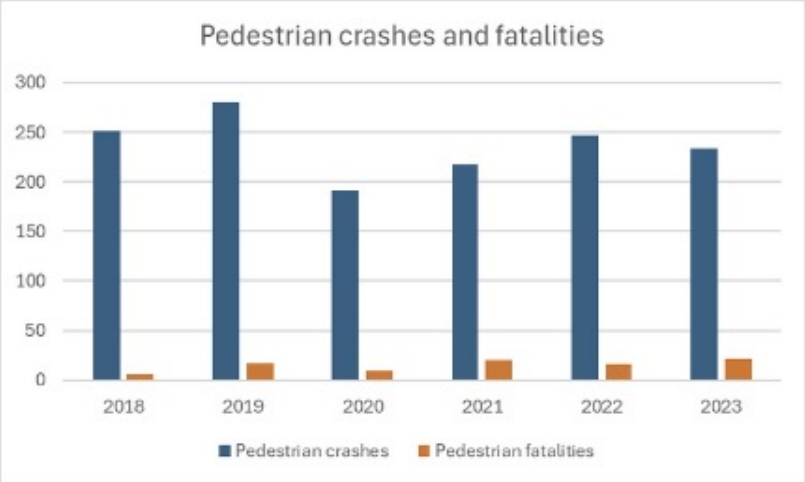


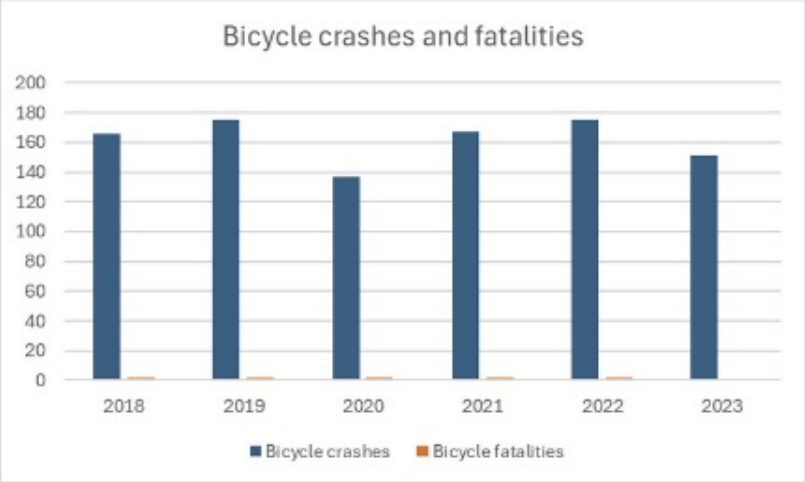
PUBLIC SAFETY

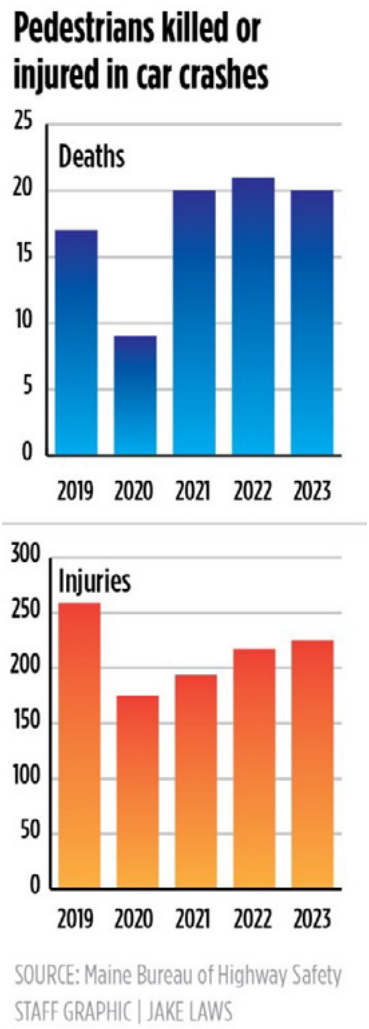
In both February 2023, and in May 2022 a total of three people were struck and killed by the Downeaster.[30] In August and October 2024 pedestrians who were trespassing on the tracks were also struck and killed by the passenger train.[31]

Even though overall traffic fatalities in Maine have dropped by 24% since 2022,[32] the number of pedestrian deaths has been relatively steady over past five years. Vehicles struck and killed twenty pedestrians in 2023 in Maine.

