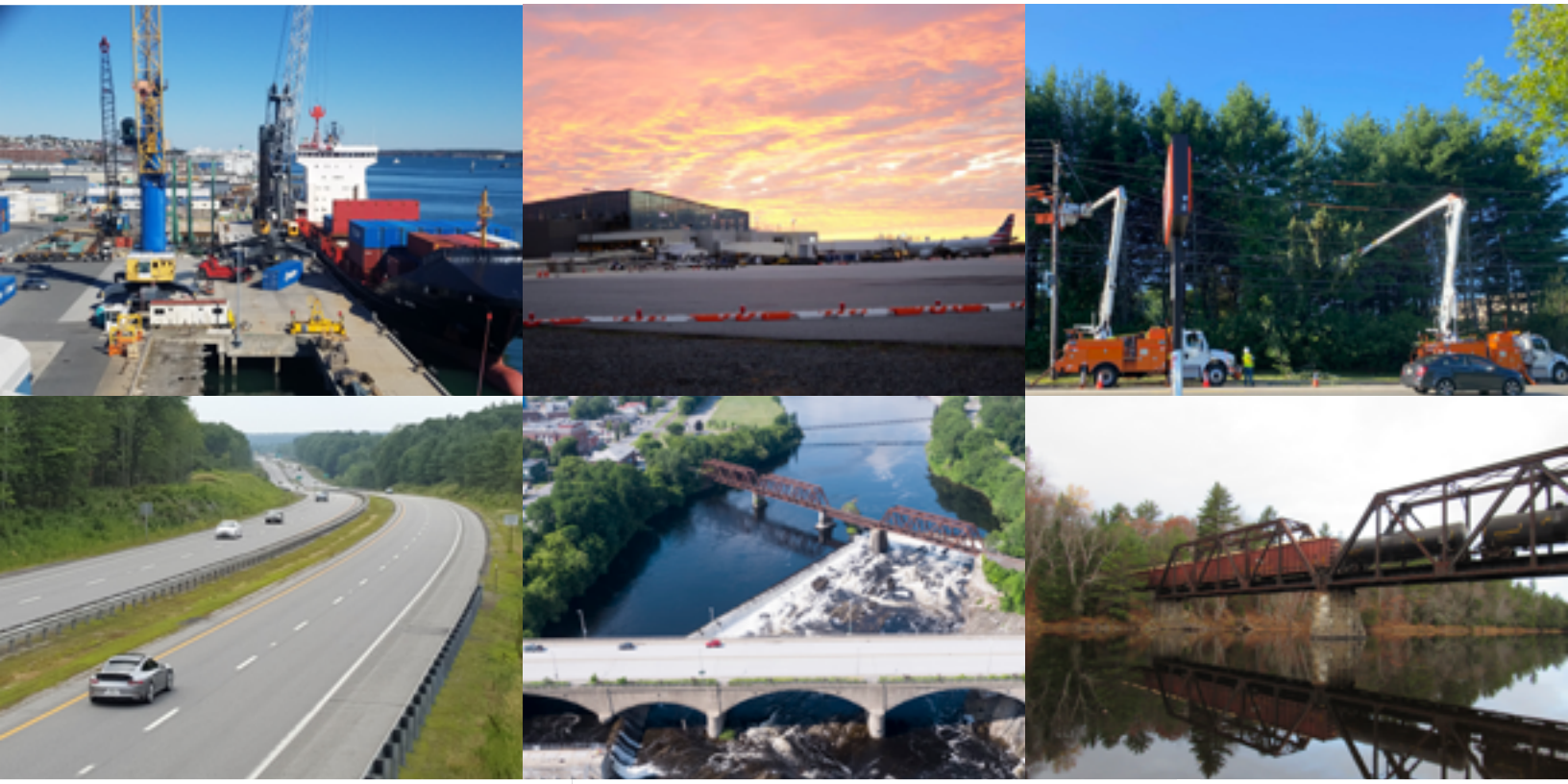
# 2020 REPORT CARD FOR MAINE'S INFRASTRUCTURE



## Maine Section of the American Society of Civil Engineers

**INFRASTRUCTUREREPORTCARD.ORG/MAINE**

December 2, 2020

ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS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# EXECUTIVE SUMMARY

Civil engineering is a broad field dealing with the planning, design, construction, maintenance and management of infrastructure networks and the resulting safety of the public. Every four years, the Maine Section of the American Society of Civil Engineers (ASCE) provides a comprehensive assessment which results in the *Report Card for Maine's Infrastructure*. Using publicly available data and the expertise of industry experts, the Report Card analyzes the current condition 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 the environment. Decisions about infrastructure the public uses, which we all pay for through user fees and taxes, as well as private investments, need to be made based on long-term comprehensive planning, with sustainable and reliable funding sources.

The purpose of the *Report Card on Maine's Infrastructure* is to raise public awareness of the importance of modern and well-maintained infrastructure. Maine's infrastructure cannot be taken for granted and requires on-going maintenance and continuous planning. We believe discussion of the issues detailed in this Report Card will lead to a greater understanding of the current and future needs of our state, prompting decision makers in our communities, the state legislature, and our congressional delegation to formulate policies and provide the necessary funding to address our infrastructure needs.

The *2020 Report Card on Maine's Infrastructure* gave the state an overall grade of C-. Maine ASCE analyzed the following fundamental components of each infrastructure area: Capacity, Condition, Funding, Future Need, Operation and Maintenance, Public Safety, Resilience, and Innovation. Of the 16 categories, only two infrastructure categories are in good condition (B or B-), nine categories ranged in the fair to mediocre range (C+, C or C-), and five categories were considered to be in poor condition (D+ or D). The good news is there are solutions to all these challenges, and we can raise Maine's infrastructure grades.

Get the full story on the Report Card for Maine's Infrastructure
**www.infrastructurereportcard.org/maine**

Ask your elected leaders what they're doing to make sure your infrastructure is reliable for the future. Use your zip code to find your list of elected officials at
**www.infrastructurereportcard.org/take-action.**

The Maine Section of the American Society of Civil Engineers (Maine Section ASCE) represents over 700 civil engineering professionals who live and work in Maine. As a public service to the residents of Maine, 33 ASCE infrastructure leaders and a team of industry experts volunteered hundreds of hours in 2020 to review publicly available data and provide an overview of the state of infrastructure in Maine.

Email: **ReportCard@asce.org**

# SOLUTIONS TO RAISE THE GRADE

While significant improvements headline this positive story, many challenges remain as addressed in our five Key Solutions to Raise the Grade:

1. **KNOW WHAT YOU HAVE: ASSET MANAGEMENT DATA:** To extend the lifespan of existing assets and reduce the unexpected, full replacement cost of infrastructure, asset management data and strategic long-term planning should be implemented across infrastructure portfolios. Furthermore, routine condition assessments, life cycle cost analysis, and prioritized asset management should be streamlined into normal infrastructure operations to judiciously steward limited resources by balancing capital cost with long-term operation and maintenance needs.

2. **KNOW WHAT YOU NEED: UNDERSTAND RISK, ENABLE ECONOMIC GROWTH, INNOVATE:** To make good decisions on infrastructure investment, in addition to understanding asset management data needs, risk needs to be assessed. Infrastructure risks to be evaluated include cost, safety, functionality, environmental damage, and limited opportunity for growth. Performance measures should be established, routinely measured, and periodically re-evaluated to assess progress. Through the design and construction process, materials, techniques, and emerging delivery methods should be implemented to create innovative and resilient infrastructure which can adapt to our ever-changing world.

3. **KNOW WHAT IT COSTS: EDUCATE THE PUBLIC ON TRUE VALUE OF INFRASTRUCTURE:** Many infrastructure owners can determine their own needs and set user fees or bonding plans, but a sustained educational effort should be made to inform users of fee changes and to instruct smaller and/or resource limited utilities on financing and approaches to public outreach. The public's willingness to finance new or upgraded infrastructure through changes to their user fees is critical, especially when significant investment is needed. User fees should reflect the true cost of using, maintaining, and improving infrastructure.

4. **MAKE THE INVESTMENT:** Smart infrastructure investments should be made on a consistent and strategic foundation based on long-term planning and prioritization. Leaders from all levels need to come together to create consistent, dedicated funding from a variety of sources to allow infrastructure owners to plan their investments. Investments should also be made in research and development to promote innovation. Thinking outside the box can result in cost effective, sustainable infrastructure, with an increased lifespan and decreased maintenance and/or recovery cost.

5. **KEEP LEARNING AND ADAPTING:** State and Federal regulations, agency policies, and design standards should be continually reviewed, updated, and synthesized to keep current with the ever-changing world to remove design and construction redundancy, increase agency effectiveness, or create additional funding mechanisms for agencies.

# ABOUT THE INFRASTRUCTURE REPORT CARD

## GRADING CRITERIA

Maine ASCE's 2020 Report Card Committee is a group of dedicated civil and environmental engineers from Maine, who volunteered their time to collect and analyze data, prepare, review, and revise each section, and develop the final Report Card. The committee worked with ASCE's Committee on America's Infrastructure and ASCE Infrastructure Initiative staff to provide Maine with a snapshot of the state of our infrastructure, as it relates to us at home, and on a national basis.


The Report Card Sections are analyzed based on the following eight criteria:

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?

# GRADES 2008—2020

The trend arrow signifies movement in a ↑ positive, ↔ neutral or ↓ negative direction. In some cases there was improvement but not enough to change the grade.

| MAINE | | | | | |
|---|---|---|---|---|---|
| **Area** | **2008** | **2012** | **2016** | **2020** | **TREND FROM 2016** |
| Aviation | B- | B | C+ | B | ↑↑ |
| Bridges | D+ | C- | C- | C- | ↑ |
| Dams | D+ | D+ | D+ | D+ | ↔ |
| Drinking Water | C | C+ | C+ | C | ↓ |
| Energy | C+ | C+ | B- | C+ | ↓ |
| Hazardous Waste | D+ | C- | C- | D+ | ↓ |
| Levees | N/A | N/A | N/A | C- | ↔ |
| Parks | B- | C+ | C+ | C | ↓ |
| Ports | C- | C+ | B- | B- | ↑ |
| Rail | C | C | C | C+ | ↑ |
| Roads | D | D | D | D | ↑ |
| Schools | C- | C- | C | C | ↑ |
| Solid Waste | C | C- | C- | C- | ↔ |
| Stormwater | N/A | N/A | N/A | C- | ↑ |
| Transit | C- | C- | D+ | D+ | ↔ |
| Wastewater | D+ | D+ | D+ | D+ | ↑ |
| **Overall** | C- | C- | C- | **C-** | ↔ |

# 2020 REPORT CARD FOR MAINE'S INFRASTRUCTURE

GPA **C-**

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

# GRADING SCALE


## EXCEPTIONAL: FIT FOR THE FUTURE

The infrastructure in the system or network is generally in excellent condition, typically new or recently rehabilitated, and meets capacity needs for the future. A few elements show signs of general deterioration that require attention. Facilities meet modern standards for functionality and are resilient to withstand most disasters and severe weather events.


## GOOD: ADEQUATE FOR NOW

The infrastructure in the system or network is in good to excellent condition; some elements show signs of general deterioration that require attention. A few elements exhibit significant deficiencies. Safe and reliable with minimal capacity issues and minimal risk.


## MEDIOCRE: REQUIRES ATTENTION

The infrastructure in the system or network is in fair to good condition; it shows general signs of deterioration and requires attention. Some elements exhibit significant deficiencies in conditions and functionality, with increasing vulnerability to risk.


## POOR: AT RISK

The infrastructure is in poor to fair condition and mostly below standard, with many elements approaching the end of their service life. A large portion of the system exhibits significant deterioration. Condition and capacity are of significant concern with strong risk of failure.


## FAILING/CRITICAL: UNFIT FOR PURPOSE

The infrastructure in the system is in unacceptable condition with widespread advanced signs of deterioration. Many of the components of the system exhibit signs of imminent failure.

# AVIATION

B

PORTLAND INTERNATIONAL JETPORT

## AVIATION
GRADE: B

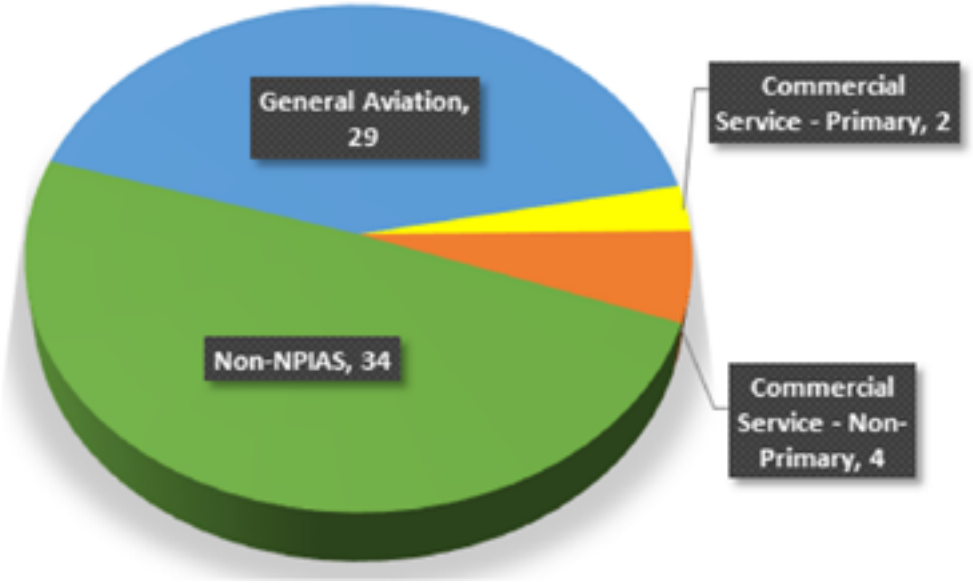
## EXECUTIVE SUMMARY

Maine's airports have made notable improvements since 2016, reaching a state of good condition and are poised to remain safe, reliable, and sufficient to serve the state's future needs. While the two largest airports, Portland International Jetport and Bangor International, have some minor capacity restraints, system-wide, Maine's airports do not have notable air or landside shortfalls. The state's Airport Improvement Program has an average of 41% higher funding since 2017, resulting in more resources for significant pavement, safety, and capacity improvements. However, threatening a future fiscal gap is the $4.50 cap on the Passenger Facility Charge (PFC) which must be eliminated to provide a more sustainable source of funds for airport improvements.

## BACKGROUND

There are 69 public-use airports in the State. Of these, only 35 are part of the National Plan of Integrated Airports System (NPIAS). Because of the availability of federal funding (through NPIAS), the MaineDOT, public records, and other available data, this report focuses on the NPIAS facilities of which 29 are general aviation and six are commercial service airports. Figure 1 illustrates the breakout of airports in the State of Maine.

**FIGURE 1. BREAKOUT OF MAINE'S 69 AIRPORTS**



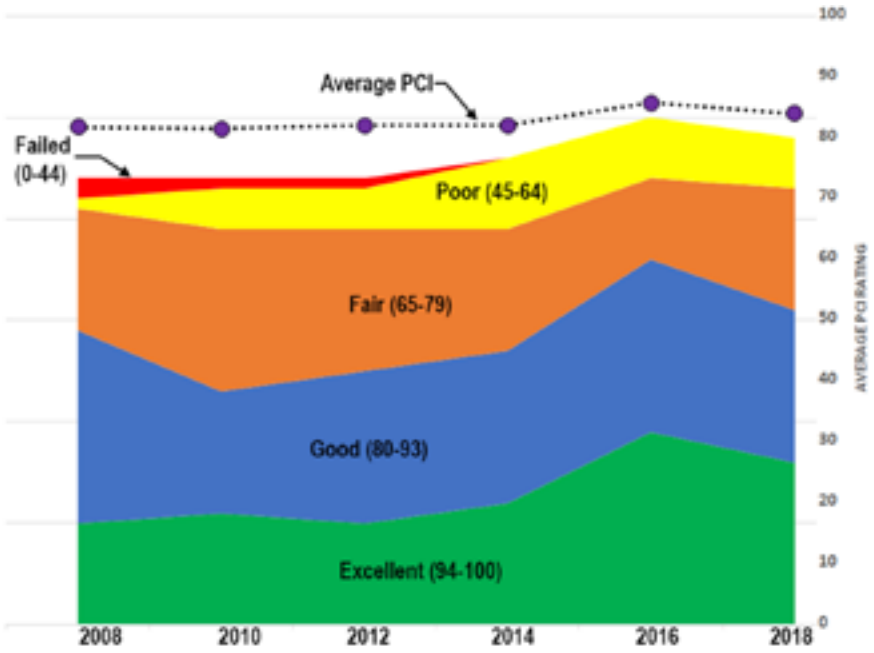

## CONDITION

Pavement Condition Index (PCI) methodology is widely used in civil engineering to indicate the overall general condition of pavements. The PCI provides a condition description that ranges from Excellent (100) to Failed (0). Figure 2 illustrates the statewide runway PCI rating since 2008. The average rating has remained relatively unchanged during this period, with an average rating of 83. This figure also shows the trend toward improved pavement conditions. In the past four years, four runways were reconstructed, and no runways received a failed rating during the last testing period in 2018. Furthermore, since 2016, the average taxiway and apron PCI have remained satisfactory with an average weighted score of 76 and 73, respectively, while the average taxilane is rated as fair (PCI 67) a slight downward trend.

Aside from pavement condition, three other areas are critical: runway length, instrument approach procedures, and weather reporting capability. Runway length has grown in importance due to the State's newly upgraded fixed-wing medical fleet. To accommodate the new fleet of aircraft, longer runways are needed at some of Maine's airports (with the minimum between 3,600 and 4,000 feet). Longer runways increase capacity and allow some emergency-service aircraft to fly approaches and land in more inclement weather scenarios. Additionally, appropriate instrument approach procedures are necessary to provide critical access during normal

and adverse weather conditions. Obstructions, primarily trees in the approach and departure surface protected airspace, continue to plague the State's airports, resulting in increased instrument approach minimums and canceled night procedures. However, in the past four years, the number of airports with night instrument restrictions decreased by 31%, from 16 airports to 11. Next, the preflight knowledge of weather at the airport is critical. It has improved in recent years, helped in part by changes in AIP funding criteria. Now, 74% (26 airports) of the NPIAS airports have a weather reporting system, up from 63% (24 airports) in 2016. Finally, Maine's airport infrastructure has also improved through a growing percentage of the NPIAS airports that offer fuel service, 86% (30 airports) of up from 80% (28 airports) four years ago.

**FIGURE 2. STATEWIDE RUNWAY PCI RATINGS (2008-2018)**




## PUBLIC SAFETY

The ground transport challenges of roads in rural areas, coupled with Maine's aging population, drive the need for an advanced and reliable air medivac system. Air medical transport provides numerous advantages over ground transport, namely increased speed and maneuverability. Ground transport is limited by factors such as roads, road conditions, and traffic volume. As previously mentioned, the air medical transport industry in Maine upgraded its aircraft in the past two years to include fixed-wing airplanes, expanding public safety resources and services.

All but three NPIAS airports have fully compliant Runway Safety Areas, an improvement from five airports in 2016; all three are scheduled for compliance restoration this year. Runway safety areas include the surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway.

## CAPACITY

An airport's capacity is that of the weakest link an airport's chain: terminal airspace, runway system, taxiways, aircraft parking areas, terminal (passenger processing), and even airport access (access roads and car parks). Airports are an integrated transportation system. Each element of the system must balance from a movement and a capacity standpoint. The runway system is, in general, the element that limits airport capacity due to its function: enabling aircraft to land and take-off safely, with minimum delay. Conversely, too much capacity depletes resources and can restrict development. Through 2019, Maine's two largest airports, Portland International Jetport (PWM) and Bangor International Airport (BGR) were experiencing landmark capacity constraints involving security facilities and equipment, and aircraft boarding bridges. At the same time, Portland had a capacity restraint with public parking and inbound baggage processing. While the rapid downturn in airline operations in 2020 has temporarily alleviated this problem, the inevitable economic recovery will reverse this temporary trend. Other than the need to reconstruct Bangor's Runway 15-33 for routine maintenance purposes, neither PWM or BGR are experiencing airside capacity concerns, both currently and in the short-term. System-wide, Maine's airports do not have any notable air or landside capacity gaps.

## OPERATION AND MAINTENANCE

While the State has made progress maintaining airport pavement since 2008, the process is unending. Statistically, $1 spent on preventative maintenance early in the pavement life is equivalent to between $4 and $5 spent later in the pavement life. The maintenance program in Maine intends to keep the condition of the pavement high with the least amount of expenditures. For example, MaineDOT conducted a statewide pavement measurement project in 2018 and commissioned an Airport Pavement Management System report in 2019. And in 2020, which will extend into 2021, 10 airports will undergo extensive runway, taxiway, and apron reconstruction projects.

## INNOVATION AND RESILIENCE

Airports are innovating and embracing green initiatives more than ever to address compliance issues, reduce their environmental footprint, and increasingly as strategic components of the airports' long-term prosperity and success. Reaching sustainability standards is a challenge given the high demand for energy and other resources. Airports are also increasingly challenged through public demand, regulations, and the cost of operating efficiently. Sustainability Master Plans, such as the one PWM developed, fully integrate sustainability into the airport's long-range planning. Unfortunately, because of FAA funding priorities, few airports are eligible for the level of funding necessary for the effort it takes to develop such plans. However, many airports are installing LED lights, usually as part of an FAA funded runway reconstruction project. Integrating sustainability into airport infrastructure planning through the use of a rating system such as Envision® is a challenge given the system's high demand for energy and other resources.

During the 2017-2018 winter season, Portland International Jetport (Portland, ME) manufactured Type I Aircraft Deicing Fluid (ADF) on-site from 100% reclaimed glycols. Presently, all ADF sprayed on aircraft at PWM is from the reclaimed fluid. The Jetport is producing the first recycled aircraft ADF certified for resale in the country. Six airports send their used ADF to the Jetport for recycling, and seven purchase the recycled product for reuse.

In November 2019, Sanford-Seacoast Regional Airport broke ground on Maine's largest universal solar energy project, a 50-megawatt, 150,000 solar panel farm that, when completed in late 2020, is expected to be the most extensive solar array on an airport in the United States. Brunswick Executive Airport and the Portland International Jetport both feature solar systems as well. Across the State, six additional airports are planning new solar systems to increase local revenue to help offset operating and maintenance costs, improve system resilience by incorporating redundancy into the electric supply, and simultaneously improving the airport's environmental impact.

NextGen's Automatic Dependent Surveillance-Broadcast (ADS-B), which tracks aircraft more frequently and consistently than traditional radar, will improve air traffic control coverage over remote regions of the state. ADS-B is used to control traffic in areas where radar surveillance is limited, like remote northern Maine. This improved coverage would permit more direct routing that saves money and cuts aircraft exhaust emissions compared to flights using traditional non-radar routes.

## FUNDING AND FUTURE NEEDS

In October 2018, Congress passed the FAA Reauthorization Act. The bill reauthorized the FAA for five years, FY 2019-2023, at the cost of $97 billion and represented the most extended funding authorization period for FAA programs since 1982. The AIP, which provides grants to airports for airport safety, capacity, security, and environmental projects, is funded at $3.35 billion in mandatory funding for all five years. The AIP Congressional authorization levels will remain unchanged through the current period (2012-2023). Nevertheless, the cost of most infrastructure projects has climbed sharply, particularly in the past two years, with a strong economy and record low unemployment. AIP entitlement remains unrealistically low at $150,000 per general aviation and $1 million per commercial airport per year. Moreover, the Passenger Facility Charge (PFC) program is still fixed at $4.50 per enplaning and passthrough passengers. However, despite not increasing AIP authorization, Congress has included supplemental funding through annual appropriations, including $1 billion in FY2018, $500 million in FY2019, and $400 million in FY2020.

The FAA's five-year development cost projection for Maine's 35 NPIAS airports is $259.7 million (nearly $52 million per year or $1.5 million per airport). Realistically, these numbers are proposed based on several factors (master plan projections, the ongoing need for pavement repairs, airport wish lists, etc.). Since 2016 the FAA has provided $121 million in AIP funding, while the four commercial airports in the State of Maine have raised an additional $731 million in PFC. AIP funding since 2017 has averaged 41% higher than the previous three years, primarily because of an infusion of money for a runway extension at the Steven A. Bean Municipal Airport in 2018 (almost $12 million). The State's PFC revenue has remained virtually unchanged.

The unprecedented loss of airline and passenger revenue because of COVID-19 will cause a significant loss of PFC funding without federal intervention. As the industry looks to withstand the impacts of COVID-19, critical investments are needed to ensure economic stability. Both the Senate and the House passed the Coronavirus Aid, Relief, and Economic Security Act (CARES Act) (H.R. 748), which included nearly $10.2 billion for the aviation infrastructure and an additional $46 billion in new loans and loan guarantees for passenger and air cargo air carriers and other businesses critical to national security.

While the State has met its obligations, overall investment needs remain underfunded. The short-term estimated development costs fall well short of potential AIP funding. For the airports that depend on PFC, the $4.50 cap is incredibly short of needs. PWM is still looking for PFC to fund a Federal Inspection Services facility and boarding bridge replacements. Likewise, BGR also needs PFC funds for similar landside projects and need an enormous cash infusion from FAA discretionary funding for a runway reconstruction project in 2023-2024. The termination of the State's 50/50 grant program circa 2000 placed a greater financial burden on local communities.


# RECOMMENDATIONS TO RAISE THE GRADE

**Maine ASCE recommends the following measures:**

- **Congress must eliminate the PFC funding cap of $4.50 per passenger. This would permit airports to generate more revenue at the local level to help fund projects;**
- **Continue to strive for improved compliance with each of the elements addressed in this report card (Pavement Condition, Medical Access, Weather Reporting, Obstructions, and Instrument Procedures);**
- **Increase in State (MaineDOT) Share Funding and reinstatement of the State only 50/50 project funding on FAA ineligible projects.**
- **Increase AIP entitlement funding, index to inflation, for both primary and non-primary airports consistent with inflation over the past 10 years, and return to 95% federal funding; and**
- **Expand the NextGen system encompassing the planning and implementation of new airspace technologies, particularly the expanded use of ADS-B to control traffic in northern and far eastern Maine, where radar surveillance is limited.**


# SOURCES

Airnav (http://airnav.com/airports/us/ME)

FAA 2019-2023 NPIAS Report (https://www.faa.gov/airports/planning_capacity/npias/reports/)

MaineDOT Airport Pavement Management System, Pavement Summary Report (2019).