FIGURE 2. PED & BIKE CRASHES & FATALITIES FROM BICYCLE COALITION OF MAINE WEBSITE AS OF 01/24/2024







RESILIENCE/INNOVATION

The Maine Climate Council tasked a Transportation Working Group in 2020 with addressing climate and resilience issues. The most recent recommendations, as of June 18, 2024, included reducing VMT by making transit easier to use, and accelerating adoption of zero-emission medium- and heavy-duty trucks by demonstrating the viability of electric bus fleets and associated technology over next four years.[33]

Since 2022, there has been an electric bikeshare program in Portland. In 2024 MaineDOT is scheduling electric bikes for demonstrations at public and corporate events to promote their use as a transportation alternative.[34] In January 2024, as the result of legislation to lower cost barriers for purchasing electric bikes, the Efficiency Maine Trust (EMT) announced a very limited new electric bike rebate pilot program for organizations that serve low and moderate income populations.[35] Bicycle Coalition of Maine is petitioning EMT to expand the program.

There are now four battery electric buses being operated by Greater Portland Metro and Biddeford, Saco, and Old Orchard Beach Transit. MaineDOT is studying transit electrification best practices for eight transit agencies, which is meant to put them in a good position for discretionary grant funding.

The new $25 million hybrid-electric ferry, "Battery Steele", is expected to cut carbon dioxide emissions by up to 800 tons per year. This new ferry has the ability to operate in a fully electric mode from an on-board battery energy system and has a back-up power source consisting of two diesel generators should there be an issue with recharging the batteries.[36]

Transit

RECOMMENDATIONS TO RAISE THE GRADE

The Maine Section of ASCE's recommendations, mostly based on MaineDOT's Public Transit Advisory Council's recommendations, to increase the grade for transit include:

- Continue to deepen state agency coordination to improve customer service and resource sharing;
- Support volunteer driver networks;
- Provide better information to users including updating Maine Transit Association Directory, improving marketing, data through GoMaine trip planner, and universal adoption of computer aided dispatching/Automated vehicle locaters;
- Continue to prudently invest in electric and hybrid propulsion systems and charging infrastructure;
- Launch moving Maine network; and
- Increase state funding to transit agencies in order to expand service and make transit more attractive to users.

SOURCES

1. Maine 2023 American Community Survey, available at https://data.census.gov
2. https://data.bikeleague.org/data/states-rates-of-active-commuting/#1 including data from the 2023 American Community Survey
3. 2023 Biennial Report State Transit Advisory Council
4. Movingmaine.org
5. Email from Ryan Neale, MaineDOT Director of Transit
6. Northern New England Passenger Rail Authority website nnepra.com
7. https://www.brunswickme.gov/DocumentCenter/View/5469/BTS_FinalPlan_20210506
8. Information regarding MSFS was provided by Bill Geary, MSFS Manager
9. High-profile.com website 08/23/2022
10. Casco Bay Lines website updated 02/13/2024 & "Schedule and Fleet Analysis" report dated March 25, 2019
11. https://gpmetro.org/1625/Performance-Statistics
12. Email from Sara Devlin, Director of BACTS
13. Email from Emily Becker, AECOM
14. https://www.walkscore.com/ME/

Transit

SOURCES (cont.)