FAA Airport Obligations: Pavement Maintenance (https://www.faa.gov/airports/central/airport_compliance/pavement_maintenance/)

Steenholf, T. C., & Zohn, S. F. (2019, February 25). EMS, Air Medical Transport. Retrieved April 7, 2020, from https://www.ncbi.nlm.nih.gov/books/NBK482358/

H.R. 302 (P.L. 115-254), the FAA Reauthorization Act of 2018

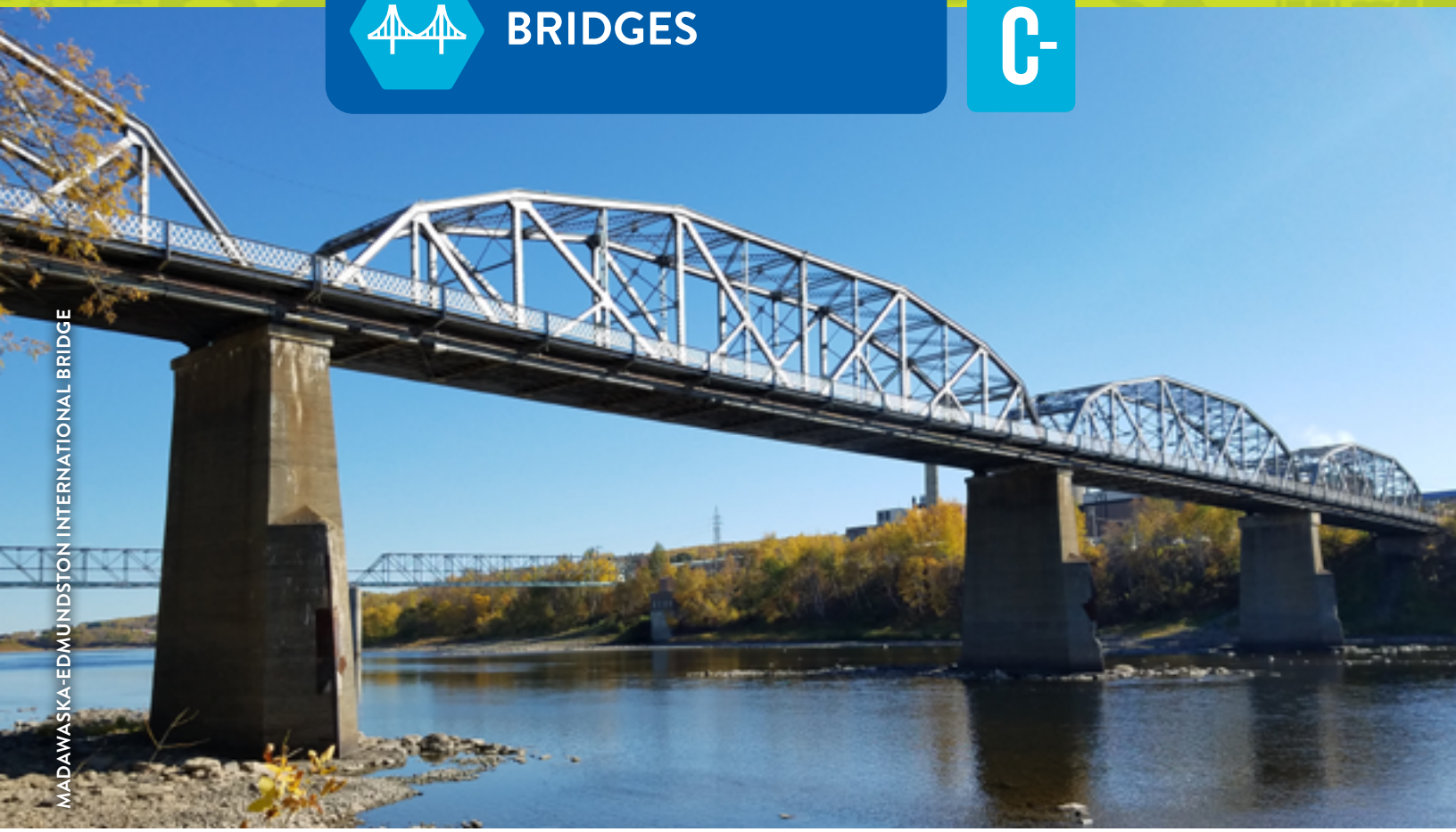
Miller, Benjamin M., Debra Knopman, Liisa Ecola, Brian Phillips, Moon Kim, Nathaniel Edenfield, Daniel chwam, and Diogo Prosdocimi, U.S. Airport Infrastructure Funding and Financing: Issues and Policy Options Pursuant to Section 122 of the 2018 Federal Aviation Administration Reauthorization Act. Santa Monica, CA: RAND Corporation, 2020. https://www.rand.org/pubs/research_reports/RR3175.html. Also available in print form.

Coronavirus Aid, Relief, and Economic Security Act of 2020 (S.3548)

Brady, J. (2020, March 24). Congress Looks to Protect Aviation Infrastructure During COVID-19. ASCE 2017 Infrastructure Report Card. https://www.infrastructurereportcard.org/congress-looks-to-protect-aviation-infrastructure-during-covid-19/

# BRIDGES

C-



MADAWASKA-EDMUNDSTON INTERNATIONAL BRIDGE

## BRIDGES
GRADE: C-

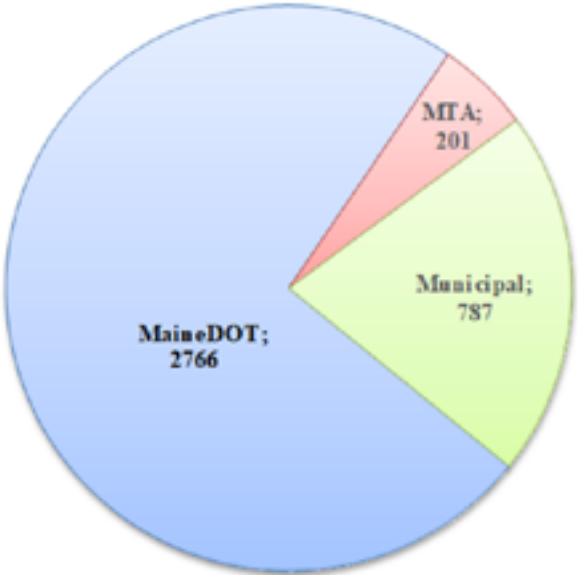
## EXECUTIVE SUMMARY

Maine's highway system includes a total of 3,754 bridges, 58% of which are more than 50 years old. Historic funding levels have not been sufficient to replace bridges before they exceed their expected design life and nearly one out of every seven Maine bridges (13%) is structurally deficient. Accordingly, MaineDOT's current 3-year work plan includes a continued emphasis on bridge maintenance and preservation projects. The number of structurally deficient bridges in Maine has been improving gradually over the past several years. While public support for transportation spending in Maine remains strong, achieving and sustaining long-term improvements requires a comprehensive strategy to address the $68 million shortfall in annual funding needed for Maine bridges.

## BACKGROUND

Maine's highway system includes 3,754 bridges at least 10 feet in length. Of these bridges, 2,461 are greater than 20 feet in length (2019 data). Bridges are owned by the Maine Department of Transportation (MaineDOT), the Maine Turnpike Authority (MTA), and municipalities as shown in Figure 1.

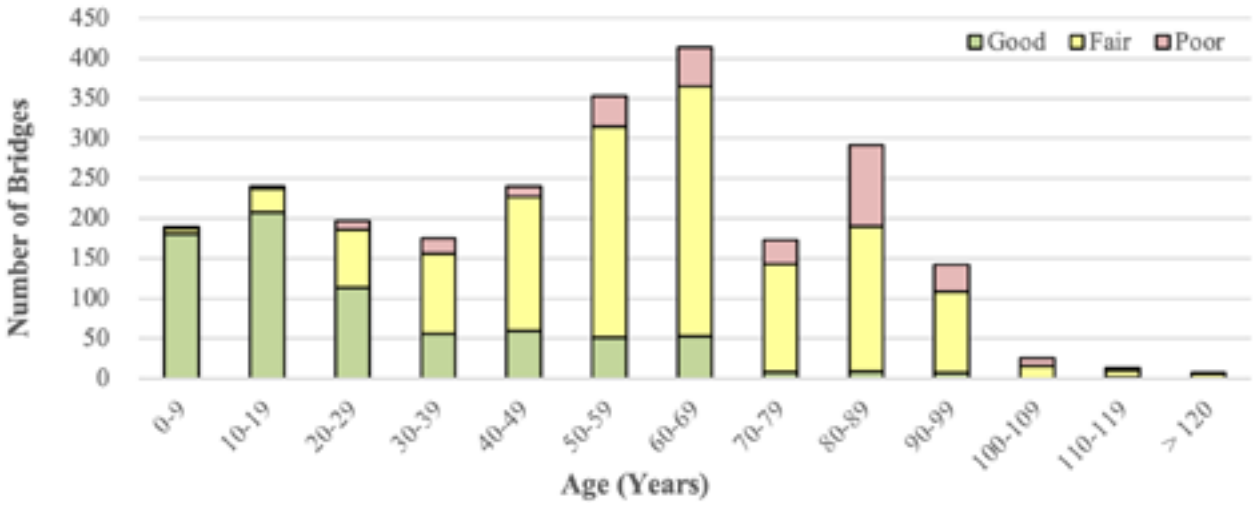
**FIGURE 1: MAINE BRIDGES BY OWNER (2019)**




According to MaineDOT data, nearly three in five Maine bridges were constructed more than 50 years ago with one in five constructed at least 80 years ago. Many of these bridges were designed to last 50 years before requiring significant repair or replacement. Historic bridge funding levels have not allowed Maine bridges to be significantly repaired or replaced before reaching the end of their design life. The age and condition of Maine's bridges is summarized in Figure 2. The figure illustrates the challenge created by the historic funding shortfall – a large group of aging bridges in fair condition that are on the cusp of deteriorating into poor condition. The number of bridges transitioning from fair to poor condition each year is expected to increase over time. Current funding levels will not be sufficient to keep pace in the long-term.

TICONIC BRIDGE CONNECTING WATERVILLE AND WINSLOW

FIGURE 2: MAINE BRIDGES BY AGE AND CONDITION (2019)




In terms of route importance, Maine's bridge inventory includes 520 bridges within the National Highway System (NHS). The NHS includes the Interstate Highway System, as well as other roads vital to the nation's economy, defense and mobility.

## CONDITION AND CAPACITY

All Maine bridges are regularly inspected in accordance with the Federal Highway Administration's (FHWA) National Bridge Inspection Standards (NBIS). MaineDOT inspects most state and municipal bridges every two years. MTA bridges are inspected annually. This inspection data includes an assessment of bridge condition and is the basis for this report's evaluation of the state's bridge condition.[1]

As of 2017, FHWA now requires all bridges be assessed on a good, fair, and poor condition rating scale based on the results of each bridge inspection. Bridges with major structural components that receive a condition rating of "poor" or worse are classified as structurally deficient.

*Structurally Deficient (SD):* A bridge is structurally deficient if there is significant deterioration of the bridge deck, superstructure, substructure or other major components. Although bridges classified as structurally deficient are safe for continued use, the bridge may be posted for lower weight limits, or closed, if conditions warrant such action. Structurally deficient bridges are typically prioritized for rehabilitation or replacement.

FHWA only compiles condition data for bridges that are 20 feet or more in length. Therefore, when in this report Maine bridge data is compared to regional or national averages, only these longer structures are considered.

A breakdown of Maine bridges classified as structurally deficient in 2019 is shown in Table 1. Bridge condition data for New England and the nation are included for comparison. The data shows Maine's bridge inventory includes significantly more structurally deficient bridges compared to the national average.

### TABLE 1: MAINE BRIDGES BY CONDITION (2019)

**Bridges** (Spans ≥ 20 Feet)

| Owner | Bridges by Count (Ea.) | | | Bridges by Deck Area (Sq. Ft.) | | |
|---|---|---|---|---|---|---|
| | Total | Structurally Deficient | % | Total | Structurally Deficient | % |
| Maine | 2,461 | 314 | 13% | 1,265,300 | 94,219 | 7% |
| New England | 18,129 | 1,513 | 8% | 11,724,614 | 1,221,649 | 10% |
| United States | 617,084 | 46,163 | 7% | 393,265,002 | 21,445,669 | 5% |

Approximately one in seven – 13% – Maine bridges are structurally deficient. According to The Road Information Program (TRIP), a non-profit national transportation research group, "Deteriorated bridges can have a significant impact on daily life. Restrictions on vehicle weight may cause many vehicles – especially emergency vehicles, commercial trucks, school buses and farm equipment – to use alternate routes to avoid weight-restricted bridges. Redirected trips also lengthen travel time, waste fuel and reduce the efficiency of the local economy".[2]

Figures 3a and 3b compare trends in the condition of Maine bridges to regional and national averages. Maine continues to have larger percentages of structurally deficient bridges when compared to the nation. Since 2016, Maine has realized a 1% reduction in the number of structurally deficient bridges, and a 1% reduction in the total deck area of structurally deficient bridges, in its inventory. These improvements have occurred despite limited funding, demonstrating MaineDOT's increased focus on addressing the most heavily deteriorated bridges in its inventory. However, these improvements are not sustainable with current funding levels. Too many bridges will become structurally deficient in the future, outpacing available funding.

### FIGURE 3A: STRUCTURALLY DEFICIENT BRIDGES (COUNT % OF TOTAL) - COMPARISON OF MAINE, NEW ENGLAND, & UNITED STATES

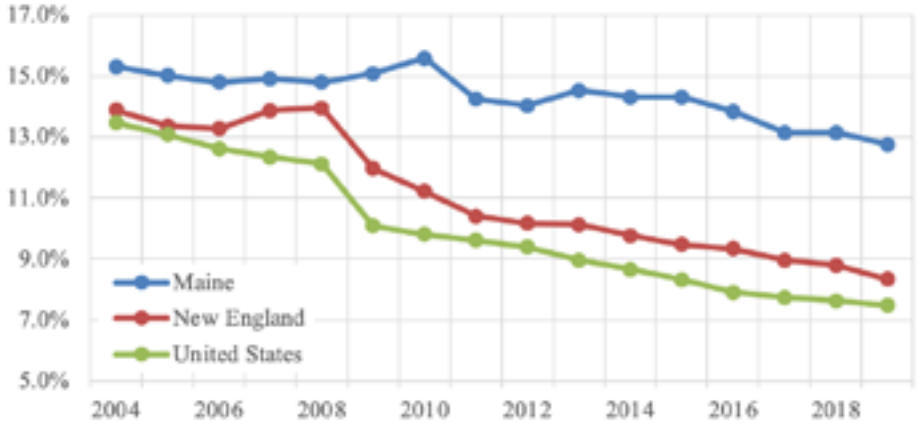
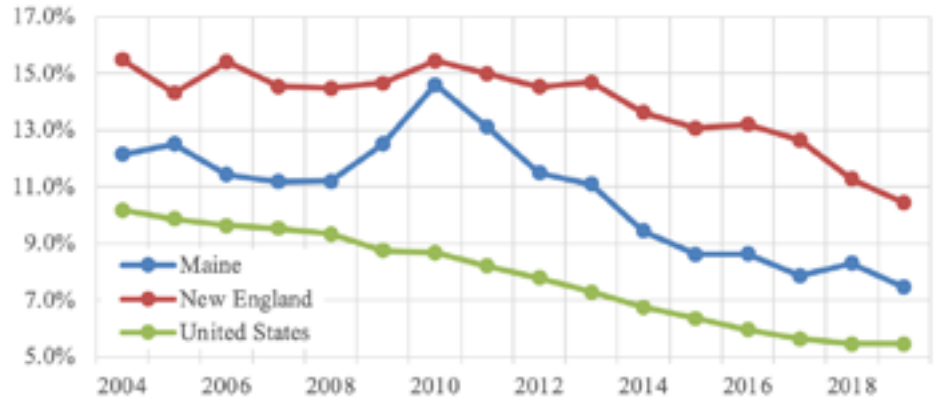


FIGURE 3B: STRUCTURALLY DEFICIENT BRIDGES (DECK AREA % OF TOTAL) - COMPARISON OF MAINE, NEW ENGLAND, & UNITED STATES




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 4% of Maine's NHS bridges are structurally deficient compared to the average of 7% for all Maine bridges. The smaller percentage of deficient bridges on Maine's NHS roadways indicate Maine's bridge owners have been successful prioritizing the maintenance and replacement of our state's most critical structures.

## 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 lifecycle costs.

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 structurally deficient bridges from the MTA's inventory. With these significant improvements achieved, the Authority's focus is transitioning to maintaining its bridges in a state of good repair.

## RESILIENCE, INNOVATION, AND PUBLIC SAFETY

Maine bridge owners have been using innovative strategies and technologies to minimize project impacts on the public and the environment, and to maximize the return on their infrastructure investments. FHWA's Strategic Highway Research Program, and their Every Day Counts initiative, has been coordinating and supporting many of these state-based efforts to shorten the project completion process and increase use of proven, innovative practices.

Accelerated Bridge Construction (ABC) methods are being used on projects throughout Maine to reduce construction duration and traffic disruptions. Other innovations, such as composite bridge drains, hybrid composite bridge girder systems, corrosion-resistant steel and improved coatings, and geosynthetic reinforced soil-integrated bridge systems have been used to deliver low-cost durable bridge solutions that can be built quickly and cost effectively while also extending the service life of new bridges to 100-years or more. These innovations, and numerous others, benefit the travelling public and the state's infrastructure. Maine ASCE encourages bridge owners to continue this strategic approach to sustainability and innovation.

Additionally, MaineDOT has issued updated design guidance with infrastructure resiliency in mind. For instance, increased emphasis is placed on the potential for sea level rise during the design of coastal bridges, and for larger and more frequent storm events.

## FUNDING AND FUTURE NEED

MaineDOT's Three-Year Work Plan, 2020 Edition issued January 14, 2020[3], notes that "The needs of the transportation system in Maine continue to outpace available resources. Maine's large land area, relatively low population, high number of state highway miles, and high construction inflation have all exacerbated the extent of this challenge for Maine." The challenge of inadequate resources was particularly acute in 2019. Lower levels of capital project production due to higher costs required MaineDOT to prioritize even more, rely on less reliable bond and competitive federal grant funding for basic needs, and essentially spread what should be two years of capital projects over three years.

According to MaineDOT's Three-Year Work Plan, the projected annual bridge funding need is $188 million, compared to current anticipated annual funding levels of $120 million. The resulting $68 million annual shortfall means MaineDOT receives only $2 out of every $3 needed to maintain the state's bridge inventory in good condition. Additionally, according to MaineDOT's current 3-year workplan, "Competitive USDOT discretionary grant programs have become a critical component of the fiscal foundation that supports basic transportation needs in Maine. The awarded grants and future successful applications are an assumed portion of the funding" of many projects in the current workplan.

The funding shortfalls included herein were reported by the Blue Ribbon Commission in early 2020 prior to the onset of the COVID-19 pandemic. Reduced gas tax and motor vehicle revenues resulting from the pandemic are expected to add to these shortfalls.

Maine has acknowledged the transportation infrastructure funding problem and taken the first steps to address it. The Legislature, with the support of the Governor, established the Blue-Ribbon Commission to Study and Recommend Funding Solutions for the State's Transportation Systems. This bipartisan Commission of legislators, transportation professionals, and stakeholders was charged with studying how to reform and adequately supplement funding for the state's transportation infrastructure. Although no definitive actions have resulted from the committee yet, its formation is a step in the right direction towards solving Maine's long-term transportation funding challenge.

For more than a decade, Maine has used bonds to fund a significant portion of its transportation budget. In July 2020 Maine voters approved an $105 million bond referendum for transportation infrastructure improvements with $90 million designated for road and bridge projects. The bond measure passed by an overwhelming 3:1 margin, demonstrating the value Maine voters place on transportation infrastructure. While the issuance of bonds is a valuable tool, they do not provide a steady, predictable and sustainable source of transportation funding around which major improvements in transportation can be achieved. Additionally, no significant increases in federal funding levels are anticipated. Unless action is taken to secure additional financing, the overall condition of Maine's bridges is in jeopardy.

Funding for bridges in the MTA's 4-year capital improvement program[4] includes an average of approximately $11.3 million per year in 2020-2023. This level of funding is expected to be sufficient to maintain their bridges in a state of good repair. Toll revenue prior to the COVID 19 pandemic was projected to be sufficient to fully fund the MTA's capital bridge program. The MTA is monitoring the revenue impact resulting from reduced travel and plans to assess the need and opportunity for additional bonding if the need arises.


# RECOMMENDATIONS TO RAISE THE GRADE

**For the continued safety of our bridges, Maine ASCE recommends:**

- **Increase bridge funding for MaineDOT by a minimum of $68 million each year, to at least $188 million total annually, the minimum funding level established by MaineDOT to maintain our bridges in a state of good repair;**
- **Maximize existing sources and secure additional sources of funding as current MaineDOT funding levels will not suffice over time. Increase fuel tax revenues, state general fund bonds, tolls, and car registration and title fees while exploring possible revenues from vehicle miles traveled (VMT) mechanisms and General Fund sources;**
- **Continue a systematic approach to bonding;**
- **Fully fund MaineDOT's bridge maintenance and capital improvement programs to meet established goals;**
- **Establish a state funding mechanism for municipal bridges and encourage municipalities to establish capital reserve funds for the repair of important municipally-owned bridges. MaineDOT should help municipal bridge owners understand and plan for the investment needs of these structures;**
- **Maintain a healthy blend of maintenance, preservation and capital improvement work; and**
- **Continue to invest in design and construction innovations that will allow MaineDOT to deliver projects more cost-effectively and to extend bridge service life.**

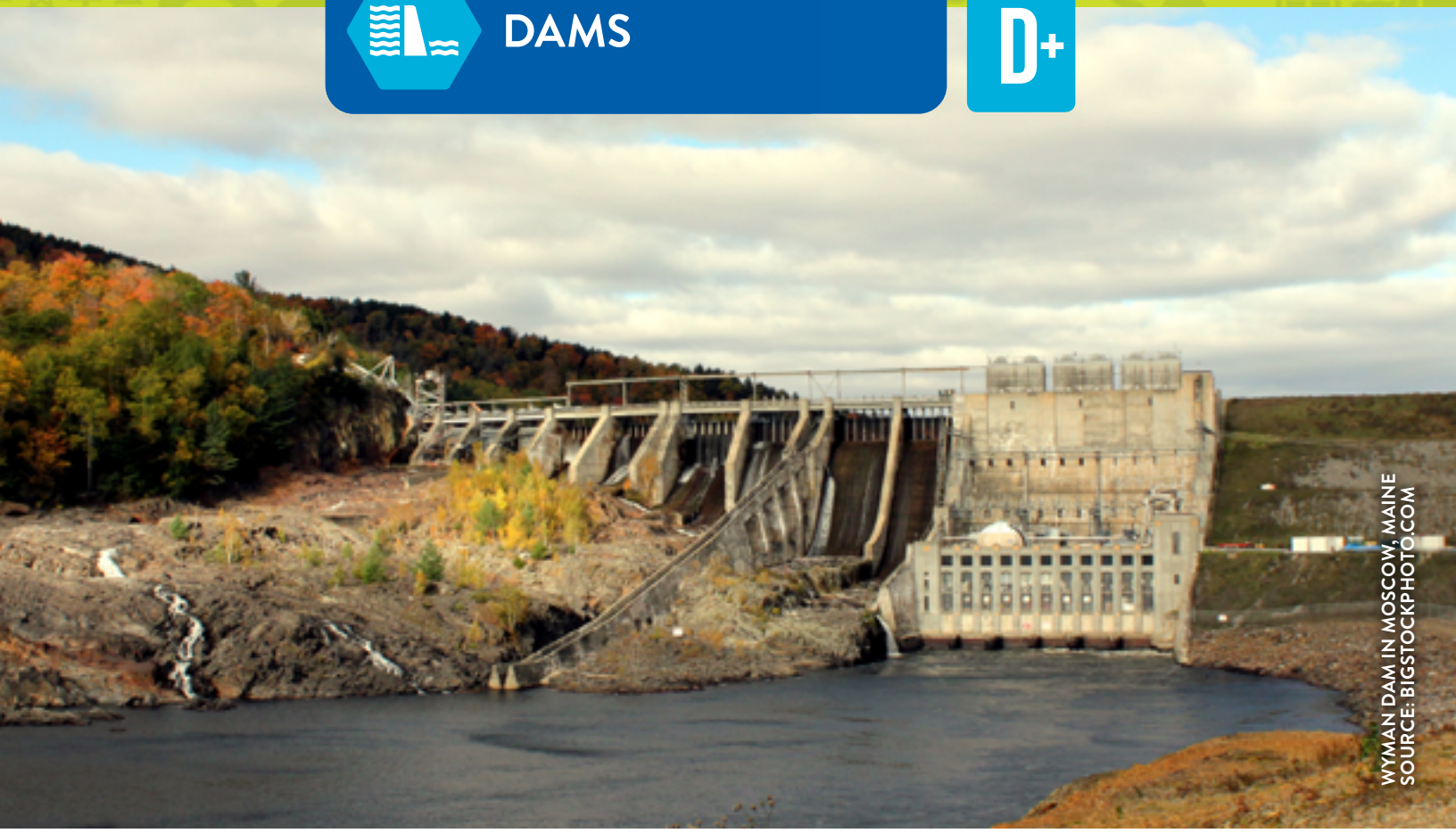

# SOURCES

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

1. FHWA, Bridges & Structures Website, National Bridge Inventory, 2019 inspection data by owner (https://www.fhwa.dot.gov/bridge/nbi.cfm)
2. "Preserving Maine's Bridges: The Condition and Funding Needs of Maine's Aging Bridge System", TRIP, November 2017
3. "MaineDOT Three Year Work Plan, 2020 Edition", MaineDOT, January 14, 2020
4. "4-year Capital Investment Plan (2020-2023)", Maine Turnpike Authority, December 19, 2019

# DAMS

D+



WYMAN DAM IN MOSCOW, MAINE
SOURCE: BIGSTOCKPHOTO.COM

## DAMS
GRADE: D+

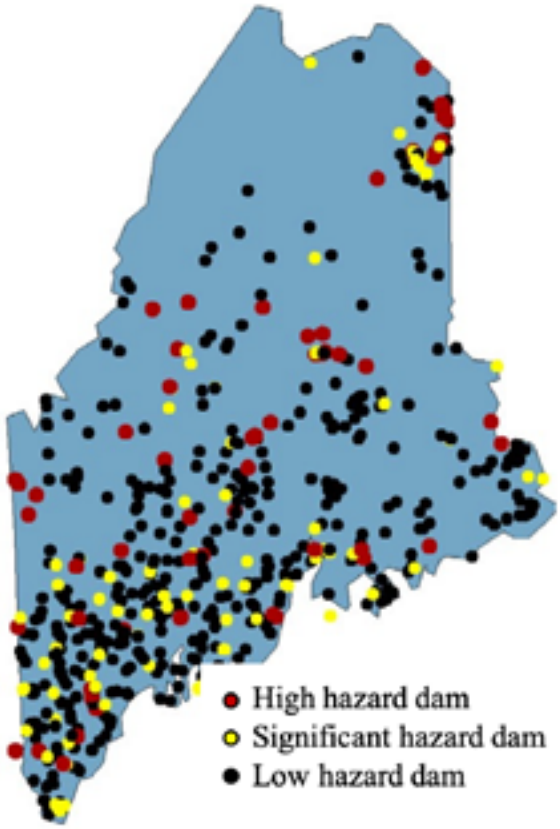
## EXECUTIVE SUMMARY

The Maine Dam Safety Program (MDSP) has identified 1,073 dams in Maine that have an average age of 104 years; additional dams exist but are not registered. 148 of Maine's registered dams are classified as significant- and high-hazard potential dams, meaning failure would result in considerable damage and/or loss of life. Nearly 100% of such dams have emergency actions plans, exceeding the national average of 81%. Maintaining and improving Maine's dams continues to be limited by funding; the MDSP receives less funding than the national average and other New England states, limiting the capacity of the program. Available loan programs are under-utilized and grant opportunities are insufficient to address the nearly $269 million investment needed to adequately maintain Maine's dam infrastructure.

## BACKGROUND

Dams are artificial barriers built across rivers or streams to impound or divert water. In Maine, dams are operated for a variety of purposes but hydropower, fish and wildlife management, and flood control are the most often-cited[1]. There are 1,073 dams in Maine (Figure 1) currently known to the Maine Emergency Management Agency (MEMA)[2]. These dams range from non-engineered 19th-century mill dams to highly engineered hydropower facilities. Nearly half of Maine's dams are privately owned (48%); the remaining dams are owned by utilities (6%), federal (8%), state (12%), or local (26%) entities[3].

**FIGURE 1:**
**HAZARD POTENTIAL OF MAINE'S DAMS[3]**




Although MEMA records identify 1,073 dams in Maine, the true number of dams is unknown as a state statute requiring registration of dams was repealed in 1993[4]. It should also be noted that the 1,073 dams identified by MEMA differ from the 581 dams identified in the US Army Corps of Engineers' National Inventory of Dams[1] (NID) as complete information for all MEMA-cataloged dams has not yet been uploaded to the NID and MEMA also catalogs non-jurisdictional dams which the NID does not catalog[1,3]. Of the 1,073 dams cataloged by MEMA, 714 are subject to regulation based on their height and storage volume. Such dams are either 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)[2,5].

Dams in Maine are regulated by several agencies including MEMA, the Federal Energy Regulatory Commission (FERC), and the International Joint Commission (IJC)[3]. Most hydropower facilities are regulated by FERC or the IJC. MEMA regulates the remaining dams that meet size criteria for regulation. The safety requirements for dams vary based on the hazard potential of the dam which is the characterization of the dam based on possible adverse consequences if the dam were to fail or be misoperated[2]. Most Maine dams are low-hazard dams, but 148 are significant- and high-hazard potential dams in which possible failure would result in significant damages or loss of life (Table 1, Figure 1)[3].

**TABLE 1. SUMMARY OF MAINE STATE DAMS BY HAZARD POTENTIAL AND REGULATORY AUTHORITY[3]**

| Hazard Potential | Number of Dams Regulated | | |
|---|---|---|---|
| | By MEMA | By FERC / IJC | Total |
| Non-Jurisdictional | 338[a] | - | 338 |
| Not Yet Classified | 11 | - | 11 |
| Low [b] | 455 | 121 | 576 |
| Significant [c] | 72 | 9 | 81 |
| High [d] | 32 | 35 | 67 |
| **Total** | **908** | **165** | **1,073** |

[a] Dams registered with MEMA which are exempt from regulation

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

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

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

## CONDITION

The average Maine dam is 104 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. Of the 150 significant- and high-hazard potential dams for which condition ratings were available in 2016 (noting there are now 148 such dams in 2020), approximately 50% were in fair or unsatisfactory condition (Table 2)[6]. As regular inspection of low-hazard dams is not required under Maine law (only verification of their hazard potential once every 12 years)[5] the 455 MEMA-regulated low-hazard dams receive little attention and, presumably, are in worse condition than significant- and high-hazard potential dams[3]. As low-hazard dams by definition pose low risk to public safety, infrastructure, or private property, regulatory attention to low-hazard dams is usually the result of "Good Samaritan calls of concern" from the general public[3]. In general, the condition of Maine dams is correlated to their ability to generate revenues for their owners: most FERC-regulated dams that generate hydropower (and therefore revenue) are in satisfactory condition whereas most non-hydropower dams are in fair or unsatisfactory condition[3].

**TABLE 2 SUMMARY CONDITION OF MEMA-REGULATED DAMS[6]**

| Hazard Potential | Assessed Condition | | | |
|---|---|---|---|---|
| | Satisfactory | Fair | Unsatisfactory | Total |
| Low | Not Assessed | Not Assessed | Not Assessed | None Assessed |
| Significant | 32 (38%) | 25 (29%) | 28 (33%) | 85 |
| High | 42 (65%) | 17 (26%) | 6 (9%) | 65 |
| **Total** | **74 (49%)** | **42 (28%)** | **34 (23%)** | **150** |

## PUBLIC SAFETY

Maine laws require owners of all significant- and high-hazard potential dams in Maine to prepare Emergency Action Plans (EAPs) for their dams[5]. 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 providing direct support to dam owners in some cases, MEMA has overseen nearly 100% compliance of significant- and high-hazard potential dams having active EAPs, outperforming the national average of 81%[7]. MEMA has also invested significant effort to make sure EAPs are "living documents" that are reviewed and practiced with emergency responders and municipal officials: MEMA completed 11 such tabletop exercises to rehearse EAPs in 2019[3].

Unregistered and non-jurisdictional dams pose another threat to public safety as their prevalence, location, hazard potential, and condition are unknown. Per an informal database maintained by MEMA, there are hundreds of unregistered dams in Maine[8]. In one relevant example, Meserve Dam, an unregistered dam which failed in 2010, caused over $100,000 in damages[8]. In addition, non-jurisdictional dams, which may not pose significant hazards if they were to collapse, pose other hazards such as creating dangerous re-circulating currents that result in drownings.

## OPERATION AND MAINTENANCE

In Maine, the regular inspection and hazard potential rating of dams is the responsibility of regulatory agencies (usually MEMA or FERC). Inspection requirements for dams vary by regulatory agency, but for those dams regulated by MEMA the inspection requirements were reduced by the Maine legislature in 2013 in response to inadequate state funding for MEMA to maintain staffing levels necessary to complete the previously mandated inspection frequencies. Since 2013, significant- and high-hazard dams potential are inspected once every six years and inspection of low-hazard potential dams is limited to confirming their hazard potential once every 12 years; no inspection of the condition of low-hazard potential dams is required by law.

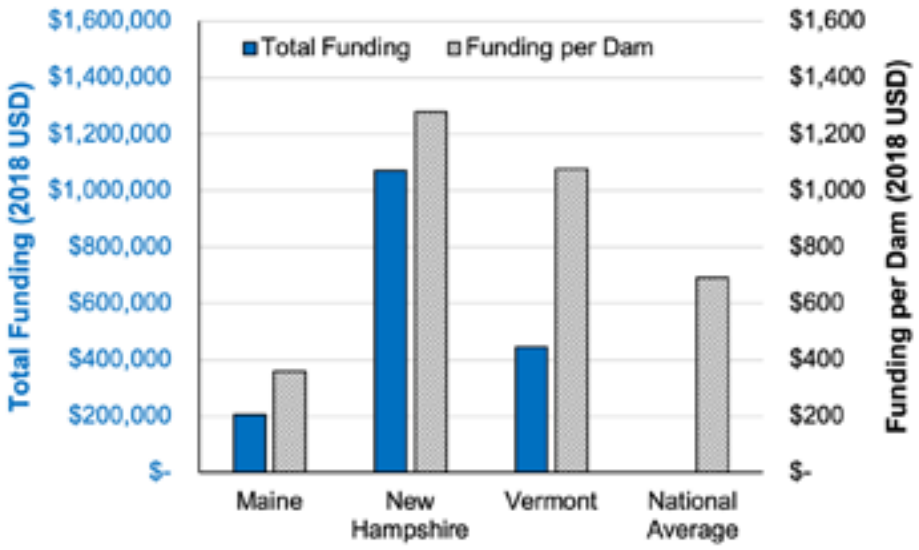
The operation, maintenance, and repair of dams in Maine is the responsibility of the dam's owner[5]. However, most owners of non-revenue producing dams lack the financial resources for maintenance of their dams and such dams have historically declined until failure[3]. Furthermore, the authority of MEMA to order maintenance, upgrades, or repairs to decrease risk is limited to those situations where the dam hazard constitutes an emergency threatening life or property[3,5]. MEMA does not have the authority to order risk reduction actions or "best practices" where those actions do not directly reduce the risk of an imminent threat to life and property.

## FUNDING

MEMA's Maine Dam Safety Program (MDSP) receives less funding than other New England states with similar authorities (Figure 2)[7] despite having a significantly larger geographic area (thus requiring additional travel time) for which they are responsible. The funding for the MDSP is also less than the national average. In contrast to many other states that defer the responsibility for dam inspections to the owners which allows their dam safety staff to focus on administering the state's dam safety program and working with dam owners to implement maintenance and repairs, the MDSP is also responsible for inspecting all non-FERC regulated dams in Maine.

The current level of funding limits the capacity of the MDSP to inspect dams, identify and mitigate potential risks to public safety, and administer Maine's dam safety program. While the MDSP has been efficient in using available funding to improve dam safety in the state, their efforts, by necessity, have been focused on meeting regulatory requirements and focusing on "problem dams" that pose the most imminent and significant risk to the public. Additional staff and funding would be necessary to improve dam safety by inventorying unregistered dams (some of which are effectively abandoned and do not have an apparent owner), more frequent and thorough inspections of regulated dams, and improvement of EAPs.

**FIGURE 2. TOTAL FUNDING AND FUNDING PER DAM IN MAINE, NEW HAMPSHIRE, AND VERMONT[7]**




Public funding for dam safety in Maine is significantly less than the national average and peer states New Hampshire and Vermont, whose dam safety staff are also responsible for dam safety inspections. In comparison to Vermont and New Hampshire, Maine has more dams spread over a larger area, requiring additional travel cost per dam.

As noted previously, dam owners of non-revenue producing dams generally lack the resources necessary to maintain their dams[3]. To help owners fund dam improvements, in 2011 Maine established 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[5]. The *Drinking Water State Revolving Fund* also provides low-interest loans for the removal or repair of dams. However, both loan programs are under-utilized for dam safety as dam owners have so far been reluctant to take on debt, even in the form of low interest loans[3]. Federal grant funding is also available through the *Water Infrastructure Improvements for the Nation Act (WIIN Act)*. Section 5006 of the WIIN Act provided funds, which were appropriated in 2019, for the removal, repair, or rehabilitation of non-Federal high-hazard dams. Currently, 16 dams in Maine are eligible to apply for this grant. However, only $10 million was appropriated nationwide for the hundreds, and potentially thousands, of qualifying dams. While the grant program is expected to be highly competitive one-third of dedicated funding is to be distributed equally to all states that submit applications.

## FUTURE NEED

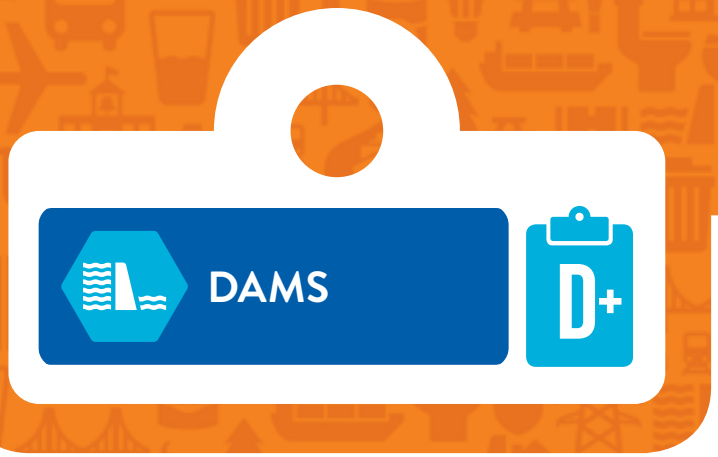
In 2019, the Association of State Dam Safety Officials (ASDSO) estimated the cost of repairing Maine's non-Federal dams to be $239 million[9]. An additional $30 million would be needed to repair Maine's 24 federally-owned dams based on the national average cost of $1.25 million estimated by ASDSO to repair a Federal dam[1,9]. However, some dams that no longer serve their purpose might more cost-effectively be removed. As Federal funding is insufficient to address these deficiencies, and state-administered loans would still require long-term owner financing, the cost for these repairs are currently anticipated to fall upon the dam owners. Private or governmental, few Maine dam owners have the financial resources to proactively maintain or repair their dams[3]. As such, owner investment towards repair of Maine's dams is anticipated to fall short of that estimated by ASDSO. To order and oversee owner-led adjudication of non-emergency dam deficiencies, MDSP would require both additional authority and funding like dam safety programs in other Northeast states such as Massachusetts, Connecticut, and New York.

Beyond funding needs, the Association of State Dam Safety Officials (ASDSO) *Model Dam Safety Program* provides a resource that can be used to develop funding and legislative priorities to address current shortfalls. While Maine received a 100% rating for EAP compliance which demonstrates its success in identifying and mitigating dam safety threats to public safety through the development and practice of EAPs, Maine's overall compliance with the ASDSO's *Model Dam Safety Program* was 56% compared to the national average of 79%. Poorly ranked categories provide areas for improvement and included inspection (18%), permitting (8%), public relations (17%), and legislation (58%)[7].

An additional dam safety challenge in Maine is conflicts between state permitting programs. Although MEMA is responsible for dam safety, the Maine Department of Environmental Protection (Maine DEP) is responsible for most activities occurring within or near waters of the state which are usually adjacent to a dam. Maine DEP responsibilities include the regulation of water levels behind the dam. Conflicts exist between the two agencies' policies and include different definitions of a dam (Maine DEP defines a dam as any structure two feet or taller) that leaves owners unsure of their legal obligations for the structure[3]. Maine DEP regulations and permitting processes which prioritize conservation of natural processes and life near regulated waterbodies can complicate proactive owner efforts to perform maintenance activities on dams. For example, DEP regulations can complicate or prevent the removal of harmful vegetation on a dam which can create pathways for water to seep through the dam and threaten its stability[3]. However, recent coordination between MEMA, DEP, and other state agencies have successfully coordinated information sharing and reduced the frequency of redundant inspections.

## INNOVATION AND 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, Maine, along with other New England states, is investigating the adoption of risk-based concepts that consider the benefits of avoiding downstream impacts against the cost of improvements. These concepts will tailor the design of dam safety improvements to the unique risks posed by each dam, rather than prescriptive standards that are uniformly applied to all dams regardless of their unique conditions. In addition, Maine, along with other New England states, is jointly considering cost-sharing a Probable Maximum Precipitation Study for New England that can provide improved estimates of design floods, project climate change impacts, and more accurately design dam infrastructure for the needs of today and tomorrow.




# RECOMMENDATIONS TO RAISE THE GRADE

**Maine ASCE makes the following recommendations:**

- **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;**
- **Educate dam owners and nearby residents in order to achieve dam registration goals and improve owner and resident understanding of the responsibilities and risks of owning and/or living near a dam;**
- **Continue efforts to coordinate regulatory authorities and policies between state entities to reduce regulatory conflicts, coordinate oversight of dams, reduce redundancies, and promote sensible dam safety actions while protecting the environment and general public;**
- **The Maine state legislature should increase the funding for the Maine Dam Safety Program to $850,000 annually to achieve a funding-per-dam comparable to New Hampshire and Vermont; the Maine state legislature should 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;**
- **To reduce travel time and increase the time available for other responsibilities, establish multiple zones for the Maine Dam Safety Program, each with its own State Dam Inspector responsible for dam safety in that zone; and,**
- **Develop a long-term strategic program and plan that includes: identifying possible funding sources; addressing the need and/or feasibility to investigate, repair, upgrade, operate, or remove aging state, municipal, and privately-owned dams; and increasing accountability of dam owners.**


# SOURCES

1. US Army of Engineers (USACE), National Inventory of Dams, Accessed February 12, 2020.
2. Maine Emergency Management Agency (MEMA), Maine Dam Safety Program, Accessed February 12, 2020.
3. Maine Emergency Management Agency (MEMA) State Dam Inspector (SDI), March and September 2020.
4. Maine Revised Statutes, Title 38, Chapter 5, Subchapter 1 "Mills and Dams"
5. Maine Revised Statutes, Title 37-B, Chapter 24 "Dam Safety"
6. Maine Emergency Management Agency (MEMA), Maine Dam Safety Program Progress Report #4 for the FEMA Grants Program Directorate
7. Association of State Dam Safety Officials (ASDSO) Dam Safety Performance Reports for Maine, New Hampshire, and Vermont, 2018.
8. Maine Emergency Management Agency (MEMA) State Dam Inspector (SDI), August 2016.
9. Association of State Dam Safety Officials (ASDSO) The Cost of Rehabilitating our Nation's Dams, December 2002, Updated 2019

WATER MAIN BREAK 2019, AUBURN

# DRINKING WATER
GRADE: C

## EXECUTIVE SUMMARY

An estimated two-thirds of Maine residents are served by 158 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. This is largely due to project funding needs exceeding the resources available at federal and state-levels. The Drinking Water Program estimates $59 million per year is needed over the next 20 years for drinking water infrastructure projects which equates to an annual $31 million shortfall in funding need. Presently 45% of applicants, including many disadvantaged systems, are still unable to access competitive state funds.

## BACKGROUND

In Maine, 158 public water systems are either a municipal water department, a separate water district, or a privately-owned water company and collectively provide drinking water to two-thirds of Maine's residents. All three organization types charge user rates and are regulated by the Maine Public Utilities Commission (PUC). As of 2020, Maine had approximately 1,892 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 158 systems regulated by the PUC. This report does not pertain to non-PUC regulated systems or the private wells used by many of Maine's residents.


**Public Water Systems With Violations:** Overall, the number of public water systems receiving violations has decreased over the past ten years. Non-health-based violations remain a high percentage of the total violations.

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 United States Environmental Protection Agency (EPA) National Primary Drinking Water Standards.

## CONDITION AND CAPACITY

No systems are known to have significant violations of the Safe Drinking Water Act. Most systems are in full compliance and provide high quality water to customers. No uncovered storage tanks or unprotected unfiltered surface water systems remain. The condition of drinking water infrastructure has a direct correlation to the quality of water received by the public. The graph to right shows more than a 20 percent decrease in the number of violations issued to Maine public water systems between 2009 and 2018 and is based on data furnished by DWP.

A well-maintained public drinking water infrastructure is critical for public health and strong businesses. Note that non-health related violations include timely, accurate record keeping and reporting requirements. Maine has a sufficient supply of water and has not experienced shortages even with the past very dry summer with a nearly normal influx of seasonal visitors.

Two large treatment plants that serve approximately 57,000 customers are currently entering into construction with projected costs approaching $85 Million. This is a significant investment in replacing aging drinking water treatment infrastructure that is expected to be completed by 2025:

**PHOTO COURTESY OF AUBURN WATER DISTRICT, WATER DEPT. 1910 PIPE, REPLACED 2018.**

**Maine Water Company – Saco River Water Treatment Facility:** One of the nation's oldest water treatment plants, the 133-year-old Maine Water Company facility on the Saco River in Biddeford, is being replaced. This facility serves the communities of Saco, Biddeford, Old Orchard Beach, and Scarborough. Construction on the new 12 million gallons per day plant began in January 2020 and is expected to be completed in the Spring of 2022 at a cost of approximately $52 million. The new plant will utilize conventional filtration treatment and will be constructed entirely outside of the Saco River floodplain.

**Brunswick-Topsham Water District - Topsham Filtration Facility:** The Topsham Filtration Facility is replacing the aging Jackson Station water treatment plant. The District provides water to the communities of Brunswick and Topsham with Jackson Station being its largest source of supply, producing 3.5 million gallons per day from two wells at the site. Construction on the new plant, which will provide offices, operations and treatment capacity for up to 4 MGD is anticipated be completed in 2022 at a cost of approximately $33 million.

Aged underground transmission lines 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 remains under 1% for the last 15-years, which reflects a 100-150 year replacement cycle.

## PUBLIC SAFETY

State and national attention continues to focus on lead in drinking water. Maine's municipal water systems have little known lead in distribution lines and have an active program for corrosion control to prevent leaching of lead into drinking water. In Maine, new legislation passed in May 2019 requiring lead testing in Maine school's drinking water (LD 153). All Maine schools must sample for lead in all taps used for drinking and culinary purposes. Testing will begin in the fall of 2020. Approximately 11,000 lead samples will be collected from 710 schools. This initiative is sufficiently funded through a $406,000 WIIN Grant from the USEPA.

**PHOTO COURTESY OF BANGOR WATER DISTRICT, WATER MAIN BREAK, AUGUST 2018**

No outbreaks of water borne diseases regulated by the SDWA have been attributed to these systems since the early 1980s. Attention has focused on potential impacts of per- and polyfluoroalkyl substances (PFAS) in drinking water. PFAS substances are the toxic chemicals found in non-stick pans, cleaning products, paints, food packaging, firefighting foam, and other products. The chemicals are linked to cancers and low infant birthweights. The Governor of the State of Maine created a task force in 2019 to 1) identify the extent of PFAS exposure in Maine; 2) examine the risks of PFAS to Maine residents and the environment; and 3) recommend State approaches to most effectively address PFAS. The DWP has selected and conducted sampling at 53 water systems due to their proximity to potential sources of PFAS contamination. The systems sampled represents 65% of the population served by community systems. Note that only one large public water system in southern Maine identified PFAS. The levels did not exceed the health advisory of 70 ppt for PFOS & PFOA (specific sub-groups of the PFAS family of constituents) at one of their wells. To date, this concern requires testing but has not impacted overall treatment costs.

## FUNDING AND FUTURE NEED

From 2016 to 2019, available federal and state funding has totaled approximately $112 million. However, aging distribution system infrastructure is not being replaced at an adequate rate in many systems. The Drinking Water Program estimates $59 million per year is needed over the next 20 years for drinking water infrastructure projects which equates to an annual $31 million shortfall in funding need using past 4 years annual average shown in Table 1 below. 45% of applicants, including many disadvantaged systems are still unable to access competitive state funds. Without increases in utility rates or public 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. 73% of municipal systems have fewer than 1,000 customers (15% have fewer than 100); without external resources, rates would need to be greatly increased in most cases to support infrastructure needs.

**TABLE 1: FEDERAL AND STATE FUNDING SOURCES FOR MUNICIPAL DRINKING WATER[1]**

| | 2016 | 2017 | 2018 | 2019 | 4-year Annual Average |
|---|---|---|---|---|---|
| Drinking Water State Revolving Fund | $19,646,660 | $ 21,660,349 | $24,042,425 | $ 24,646,062 | $ 22,501,374 |
| Maine Community Development Block Grant | $ 1,000,000 | $ - | $ 2,740,000 | $ 990,000 | $ 1,182,500 |
| USDA-Rural Development | $ 7,581,000 | $ 5,500,000 | $ 500,000 | $ 3,721,000 | $ 4,325,500 |
| **Total Federal & State Funding Sources:** | **$ 28,227,660** | **$ 27,160,349** | **$ 27,292,425** | **$ 29,357,062** | **$ 28,009,374** |
| MMBB Issued Revenue Bonds (not re-financing) | $1,550,000 | $ 2,034,000 | $ 1,232,282 | $ 4,015,475 | $ 2,207,939 |

Maine does not currently record the average cost per household for drinking water but is working towards a system that will provide that information to customers and regulators. Over the past four years the "revolving nature" of the Maine DWSRF program has made an average $22.5 million per year available in grants and loans to public water systems. This amount includes federal DWSRF funds averaging $9.8 million per year; 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. Table 1 summarizes funding for water infrastructure in Maine over the last 4 years based on publicly available information.

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.
- Property taxes, which pay a portion of public water system maintenance by way of public fire protection fees to municipalities.
- User charges for system depreciation. These can be a significant source of funding when implemented and used for system maintenance. Unfortunately, the depreciation calculation allowed under PUC rules is a percentage of the initial infrastructure cost, not its replacement cost. This may significantly reduce the available funds for replacements in today's dollars. Industry estimates indicate the ten largest public water systems in Maine have more than $10 million in depreciation every year, which is built into their utility rates.

At the Federal level, the House recently passed a $10 Billion Water Resources Development Act (WRDA-H.R. 7575) but the Senate and White House have not yet acted on WRDA legislation.

## OPERATIONS AND MAINTENANCE

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. With funding from the Maine Drinking Water Program and the Drinking Water State Revolving Fund, an effort is being led by a consortium of the Maine Rural Water Association, Maine Water Utilities Association, and RCAP Solutions to develop standardized metrics that assess financial health and operational parameters. The long-term goal of this effort is the development of a sustainable electronic rational benchmarking database containing key financial and operational metrics for 158 PUC regulated public water systems. Such a database would collect and analyze public drinking water financial and operational data accessible for regulated public water systems and help utilities and the Maine Drinking Water Program to develop, track, and prioritize long term public drinking water infrastructure needs. This approach would help districts maintain the terms and conditions of grants or loans, enable timely updating of Comprehensive System Facilities Plans (CSFP), and facilitate data collection to improve operational performance including efforts such as asset management, water audits, and leak detection programs.

## RESILIENCE

The new Saco River treatment plant will be located outside of the 100-year floodplain. Water utilities in coastal towns will need to consider potential impacts of sea level rise in future designs on a case by case basis. Public water systems are considered prime targets for cyber-related incidents because of their critical role in supporting primary human functions, disease control, and hygiene. If a PWS were attacked and impaired, it would affect the community's ability to function and remain healthy. Cyber-attacks against the critical infrastructure sector, including public water systems, have increased nationwide and in Maine. In the past three years, at least six different cybersecurity incidents have been reported from Maine public water systems.

The global COVID pandemic has highlighted the potential need for additional operator training and systems for provision of backup operators particularly for small rural systems with limited personnel. Some utilities have already begun implementing cross-utility training to prepare for substitution of personal if a neighboring utility is facing Covid positive cases.


# RECOMMENDATIONS TO RAISE THE GRADE

**Maine ASCE makes the following recommendations:**

- **Support full cost user fees 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 rehabilitation techniques such as directional boring techniques and main lining strategies as costs become competitive. Encourage a goal of developing a long-term database of key financial and operational metrics for drinking water systems;**
- **Follow the guidelines established by the Governor of Maine associated with PFAS, as issued by the PFAS task force in 2019; and**
- **Provide flexibility in contracting requirements at the federal level.**


# SOURCES

1. Maine Drinking Water Program – 2016, 2017, 2018, 2019 DWSRF Intended Use Plan: https://www.maine.gov/dhhs/mecdc/environmental-health/dwp/pws/srf
2. Maine Drinking Water Program – 2016, 2017, 2018 Construction Project Reports https://www.maine.gov/dhhs/mecdc/environmental-health/dwp/pws/srf.shtml
3. Drinking Water in Maine - Annual Compliance Report -2018, Program Website: https://www.maine.gov/dhhs/mecdc/environmental-health/dwp/documents/DWPAnnualComplianceReport2018.pdf
4. Financial Health of Maine's Larger Water Utilities for the Years 2006-2016, dated August 28, 2017, prepared by the Maine Water Utilities Finance Officers Group and Maine Water Utilities Association.
5. Cybersecurity Tools to Understand, Evaluate, and Mitigate Risks For Maine Public Water Systems, Dated October, 2019. https://www.maine.gov/dhhs/mecdc/environmental-health/dwp/wrt/documents/CybersecurityToolsUnderstandEvaluateMitigateRisks.pdf
6. Photo courtesy of Jonathan Earle, District Engineer, Maine Water Company – Maine Division
7. Photo courtesy of TC Schofield, District Engineer, Brunswick Topsham Water District
8. Photo courtesy of Mike Broadbent, District Engineer, Auburn Water District
9. Photo courtesy of Kathy Moriarty, General Manager, Bangor Water District
10. https://www.infrastructurereportcard.org/senate-environment-public-works-committee-releases-water-resources-development-act-of-2020-and-drinking-water-legislation/

i Maine Drinking Water Program, Department of Economic Development, United States Department of Agriculture-Rural Development, and Maine Municipal Bond Bank.

# ENERGY

C+

CENTRAL MAINE POWER RESTORATION EFFORTS AFTER HURRICANE AUGUST 5, 2020

## ENERGY
GRADE: C+

## EXECUTIVE SUMMARY

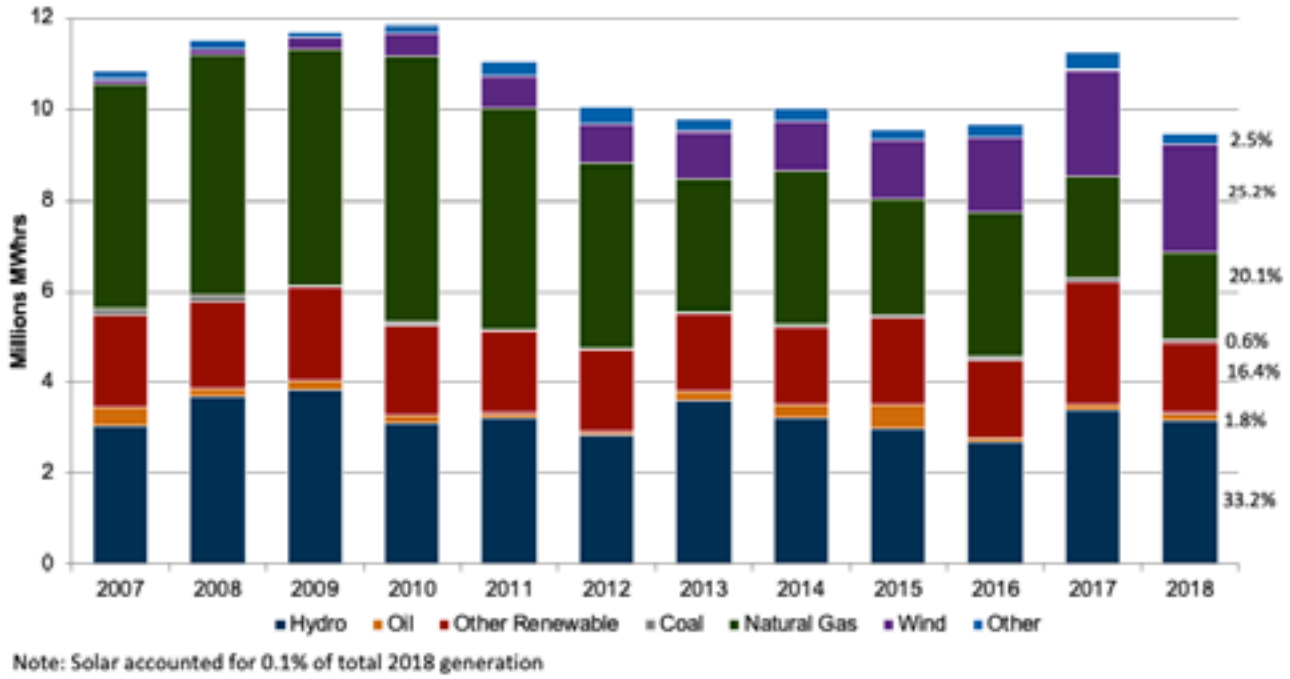
Much of the electricity infrastructure in the state was built between 1970 and 1990, meaning the original transmission and distribution network has begun to reach its useful service life. Meanwhile, some of Maine's electricity outage, interruption, and customer satisfaction indexes have declined in recent years. However, Maine, a renewable energy leader in the region and the United States, is on pace to meet its updated Renewable Portfolio Standards. Recent major improvements in Maine's bulk electric transmission system and plans to upgrade and harden the distribution system are building a more reliable and resilient network. Additional improvements in excess of $1 billion annually are needed to achieve Renewable Portfolio Standards and to improve system reliability and resilience.