15. Email from Kristina Egan, Executive Director of Greater Portland Council of Government (GPCOG)
16. Bikeleague.org League of American Bicyclists
17. https://www.newscentermaine.com/article/news/community/portland-bike-share-program-sees-success-in-first-few-months-portland-maine-bike-rental-city-bike-program/97-88657ece-5ee4-4c5e-84f4-4f8a86998884
18. https://www.newscentermaine.com/article/news/community/old-town-to-offer-eco-friendly-electric-bird-scooters-scooter-environment-transportation-travel-maine-community/97-fa17fc14-9e48-4f4b-b246-7fc8d9e80b3f https://www.newscentermaine.com/article/news/community/old-town-to-offer-eco-friendly-electric-bird-scooters-scooter-environment-transportation-travel-maine-community/97-fa17fc14-9e48-4f4b-b246-7fc8d9e80b3f
19. Peter Merfeld, Interim Executive Director of Maine Turnpike Authority
20. Maine State Transit Plan, March 2023
21. Maine.gov/mdot/bil
22. https://www.gpcog.org/530/CARES-ACT-Project-Updates
23. 2023 Errata for Survey of State Funding for Public Transportation, Final Report 2023—FY 2021 Data (SSFP-17-UL) https://downloads.transportation.org/SSFP-17-Errata.pdf Change to 2024 report with 2022 data
24. NNEPRA website, 08/26/24 Board packet
25. P. 2 NNEPRA Corridor Identification and Development Program application to FRA March 24, 2023
26. Email from Sara Devlin 07/22/24
27. Email from Sara Devlin 07/22/24
28. The Island Institute Article, 4/10/2024. https://www.islandinstitute.org/working-waterfront/ferry-service-proposes-higher-fares/
29. Portland Press Herald article 4/25/2024
30. Portland Press Herald article 02/02/2023
31. Police: Pedestrian killed after being struck by train in Portland | newscentermaine.cA pedestrian was killed in August 2024 and om & Bicycle Coalition of Maine https://www.bikemaine.org/2024/10/pedestrian-killed-on-old-orchard-beach-train-tracks/
32. Portland Press article posted 01/06/2024 updated 01/07/2024
33. https://climatecouncil.maine.gov/strategies/transportation
34. MaineDOT website 02/02/2024
35. Bicycle Coalition of Maine website -press release dated 01/12/2024
36. WorkBoat website Latest News section dated 06/07/2023

Wastewater

C-

EXECUTIVE SUMMARY

Maine's wastewater infrastructure continues to age, with many of the state's treatment facilities approximately 50 years old after construction in the 1970s. With plans in place for varied upgrades at many facilities in Maine, significant funding needs remain. New design considerations impact project planning, including the need for resilience to extreme weather and new emerging water quality treatment regulations. A 2022 survey identified just over $3.1 billion in total wastewater upgrade needs to account for new considerations and meet longstanding maintenance backlogs. This included $769 million for decentralized wastewater treatment systems – primarily the septic systems used by most Maine residents. Municipal wastewater needs for the State of Maine were identified at $1.7 billion. Recent federal and state funding increases have helped, but those investment methods are unpredictable. Utility rate structures should include the full cost of services, including operation, maintenance, and capital needs.

BACKGROUND

Maine has a wide-spread population with varying density across large areas in the state. As a result, wastewater management varies significantly based on location. Most of the state is served by private septic systems while roughly 30% of the state's population is served through Publicly-Owned Treatment Works (POTWs). In June of 2023, the Maine Department of Environmental Protection (MaineDEP) reported that there were 160 licensed POTWs in the State. These POTWs vary, with flows ranging from 2000 gallons per day up to 19.8 million gallons per day (MGD) with a varied range of conditions and challenges across the state. Of these, 10 facilities or 4% of the total are classified as "Major" which is defined as either having design flows greater than one MGD or having approved industrial pretreatment programs. (1)

CONDITION AND CAPACITY

Wastewater Treatment

Since 2001, the State of Maine has had the authorization to implement the National Pollutant Discharge Elimination System (NPDES) Program, and the MaineDEP manages this as the Maine Pollutant Discharge Elimination System (MEPDES) Program. As of a report issued in June 2023, MaineDEP states that 92 of the 160 POTWs have expired licenses. The MaineDEP notes that while licenses may have expired, if timely renewal applications have been submitted, the expired licenses do remain in effect until the MaineDEP reviews and approves the renewals. Most of the expired licenses are dated within the past 5 years, with less than twenty facilities having older expirations. (1) Even if licenses are recent, the facility infrastructure may still be old, with many facilities originally built in the 1970s, without completing significant upgrades since construction.