## CAPACITY AND CONDITION

*Generation* – Maine has a total potential capacity of 4,800 megawatts (MW) with 3,200 MW cleared by Independent System Operators of New England (ISO-NE), which exceeds the summer peak demand of 2,000 MW.[i,ii] Even though Maine has excess capacity, Maine currently imports much of its electricity from out-of-state generators and exports much of its renewable energy.

Approximately 75% of Maine's 2018 net generation was renewable energy compared to 18% for the U.S. as a whole.[iii] This is up from 60% in 2014 and is due largely to an increase in wind generation with a reduction in gas generation. As shown in Figure 1, in 2018 33% came from hydroelectricity, 25% from wind, and 16% from other renewables (primarily biomass derived from wood products).

**FIGURE 1: ELECTRICITY GENERATED IN MAINE BY FUEL TYPE, 2007-2018[ii]**




Note: Solar accounted for 0.1% of total 2018 generation

In terms of Maine's net generation mix relative to the national average, Table 1 illustrates how Maine is a leader among the U.S. states in renewables resources, particularly in biomass, hydroelectric, and wind.

**TABLE 1 - MAINE'S UTILITY SCALE FACILITY NET GENERATION IN 2018**[iv,v,iii,vi]

| Energy Source | % of U.S. Electric Generation (Benchmark is 0.4%)[1] |
|---|---|
| Biomass | 4.4%2 (11 x the national average) |
| Petroleum Liquids (Oil) | 1.2%3 (3 x the national average) |
| Hydroelectric (Conventional) | 1.1%4 ( 2.8 x the national average) |
| Wind | 0.9%5 (2.3 x the national average) |
| Natural Gas | 0.2%3 (50% of the national average) |
| Solar PV | <0.1% (< 25% of the national average) |
| Coal | 0.0% |
| Nuclear | 0.0% |

*Notes:*

1. *Benchmark is based on Maine's contribution to U.S. Gross National Product, population, and total electricity sales (usage), all equal to approximately 0.4% of total national values.*
2. *Petroleum liquid usage in 2018 was abnormally high due to January 2018 cold snap resulting in a natural gas shortage in New England.*
3. *Maine has the highest share of its electricity derived from biomass of any state.*
4. *Maine leads all states east of the Mississippi River, except for Vermont, with the share of its electricity derived from hydroelectricity.*
5. *Maine leads New England in wind-powered generation and ranks 6th in the nation in the share of its electricity generated from wind.*

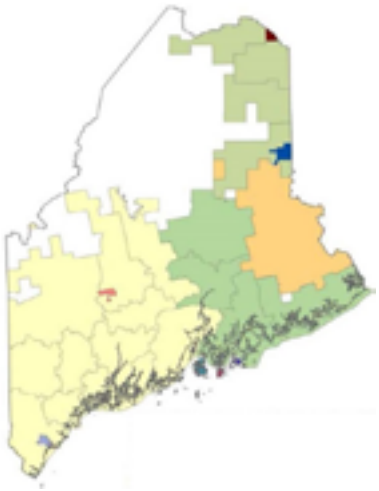
Natural gas generation was as high as 73% in 2002, falling to 34% in 2014 and 20% in 2018.[ii] The trend of replacing gas generation with renewable energy has continued over approximately the last seven years.

Although Maine is currently a leader in renewable generation, much of the renewable energy credits (RECs) are sold to meet the renewable portfolio standards (RPSs) of nearby states. Maine's primary electricity providers deliver electricity supplied by energy companies who source a majority of their power from both in-state and out-of-state natural gas generation.[vii] To encourage in-state use of more renewable resources, the 2018 incoming state administration passed LD 1494, which increased Maine's RPS for the in-state sale of Class I new renewable resources to 50% by 2030.[viii] The RPS also sets a goal of 100% of total electricity sales from renewable generation by 2050, making Maine's RPS now one of the most ambitious in the country.[ix]

Maine is also encouraging solar development through recent policy changes that reinstated traditional net metering and removed fees charged to Maine homeowners and businesses that made and used solar energy.[x] Published information shows 100 MW of wind generation in advanced development or under construction state-wide, and over 600 MW of solar development projects with fully executed interconnection agreements just in southern Maine.[xi,xii] By continuing this pace of new renewable projects, Maine's RPS for new renewables could feasibly be achieved.

In 2019, the state legislature enacted a series of energy bills requiring the Governor's Energy Office to undertake various studies, which are currently underway. The studies include transmission grid reliability; retirement of biomass generation; retail rate stability in northern Maine; and the state's ability to become a net exporter of energy by 2030 through the development and expansion of energy generating capacity, energy conservation, and energy efficiency.[xiii] Public Law 2019, c. 478 creates a new distributed generation procurement program that facilitates developing on-site and grid-connected generation resources with improvements to the interconnection process.[ii] Other bills enacted in the 2019 session require the new goal of installing 100,000 heat pumps by 2025, which will decrease reliance on heating oil and increase electricity usage in Maine.[xiii]

**FIGURE 2: MAINE'S ELECTRIC GRID REGIONS**



*Transmission and Distribution* – 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 Emera Maine (EME), 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.[ii] Maine's electric grid is comprised of three general regions: the southern region, serviced primarily by CMP, the northeastern region serviced primarily by EME and consumer owned utilities, and northwestern region, which remains fairly unelectrified.

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 T&D networks during that time. This now 30- to 50-year-old T&D network has begun to reach its useful service life.[xiv]

The southern regions shown on Figure 2 in yellow and dark green are connected directly to the remainder of New England via multiple 345 kV and 115 kV lines at the New Hampshire border and is administered by the ISO-NE.[ii] The Maine Power Reliability Program (MPRP), a $1.4 billion electric reliability project in 2015 reinforced the backbone of the southern region's aging bulk power system and improved reliability. MPRP included the construction of five new 345kV substations, one new 115kV substation, and related facilities linked by approximately 440 miles of new transmission lines.[xv]

The northeastern region shown on Figure 2 in orange and pale green, is directly connected to New Brunswick, Canada, and interfaces with the New Brunswick Power (NBP) transmission in eastern Maine. This region of Maine's transmission is administered by Northern Maine Independent System Administrator (NMISA) and is not directly connected to the energy market in southern Maine and the rest of the United States.[ii]

The northwestern region shown on Figure 2 in white, is non-electrified. This region is the least populated region, and comprises approximately 8,500 square miles, or ¼ of Maine's land area.[i,ii] The Maine Municipal and Rural Electrification Cooperative Agency Act was created in 1987 to address the serious deficiency that municipalities and rural electric cooperatives have in financing the infrastructure necessary to service both electrified and non-electrified areas of Maine.[xvi] However, current proposals for significant funding of electric infrastructure in the non-electrified areas of Maine are limited to transmission investments in on-shore wind generation projects.

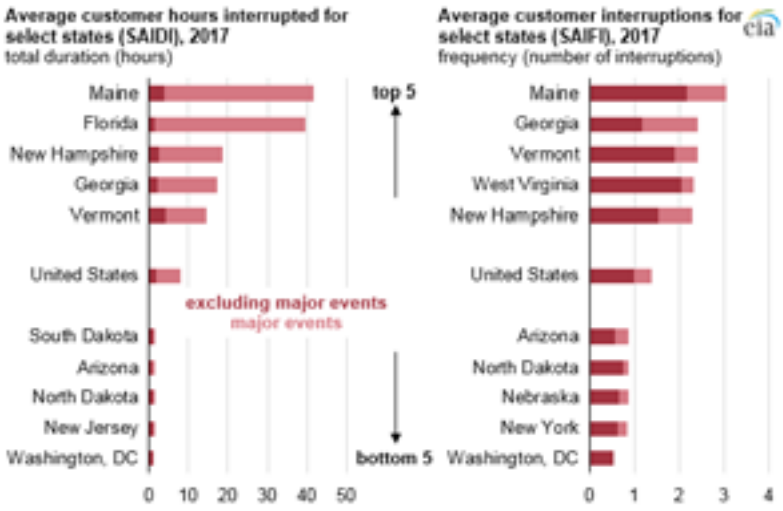
In 2017, CMP filed a Petition for a Certificate of Public Convenience and Necessity (CPCN) for the New England Clean Energy Connect (NECEC) HVDC project - a proposed 145-mile, 1,200 MW HVDC transmission line from the Québec-Maine border to Lewiston to deliver Canadian hydroelectric resources to load centers in Massachusetts. The NECEC project is in response to the Massachusetts RFP for Long-Term Contracts for Clean Energy Projects and promises various benefits to State including lower energy costs in Maine, regional greenhouse gas (GHG) reductions, tax revenues and grid upgrades. The CPCN has been approved, and as final permit approvals are pending, construction could potentially start in late 2020.[xvii]

## OPERATIONS, MAINTENANCE, PUBLIC SAFETY AND 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 man-made threats.

Maine relies heavily on regional natural gas generation plants, which are geographically constrained from natural gas resources located outside of the region and on the other side of New York. The region's reliance on the natural gas fuel-delivery system exposes the state and regional electric power systems to potential reliability problems, energy-security risks, and an associated increased cost of electricity when natural gas prices are high. 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 man-made threats and may not be available during extreme weather conditions or as responsive to emergencies on the system.

Most public safety critical infrastructure facilities (hospitals, IT networks, communications, emergency services, etc.) have employed resiliency plans including back-up power systems in the event of short- to intermediate-duration power outages. However, a healthy energy infrastructure is one of the defining characteristics of a modern global economy, and a prolonged interruption of the supply of basic energy would do considerable harm to the economy and Maine residents.[xviii] 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.



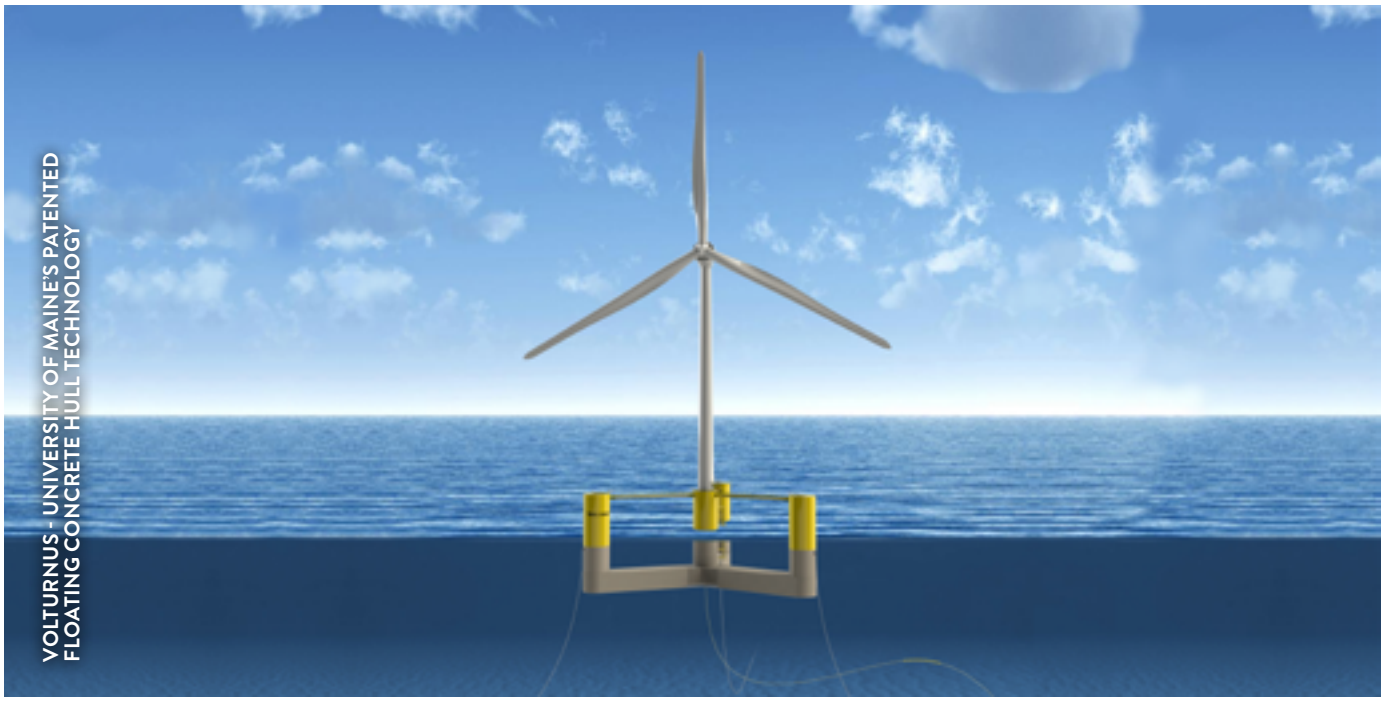

Electric serviceability from the customer's perspective can be measured by the frequency and duration of outages. Today's periodically high load and restricted supply are more accurately predicted and managed by increasingly robust monitoring and switching systems. In Maine, the leading causes of transmission outages were a result of faulty equipment and human error. The largest outage impact felt by customers is due directly or indirectly to severe weather and high winds primarily affecting the distribution system.[xix] Recent local events include the Wind Storm of 2017, when nearly 500,000 Mainers lost power[xx] and an April 2020 spring snowstorm that caused more than 250,000 outages across the state.[xxi] The 2017 storm, defined as a major event, was a root cause of Maine leading the country that year in electric service interruptions. Maine's metrics for duration (42 hours) and frequency (3 events) were 5 times and 2 times the national average in 2017.[xxii]

Looking beyond 2017, the J.D. Power 2019 Electric Utility Business Customer Satisfaction Study surveys customers on overall satisfaction across factors that include power quality and reliability and other non-infrastructure related items. CMP, which was the only Maine utility included in the survey, ranked at the bottom among the 12 midsize utilities in the East Region.[xxiii]

Vegetation management, along with restoration responsiveness and circuit re-routing, is a critical component to improving resiliency and mitigating outage frequency and duration. To improve metrics, CMP's current proposed Resiliency Plan includes $30.3 Million in increased vegetation management and structure and equipment hardening. Their calculated benefit-cost analysis (BCA) is 2.8, with a majority of benefits derived from avoided interruption costs.[xxiv]

## INNOVATION

Much of the current innovation trends in the electricity generation and delivery industries are driven by the need to reduce GHG emissions. Maine boasts several innovative initiatives and successes to that end. In June 2019, the Maine Governor's Energy Office created the Maine Offshore Wind Initiative, charged with identifying opportunities for offshore wind in the Gulf of Maine along with promoting compatibility with existing and future stakeholders including commercial fishing and maritime industries.[xxv] In November 2019, Maine Public Utilities Commission (MPUC) approved a 20-year power purchase agreement between Maine Aqua Ventus I and CMP for up to 12 MW from two floating wind turbines located in the Gulf of Maine.



VOLTURNUS - UNIVERSITY OF MAINE'S PATENTED FLOATING CONCRETE HULL TECHNOLOGY

The University of Maine (UMaine) Advanced Structures and Composites Center offers composites manufacturing, analysis, and can test up to 200 foot long wind blades for various strength parameters including fatigue. With the acquisition of one of the world's largest 3D printers, UMaine has spurred collaboration with the Oak Ridge National Laboratory to develop manufacturing capabilities of wind blade tooling and components, potentially allowing manufacturing to take place at project sites.[xxvii,xxviii]

## FUNDING AND FUTURE NEEDS

Electric rate payers fund most aspects of electric infrastructure. Complex power purchase agreements, forward capacity auctions, regional cost sharing, rate cases, fuel costs, and other cost structure mechanisms dictate the costs to the ratepayers. MPUC regulates the operations and rates of Maine's transmission and distribution utilities, except for transmission rates, which are regulated by the Federal Energy Regulatory Commission (FERC).[ii] Other financial incentives include investment and production tax credits which are tax-payer-funded. The financial incentives are typically used for constructing new renewable resources and are subject to a variable political will and therefore difficult to forecast into long-term development projections.

The most expensive electric rates in the contiguous U.S. are found in the New England states, averaging $0.176/kw-hour (all end-users). Maine's electric rate payers paid $0.134/kw-hour, which is 24% less than the New England average, but 28% more for than the national average of $0.105/kw-hour in 2018.[xxix] Recent declines in U.S. natural gas prices have significantly helped reduce Maine's generation costs. These savings have been countered by continued investments in necessary upgrades to the transmission infrastructure. Continued reductions in wind and solar installation costs will help with future overall generation costs.[ii] Natural gas supply constraints, however, can drive local prices and supply shortages for Maine consumers are possible, particularly during cold snaps. Maine will benefit from continued diversity in generation sources with storage solutions necessary to become less dependent on the dynamic fossil fuel market.

As a follow up to the MPRP, an ISO-NE needs assessment studied the Lower Maine transmission system and showed various time-sensitive needs (thermal capability, voltage level, stability response, or other performance criteria) on the 115 kV system and high-voltage needs under minimum-load conditions on the 345 kV system at minimum-load levels. A separate Upper Maine solutions study was initiated to solve the time-sensitive criteria violations identified in the Upper Maine needs assessment. The study found the Upper Maine 115 kV lines are exceeding their ability to serve load efficiently and effectively. The study also found the lines are insufficient to reliably integrate the multiple proposed northern Maine wind generation projects. [xiii,xxx]

In addition to maintaining and improving its current electric infrastructure, Maine will need to undergo drastic changes to its electric infrastructure to connect new renewable resources. Meeting Maine's RPS requires continued retirements of fossil plants, construction and interconnection of renewable resources and distributed generation, increased vehicle electrification and energy efficiencies. The resulting transmission and distribution needs to accommodate the generation and load changes will require significant modifications, while still meeting the on-going customer demands. The success of meeting these goals depend on the planning, investments, and coordination by electric utilities, energy companies, and regulators.

LD1494 also requires a renewable energy goals market assessment, that includes analyzing the estimated electricity costs and benefits for ratepayers, and the study is being initiated.[xxxi] One recent study indicates that in order to achieve meet the current administration's goal of 100% renewable electricity sales using in-state resources by 2050, capital spending on electricity generation, storage, and delivery would be on the order of $56 billion over the next 30 years.[xxxii] This study is based on all heating, cooling, transportation and processes in Maine excluding vessels and airplanes being electrified by 2050. Although this estimate conservatively assumes the worst case electrical demands on the system, the study does not take into account needed maintenance and upgrade investments in system reliability and resilience over this time period.


# RECOMMENDATIONS TO RAISE THE GRADE

**Maine ASCE recommends the following:**

- **Create affordable and achievable development standards, enhance tax credits and other incentives, and partner with surrounding states and provinces;**
- **Fund capital improvement and research projects, including renewable generation, storage, and dispatching technology development and commissioning;**
- **Continue to diversify power generation sources and expand renewable energy generation projects and research particularly with integrated storage solutions, to maintain Maine's energy independence and to meet the state's Renewable Portfolio Standard;**
- **Improve capacity and reliability state-wide by integrating the northeastern region into ISO-NE, and providing the opportunity for electrification and wind generation in northwestern Maine with the upgrade and expansion of transmission infrastructure through the center and northern reaches of the state;**
- **Continue inspection, maintenance, and upgrade of the transmission and distribution system including responsible vegetation management and new technology to continue to improve reliability and resilience; and**
- **Facilitate investments into Maine to satisfy the current and near-term needs identified in the state's electric generation and transmission infrastructure. Investments on the order of $1 billion to $2 billion annually will be needed to begin to meet the state's RPS and increase system reliability.**


# SOURCES


i. U.S. Energy Information Administration, *Table 6.2.A., Electric Power Monthly with Data for December 2019,* February 2020.

ii. Maine Public Utilities Commission, *2019 Annual Report,* February 1, 2020.

iii. U.S. Energy Information Administration, *Maine State Energy Profile,* June 20, 2019.

iv. U.S. Energy Information Administration, *Electric Power Annual 2018,* October 2019.

v. U.S. Bureau of Economic Analysis, https://www.bea.gov/data/gdp/gdp-state

vi. U.S. Energy Information Administration, *Maine State Energy Profile,* July 16, 2020.

vii. Maine Public Utilities Commission, *Residential And Small Non Residential Standard Offer Service Consumer Information About Your Electricity Supply for Central Maine Power Company,* July 2020, Emera Maine – Bangor Hydro District, April 2020. and Emera Maine – Maine Public District, April 2020.

viii. Legislative Document No. 1494, "An Act to Reform Maine's Renewable Portfolio Standard".

ix. Maine Governor's Energy Office, *"Resolve, To Study Transmission Solutions To Enable Renewable Energy Investment in the State - Stakeholder Study Pursuant to Public Law 2019, Chapter 57, FINAL REPORT",* January 3, 2020. January 3, 2020 US Energy Information Administration, *Today in Energy,* September 26, 2019.

x. Natural Resources Council of Maine, https://www.nrcm.org/programs/climate/clean-energy/solar-power-in-maine/

xi. American Wind Energy Association, *Wind Energy in Maine,* Q2, 2020 Statistics.

xii. Central Maine Power, *CMP Chapter 324 Level 4 Interconnection Queue*, downloaded September 23, 2020.

xiii. ISO-NE, *2019 Regional System Plan*, October 31, 2019.

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

xv. New England Clean Energy Connect, https://www.necleanenergyconnect.org/maine-power-reliability-program

xvi. Maine Revised Statutes, 35-A, Ch. 41.

xvii. New England Clean Energy Connect, https://www.necleanenergyconnect.org/in-the-news

xviii. Department of Energy, *Energy Critical Infrastructure and Key Resources Sector-Specific Plan as input to the National Infrastructure Protection Plan (Redacted)*, May 2007.


# SOURCES (cont.)


xix. U.S. Department of Energy, Maine Energy Sector Risk Profile, 2015.

xx. Bangor Daily News, https://bangordailynews.com/2017/10/30/weather/storm-leaves-nearly-500000-mainers-without-power-restoration-could-take-days/

xxi. News Center Maine, https://www.newscentermaine.com/article/news/cmp-emera-brace-for-thousands-of-additional-power-outages/97-a1b1eab5-56ef-483b-88b6-30c12a9ee072

xxii. U.S. Energy Information Administration, *Today in Energy*, November 30, 2018.

xxiii. J.D. Power, Press Release, *Business Customer Overall Satisfaction with Electric Utilities,* November 13, 2019.

xxiv. Central Maine Power, *CMP Resiliency Plan*, April 12, 2019.

xxv. State of Maine, *Governor Mills Signs Bill to Advance Offshore Wind Demonstration Project, Announces Maine Offshore Wind Initiative,* June 19, 2019.

xxvi. University of Maine, *Wind Blade Testing*, February 2019.

xxvii. Composites World, *UMaine Composites Center's 3D Printer Named World's Largest*, October 14, 2019.

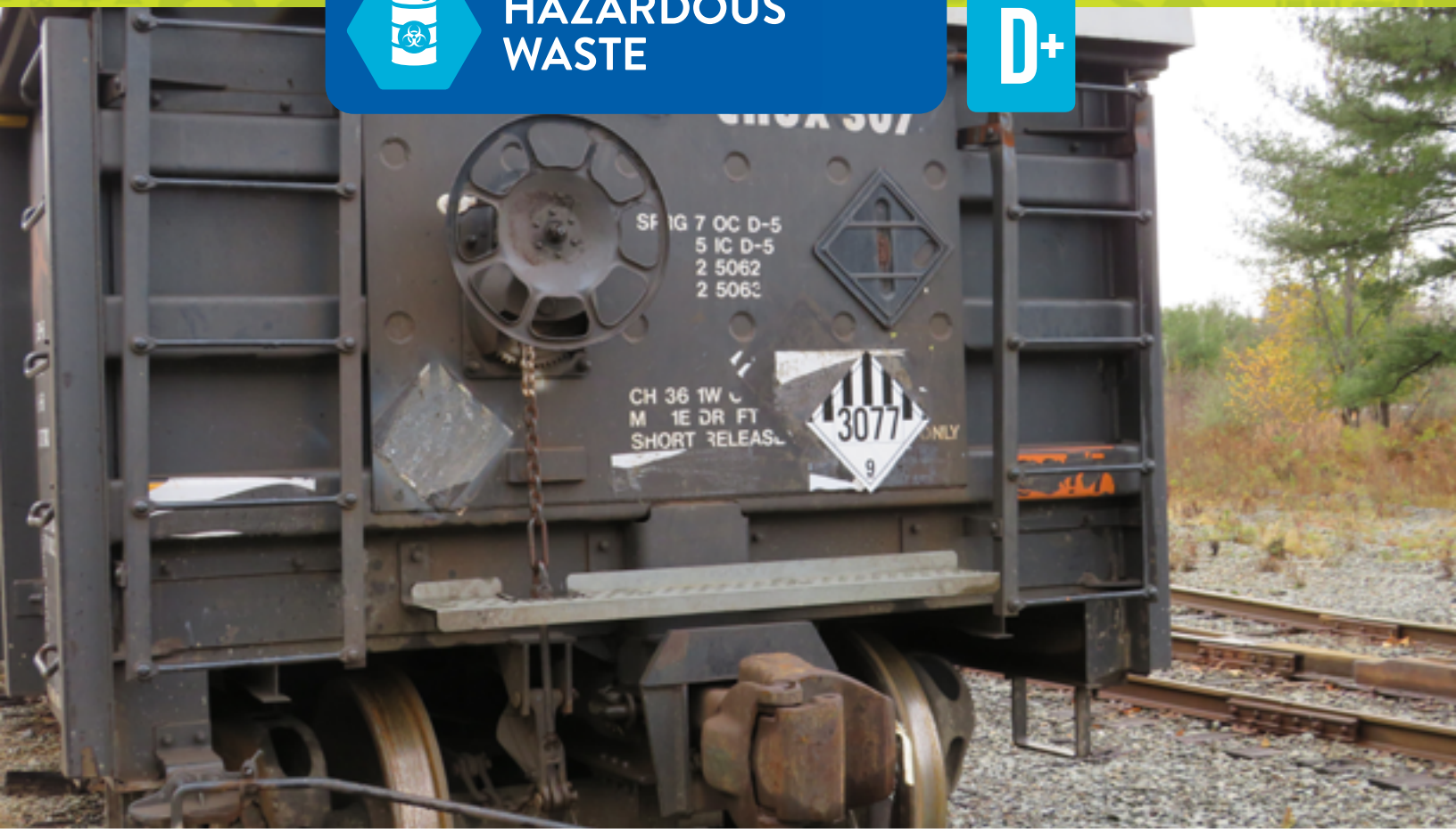
xxviii. Oak Ridge National Laboratory, *ORNL and University of Maine Collaboration Launches 3D Printing With Wood Products*, June 19, 2019.

xxix. U.S. Energy Information Administration, *Electric Power Annual 2018*, October 2019.

xxx. ISO-NE, *Notice of Initiation of the Upper Maine (ME) 2029 Solutions Study*, March 24, 2020.

xxxi. Maine Governor's Energy Office, *"Renewable Energy Market Assessment"*, July 2020.

xxxii. Silkman, Richard, *A New Energy Policy Direction for Maine*, November 2019




# HAZARDOUS WASTE
GRADE: D+

## EXECUTIVE SUMMARY

Funding has increased for the Brownfields assessment and cleanup assistance programs; however, available funds are insufficient to cover all sites. Additional challenges include addressing emerging contaminants and climate resiliency. The Maine Department of Environmental Protection's (DEP) remediation site database includes 859 sites as "active" with 263 sites listed as awaiting resources. This is an increase from 2016 which had 693 active sites with 155 awaiting resources[1]. Many of these sites have entered the system through the Voluntary Response Action Program (VRAP) and Brownfields programs, indicative of an increase in cleanup and redevelopment projects. Though this is positive, the limited options for reuse of excess soil from these projects creates a significant impediment.

[1] Sites may appear on under multiple programs and therefore the number of unique sites is lower than the number presented.

## BACKGROUND

The Maine DEP and the Maine Legislature have developed regulations and passed laws intended to limit the potential for spills and mishandling of hazardous substances such that those substances will not pose a risk to human health or the environment. However, spills still occur and contamination continues to be discovered. Some former municipal landfills that were closed (capped) to meet the standards of the day still require remediation of contamination related to the past landfilling activities.

Collectively, the Maine DEP and U.S. Environmental Protection Agency (EPA) administer six programs that oversee contaminated site investigation, remediation, and redevelopment:

- Federal Facilities and Superfund Programs;
- Uncontrolled Sites Program;
- Petroleum Clean Up Program;
- Brownfields Program;
- Voluntary Response Action Program (VRAP); and
- Landfill Closure and Remediation Program

In addition to the above programs, the State of Maine has been authorized by the EPA to implement its own Resource Conservation and Recovery Act (RCRA) program and RCRA Corrective Action Program. The hazardous waste management rules include requirements for the generation, transportation, and handling of hazardous waste in Maine.

## CONDITION AND CAPACITY

FEDERAL FACILITIES AND SUPERFUND PROGRAMS. As part of the federal Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), commonly referred to as Superfund, sites are placed on the EPA's National Priority List (NPL). As of March 2020, 12 of the nation's active 1,335 NPL sites are located in Maine. Four Maine sites have been deleted from the NPL (424 nationally), the most recent deletion was the Union Chemical Co, Inc site in 2018. There are no newly proposed NPL sites in Maine (51 nationally).

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 not eligible for the NPL. As of March 2020, the DEP's remediation sites list included 66 active Federal Facility sites in Maine, of which 6 are awaiting resources (up from 4 in 2016).

Maine's UNCONTROLLED SITES PROGRAM was created in 1983 and is Maine's equivalent of the federal Superfund program. This program's founding legislation authorizes DEP to issue orders to potentially responsible parties requiring them to conduct DEP-approved cleanup actions. If there are no viable potentially responsible parties, the legislation authorizes DEP to undertake necessary remedial actions. As of March 2020, the DEP Remediation Division's sites list included 211 active uncontrolled sites of which 47 are awaiting resources (up from 28 out of 181 active sites needing resources in 2016).

DEP'S PETROLEUM CLEAN-UP PROGRAM. There are over 5,000 registered underground storage tanks (USTs) storing oil located at approximately 3,000 underground oil storage facilities in the State of Maine. The DEP reports that, on average, they respond to more than one spill a day from home heating oil tanks at single-family residences. Investigation and remediation of petroleum contamination are managed by DEP's Petroleum Clean-Up Program that was established in 1991. Currently, DEP's Long-Term Petroleum Remediation Priority List contains 474 petroleum-contaminated sites managed by DEP's Division of Technical Services (consistent with the estimated 500 petroleum contaminated sites in 2016).

BROWNFIELDS AND VOLUNTARY RESPONSE ACTION PROGRAM (VRAP). By definition, brownfield sites are property whose expansion, redevelopment, or reuse is impeded because of contamination, real or perceived. As of March 2020, the DEP's remediation sites list included 265 active brownfields sites of which 85 are awaiting resources (up from 47 out of 214 active sites needing resources in 2016). In 1993, Maine legislation established the VRAP that allows and encourages applicants to voluntarily investigate and remediate properties to the DEP's standards in exchange for protections from DEP enforcement actions, including the uncontrolled and petroleum priority sites discussed above. Remediation of most brownfield sites is through the VRAP process. As of March 2020, the DEP's remediation sites list included 228 active VRAP sites of which 90 are awaiting resources (up from 53 out of 162 active sites needing resources in 2016)[2].

The VRAP program has been very effective at facilitating the redevelopment of brownfield sites with the exception of provisions for soil management. Excess soil is often generated from brownfield or other 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 are frequently left with no choice but to transport and dispose of the material at solid waste facilities located significant distances from the project site resulting in significant cost premiums that can discourage development.

Maine's LANDFILL CLOSURE AND REMEDIATION PROGRAM oversees post closure remediation projects to address issues that have developed since the landfill was closed. Most of the closed landfills were unlicensed sites that threatened ground and surface water quality because of inappropriate siting, inadequate construction design, or improper operation. As of March 2020, the DEP's remediation sites list included 26 landfill closure sites of which 20 are awaiting resources (compared to 21 out of 25 active sites needing resources in 2016).

RESOURCE CONSERVATION AND RECOVERY ACT 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 be the result of spills or discharges discovered as part of 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. As of March 2020, the DEP Remediation Division's sites list included 41 active RCRA corrective action sites of which 14 are awaiting resources (up from 2 out of 28 active site needing resources in 2016).

[2] VRAP Sites are often also listed under more than one Program.

HAZARDOUS WASTE GENERATION/MANAGEMENT. Landfills are prohibited from accepting hazardous waste and require a permit for special waste[3]. The last full year of reported hazardous waste generation information in Maine is from 2017.[4] A total of 36,300 tons of hazardous waste was generated in Maine during calendar year 2017, this includes hazardous waste generated from manufacturing and commercial activities, as well as hazardous wastes generated from remediation projects in Maine. Of that, 35,500 tons (98%) of hazardous waste was exported from Maine generators to out-of-state facilities and 700 tons of hazardous waste from Maine generators were accepted at the two licensed treatment and storage facilities in Maine. The licensed facilities in Maine include the Portsmouth Naval Shipyard in Kittery (for waste generated by military facilities); and NRC Environmental of Maine, Inc. (NRC; formerly ENPRO Services of Maine) in South Portland which treats waste gasoline and oil-contaminated wastewaters. An additional 217 tons of hazardous waste were imported from out-of-state generators to NRC in 2017. An assessment of the hazardous waste generation trends for Maine from 1993 through 2018 indicates that yearly waste generation totals vary greatly year-to-year, primarily due to the volumes generated by site remediation projects.


**RAILCARS USED TO TRANSPORT LARGE QUANTITIES OF ENVIRONMENTALLY HAZARDOUS SOIL FROM REMEDIATION PROJECT OUT OF STATE FOR DISPOSAL.**

## OPERATIONS AND MAINTENANCE, FUNDING, AND FUTURE NEED

The DEP's remediation sites list included a total of 859 active sites, of which 263 are awaiting resources. Funding for the various programs comes from many different sources as described below.

DEP'S UNCONTROLLED SITES PROGRAM is funded primarily through voter-approved bonds, with the last bond referendum for contaminated site clean-up predating 2005. Remediation under the VRAP PROCESS is primarily privately funded. The EPA provides some funding for BROWNFIELD REDEVELOPMENT, most of which is through two competitive grant programs that primarily benefit municipalities focused on economic development. EPA Brownfield monies provided to Maine municipalities, regional planning and economic development organizations, and Tribal and State entities have totaled $94.1 million between 1994 and June 2020. A breakdown by year from 2016 through May 2020 is provided below:

| Year | Program Totals by Year |
|---|---|
| 2016 | $9,231,917 |
| 2017 | $4,180,089 |
| 2018 | $6,870,080 |
| 2019 | $8,191,206 |
| 2020 (through May) | $2,653,000 |

[3] Special waste is any solid waste generated by sources other than household and typical commercial establishments that exists in such an unusual quantity or in such a chemical or physical state, or any combination thereof, 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.

[4] Only a partial year of information is available for 2018 because the implementation of the WPA electronic manifest system (eManifest).

DEP'S PETROLEUM CLEAN-UP PROGRAM. The Maine Ground and Surface Waters Clean up and Response Fund[5] provides for the prompt and effective clean-up of petroleum releases and compensation of third parties. The Fund's income is derived from fees on the importation of petroleum into Maine, registration fees from oil storage facilities, fines, and reimbursements (e.g., from potentially responsible parties). The main sources of revenue into the Fund are fees on each barrel of petroleum transferred into Maine by ship, road, or rail. Additionally, a surcharge is imposed when the balance in the Fund falls below $6 million. The surcharge was in effect throughout the state fiscal years 2017 and 2018. The DEP has implemented a variety of strategies to reduce expenditures, prioritize spending and control costs such as targeting removal of contaminated soils using health-based clean-up guidelines, and considerations for the reuse of properties. Likewise, the DEP has adopted regulations that are intended to reduce spills and, therefore, the demand on the Fund.

DEP'S LANDFILL CLOSURE AND REMEDIATION PROGRAM. The most recent modification to the program in 2015 extended the DEP cost-sharing for landfill closure-related costs until 2025. The goal was to continue to assist with remedial or corrective actions at landfills that contaminate or threaten to contaminate groundwater that persisted at certain landfills after the landfills had been closed to the standards of the day. Many remediation projects are eligible for up to a 90 percent reimbursement from the program as part of the State's cost-share.

## PUBLIC SAFETY, INNOVATION, AND RESILIENCE

A 2003 Maine law required the DEP to develop and submit a Climate Action Plan for Maine. In September 2019, Maine launched the Climate Action Council. One of the goals of the Climate Action Council is to develop strategies for resiliency, however, there is no current discussion on the need to incorporate climate resilience into climate-vulnerable cleanup sites. Climate and energy are current areas of focus of the Governor's Office of Policy Innovation and the Future.

In March 2019, Governor Janet Mills created the Maine Per- and Poly-fluoroalkyl Substances (PFAS) Task Force by Executive Order to review the extent of PFAS contamination in Maine and provide recommendations about how to protect Maine residents from exposure. The PFAS Task Force recommended the State accelerate its ongoing efforts to identify prioritized locations and to sample groundwater, surface water, and soil, analyze sampling results for patterns, and refine models of PFAS fate and transport. Locations near unlined landfills are included in the highest priority locations. Additionally, the PFAS Task Force support legislation introduced by DEP to amend Maine's Uncontrolled Sites law to give the State the authority to require the removal and treatment of PFAS when they are a danger to public health.

[5] Legislation in 2015 combined the Ground Water Oil Clean-up Fund and the Maine Coastal and Inland Surface Water Oil Clean-up Fund into the Maine Ground and Surface Waters Clean-up and Response Fund.


# RECOMMENDATIONS TO RAISE THE GRADE

**Maine ASCE makes the following recommendations:**

- **Provide clear guidance documenting expectations for the characterization of excess soil and a risk-based policy providing options for reuse, comparable to the Massachusetts "Similar Soils" regulations;**
- **Evaluate resilience at remediation sites and incorporate plans to address long-term goals, best practices, and financing opportunities for sites that are in climate change vulnerable areas;**
- **Continue to determine the best use of available funds. This determination must be made by risk-based prioritization of identified sites in and across the multiple programs and through accountability;**
- **Continue to evaluate and revise regulations to achieve a balance of protection and workability, with the intent of reducing the need for funds in the future;**
- **Consider a bond to compensate municipalities for overdue cost-share reimbursements for landfill closures and remediation; and**
- **Continue to leverage EPA cost-sharing opportunities for remediating sites in Maine.**


# SOURCES

Biennial Hazardous Waste Activities Report. Report to the Joint Standing Committee on Environment and Natural Resources129th Legislature, Second Session. Maine Department of Environmental Protection, November 2019.

Biennial Report of the Clean-up and Response Fund Review Board. Report to the Joint Standing Committee on Environment and Natural Resources129th Legislature, First Regular Session. Maine Department of Environmental Protection, April 2019.

Maine Department of Environmental Protection, Bureau of Remediation and Waste Management (DEP) DEP's remediation sites list accessed on March 30, 2020. https://www.maine.gov/dep/gis/datamaps/brwm_remediation_sites/rpt_rem_site_list.pdf.

Managing PFAS in Maine. Final Report for the Maine PFAS Task Force. January 2020.

Website of the Maine DEP Bureau of Remediation and Waste Management (http://www.maine.gov/dep/spills/uncontrolledsites/) last accessed in May 2020.

Website of the Maine DEP Bureau of Remediation and Waste Management, Aboveground Oil Storage Tanks and Underground Storage Tanks programs (https://www.maine.gov/dep/waste/abovegroundtanks/index.html) and (https://www.maine.gov/dep/waste/ust/index.html) last accessed in May 2020.

Website of the Maine DEP Bureau of Remediation and Waste Management, Solid Waste Management Program (https://www.maine.gov/dep/waste/solidwaste/index.html) last accessed in May 2020.

https://www.epa.gov/brownfields/maine-brownfields-funding-history;

Website of Maine DEP, "Long-Term Petroleum Remediation Priority List" https://www.maine.gov/dep/spills/petroleum/long-term_priority.html updated quarterly; last accessed May 2020.

Website of the United States Environmental Protection Agency (EPA) (http://www.epa.gov/superfund/) last accessed in May 2020.

# LEVEES

C-

LEVEE ALONG THE SAINT JOHN AND FISH RIVERS - FORT KENT

## LEVEES
GRADE: C-

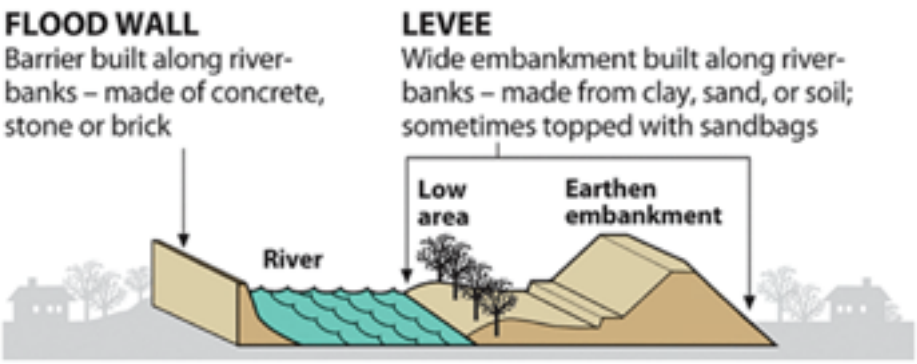
## EXECUTIVE SUMMARY

The National Levee Database identifies five levees in Maine that protect 600 citizens and $133 million of property from flooding. In 2013, U.S Army Corp of Engineers assessed four of the five levees to be "minimally acceptable" and one levee "unacceptable". While the USACE considers the risk associated with Maine's five levees to be "low" in comparison to levees nationwide, breaches of these levees may be catastrophic to the communities they protect and therefore justify increased investment to manage this risk. However, funding for the maintenance and improvement of Maine's levees is generally limited to local contributions which are often insufficient to properly maintain the levees. 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.

## BACKGROUND

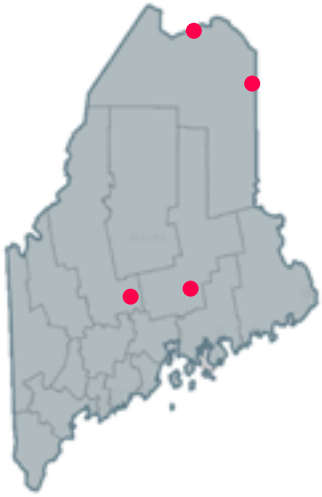
Levees are engineered earth embankments or floodwall structures used to contain, control, or divert the flow of water. In contrast to dams which store or slow down water to manage downstream water levels, levees are generally located parallel to a flooding source and are used to protect areas adjacent 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 levees in Maine that are operated and maintained by their respective municipalities with support from USACE[2]. The NLD includes levees that have been identified by FEMA and USACE, the two Federal agencies responsible for accrediting levee systems, but the NLD may not include all levees within Maine[3].

**FIGURE 2: FEDERALLY SUPPORTED LEVEES IN MAINE[2]**



## CAPACITY

The five levees cataloged in the NLD have a total length of 1.9 miles and protect 600 citizens and $133 million of property from flooding[2]. Their locations are identified on 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 19 and 44 years ago and have an average age of 37 years[2]. Between 2011 and 2013, Maine's levees were last inspected and assigned a condition rating of "minimally acceptable" except for the Sebasticook River Left Bank levee which was assigned a condition rating of "unacceptable"[4]. Since 2013, USACE has transitioned from assigning a condition rating to levees and is now assessing the levees based on their risk of overtopping or breaching during a flood event. During these risk assessments, USACE identified unauthorized modifications to the Penobscot River, Indian Island levee system and the Sebasticook River Left Bank levee system that may compromise their performance in future floods[2]. USACE noted all five levees to have uncertain performance if they were overtopped. Overtopping did occur at the Sebasticook River Left Bank levee system in Hartland in 1987 and nearly occurred in Fort Kent in 2008 when flood levels came within one foot of overtopping the levee and nearly 600 residents were evacuated[5].

**TABLE 1: CONDITION SUMMARY OF MAINE'S LEVEES[2,4]**

| Levee System | Location | Year Built | Prior Condition Rating | Risk |
|---|---|---|---|---|
| Aroostook River, Right Bank | Fort Fairfield | 2001 | Minimally acceptable | Low |
| Penobscot River, Indian Island | Old Town | 1976 | Minimally acceptable | Low |
| Saint John and Fish Rivers | Fort Kent | 1977 | Minimally acceptable | Low |
| Sebasticook River / Moose Lake Bypass | Hartland | 1983 | Minimally acceptable | Low |
| Sebasticook River Left Bank | Hartland | 1983 | Unacceptable | Low |

## PUBLIC SAFETY

The USACE has recently published draft guidelines for the policies and procedures of its Levee Safety Program. This draft guidance includes a risk-based assessment of levee systems that considers the probability of levee failure such as overtopping or breaching and the assets and risks that would be at risk in such a failure. The risk of a levee system is then qualitatively ranked on a 5-point scale from "Very Low" to "Very High" risk. Among numerous objectives, the primary intent of this change is to better communicate all levees have a risk of failure due to controllable and uncontrollable factors. As documented in Table 1, all of Maine's levees are considered low risk. However, it is important to note that this risk rating 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 likely indeed are low risk. However, failure of these five levees which protect over 600 citizens and $133 million of property could be a significant risk for the communities these levees protect.

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 270 pages comprising the 2019 Maine State Hazard Mitigation Plan there was no mention of the need to maintain or improve Maine's levees[6]. Of the three county Multi-Jurisdictional Hazard Mitigation plans for Maine counties where Maine's levees are located, the only mention of the need to maintain or improve levees was the recently completed improvement of the Fort Kent levee[7,8,9].

## FUNDING, OPERATION, AND MAINTENANCE

Historically, funding for the operation and maintenance of locally operated levees such as those in Maine has been limited to USACE inspection assistance and local contributions[3]. However, 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 and despite a recent appropriation of $15 million in 2020, 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[10].

Funding opportunities for the upgrade of existing levee systems is also limited, but more available than funding for maintenance. Federal agencies including the Federal Emergency Management Agency (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 such time 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[11]. The Town's project, which was 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 which occurred in 2008[11].

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 overtop[2]. 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[12] 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, the draft Outline for Maine's Climate Action Plan, expected to be finalized in December 2020, recommends 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 of resilience activities[13].


# RECOMMENDATIONS TO RAISE THE GRADE

**Maine ASCE makes the following recommendations:**

- **At the national level, increase funding to National Levee Safety Program to identify levees across the nation and support the creation of national levee safety standards;**
- **At the local, state, and national level, investigate and establish dedicated funding streams 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; and**
- **Similar to dams, establish Emergency Action Plans for Maine's levees that identify potential levee failure scenarios and populations at risk and establishes procedures for emergency responders and affected community members to minimize the loss of life and property if a levee were to fail.**


# SOURCES


1 Landscape-a-Design Methods of Flood Control, Accessed June 20, 2020

2 US Army Corps of Engineers (USACE) National Levee Database, Accessed March 25, 2020.

3 US Army Corps of Engineers (USACE) New England District Geotechnical & Water Resources Branch Chief, March 2020

4 US Army Corps of Engineers (USACE) National Levee Database, Accessed August 1, 2016.

5 Insurance Journal article "Levee Protects Downtown but Flooding Still Severe in Fort Kent, Maine" May 2, 2008.

6 Maine Emergency Management Agency (MEMA), "Maine State Hazard Mitigation Plan", 2019.

7 Aroostook County Emergency Management Agency, "Aroostook County Hazard Mitigation Plan - 2016 Update", 2016.

8 Penobscot County Emergency Management Agency, "Penobscot County Multi-Jurisdictional Hazard Mitigation Plan - 2016 Update", 2016.

9 Somerset County Emergency Management Agency, "Somerset County ME Hazard Mitigation Plan - 2017 Update", 2017.

10 American Society of Civil Engineers (ASCE) News and Information from ASCE Government Relations, March 20, 2020.

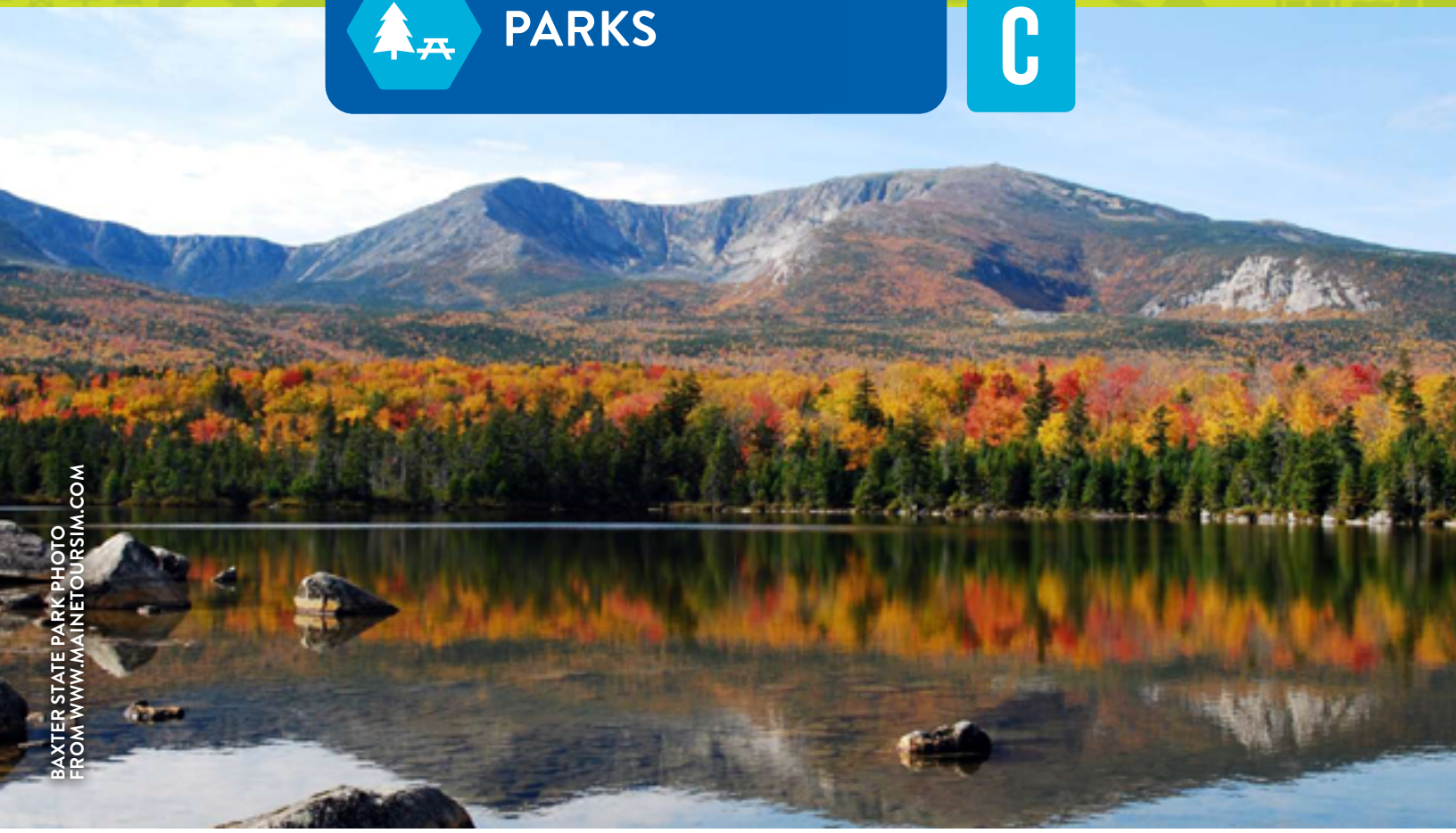
11 Fiddlehead Focus "Fort Kent celebrates completion of levee project", August 15, 2019.

12 US Environmental Protection Agency "What Climate Change Means for Maine", August 2016.

13 Maine Climate Council Draft Detailed Maine Climate Action Plan Outline, October 2020.

# PARKS

C



BAXTER STATE PARK PHOTO
FROM WWW.MAINETOURSIM.COM

## PARKS
GRADE: C

## EXECUTIVE SUMMARY

Maine's state parks are a key contributor to tourism which is one of Maine's top industries. Outdoor recreation generates $8.2 billion in annual consumer spending and supports over 75,000 jobs. Attendance at Maine's state parks has continued to rise in recent years. However, there has been little capital investment to help reduce an estimated $50 million maintenance backlog. The Maine Department of Agriculture, Conservation, and Forestry continues to prioritize the use of available funding based on the most critical needs and managing deferred maintenance needs to the extent practicable. While some improvements have been made, the needs continue to outweigh the funding available. If this trend continues, visitor experiences will diminish in quality and Maine may suffer lost economic opportunities.

## BACKGROUND

Maine's public recreation backbone consists of 40 state parks and additional historic sites (See Figure 1)[i]. 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.[ii] 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.[iii] The state also has numerous municipal recreation areas, one national park, one national monument, one national forest, and many other recreational activity areas.

**FIGURE 1.**
**MAP OF MAINE STATE PARKS**


## CONDITION AND CAPACITY

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.[iv] The highest priority of the most recent SCORP is to "connect more Mainers of all ages with the health and wellness benefits of outdoor recreation" this includes making the outdoors more accessible to those with disabilities.[iv] The report found there have been accessibility upgrades to numerous campsites at multiple state parks impacting trails, bathrooms, and other structures, but there is still unmet demand for accessible facilities. Maine's State Parks served close to 3 million visitors in 2018.[v] When 2014-2018 is compared to 2009-2013, state parks have increased attendance by nearly 10%. The camping average over the same periods also rose 7.5%. This increase in attendance at Maine's State Parks is due to both residents and non-residents.[iv] A survey was completed as part of the 2020-2024 Maine SCORP which asked residents where in Maine they recreated. Over 75% of residents reported they had visited a Maine State Park in the last three years.[iv] With the demand at Maine State Parks increasing, both from resident and non-resident attendance, the need for additional funding to keep up with this demand also increases.

## OPERATIONS AND 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 prioritize 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.