Across the existing facilities, the discharge methodology for treated wastewater varies, with 84% of the POTWs discharging to surface water, 7% discharging to the subsurface, and 9% discharging using land application. Of the 160 POTWs in the state, 10 facilities discharge their treated

wastewater using more than one methodology, requiring more detailed review and consideration by MaineDEP. (1)

To ensure compliance with the licensing requirements, MaineDEP carries out facility inspections and reviews monitoring data that has been submitted by each facility. For 2022, MaineDEP reported that of the 160 POTWs, 145, or 91% were in substantial compliance with the applicable regulations, while 15 facilities, or 9%, were considered to have issues of significant non-compliance. Significant non-compliance is found when a facility has two major violations or four of any type of violation for a regulated parameter over a six-month period, indicating that there is a treatment issue. Large violations of a conventional pollutant (biological oxygen demand (BOD), total suspended solids (TSS), fecal coliform bacteria, oil and grease, and pH) are an exceedance of 40% or more, or for a toxic pollutant are an exceedance of 20% or more. The MaineDEP has chosen to use all permit limits for potential significant non-compliance, while the EPA uses a more abbreviated list. For enforcement of license requirements, the MaineDEP uses a series of actions, starting with Letters of Warning and Notices of Violation, working up to Administrative Consent Agreements as required. MaineDEP noted that in 2022 one Administrative Consent Agreement was finalized, while the rest of the enforcement was through letters and notices. (1)

Combined Sewer Overflows

A number of municipalities in Maine have combined sewer systems that convey sewer and stormwater flow together in the same piping system. Maine started planning in earnest for the reduction in Combined Sewer Overflows (CSO) from its communities in the 1990s with the development of Master Plans by a number of its existing CSO permittees. Over the past 30 years, a significant effort has been underway to reduce the number of combined sewer systems in place in Maine to eliminate CSO outfalls. In the 2023 Maine CSO Status Report, the MaineDEP reported that at the end of 2023, there were 34 remaining CSO Permittees in Maine located in 31 municipalities. These 34 entities have 111 individual CSO discharge points. In addition, there are 118 active CSO regulators, which are not permitted outlet points, but in high flow situations can allow for wastewater flow to discharge to an outfall before reaching a treatment plant. (2)

While there are a number of remaining CSO outfalls and regulators, the current status represents a significant improvement. Over the past 5 years statewide, the total annual CSO discharge totals have ranged from approximately 212 to 745 million gallons. In 1989, just before the start of most CSO abatement work, this annual flow was approximately 6.2 billion gallons. The 745 MG flow in 2023 was the highest annual discharge since 2014, tied to a high statewide average rainfall. (2)

Nearly 50% of the state's CSO discharge volume was generated from the City of Portland and Portland Water District. The Back Cove West Storage Conduit was placed online in the spring of 2023, and the Back Cove South Storage Conduit is anticipated to be completed by the end of 2024. Roughly 26% of the state's CSO discharges are from the City of Lewiston and Lewiston-Auburn Water Pollution Control Authority (LAWPCA). LAWPCA is currently designing a CSO reduction storage tank for their system, which will significantly reduce outflow. With these three storage systems in southern Maine, the state will see a significant reduction in CSO discharges. (2)

PUBLIC SAFETY

The safety of the communities supported by the State's POTWs is at the top of the list of priorities for the operators of these facilities. Regular operations plans as well as the plans for staged upgrades at facilities take public safety into consideration.