## FUNDING AND FUTURE NEED

Funding for Maine's state parks comes from several sources including gate fees, campground fees, and grant programs such as the federal Land and Water Conservation Fund (LWCF) and the Maine Outdoor Heritage Fund (MOHF).

According to Governor Janet Mills' administration, outdoor recreation generates $8.2 billion in annual consumer spending and over 75,000 jobs.[iv] While there are numerous funding sources for Maine State Parks there is still a need for additional funding. In 2018, the Natural Resources Council of Maine cited a $50 million maintenance backlog 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."[vi]

**TABLE 1: LIST OF ALL MAINE STATE PARKS[ix]**

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

In 2019, a $95 million conservation bond including $20 million to state parks and historic sites for improvements was proposed to the Maine Legislature but never made it to the ballot box.[vii] Additional sources of revenue for the maintenance of Maine state parks are the sale of the Wildlife Loon License Plate and royalties from Poland Springs. For every $20 spent to register a new loon license plate, $8.40 goes to the BP&L.[viii] However, from 1998 to 2009 contributions declined by nearly 50% due to more license plate options available to motorists. Poland Springs continues to pay royalties to extract water from an aquifer bordering Range Pond State Park. Dedicated license plate sales and water extraction fees have generated only enough funding to make minor improvements and cover a portion of routine maintenance.

The LWCF provides matching funds to states for statewide outdoor recreation and planning and for acquisition and development of public outdoor recreation areas and facilities. From 2013 through 2019, just under $5 million of LWCF funding has been used for non-federal projects in Maine. One of the recent LWCF-funded projects included building an ADA-compliant trail and boat launch at Owls Head State Park in Owls Head.[iv]

Additional revenue is also generated for the MOHF through the sale of certain instant scratch lottery tickets. Over the past four years, grants from the MOHF totaling over $100,000 have been awarded for State Park projects, including:

- In 2019, three grants totaling $11,769 were awarded to various parks, Rangeley Lakes, and Allagash Wilderness Waterway.
- In 2018, four grants totaling $52,976 were awarded to Allagash Wilderness Waterway, Baxter State Park, and Owls Head and create a report that evaluated needs in various parks.
- In 2017, three grants totaling $38,195 were award to Allagash Wilderness Waterway.[xi]

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.[xii]

## PUBLIC SAFETY

State parks have proven to be a valueable asset to public health in the State of Maine, by creating an environment that promotes spending time in the outdoors and exercising. Although there have been recent improvements to make state parks more accessible to those with disabilities, such as the handicap accessible fishing pier at Sebago Lake State Park, the need for making safe and accessible areas in all state parks is still largely unmet. A quote from the SCORP survey states "most Maine parks and outdoor activities do not have true handicap accessibility. I cannot use my wheelchair because the terrain is too rough..." The SCORP states that partnerships with group homes and accessibility support groups such as Maine Adaptive are opening up parks and other destinations to more Mainers with disabilities.[iv] 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 get the funding to be maintained when necessary.

## RESILIENCE AND 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 vuneralble. Maine's beaches and dunes draw more than 13 million visitors each year, which in turn supports many coastal tourism economies. These visitors spent $1.7 billion in 2018 –an average of $125 per person. By 2050, sea level rise and erosion may shrink Maine's total dry beach area by 42%, decreasing visits by more than one million people and lowering annual tourism spending by $136 million.[xiii] 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.[iv] In addition the Maine Climate Council is tasked with creating a Climate Action Plan to help reduce emissions and slow the effects of climate change.

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.[xiv] 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.[xv] 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.

RANGE POND STATE PARK


# RECOMMENDATIONS TO RAISE THE GRADE

**Maine ASCE makes the following recommendations:**

- **Permanently and fully funds the Land and Water Conservation Fund;**
- **Update the Bureau of Parks and Lands database to include recent investments and establish an updated baseline of where the inventory stands;**
- **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;**
- **Support the Maine Climate Action Plan to reduce emissions and protect coastal parks from rising sea levels;**
- **Support a bond for state parks improvements; and**
- **Use public-private partnerships, charitable conservation organizations, and accessibility support groups to increase revenues for increased capital maintenance.**

# SOURCES

i. Maine Office of GIS 4/30/2010

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

iii. Maine State Government Annual Report 2014-2015 P. 327 Baxter State Park Authority

**iv.** *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.


# SOURCES (cont.)


v. LaClaire, Hannah. "Maine State Parks Nearing 3 Million Visitors a Year." *Press Herald*, 24 Jan. 2019, www.pressherald.com/2019/01/23/maine-state-parks-saw-11-percent-increase-in-visitors-in-2018.

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

vii. Miller, Kevin. "Coalition Calls for State to Borrow $95 Million to Get Conservation 'Back on Track'." *Press Herald,* 5 Mar. 2019, www.pressherald.com/2019/03/05/groups-push-for-95-million-bond-to-fund-maine-land-conservation/.

viii. "Loon License Plate." *Loon License Plate: Get Involved: Bureau of Parks and Lands: Maine DACF*, www.maine.gov/dacf/parks/get_involved/loon_plate.shtml.

ix. "Outdoors in Maine." [PDF File] M*aine Department of Agriculture, Conservation, and Forestry,* 10 May 2018, www.maine.gov/dacf/parks/camping/pdf/outdoorsmini.pdf.

x. Maine Department of Agriculture, Conservation, and Forestry Bureau of Parks and Lands. Maine State Comprehensive Outdoor Recreation Plan, 2014-2019. Rep. July, 2015. Print.

xi. "Maine Outdoor Heritage Fund." *Maine Outdoor Heritage Fund: Grants: Programs & Resources: Maine Dept of Inland Fisheries and Wildlife,* Maine Department of Inland Fisheries & Wildlife, 2020, www.maine.gov/ifw/programs-resources/grants/outdoor-heritage-fund.html.

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

xiii. "Draft Detailed Maine Climate Action Plan Outline" October 19, 2020 https://www.maine.gov/future/sites/maine.gov.future/files/inline-files/MCC_DRAFT_DetailedOutlineClimateActionPlan_Oct19_2020.pdf

xiv. "Find Parks & Lands." *State Parks and Public Lands: Maine DACF*, www.maine.gov/cgi-bin/online/doc/parksearch/index.pl.

xv. "Passport Program." *Maine State Parks and Public Lands: Maine DACF*, www.maine.gov/dacf/parks/discover_history_explore_nature/activities/passport_program.shtml.

PORTS

B-

INTERNATIONAL MARINE TERMINAL, PORTLAND

# PORTS
GRADE: B-

## EXECUTIVE SUMMARY

Maine's ports are in good condition with more than $108 million in state and federal funds invested over the last 12 years. Projected growth in freight traffic and the cruise industry will require an additional $110 million for necessary investments in areas of industrial infrastructure, intermodal connections, cruise ship terminals, and municipal facilities. Maine has not yet fully leveraged the opportunities afforded by the M-95 Marine Highway and short sea shipping and investments are needed to make this shipping option viable. Cruise ship calls throughout the state have been historically strong with year over year increases, except in 2020. Maine should update its Three Port Strategy to reflect recent investments to its industrial terminals.

## BACKGROUND

Maine has over 3,500 miles of coastline with 12 significant ports and harbors as shown in Figure 1. Five of these ports: Portland, Searsport, Eastport, Bucksport, and Bangor are well-suited to handle the requirement of most modern cargo vessels. The shipping industry is strong. The remaining ports serve local commercial fisherman and recreational activities.

**FIGURE 1: PORTS AND HARBORS OF MAINE**

**Maine Ports and Harbors**

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

Utilization of industrial ports in Maine varies depending on the terminals, time of year, and market conditions. Dry cargo was typically handled at Portland and Searsport, and none in Eastport. Today, Portland and Searsport also handle petroleum products; however, volumes have been down in recent years from the 100 million barrels per year in 2012, to just under 8 million barrels per year in 2016, primarily due to decreased demand from Canada with the emergence of wind and solar power.

Improvements in Maine's port facilities, coupled with the nationwide economic upturn since 2009, has produced increases in shipments and volumes particularly in Portland at the International Marine Terminal. Since 2013 upon the arrival of the Icelandic shipping company, Eimskip, container shipments through Portland have increased significantly with 2016 recording a 23% increase alone. Continued growth on the order of 20% year-over-year have continued as ship frequencies have increased from one ship every ten days to one ship per week. In 2015, over 7,000 containers shipped through the Port of Portland (up from 227 in 2012), and in 2019 the number of containers increased to 15,460; a 27% increase over 2018 and a 120% increase since 2015. The surge in cargo traffic mirrors the nationwide trend and throughout the East Coast ports. Annual dry cargo tonnage in Maine has been on the rise since the early 1980s and has recovered from the sharp decline in 2009 when it reached a dip to 800,000 tons (see Figure 2[i]). Increases in dry cargo tonnage since 2009 have resulted in over 1.6 million tons in 2015 and approximately 1.8 million tons in 2018.

FIGURE 2: ANNUAL DRY CARGO TONNAGE THROUGH MAINE PORTS (1990-2018)


Intermodal connectivity is critical to the long-term success of shipping and handling cargo through Maine's ports. After completion of the intermodal connection in 2014 at the Portland International Marine Terminal (IMT), the site now offers 5 acres of chassis storage area where trucking companies can access the terminal and pick up containers. In 2019, the Maine Port Authority (MPA) expanded the site to include 2,750-ft railroad track with sidings; a concrete loading slab for loading 20 rail cars; and the makings of an internal roadway connection to Merrill's Terminal.

## 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. This location has also become more advantageous as interest in Arctic regions has grown as a result of climate change. 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.

In Portland, the IMT has undergone major renovations since 2012 and is in relatively good condition. The upland container storage grounds have been strengthened with screened gravels and a bituminous pavement. Future improvements to the terminal are scheduled beyond 2020 but will require more investment to leverage the great strides made to date. Additional improvements include construction of a cold storage building, rail components to serve the cold storage building, improvements to the existing pier, an internal haul road, and additional port security features. In Portland, the downtown waterfront is within a few miles of the Interstate Highway System I-295 and I-95, and recent upgrades to the terminal included a new rail line connection operated by Pan Am Railways.

In Searsport, the dry cargo pier is constructed of steel pipe piles and a concrete deck, both of which are in relatively good condition. Direct rail access is available to the terminal at Mack Point via the Canadian National Railroad (CNR, formerly Central Maine and Quebec). The CNR offers double-stack rail clearance from Searsport to Montreal and then Class 1 connections to the Midwest. These intermodal connections provide a valuable link for effectively moving freight and help to keep this traffic from traveling on the interstate highway system.

Eastport maintains two waterfront structures that serve eastern Maine: Estes Head terminal and the Breakwater Pier. The Estes Head marine facility has seen improvements and expansions with the installation of 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 with bollards and fender panels all in relatively good condition. In recent years, the capacity of the site has increased downtown Breakwater Pier on the other side of Eastport was recently renovated.

Over 430 vessels bringing more than 467,000 passengers were scheduled to visit Maine in 2019, a 17% increase over 2018.[ii] Ocean Gateway now has three berths to keep up with the demands of the cruise ship industry.

SWAN'S ISLAND FERRY TERMINAL

Cruise ship passenger numbers were forecasted to increase in 2020; however, tourism from the cruise ship industry, was dramatically impacted due to COVID-19. Portland is well positioned to rebound given the number of improvements it has made to its Ocean Gateway Terminal in recent years to better handle the increasing number and size of vessels.

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 CBITD. Two other terminals in the Portland area are owned by the city, and there is one private pier in Diamond Cove. A few additional terminals are located throughout the state albeit smaller and mostly seasonal to accommodate tourism. The ferry terminals at Vinalhaven and Islesboro are currently undergoing $6 million upgrades to their fender systems to include new outboard dolphins that will accommodate larger vessels, and another $1 million has been invested in the Peaks Island terminal. CBITD is also investing $18 million to upgrade its facility in Portland.

Maine's fishing industry across all seafood landings continues to be strong as new records have been achieved. The overall value of the fishing industry has increased by 20%, from $600 million in 2015 to $721 million in 2017. The Maine lobster industry boasts the presence of 19 lobster co ops and the fastest growing sector of the States' commercial fisheries. Regional infrastructure commonly includes timber piers, wharves, floating docks, mooring fields, and boat launches, all of which receive routine funding through Maine's administration of two popular grant programs: SHIP (Small Harbor Improvement Projects) and BIG (Boating Infrastructure Grants).

## 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 2014/2015 by the U.S. Army Corps of Engineers (USACE). At that time, the USACE removed most of the 750,000 cubic yards originally programed for removal in order to achieve the required 35-ft channel depths; however, the side slopes and 2-ft over-dredge were not completed. Private waterfront owners will be required to dredge the immediate shoreline along their wharves to maintain usability, yet this activity has been in the works for several years and may require several more years to come to fruition given funding constraints and permitting requirements. Private investment will be required at the local level and will require coordination with the state to develop a Confined Aquatic Disposal (CAD) cell, which is currently being analyzed for siting. Since the most recent dredge project was not completed in its entirety, additional dredging by the USACE will likely be required by 2024.

In Searsport, maintenance dredging is also necessary to maintain the viability of the navigation channel near Sears Island which leads to the Penobscot River and access to the two piers at Mack Point. Searsport is only hampered by the dredging needs of the approach channel. Approximately 900,000 cubic yards of material are scheduled to be removed, but local disagreement still endures over the amount of materials and the disposal site have delayed dredging.

## RESILIENCY AND PUBLIC SAFETY

Site planning and infrastructure improvements at the State's prominent ports over the last several years have taken into consideration climate change forecasts by the Maine Climate Council, hence accommodating sea level rise projections and worst-case scenarios along Maine's coastline. For example, upland improvements to the Portland IMT included raising the final grade elevation by as much as 2 ft above Commercial Street to counter higher predicted flood elevations through 2050. These raised areas will become the future grounds of the Cold Storage Building once private investment is secured. Similar accommodations for sea level rise have been implemented at the State's ferry terminals by increase the height of existing fender panels to enable safe vessel berthing operations.

## INNOVATION

The MPA seeks opportunities to implement innovation in its facility designs and operational equipment. In 2019, the MPA purchased a new mobile harbor crane with greater reach and lift capacities for on/off-loading of shipping containers. Normally, these advances can only be accomplished through significant modifications or strengthening of the wharf infrastructure. However, the MPA acquired a mobile harbor crane with the latest in innovative technologies that allow it to achieve greater efficiencies without requiring additional infrastructure investments in its wharf.

## FUNDING AND FUTURE NEED

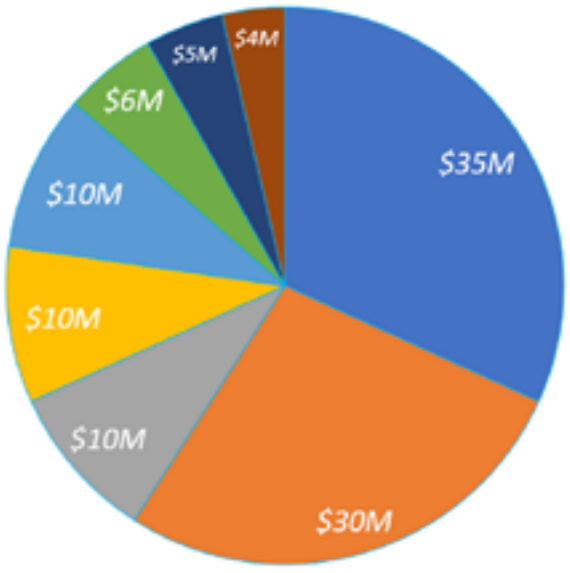
Within the last four years, over $29 million was invested from federal, state, and local funds in Maine's waterfront ports. The breakdown of recent investments includes: $5.3 million for port equipment, $17.8 million for improvements to the Portland IMT, and $6 million for ferry terminals. The FASTLANE federal grant program has been instrumental in funding Maine's port infrastructure needs, and is matched by state contributions through transportation bonds, which are overwhelmingly approved by voters on a routine basis. Improvements to Portland, Searsport and Eastport are at reduced levels since 2016. More investments are needed to maintain the good working condition of the facilities and leverage the existing infrastructure for future markets in growing sectors. A small amount of revenue is generated from office rentals and port fees which help offset some of the shortfalls.

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 addressed with future improvements to enable efficient internal container circulation. The Portland IMT will need to increase its capacity 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 waterfront facilities need upgrades and expansion to keep up with the vessel sizes, manage the demand for port calls, and accommodate continued growth. Dredging in 2014/2015 achieved water depths of 35-ft 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 liquid cargo pier is constructed of timber piles and a concrete deck and will require additional maintenance due to the timber elements. Plans have been developed for new structures while permits and funding are being pursued. For Eastport to remain competitive and viable in Maine's three-port system, improvements to the rail and highway system are needed. The waterfront structures should receive annual maintenance. Rail connectivity between the Port of Eastport and the surrounding areas requires upgrades and could be stifling growth in the eastern part of the state. All three ports would benefit from improved rail connections and capacity.

The U.S. Department of Transportation Maritime Administration has been exploring the development of a Short Sea shipping system to aid in reducing the growing amount of freight congestion on our nation's rail and highway systems. In 2010, the USDOT designated a Marine Highway route from Portland to NY/NJ, which is now one of 25 such routes along the east coast. The Maine Port Authority (MPA) is implementing a tug and tow operation; however, the design of an ATB (Articulated Tug Barge vessel) remains delayed due to lack of construction funds as well as the reliability of a new service with customers on both ends of the route. Larger passenger/car ferries are under development to maintain their good condition and expand capacity to handle increased tourism numbers; therefore, the ferry terminals require modifications to handle the upsize in length  breadth of these vessels. Two of the nine state-owned terminals are undergoing modifications, and three more are scheduled for similar upgrades in the next four years at a cost of $10 million.

## Maine Port Funding Needs (Total = $110 Million)

- Portland IMT - Cold Storage Building ($35M)
- Portland IMT - Waterfront Expansion ($30M)
- Searsport - Dredging ($10M)
- Maine - ATB ($10M)
- Maine - Ferry Terminals Upgrades ($10M)
- Portland - CAD Cell ($6M)
- Portland - Dredging ($5M)
- Maine - SHIP & BIG Projects ($4M)




# RECOMMENDATIONS TO RAISE THE GRADE

**Maine ASCE makes the following recommendations:**

- **Invest in Maine's industrial ports and ferry terminals with emphasis on waterfront infrastructure, intermodal connections, rail connectivity, upland storage facilities, and short sea shipping;**
- **Invest in Articulated Tug Barge vessels and the development of a marine highway connection between Portland and east coast ports;**
- **Invest in maintenance activities at Maine's industrial ports;**
- **Increase investments in cruise ship industry infrastructure to capitalize on economic benefits of this industry;**
- **Increase investments in fishing and recreational infrastructure via the SHIP and BIG programs;**
- **Promote maintenance dredging and channel improvement projects in Maine's navigable waterways;**
- **Develop a 10-year maintenance program with specific work items and budget allocations; and**
- **Update Maine's Three-Port Strategy to develop clear objectives for future uses and investments at each terminal.**

# SOURCES

MaineDOT Office of Freight Transportation, Maine Port Authority, Cruise Maine USA, and Portland Press Herald.

[i] Maine Port Authority and USACE

[ii] Portland Press Herald, May 20, 2019.

# RAIL

C+

## RAIL
GRADE: C+

## EXECUTIVE SUMMARY

Maine has 1,296 miles of active railroad with the pulp and paper and lumber industries as the largest rail customers. Recent federal grants have been leveraged with state and private funding to make noticeable improvements to Maine's railroads over the past four years. At the completion of the planned improvements in the near future, it is expected that all of the state's railroad main lines will be able to support 286,000-pound rail cars, the standard with Class I railroads, a major modernization milestone. Meanwhile, a $20 million federal grant aided in track updates that now allow for increased speed and reliability. However, one area of concern is the unimproved condition of state-owned railroad tracks rated good or fair which remained at 56.4%, the same as in 2016.

## BACKGROUND

Rail service is an important component of the transportation mix in Maine and is particularly cost-effective and energy-efficient when moving high-volume, low-value commodities over long distances, as it minimizes heavy truck traffic on roads. In 2015, Maine had nearly 4.7 million tons of freight moved annually by rail.

In 2020, Maine had 1,296 miles of active railroad, an increase of 177 miles since the 2016 report. Almost 320 miles are owned by the state (25%), which is an increase from 2016 when 293 miles of active track were owned by the state.[1] The state also owns an additional 252 miles of inactive rail right-of-way. Maine has converted 384 miles of inactive rail to 30 trails across the state.

Maine is serviced by seven private railroads; five of which form the core of the regional rail network: St. Lawrence & Atlantic Railroad (SLA), Pan Am Railways (PAR, formerly Guilford Rail), Canadian Pacific (CP) (purchased from the Central Maine & Quebec Railway (CMQR), Eastern Maine Railway (EMR) and Maine Northern Railroad (MNR). The state leases some of its track to MNR, CMQR and also to two seasonal passenger excursion railroads, the Belfast and Moosehead Lake Railroad and Downeast Scenic Railroad. Freight railroads are classified by the Federal Rail Administration (FRA) based on annual operating revenues as follows:


- Class I – annual revenues greater than $433.2 million;
- Class II- annual revenues between $37.4 million and $433.1 million; and
- Class III- annual revenues under $37.4 million.

EMR, MNR and SLA are all Class III railroads, PAR is a Class II railroad and CP is a Class I railroad.

Class also is used to describe the allowable track rail speeds:

- Class 1 – 10 mph freight, 15 mph passenger
- Class 2 – 25 mph freight, 30 mph passenger
- Class 3 – 40 mph freight, 60 mph passenger
- Class 4 – 60 mph freight, 80 mph passenger
- Class 5 – 80 mph freight, 90 mph passenger

[1] A complete Maine Rail map is available at https://www.maine.gov/mdot/maps/docs/2020/Maine_Rail_System.pdf.

## CONDITION AND CAPACITY

Maine has a State Rail Plan, last developed in 2014, as required by the Federal Rail Administration (FRA). This plan includes overall planning for rail needs in the state and ties into the Federal Rail Plan. The State Rail Plan also ties into the 2017 Maine Integrated Freight Strategy Report. Most rail facilities in Maine are privately owned or are leased. The bulk of the maintenance and the payments for upgrades, as well as the impetus for improvements, is on the rail owners, is generally private, and is based on business decisions about their customers and profits.

No railroad track in Maine is currently capacity-constrained by volume.

Currently, sections of Maine's active track will not support the 286,000-pound rail cars that are becoming the standard of Class I railroads. At the completion of the INFRA project in 2020, and the Pine Tree Corridor CRISI project in 2022/2023, all railroad main lines in Maine are expected to be able to support 286,000-pound rail cars. The ability to use consistent car types with Class I railroads will reduce handling costs and make systems more efficient.

SLA, in conjunction with MaineDOT and Lewiston Auburn Railroad, has re-connected the old Rangeley Branch Line to the Lewiston Auburn Railroad and the St. Lawrence & Atlantic Railroad. Their $3 million infrastructure investment adds a switching track capacity and provides service to MB Bark in Auburn. This project will allow for future industrial development opportunities on 320 acres of land served by rail.

PAR track is currently Class 3 between the Maine/New Hampshire state line and Yarmouth and Class 2 track north of Yarmouth. PAR is preparing for significant improvements to the 75-mile corridor between Yarmouth and Waterville. At the conclusion of that project, this section of track will be near Class 3 standards. PAR is planning to continue to look for future funding to make additional improvements and secure this section at Class 3.

PAR partnered with Norfolk Southern to improve the "Patriot Corridor" between Albany, New York and Boston, Massachusetts for double-stack service. This partnership has provided a direct benefit to freight rail in Maine, even though double-stack clearance on PAR's rail line into Maine is not yet available. Federal funding was received for these improvements in Massachusetts.

The MaineDOT provided condition assessments for 478 miles that it owns (of which 320 miles are in active use). MaineDOT owns an additional 94 miles of right of way with no tracks. Of the segments assessed, conditions were classified into three categories: 70 miles or 14.6% were good, 200 miles or 41.8% were fair, and 208 miles or 43.6% were poor. Track maintenance standards are those acceptable to the Federal Rail 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.

## FUNDING AND FUTURE NEED

Significant investments have been made over the past four years to mainline tracks throughout the State of 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 on branch lines, siding tracks, and in rail yards. These improvements will continue to help freight rail reach their ultimate destinations in Maine faster and more reliably.

There are a variety of funding sources for rail improvements, including federal, state, and private sources and many projects have funding from both public and private sources over the past four years. The federal sources include FRA funding through ongoing Better Utilizing Investments to Leverage Development (BUILD) and Infrastructure for Rebuilding America (INFRA) projects as well as ongoing and future Consolidated Rail Infrastructure and Safety Improvements (CRISI) projects, the Federal Transit Authority (FTA) funding, and the Congestion Mitigation and Air Quality Improvement (CMAQ) program (significantly used for intersections and public grade crossings). MaineDOT's funding sources include the Industrial Rail Access Program (IRAP), the Multimodal Account (for passenger rail), and specific bonds.

Over the past 4 years, MaineDOT has used three FRA-funded grants, totaling $88.7 million, to improve track structure and railroad bridges; the FY2015 Maine Regional Railways Transportation Investment Generating Economic Recovery (TIGER) grant, the FY2017 Maine Railroad Bridge Capacity Fostering Advancement in Shipping and Transportation for the Long-term Achievement of National Efficiencies (FASTLANE) grant, and the FY2018 Pan Am Railways Mainline Upgrades and Rail Crossing Safety Improvements CRISI grant.

The ongoing Maine Regional Railways Project is a $37.4 million TIGER grant – since renamed BUILD grants – to upgrade rail, cross ties, turnouts, and bridge timbers. Upgrades were made to the former CMQR, now CP, mainline and Moosehead Subdivisions, to the EMR Madawaska Subdivision mainline and Van Buren Subdivision. Since 2016, yard improvements were also completed at Northern Maine Junction, Searsport Yard, Millinocket Yard, Oakfield Yard, Van Buren Yard and Madawaska Yard. At the end of 2020 the CMQR/CP mainline will be upgraded to FRA Class 2 track, the CMQR/CP Moosehead Subdivision will be upgraded to FRA Class 3 track, the EMR Madawaska subdivision will be upgraded to FRA Class 3 track, and the EMR Van Buren Subdivision will be upgraded to FRA Class 2 track. The upgrades will allow for increased speed and reliability. The TIGER grant program provided $20 million in funding, MaineDOT provided $2.8 million in funding and the remaining $14.6 million was provided by the participating railroads (MNR/EMR and CMQR).

The ongoing Maine Railroad Bridge Capacity project is a $15.8 million FASTLANE grant – since renamed the INFRA grant program – to repair and strengthen 21 bridges and 1 culvert on the EMR Madawaska Subdivision mainline. Improvements include rehabilitation and strengthening of the 8-span, 774-foot steel deck Sheridan Truss, replacement of a 210-foot long culvert, and significant

substructure repairs to 4 bridges. At the end of the project, all structures on the EMR Madawaska Subdivision will be able to support 286,000-pound rail cars. The FASTLANE grant program provided $7.9 million in funding, MaineDOT provided $5.9 million in funding and the remaining $2 million was provided by the participating railroad (EMR).

The recently awarded Pan Am Railways Mainline Upgrades and Rail Crossing Safety Improvements project is a $35.5 million Consolidated Rail Infrastructure and Safety Improvements (CRISI) grant funded project to upgrade rail, replace turnouts, reconstruct and modernize public grade crossings, replace bridge timbers, extend the existing New Gloucester Siding track, and improve the Wayside Signal Systems on PAR mainline between Yarmouth and Waterville. In total, 37 miles of rail will be upgraded to continuous-welded rail (CWR), 25 mainline turnouts will be replaced, and 47 public grade crossings will receive safety and surface improvements. These improvements will improve the speed and reliability of freight rail traffic in this corridor. The CRISI grant program provided $17.5 million in funding, MaineDOT provided $570k in funding, and the remaining $17.5 million was provided by the participating railroad (PAR).

The Industrial Rail Access Program (IRAP) is funding provided through MaineDOT for Maine businesses to encourage economic development and increased use of rail transportation for new rail users. Shippers can appl y for funding to provide or improve access to freight rail transportation. IRAP provides up to a fifty-percent match and the user provides the rest. There is $1.25 million in state funding, matched with $1.25 million in private funding annually in the 3-year MaineDOT work plan for IRAP to encourage moving heavy freight off the road systems, jobs growth and retention, and to keep Maine businesses competitive. One example project was the 2019 project to support the reopening of the Old Town Mill. This $1 million project rehabilitated tracks leading to the mill from Pan Am Railways mainline. At the end of the first year in service, the mill had been served by approximately 2,000 carloads of pulp and other raw material.

## OPERATION, MAINTENANCE, AND PUBLIC SAFETY

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 funding as available. MaineDOT's three-year work plan budgets $1.2 million annually in FHWA crossing safety funds for improving safety at highway-rail crossings. The FHWA allocation is intended to fund 4 to 5 crossing improvement projects annually.

There are currently 779 active public at-grade crossings. There are 430 crossings with active protection that include lights and gates or lights only. The cost to maintain the crossings is shared between the railroad owner and MaineDOT. The remaining 349 crossings are passively protected with signage only. There have been a total of 12 accidents/incidents in the last four years (2016-2019) with no fatalities, compared to 29 accidents/incidents between 2012 and 2015 with similar track miles.

## INNOVATION AND RESILIENCE

Innovations in rail include adding ground-mounted infrared cameras ("trackside detectors") to inspect the cars as they pass, looking for hot spots and identifying them by axle location, then transmitting the information to the engineer and to a database which initiates maintenance requests. In Maine, these are in place approximately every 100 miles of track.

Inspection performed by drones and vehicle-mounted lifts will allow enhanced bridge inspections. Track can be inspected with ultrasound and ground penetrating radar but this technology is not currently in widespread use in Maine.

Many culvert crossings found along Maine rail lines are currently undersized and are in poor condition. As rainstorm intensity increases, these culverts are at increasing risk for failure. Undersize culverts at stream crossings also impede fish and animal passage and impact watershed ecology. Culvert replacement is challenging on rail due to no useful detours, deep crossings and steep slopes. Due to funding and logistics, culverts are typically only replaced when failure is imminent or has already occurred. Proactively replacing culverts would reduce the risk of future failures and restore aquatic species habitat.

There has been no comprehensive survey of the rail system in Maine for resilience. One paper listed 6 miles of rail as being subject to inundation due to possible sea level rise.

LARGE CULVERT UNDER RAILROAD IN DISREPAIR


# RECOMMENDATIONS TO RAISE THE GRADE

Maine 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 and terminals, and culverts;
- Continue to fund and promote the IRAP program so businesses can plan on using freight rail;
- Continue to work with railroad owners on interchange projects to assure the system's smooth performance;
- Continue to invest in at-grade crossing improvements to improve safety for both the freight rail system and highway vehicles;
- Conduct reviews with municipalities for redundant crossing locations and alternative traffic pattern opportunities to improve efficiency of the rail systems;
- Develop policies to increase and improve intermodal freight transportation, including improving data collection;
- Review all agency policies on raising bridges that pass over rail lines. By raising bridges to a 22' height over the long term, double-stack trains will be accommodated, increasing the efficiency and cost effectiveness of the system;
- Continue to upgrade appropriate sections of track for 286,000 pound capacity;
- Make a plan to replace undersize culverts to increase resiliency of rail infrastructure and improve aquatic habitat; and
- Perform a state-wide review of the rail systems for resilience and climate change issues.


# SOURCES

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

Maine DOT Annual Report FY 2015, http://maine.gov/mdot/docs/2016/mainedot-annualreport2015-web.pdf

Interviews and emails with:

- Nate Moulton, Director, Office of Freight and Passenger Services, MaineDOT
- Brian Reeves, Director, Rail Transportation, MaineDOT
- Ted Krug, Chief Engineer of Design & Construction, Pan Am Railways
- Josh Snyder, Civil Engineer– M.O.W & Rail Services, New Brunswick & Maine Railways

FY2015 Maine Regional Railways TIGER Grant: https://www.maine.gov/mdot/grants/tiger/archive/

FY2017 Maine Railroad Bridge Capacity FASTLANE Grant: https://www.maine.gov/mdot/grants/fastlane/

FY2018 Pan Am Railways Mainline Upgrades and Rail Crossing Safety Improvements CRISI Grant: https://www.maine.gov/mdot/grants/crisi/

MaineDOT, 2020-2022 Capital Work Plan: https://www.maine.gov/mdot/projects/workplan/

2014 Maine State Rail Plan http://maine.gov/mdot/ofbs/docs/Rail_Plan_7-9-2015.pdf

2017 Maine Integrated Freight Strategy http://maine.gov/mdot/ofbs/docs/FreightStrat.pdf

# ROADS

D

## ROADS
GRADE: D

## EXECUTIVE SUMMARY

There are nearly 23,000 miles of roads in our rural state, and MaineDOT manages 37% of them. The state's highway system had a projected $165 million annual funding gap before the drastic downturn in 2020 which will grow the need even more. Due to Maine's continued funding shortfall, roads are not meeting the customer condition, safety, and service goals; with 8% of the highest priority roads continuing to have low ratings in condition and safety. Maine motorists spend at least an extra $1 billion per year in vehicle operating costs, congestion, and crashes with the state producing the highest fatality rate in New England. However, recent leadership in the state legislature and years of overwhelming voter support at the ballot box for transportation bond referendums points to interest in finding sustainable funding solutions for Maine's roads.

## BACKGROUND

Maine's highway system is a critical transportation service for the state's 1.3 million residents and 37.1 million annual visitors.[i] Improved roads provide Maine's residents with greater mobility and traffic safety, which in turn improves personal and commercial productivity, tourism experiences, and economic development statewide.

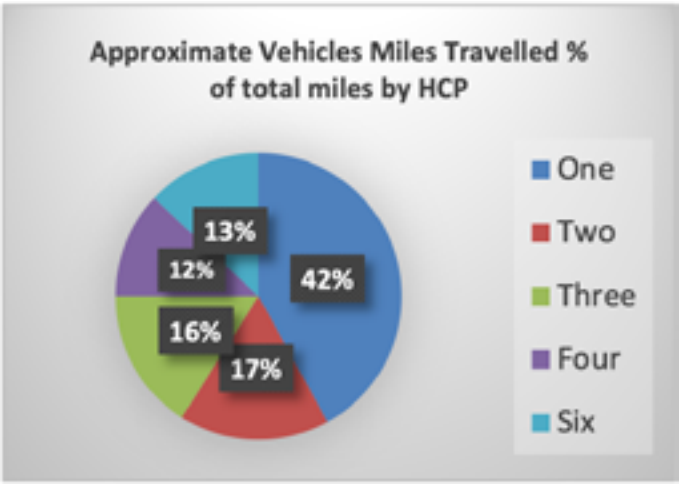
**TABLE 1: NEW ENGLAND'S ROADWAY SYSTEMS IN 2020[ii]**

| State | Total System Mileage | State Controlled Mileage (A) | Percent State Controlled | Federal apportionment in millions (B) FY2020[iii] | Federal $ mill/ Mile (B/A) |
|---|---|---|---|---|---|
| MA | 36,763 | 3,006 | 8 | $669 | $0.22 |
| **ME** | **22,815** | **8,350** | **37** | **$203** | **$0.02** |
| CT | 21,556 | 3,719 | 17 | $553 | $0.15 |
| NH | 16,171 | 3,903 | 24 | $182 | $0.05 |
| VT | 14,253 | 2,629 | 18 | $223 | $0.08 |
| RI | 6,013 | 1,101 | 18 | $241 | $0.22 |

The total mileage of Maine's roadway system is only surpassed in New England by Massachusetts. MaineDOT controls more than twice the mileage of any other New England DOT.

MaineDOT categorizes Maine's highway assets into five 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.[iv] The Moving Ahead for Progress in the 21st Century (MAP-21) was passed into law in 2012 and requires states to meet certain performance measures for the National Highway System (NHS).[v] The NHS is primarily Priority 1 roads and consists of less than 6% of the overall public road mileage but more than 41% of all traffic.

**FIGURE 1: MAINE ROADS BROKEN UP BY HIGHWAY CORRIDOR PRIORITY MEASURES**




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. Priority 5 roads have been re-categorized into 1-4. This report does not focus on priority level 6 roadways which are maintained by local municipalities and make up only 13% of the vehicle miles traveled in the state.

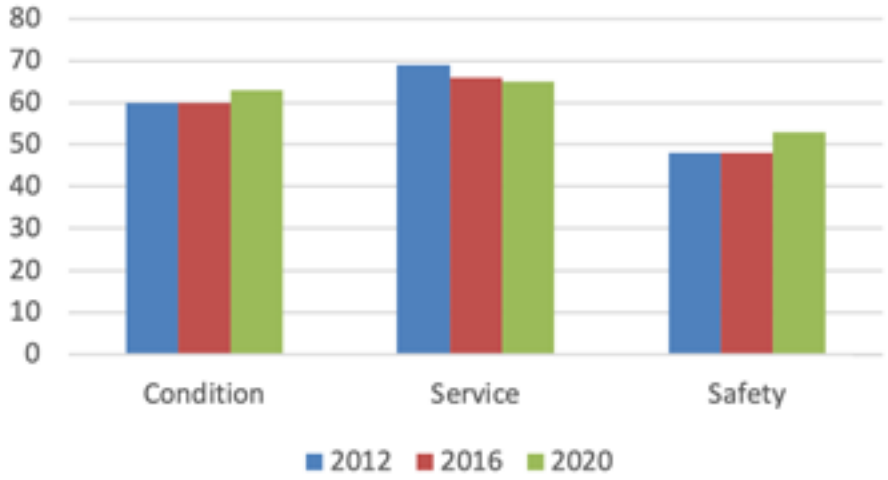
## CONDITION

MaineDOT looks at four measures when producing an overall condition rating: ride quality, pavement condition, roadway strength, and bridge condition. Figure 2 shows a slight improvement for 2020 (using 2019 data) when compared to 2016.[vi] The NHS for MAP-21 performance measures rates miles as Good, Fair and Poor. Using 2017 data, a majority of pavements fall in the Fair category (63%), while 33.4% are good and only 3.6% as Poor.[vii] Minimum acceptable percentage for poorly rated interstates is 5% while Maine only has 1.2% rated Poor.

## 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 2020 (using 2019 data), figure 2 shows an improvement from 2016.

**FIGURE 2: PERCENT OF PRIORITY 1-4 RATED BY MAINEDOT AS GOOD OR EXCELLENT**



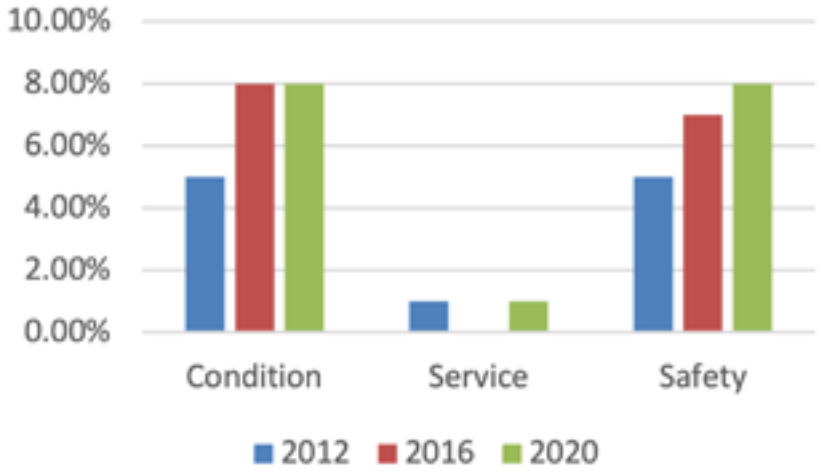

The number of fatalities on Maine's roadways has varied, with 112 reported in 2014 to a high of 157 reported in 2017 (136 in 2018). In Maine the fatality rate per 100 million vehicle miles traveled (VMT) in 2015 was 1.07 and in 2017 it increased to 1.17, though dropped again to 0.91 in 2018[viii]. The 2019 values tracked close to the 5-year average of 1.04. The national averages were 1.15 in 2015 and 1.16 in 2017. For additional comparison the fatality rates in New England for 2017 were recorded as: 0.56 in Massachusetts, 0.75 in New Hampshire, 1.04 in Rhode Island, and 0.93 in Vermont. Among the New England states, Maine has the highest fatality rate, though the rate in New England states typically have been some of the lowest fatality rates in the nation.[ix]

## CAPACITY

Service (or capacity), consists of three measures: posted roads, posted bridges and congestion. A majority of Maine roads provide fair to excellent service and did not have congestion. Figure 2 shows good and excellent, ratings are consistent with 2016 but lower than 2012.

Total statewide vehicle miles travelled are just over 15,000 billion annually.[x] In 2015 Maine experienced a very high rate of growth; 3.3% when compared to 2014. In 2018 the growth rate slowed and was a more stable 0.5% over 2017. The Maine Turnpike (109 miles of I-95 in southern Maine) experienced nearly 5% growth from 2017 to 2019. A Portland Area Needs Assessment conducted in 2018 necessitated a widening of the Turnpike from mile 44 to 49. The widening is currently under construction.[xi]

**FIGURE 3: PRIORITY 1 & 2 ROADS RATED BY MAINEDOT AS D OR F**




Per the Maine State Law, 23 MRSA section 73(7) which was passed into law in Spring 2012 (LD 1753), "Right-Sized" goals were established including by 2022, improve all Priority 1 and Priority 2 corridors so that their safety, condition and serviceability customer service level equals Fair or better. As shown in figure 3, in 2019 8% of Priority 1 & 2 roads have poor or unacceptable ratings for Condition and 8% have poor or unacceptable ratings for Safety as graded by MaineDOT.[xii]

## INNOVATION AND RESILIENCE

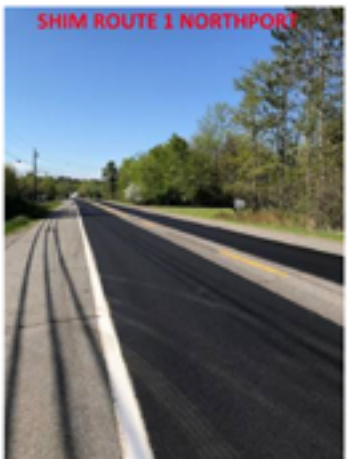
In July 2019, MaineDOT moved into a new Transportation Management Center (TMC)[xiii]. Almost a hundred Message Boards, speed radar units, cameras, as well as Probe Data to detect travel times have been added to the MaineDOT operator's responsibility. MaineDOT is also currently in the middle of a project to install new Road Weather Information Stations along the Interstate Corridor. These will allow MaineDOT's crews to be better informed of real time traffic conditions. For instance, the TMC will have a quicker indication of road conditions to inform their use of Message Boards for warning motorists of winter weather hazards. Also in progress are several enhancements to the Advanced Transportation Management System software the TMC utilizes for connecting to their ITS devices and to provide 511 traveler information. MaineDOT also has purchased access to several sources of real-time and historic traffic data through third party vendors, StreetLight and Tom-Tom. Currently, MaineDOT is working in partnership with the NHDOT and Maine Turnpike to investigate part-time shoulder use along the I-95 High Level Bridge as a mobility enhancement in the Kittery-Portsmouth area.

In 2019 Governor Janet Mills created the Governor's Climate Council. The Council has several working groups including a Transportation Working Group which focused on reducing greenhouse gas emissions from single passenger cars and heavy duty trucks. In Spring 2020 the group reported out recommendations including[xiv] improving vehicle emissions through strategies such as increasing subsidies on purchase of electric vehicles & electric vehicle chargers. The report also recommended considering reducing vehicle miles driven by raising the gas tax, increasing working from home options, improved transit and ridesharing to name a few. A major emphasis was given to adaptation to climate change. The report recommends assessing vulnerable assets statewide either through Geographic Information System mapping, recording historical wash outs or problems, or other means. Once that data is analyzed, the assets can be added to a list to prioritize funding, and when projects for improvements are funded, climate adaptation should be addressed using the updated standards and possibly green infrastructure tools. A final report to the Governor will be completed by December 2020.

## OPERATIONS, MAINTENANCE, AND FUNDING

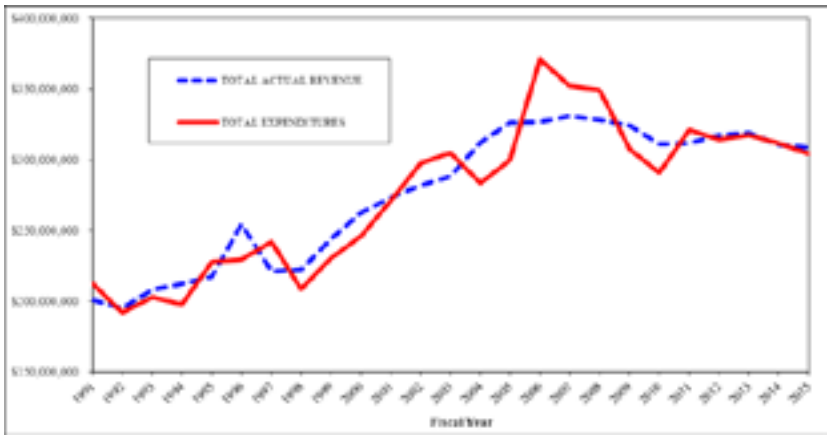
MaineDOT's 2020-2022 work plan includes over 2,000 projects costing an estimated $2.59 billion. In spite of this, Commissioner Bruce Van Note is quoted as saying "With lower levels of capital project production, we are focusing on essential safety needs, bridges, maintaining the level of Light Capital Paving (skinny mix) program as long as Highway Fund revenues allow, and implementing low-cost holding actions to even higher priority roads, consisting of **p**atching **u**ntil **n**ormal **t**reatments become fiscally possible." PUNT is the new acronym and is being applied to Priority 1-3 roads to hold them over. Van Note goes further "The reality is that we are now competently managing a slow decline of our transportation system until bipartisan funding solutions materialize."[xv] When resources are limited, maintenance is often deferred, thus costing agencies more and deferring costs into future years. Maine is in the middle of this situation today.

**BEFORE & AFTER PHOTOS COURTESY OF MAINEDOT**


In 2019, a Blue Ribbon Commission was formed during the first regular session of the 129th Maine Legislature to study and recommend funding solutions for the state's transportation system.[xvi] Maine's fuel tax has been the same since 2011 at 30 cents per gallon making it 23rd lowest in country, and 3rd lowest in New England (as of July 2020)[xvii]. The revenue shortfall continues to grow and as revenues from gas tax, which are not adjusted to inflation at the federal or state levels, decline. Gas tax revenues will further decline as the motor vehicle fleet continues to electrify.

FIGURE 4: MAINE HIGHWAY FUND REVENUES 1991-2015 (NOT ADJUSTED FOR INFLATION) FROM MAINE STATE LEGISLATURE OFFICE OF FISCAL & PROGRAM REVIEW WEBSITE



The commission identified a $232 million annual gap in funding for all transportation. Based on the assumption the state can secure federal funding of one-third of the gap, the commission recommended a Maine-based funding target of $160 million per year. In March 2020, the Commission recommended that the Legislature fund an additional $20-60 million for current year. Further, the Commission recommended that the next Legislature consider long-term sustainable sources for the additional $160 million from a blend of the 50 to 80 percent from current General Fund revenues and the balance from new revenue sources. The Commission recommended that the increase in funding be ramped up over a 3 to 4-year period.[xviii] Transportation bonds traditionally pass at the ballot box each year. In July 2020 Maine passed another $105 million transportation bond.

COVID-19 lowered traffic on Maine's highways thus has resulted in lower fuel tax and other planned revenues creating additional shortfalls that need to be resolved in future years.

## FUTURE NEED

The majority of current and future delays will occur on the state's urban arterials, where capacity is limited, volumes are high, and land use access is generally uncontrolled. Growth in development along these corridors has resulted in more driveway entrances and left turning movements adding to the congestion. In November of 2018, MaineDOT published a Mobility Report outlining three critical areas of necessary improvement: 1) Traffic signal performance; 2) Use of Intelligent Transportation Systems (ITS) to better utilize existing capacity; and 3) Promotion and expansion of incident management solutions. To help achieve these goals, the design of improvements to a 100+ traffic signals is currently underway with the help of a FHWA BUILD grant, including along heavily traveled corridors in Augusta, Waterville, and Sanford.

**Cost to Maine Drivers:** According to The Road Information Program (TRIP) in 2020 Maine's road conditions are costing each Maine motorist an average of $543 per year in extra vehicle operating costs (accelerated depreciation, additional repair costs, increased fuel consumption, and increased tire wear), which amounts to over $561 million statewide annually. Road conditions, congestion, and crashes cost Maine motorists over $1 Billion annually.


# RECOMMENDATIONS TO RAISE THE GRADE

Maine ASCE makes the following additional recommendations:

- Update the goals set by Legislature in 2012 to address findings in the 2017 Roads report and consistency with MAP-21 requirements;
- 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;
- While support for Transportation bonds has been overwhelming including recent support for a July 2020 referendum, MaineDOT needs to implement larger bonds, less frequently, allowing MaineDOT to fund a 3-year work plan with more predictable funding mechanisms;
- To meet the goals as set out by statute in 2012, fully fund the Pavement Preservation Program; the Light Capital Paving Program; and the other necessary highway reconstruction, safety improvement, and paving programs;
- MaineDOT and its partners should continue simple operational techniques for congestion mitigation, such as intersection improvements and land use policies and also continue to design and construct bypasses and capacity enhancements where required; and
- Research materials to make our physical infrastructure more resilient to changes in the environment including sea level rise. As an example, our assets will need to withstand and increase in salt usage due to a projected increase in ice storms.


# SOURCES


i. https://motpartners.com/wp-content/uploads/2019/04/2018_MAINE_GovConf_HighlightSheet.pdf

ii. fhwa.dot.gov, HM-10, Highway Statistics 2018, Accessed 3/8/2020

iii. fhwa.dot.gov,FA-4, Federal-aid Highway Fund Apportionments for Fiscal Year 2020, Accessed 3/29/2020

iv. A more detailed explanation can be found on MaineDOT's website at www.maine.gov/mdot/about/assets/hwy/

v. MaineDOT Transportation Asset Management Plan June 6, 2019

vi. Data for Customer service levels in 2018 & 2019 provided by Andrew Bickmore, MaineDOT in an email dated 04/24/2020

vii. MaineDOT Transportation Asset Management Plan June 6, 2019, P. 16

viii. 2018 safety updates provided by Email from Andrew Bickmore, MaineDOT May 8, 2020

ix. https://cdan.nhtsa.gov/SASStoredProcess/guest

x. Email from Andrew Bickmore, MaineDOT May 8, 2020

xi. Maine Turnpike Authority website, www.maineturnpike.com & COO Peter Merfeld

xii. http://www.mainelegislature.org/legis/bills/getPDF.asp?paper=SP0601&item=4&snum=125

xiii. Email from Stephen Hunnewell, Assistant State Traffic Engineer 03/17/2020

xiv. https://climatecouncil.maine.gov/strategies/transportation; Peter Merfeld member

xv. https://www.maine.gov/mdot/projects/workplan/docs/2020/WorkPlan2020_2021_2022%20Jan_14_2020.pdf

xvi. https://legislature.maine.gov/blue-ribbon-commission-to-study-funding-solutions

xvii. https://taxfoundation.org/state-gas-tax-rates-2020/

xviii. Bangor Daily News 03/03/2020 "Maine panel recommends hiking road funding, but punts on long-term shortfall fix."

# SCHOOLS

C

# SCHOOLS
GRADE: C

## EXECUTIVE SUMMARY

Approximately 170,000 pupils attend school at Maine's 540 school facilities. Maine school districts spend only 1-2% of their operational budgets on infrastructure maintenance and repairs. Since 2010, 16 new schools were built and 30 deficient facilities were closed through the two primary state programs providing funding for infrastructure – the Major Capital Projects program and the School Revolving Renovation Fund. Current funding levels show an estimated gap of $2.8 billion in major renovations or new construction between the requested and funded projects. However, after five years of funding well below the allowable debt ceiling, the last four years have increased funding  up to the debt ceiling and also additional funding has been added to the revolving fund for smaller projects.

## BACKGROUND

Maine has over 600 schools in 540 buildings, with an enrollment of approximately 170,000 pupils from pre-kindergarten through 12th grade. The school facilities are local community centers and sources of pride. They are generally well maintained and use the available funding well.

## CAPACITY AND CONDITION

Enrollment statewide decreased 7% since 2016, with an additional 5% reduction expected by 2026. Enrollment in the more populous counties (York and Cumberland) has decreased less, and a number of districts have had gains during this same period. The shrinking student population can be attributed to the state having the nation's oldest median age. The capacity is appropriate.

Between 1997 and 2011 Maine's school facilities were evaluated by the Maine Department of Education (DOE), using the Facility Condition Index (FCI), which is used in many states for asset management and planning purposes. The database is now no longer required to be used; the requirement was eliminated to return more control of education to the local governments. The FCI database was last updated in 2012. The ASCE schools condition assessment is now based on anecdotal evidence including communications with the DOE.

School facilities have many infrastructure components such as water supply (potable and fire protection), wastewater disposal, parking lots, playing fields, and energy. 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 insure 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

In 1998, the School Revolving Renovation Fund (SRRF) was created by the Maine State Legislature to provide funding through loans and grants that would contribute to safe, healthy and adequate school facilities through renovation or capital construction projects. These projects are generally up to $1 million with 30 to 70% of the funding provided as grants. The SRRF has four major 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.

Between 1999 and 2015 the SRRF program funded $171.9 million out of $346.3 million of requests (approximately $10 million per year); this represents a funding level of slightly over 49% of the requests during that time frame. Some projects have been requested more than once. The Legislature added $18 million to the revolving fund in 2018 for a total of $25 million. The last cycle had 143 requests, all Priority 1, and 105 requests were filled; the DOE is not taking requests for Priority 3 or 4 projects, which are done with local funding, and no Priority 2 requests were applied for.

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 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. 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. A comprehensive high school with CTE was completed in Sanford in 2019 at a cost of $120 million.

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. As of the 2019 funding cycle, 74 new schools were applied for, and three were approved. The remaining 71 projects are likely to reapply in future cycles; assuming $39.3 million per project, these give a backlog of $2.8 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.

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 $36 million renovations to three buildings with RSU 21 (Kennebunk, Kennebunkport and Arundel), a $30 million school expansion in Westbrook, and $35 million for renovations to four schools in Yarmouth. These are relatively affluent communities in the southern part of the state.

Because of the high level of construction work statewide, the insufficient level of tradespeople available, and the effect of tariffs on the prices of material, 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 and fewer qualified people are being encouraged to consider or prepare for construction jobs.

## 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.

Not currently covered in routine operation and maintenance (O&M) costs, however, are those incurred from lead testing in drinking water. Drinking water is regulated under the Maine Department of Health and Human Services (DHHS). Most water inspections are done to a municipal or other public water system. Drinking water is inspected with a number of tests per people served, and more frequent tests if conditions of concern are found. 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. In October 2019, testing found PFAs (per-and polyfluoroalkyl substances) in 9 of 19 tested public water supplies, including the water supplies for three schools. Now, all Maine schools must sample for lead in all taps used for drinking and culinary purposes. Testing will begin in the fall of 2020. Approximately 11,000 lead samples will be collected from 710 schools. This initiative is sufficiently funded through a $406,000 WIIN Grant from the US Environmental Protection Agency. However, funding for subsequent testing, infrastructure maintenance, and routine repairs should be prioritized to keep the overall infrastructure costs down.

## INNOVATION AND RESILIENCE

Maine is in the process of funding and designing 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.

Some school districts are moving ahead with projects for geothermal, solar, and wind energy, as well as adding pellet boilers.