In 2022, as part of a study by Environment America Research & Policy Center, of 67 beaches tested for fecal indicator bacteria, 36 beaches were found to have potentially unsafe levels of fecal indicator bacteria on at least one testing day. (3) In Maine, the Maine Healthy Beaches Program, (a non-mandatory regular testing program that is used at over 60 participating beaches along the coast of Maine) is used to alert if there is any risk of water-borne illness due to any reason. (4) The potential for impact due to issues at wastewater treatment facilities is evaluated when water quality is poor, but often the contamination is due to other sources.

OPERATION, MAINTENANCE AND FUNDING

Maine communities are continuing to operate their wastewater treatment facilities. Many are on the order of 50 years old and are supported by aging conveyance and pumping infrastructure. With organized maintenance programs in place, many facilities are continuing to operate beyond their intended lifecycles. Planned upgrade projects range in scale depending on availability of grants, loans, and the ability of communities to support projects with their own funds.

Affordable financing is required to properly maintain and upgrade sewers, pump stations and treatment facilities. The main funding sources for wastewater infrastructure improvement projects are local sewer fees and state/federal sources including the Clean Water State Revolving Fund (CWSRF), Rural Development (RD), and Community Development Block Grants (CDBG). All borrowed funding is the responsibility of the municipality to pay back in full, which is typically done through local utility rate payer structures.

Maine's CWSRF was established in 1987 as one source to help provide financial support to the state's inventory of POTWs. This fund is not sufficient to provide all of the funding needed on an annual basis by all of the state's POTWs and their associated infrastructure.

In November 2021, the Bipartisan Infrastructure Law (BIL) was signed, providing additional funding allocations to CWSRF for the years FFY 2022 through FFY 2026. This Federal funding requires a 20% match from the State to receive the allocated money, and the State will be providing this match through the State Budget. (5)

Wastewater capital funding is especially challenging for the smaller communities in Maine. The CWSRF program does have a detailed priority point system that considers environmental needs like water supply impacts and shellfishery protection. Local affordability is also evaluated through the communities' median income, unemployment data, population trends, poverty rate, and sewer rate. The goal is to apply the available funding where it can be the most beneficial. In the CWSRF Federal Fiscal Year 2024 Intended Use Plan, a full capital project priority list was provided, including projects receiving funding, and those submitted that remain outside of the available funding.

The total 2024 CWSRF and BIL assistance anticipated to be provided is approximately $67 million, while the total estimated cost of all of the projects on the list was approximately $508 million. In addition, in March 2024, the Fiscal Year 2024 Interior, Environment, and Related Agencies appropriations bill was approved with $40 million for use on assorted wastewater infrastructure projects in Maine. While there is significant funding to help support Maine's wastewater project, the need remains great. (5)

As part of the CWSRF Federal Fiscal Year 2024 Intended Use Plan, the MaineDEP reported on the results of the 2022 EPA Clean Watersheds Needs Survey (CWNS), specifically highlighting the wastewater funding needs that were identified through that inquiry. For the State of Maine, the survey identified just over $3.1 billion in needs for wastewater upgrades. This included $769 million for decentralized wastewater treatment systems – which are primarily septic systems, that are, as previously noted, the form of wastewater treatment utilized by a majority of the state. Municipal wastewater needs for the State of Maine were identified at $1.7 billion. For this survey, 185 requests for responses were made, with 170, or 92% received. (5)

For CSO abatement in Maine, since the late 1980s, the CWSRF has contributed approximately $342 million, or 42% of the total expenditure on this work by current CSO Permittees. Extensive work has been completed to help reduce impact and as was noted, large systems will be online in Portland and Lewiston-Auburn in the next few years. Even with these advances, it is anticipated, as of June 2024, that an additional $316.5 million is needed for infrastructure improvements by permittees in the next five years to advance CSO abatement for the State. (5)

FUTURE NEED

As wastewater facilities in Maine continue to age, the need for upgrades and replacements continue to grow faster than the funds become available. In addition, new challenges with Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS) are requiring changes and additions be considered for the treatment that is being provided in Maine. A law approved in Maine in April 2022 prohibited land application of certain waste materials like septage and wastewater sludge. To support this law extensive sampling was completed in 2022 and 2023 at Maine's wastewater treatment plants to evaluate for the presence of PFAS in treated sanitary wastewater. This was done as part of a wider investigation that is considering sludge and septage sites, remediation sites, and landfill leachate, Results were widely varied among the sampled facilities, and with the data available in November 2023, the evaluation of the information is continuing to determine how best to address PFAS through existing treatment systems and upgrades. (6)

With the BIL signing in 2021, specific funding was allocated for use in the treatment of PFAS and any pollutant identified by the Environmental Protection Agency Administrator as a contaminant or emerging concern. This funding was to be available from Fiscal Year 2022 through 2026. (5)

RESILIENCY

Climate change is becoming more of a focus and concern for POTWs in Maine. As communities begin to see more impacts due to storm events like the significant rainfall seen in in a few events in 2023, concerns around resiliency are becoming greater. As certain equipment, like emergency generators and pump stations, are coming to the ends of their lifecycles and need replacing or upgrades, facilities are considering what upgrades are needed based on anticipated sea level rise and storm impacts. Upgrades to systems are now typically including more robust flood protections that include higher revised flood elevations and associated equipment heights.

Maine is also a heavily forested state with regular power outages due to tree damage. Power outages are anticipated to increase in the future due to more intense storms. Utilities will need to plan for this with additional backup generators at pump stations, generator fuel capacity, water storage capacity, or other provisions to provide resilience to power disruptions.

Changes to rainfall amounts are also being considered as they impact future CSO discharges. 2023 saw the highest flow in nearly 20 years due to rainfall, even with a significantly reduced number of outlet points. (2) More focus on the impact of climate change on Maine's wastewater treatment programs is needed to ensure long term sustainability. Extreme rainfall events in recent years have emphasized the importance of this for many POTWs in Maine. (7)

INNOVATION

A review of all of the projects in the CWSRF Federal Fiscal Year 2024 Intended Use Plan, including projects that have been identified for funding, and those outside of the year's available resources notes a wide range of types of projects. Ranging from small system upgrades to significant improvements using systems that are new to some POTWs, Maine municipalities have tried to find their best options. From facilities like Old Orchard Beach planning for collection system resiliency upgrades to municipalities like Saco and Rockport proposing resource recovery systems, innovation is still considered while POTWs try to make the most of the funding they may have available to them. (5)

Wastewater

RECOMMENDATIONS TO RAISE THE GRADE

- Funding to support Maine's existing POTWs remains the primary need to be able to raise the grade for wastewater in Maine. Recent increased funding through SRF and BIL do help, but the overall need still remains great. Utility rate structures should include the full cost of services including operation, maintenance, and capital needs.
- As infrastructure upgrades continue, design methodologies will need to evolve, taking climate and sea level change into consideration more than it has in the past.
- Changes and upgrades are also necessary with the updated need for addressing PFAS. As more data is gathered to determine how great the need really is, treatment approaches will need to consider PFAS to a greater extent than ever before.

SOURCES

1. Maine Department of Environmental Protection. (2023 June). *Status of Licensed Discharges.*
2. Maine Department of Environmental Protection. (2024 June). *Maine Combined Sewer Overflow 2023 Status Report.*
3. Environment America. (2023 July 5). *Safe for Swimming?* Retrieved from: https://environmentamerica.org/center/resources/safe-for-swimming/
4. Maine Department of Environmental Protection. Maine Healthy Beaches. Retrieved from: https://www.maine.gov/dep/water/beaches/index.html
5. Maine Department of Environmental Protection. (2024 September). *Clean Water State Revolving Fund Federal Fiscal Year 2024 Intended Use Plan.*
6. Maine Department of Environmental Protection. (2023 November). *Maine Department of Environmental Protection P.L. 2021, ch. 641 Wastewater Effluent Monitoring for Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS) PFAS Sum of Six Report.*
7. DeWitt, Lynda. (2024 May 4). *Maine's aging wastewater facilities adjust to meet new challenges.* Retrieved from: https://themainemonitor.org/aging-wastewater-facilities-adjusting/