# RECOMMENDATIONS TO RAISE THE GRADE

**Maine ASCE provides the following recommendations:**

- **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;**
- **Schools are major facility investments and should be required to use FCI-type software to have the information to manage their facilities, and some method of reporting the facilities condition needs to be implemented to be eligible for state funding;**
- **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;**
- **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.**


# SOURCES

Interviews with Education Specialists at the Maine Department of Education

Maine Department of Education Booklet 3, Public School Standards and Construction Guidelines for New School Construction and Major Renovation Projects (2015) https://www.maine.gov/doe/sites/maine.gov.doe/files/inline-files/3%29%20Standards%20and%20Guidelines%20FINAL%20MAY%202015.pdf

https://www.towncharts.com/Maine/Maine-state-Education-data.html

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

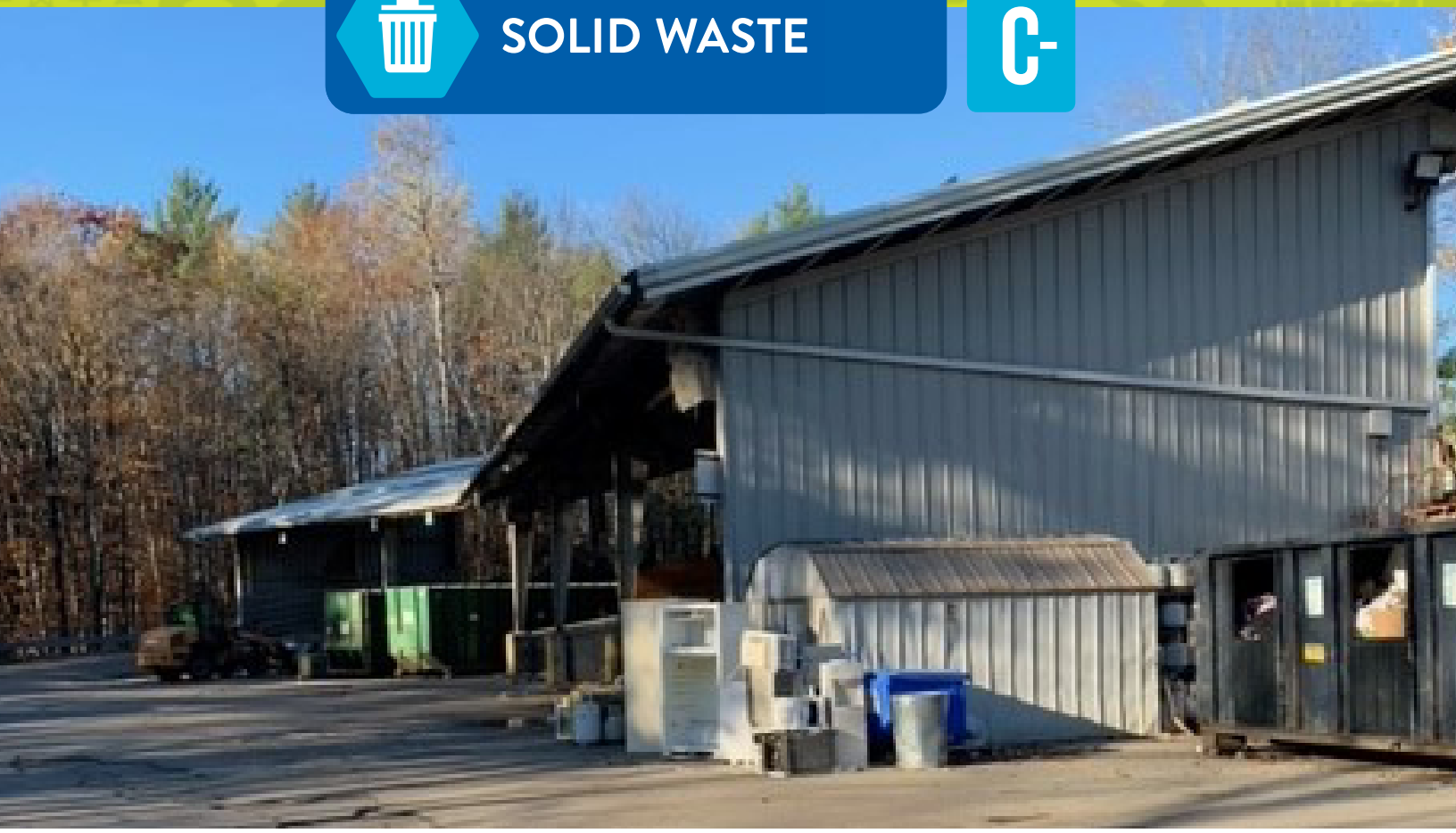
https://www.maine.gov/doe/schools/facilities

https://www.maine.gov/dafs/economist/sites/maine.gov.dafs.economist/files/inline-files/Maine%20Population%20Outlook%20to%202026.pdf

https://www.mainepublic.org/post/maine-districts-paying-high-price-new-schools-construction-surges

# SOLID WASTE

C-



## SOLID WASTE
GRADE: C-

## EXECUTIVE SUMMARY

In 2017, Mainers generated and disposed of 1.4 million tons of municipal solid waste (MSW), including construction and demolition debris (CDD), which is an average of 1,080 pounds of household waste per person, a reduction from the 2013 rate of 1,140 lbs/person and consistent with the national average of 1,068 lbs/person. At 38% in 2017, MSW recycling remains below the state-established goal of 50%. Strict solid waste regulations are in place to limit environmental impacts. Landfill capacity continues to be efficiently utilized through volume reduction efforts at Waste-To-Energy (WTE) facilities. However, legislation is needed to further limit out-of-state waste. Continued promotion of reduction and reuse, along with planning and investment will be necessary to ensure waste minimization is achieved and disposal capacity is available beyond 20 years.

## BACKGROUND

Solid waste in Maine is generated by residential, commercial, institutional, and industrial entities and is categorized as MSW, CDD, land-clearing debris, and special wastes. MSW is the typical solid wastes generated by household and normal commercial sources. In 2013, the Maine Legislature required the solid waste hierarchy (first diversion from the waste stream by reducing, reusing, recycling and composting; then volume reduction of waste by incineration; and only then landfill disposal) be incorporated into the solid waste regulations as licensing criteria for all solid waste licensing actions. This incorporation shifted the responsibility of meeting the environmental stewardship (hierarchy) goals from the State level to that of the individual solid waste facilities, most of which are not State owned and operated.

In accordance with legislation, periodic waste management plans have been developed; currently, the plan is the responsibility of the Maine Department of Environmental Protection (DEP), Bureau of Remediation and Waste Management. The most recent Waste Materials Management Plan Update was issued by Maine DEP in January 2019. The plan provided an assessment of current policies and a review of changes since the previous plan was issued five years prior.

The 2019 plan defined the following four focus areas for solid waste management in Maine;

1. Increase waste reduction and reuse initiatives;
2. Build on recent successes in increasing the diversion of organics from disposal;
3. Divert materials from landfill disposal; and
4. Address current conditions and trends that create disincentives to managing wastes further up the hierarchy.

The Maine DEP collects annual solid waste data from waste processors and municipalities and summarizes this information in statewide waste generation and disposal capacity reports issued at the beginning of each year. The most recent report was issued in January 2019 and includes data from 2017. This annual data is used to project capacity and evaluate progress towards the State's waste management goals.

## CONDITION AND CAPACITY

In Maine, solid waste is managed by a combination of municipal, commercial, and private industrial waste handling services and facilities. The condition of Maine's solid waste system is evaluated annually by comparing the state's waste generation rates to the available solid waste management options.

WASTE GENERATION RATES: In 2017, Maine generated and disposed of 1.4 million *tons* of MSW and CDD. Considering only MSW disposal, this was an average of 1,080 pounds per person, a slight decrease from 1,140 pounds per person in 2013. This value is on par with the 2017 national average disposal rate of 1,068 pounds per person.

From 1993 through 2001, waste generation increased by 42%, but from 2003 through 2007 waste generation growth leveled off, with an increase of only 1%. Since 2007, waste generation has fluctuated, decreasing with the economic downturn between 2008 and 2012 and returning to pre-2008 levels by 2014.

In 2017, 1.5 million *cubic yards* of landfill capacity in Maine was used for the disposal of MSW (including WTE incinerator ash), CDD, and special wastes. In addition to MSW and CDD, landfill capacity is used for the disposal of some land clearing debris and of special wastes. Special wastes are disposed of at generator-owned and operated facilities and at the two landfills licensed to accept special waste streams (Juniper Ridge in West Old Town and Crossroads in Norridgewock). Special wastes are non-hazardous industrial wastes and wastes requiring special handling, and include ashes, sludges, contaminated soils, asbestos containing materials, and industrial process waste.

## Solid Waste Management:

DIVERSION FROM DISPOSAL: Current planning in the "Reduce" category includes exploring initiatives being used in other state and local jurisdictions, these include; increasing education and outreach; recognizing businesses that reduce single-use plastics; identifying data elements to conduct a "consumption-based greenhouse gas (GHG) emissions inventory;" supporting local initiatives to reduce wasted food through technical assistance and grant funding prioritization; and supporting strategies to decrease and eliminate single-use plastics. Reuse includes items such as working with MaineDOT to gauge the feasibility of reusing glass and shingles in transportation projects; implementing tool and equipment lending libraries; exploring options for managing products at end-of-life; and integrating food scrap separation and management into State office building dining service contracts.


Maine's updated legislative goal is to achieve a 50% MSW recycling rate by January 1, 2021. Unfortunately, we have not reached that goal. In 2017, Mainers recycled 38% of the MSW they generated, not including CDD. While reasonably effective municipal recycling programs currently exist throughout the state, those programs may be in jeopardy. In January 2018, China enacted its "National Sword" policy, banning the import of most plastics and other materials typically received by their recycling processors. This ban has been attributed to unacceptable levels of contamination in past recyclables sent from the United States. For the previous 25 years leading up to 2018, China accepted nearly one-half of the world's recyclable waste. This 2018 development has had a significant negative impact on recycling economics throughout the country, including in Maine. Presently, single-stream recycling costs are nearly double that of direct disposal costs and some Maine communities have indefinitely suspended their recycling programs. Although 2018 and later recycling data was not available at the writing of this report, recycling rates appear to be declining.

Efforts have been made to increase the amount of composting in Maine. From 2013 to 2017, the amount of organic materials diverted from the waste stream increased from 12,700 tons to 17,600 tons, an approximately 40% increase. The state continues to emphasize the importance of reducing, reusing and composting organics primarily to remove these materials from landfills. However, diverting 17,600 tons of organics represents only one (1) percent of the total waste stream. Although an effort to enact legislation to ban food waste in landfills was unsuccessful in Maine, private business is acting on the opportunity to expand efforts in organics diversion and anaerobic conversion to energy.

VOLUME REDUCTION THROUGH COMBUSTION:

There are currently three Waste-To-Energy (WTE) facilities in operation in Maine:

- Mid-Maine Waste Action Corporation (MMWAC), Auburn;
- ecomaine (formerly Regional Waste Systems), Portland; and
- Penobscot Energy Recovery Company (PERC), Orrington.

Incineration typically results in a 90% volume reduction of the waste accepted at a WTE facility. The by-product of waste incineration is primarily ash, with some residual metals. In 2017, 591,100 tons of waste were received at incineration facilities and, of that waste, 441,800 tons (75%) were incinerated (destroyed through combustion), producing 114,350 tons of ash that was subsequently landfilled. The remaining tonnage (front-end bypass waste) was also disposed of in landfills and a small amount of metals were recovered and recycled.

The combined design incineration (disposal) capacity of the three WTE facilities in 2017 was 550,00 tons/year, but was reduced to 450,000 tons/year in 2018 due to a change in boiler operating times at the PERC facility. It is expected to remain at 450,000 tons/year through 2037.

LANDFILL DISPOSAL: In 2017, in addition to the three WTE facilities that reduced the volume of waste that requires landfilling, Maine had two WTE ash landfills, five municipally-owned MSW landfills, one State-owned landfill, which is operated by a commercial entity, and one commercial landfill. The number of municipally-owned landfills in Maine has remained steady since 2016, although at least one of these facilities is expected to close in 2021. Permitting, constructing, and operating a landfill is an expensive endeavor. New municipally-owned facilities are not expected to be proposed in the future.

In 2017, the Maine DEP estimated approximately 19.2 million cubic yards of licensed landfill capacity existed in Maine. This number drops to 1.8 million cubic yards (roughly equivalent to 1.2 million tons of MSW) in 2037, which would provide less than one year disposal capacity at current rates. Nearly all this remaining capacity will be in the two WTE ash landfills and in two municipal landfills located in Aroostook County.

However, the commercial Waste Management landfill in Norridgewock applied for a 7 million cubic yard expansion (15 years of life expectancy) in October 2019, which is currently under review at the DEP. Additionally, the State holds a license for an approximately 2.0-million-cubic-yard landfill, Carpenter Ridge, located west of Lincoln that has not yet been developed. One of the strains that exists on Maine's landfill capacity is the need for capacity for bypass waste and ash from incineration facilities, and the impact of out-of-state waste on this specific waste stream. While State law does place some restrictions on the direct landfilling of out-of-state waste, including prohibiting it from State-owned landfills like Juniper Ridge, these same restrictions do not apply to the bypass waste and front-end residue from processing facilities that can receive out-of-state waste. This inconsistency can result in a challenge for predicting capacity needs in the future. A current bill in the legislature is aimed at correcting this loophole and minimizing or eliminating out-of-state waste in order to preserve Maine's landfill capacity.

## FUNDING, FUTURE NEED, OPERATIONS AND MAINTENANCE

Though policy decisions are made at the state level, solid waste disposal is still the responsibility of and funded almost entirely by municipalities and their taxpayers. According to the 2017 Municipal Solid Waste Generation & Disposal Capacity Report, solid waste disposal costs include collection, consolidation, and transportation costs, as well as tipping fees at the disposal facility (WTE incinerator or landfill), with the tipping fee often the major share of the overall cost. The report further states that tipping fees vary between the facilities, but are reported to range from about $40 to $85 per ton of MSW.

Operation and maintenance (O&M) activities at landfills include landfill gas management and monitoring; leachate management; daily cover, temporary cover, permanent cover and gas management system installation/construction; windblown debris management; hot load and excluded waste plans/ management; haul road construction and maintenance; tire wash operations; litter patrol on public haul routes; and more. Furthermore, at WTE facilities, O&M is more complex because the infrastructure system includes boilers, turbine generators, water cooling/processing, front-end sorting, residuals management, ash management, air quality, and more. Tipping fees at the WTE and landfill facilities are intended to cover these O&M costs, in addition to significant permitting and construction costs, as well as final closure and post-closure care costs.

State policy makers must consider the costs to local taxpayers for solid waste management, yet strive to maintain environmental protection, especially as recycling becomes cost prohibitive, local disposal facilities close, and disposal options in some areas of the state become limited. Regulations must also recognize the need for private investment to permit, construct, operate, and ultimately close facilities at all levels within the State's solid waste hierarchy.

Future landfill disposal capacity will need to be provided through investment by/at State-owned and commercial landfills. Likewise, investment in operations and maintenance by each of the commercial WTE facilities will be necessary to keep the facilities operating at their currently licensed (design) capacities. Innovative approaches are necessary to address the global uncertainty for economical household recycling programs in order to reach the 50% MSW recycling goal.

## PUBLIC SAFETY, RESILIENCE AND INNOVATION

Maine's solid waste management hierarchy sets the framework for achieving an integrated approach to solid waste management with the overall objective of protecting public health and the environment. Maine's solid waste laws and regulations are comprehensive and set forth stringent solid waste facility siting and design standards that require redundant protections to the environment, as well as routine monitoring of surface water and groundwater throughout the life of a facility and the post-closure period. Solid waste facilities are also held to strict closure design standards and a long post-closure care and monitoring period. Solid waste facilities must prepare detailed construction, operations, and closure cost estimates and provide financial assurance reserves.

Maine's statutory goal for waste reduction was updated in 2017 to focus on the amount of MSW, exclusive of CDD, sent for disposal since it is easily tracked/measurable. Maine achieved its goal to reduce the per capita amount of MSW disposal to 1,100 pounds by January 1, 2019 based on the 2017 data. However, anticipated decreases in recycling may result in an increase in per capita disposal. Likewise, market factors resulting from the State's operating services agreement with a commercial solid waste company that operates the State-owned Juniper Ridge Landfill and issues with the Coastal Resources of Maine facility, discussed below, and the 115 Maine towns and cities that entered into waste disposal agreements with it have served to disincentivize incineration over landfilling.

In 2017, Mainers recycled 38% of the MSW they generated, not including CDD, shy of the State goal of 50%. The Coastal Resources of Maine waste processing facility was permitted in 2016 with a design capacity to process 237,250 tons of municipal solid waste annually. The facility was intended to convert organic waste to biofuel for energy production and to sort the remaining non-organic materials that are brought into the facility for recycling or disposal. Located in Hampden, the facility had an anticipated conversion and recycling rate of 70%-80% with the remainder of the processed waste to be separated and landfilled. The proposed technology had not been used in Maine before at this scale. Recently, financial troubles have caused the Hampden facility to cease operations and it is unclear when or if it will be restarted. The MSW waste stream from the 115 Maine towns and cities who had an agreement with the facility is now being diverted to an operating commercial landfill and one of the WTE facilities, further reducing the recycling rate and available disposal capacity, and adding more reliance on disposal resources at the bottom of the solid waste hierarchy.

A recent emphasis on the diversion of organic wastes from landfill disposal has resulted in some innovative opportunities in Maine. Exeter Agri-Energy and Village Green Ventures are two companies that are using innovative technologies to convert organic waste to energy using anaerobic digestion. These facilities focus on using organic wastes from various sources, and there is an effort to expand the technology into more widespread use. However, at present, only about 1% of the solid waste generated in Maine is being diverted through the capture of organics. Concepts for future reduction of solid waste include Circular Economy and Product Stewardship. The reduction of paint and mercury containing devices are examples of successful product stewardship laws enacted in Maine.


# RECOMMENDATIONS TO RAISE THE GRADE

**Maine ASCE makes the following recommendations:**

- **Continue State support to municipalities to enhance local solid waste management programs, with emphasis on cost-effective reuse and reduction, and support of household recycling and hazardous waste collection;**
- **Promote waste reduction, recycling, and beneficial reuse of waste products;**
- **Continue to pursue product stewardship, similar to the state's paint stewardship program. Items such as mattresses, pharmaceuticals, and batteries among other wastes are currently under consideration; and**
- **Respond to annual updates of the solid waste plan and capacity projections promptly, recognizing the long time and significant investment necessary for permitting and constructing additional (disposal) capacity.**


# SOURCES

Report entitled Maine Materials Management Plan, State Solid Waste Management and Recycling Plan 2019 Update

Code of Federal Regulations (CFR) Title 40: Protection of the Environment; Part 258 – Criteria for Municipal Solid Waste Landfills;

Maine Revised Statutes Annotated (MRSA) Title 38; Chapters 13 (Waste Management) and 24 (Solid Waste Management and Recycling);

Report entitled "Maine Solid Waste Generation and Disposal Capacity Report for Calendar Year 2017," prepared by the Maine Department of Environmental Protection for the Joint Standing Committee on the Environment and Natural Resources of the 129th Legislature, and dated January 2019;

Web site of the Bureau of Remediation and Waste Management, Maine Department of Environmental Protection, http://www.maine.gov/dep/waste/index.html, accessed April 2020;

The Circular Economy in Detail – the Ellen MacArthur Foundation

EPA- Facts & Figures about Materials, Waste & Recycling

# STORMWATER
GRADE: C-

## EXECUTIVE SUMMARY

Thirty communities with municipal separate stormwater sewer system (MS4) have 45% of the state's urban population and 30% of the state's developed land. Capacity and condition of the MS4s have not been assessed comprehensively; rather attention has been focused on the combined sewer infrastructure to minimize the sewage overflows entering the state's waters. Within the past five decades, extreme precipitation events increased by 70% which is more significant than in any other US region. Urban stormwater disproportionately impacts Maine's surface water quality considering that only 2.8% of the state is developed land. Dedicated funding for stormwater infrastructure is critical; voter-approved bonds similar to the transportation sector and more local stormwater utilities are crucial for serving the present needs while preparing for the future.

## BACKGROUND

Surface runoff generated by rainfall and snowmelt constitute stormwater which flows via drainage systems. In Maine, stormwater infrastructure mainly consists of buried (e.g., catch basins, manholes, pipes, culverts) and above-ground (e.g., ponds, basins) structures and green infrastructure (e.g., vegetated buffers, constructed wetlands). Land development, particularly creation of new impervious surfaces, increases the volume, peak flow, and pollutant load of stormwater which can negatively impact water quality, public health and safety. Due to its far-reaching impacts on the society, stormwater must be effectively managed using green and grey infrastructure. This is a particularly important goal for a state like Maine which has rich water resources. The Maine Department of Environmental Protection (DEP) is the state agency authorized to issue National Pollutant Discharge Elimination System (NPDES) permits regulating stormwater discharges from municipal separate stormwater sewer systems (MS4) and from construction and industrial activities.

## CAPACITY

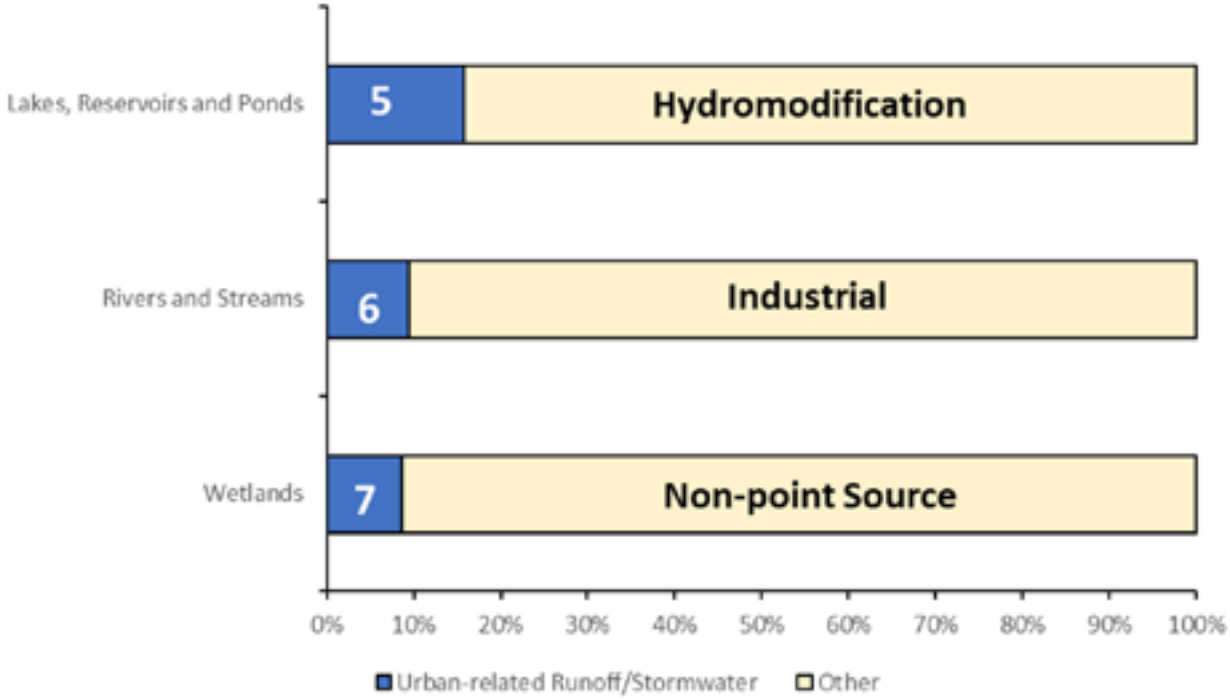
Currently, there are 30 communities, eight state and federal entities (e.g. colleges), and two transportation agencies regulated under the MS4 program. The MS4 communities are mainly concentrated around the four population centers, York County, Portland, Lewiston-Auburn, and Bangor-Brewer that constitute 45% of Maine's urban population. Many communities have a network of both combined and separate sewer systems and have mostly focused on assessing the old combined sewer infrastructure, which collects and conveys both wastewater and stormwater, to abate the combined sewer overflows (CSOs). Limited information is available on the existing stormwater system capacity and maintenance needs.

Little or no stormwater treatment is provided for the developments exempt from the stormwater regulations. Aggregated impact of these developments can adversely affect the stormwater quantity and quality on the watershed scale. To mitigate these impacts, DEP regulates Total Maximum Daily Loads (TMDLs) of various pollutants entering the state's waterbodies that have been determined as "impaired". Nineteen water bodies receiving stormwater discharge from MS4 communities are considered urban impaired streams (1). Maine uses percent impervious cover as a surrogate for the stormwater pollutants and has percent impervious cover TMDL targets for 29 impaired stream watersheds. Number of the impaired streams regulated under the impervious cover TMDL has not changed since the TMDL was approved in 2012.

## CONDITION

Figure 1 shows the extent of the surface water impairment attributed to urban stormwater based on DEP's 2016 integrated water quality report (3). The percentage of the impaired rivers, streams, and freshwater wetlands impacted by urban stormwater did not increase from 2014 to 2016 (3,16). Over the same time, the estuarine and marine area impaired by urban stormwater remained unchanged at 1.5 square miles. Urban stormwater ranked as the fourth leading source of water quality impairment for estuaries. Urban stormwater disproportionately impacts Maine's surface water quality considering that only 2.8% of the state is developed land (3).

**FIGURE 1. PERCENT OF THE SURFACE WATERS IMPAIRED BY "URBAN-RELATED RUNOFF/STORMWATER" IN 2016.**




Numbers given in blue bars show the source ranking of the stormwater. "Other" stands for the waters impaired by the non-stormwater sources. Name of the highest-ranking source is given in the yellow bars.

Combined sewer systems are the oldest components of the stormwater infrastructure followed by the MS4s and then detention ponds, which were introduced primarily for flooding control around 1970. Expected life span of the stormwater ponds is 80 years (20). Although most of the older stormwater ponds may not be at the end of their life, it is safe to assume that some of them need maintenance such as removal of the accumulated sediments. Stormwater retention, quality treatment, and low impact development are relatively new; the state-wide quality treatment standards were introduced in 1997. Combined sewer assets have been the focus of municipalities aiming to abate CSOs. Comprehensive assessment of the MS4 assets has not been performed in Maine at a state level.

## FUNDING

Dedicated funding for MS4s and watershed-scale stormwater management is an important need in Maine (4). The state does not allocate funds specifically for municipal stormwater programs or capital project implementation. The Clean Water State Revolving Funds (CWSRF) are mostly used for the improvement of the wastewater infrastructure and CSO abatement: out of the 14 projects funded for 2020 fiscal year, two were for CSO abatement (5).

The most recent Clean Watersheds Needs Survey (CWNS) available for Maine is dated 2012 (6). The CWNS focused on the state's wastewater infrastructure and did not include any data for the stormwater management category. Data collection for an updated CWNS is currently underway, and municipalities have been encouraged to list stormwater needs in this update.

Competitive grants funded through a voter-approved bond in 2017 & 2018, for $5 million, and in 2019 for $4 million were available for the stream crossing (culvert) upgrade projects, which improve stormwater drainage and alleviate local flooding issues (7). Federal funding through EPA is available for installation and retrofits of stormwater infrastructure to address impaired or threatened waterbodies (8). In 2019 these grants funded best management practices (BMPs) in 11 watersheds reducing the pollutant load by 690 tons of sediment per year. The CWSRF program also funded 6 under-drained soil filters in the City of Portland to treat stormwater runoff (18).

**AN UNDERDRAIN SOIL FILTER UNDER CONSTRUCTION IN SOUTH PORTLAND IN 2020**

In addition to state and federal aids and grants, MS4 communities use bonds, which are ultimately repaid by property tax and utility revenues, for their stormwater capital improvement projects. Stormwater enterprise bonds constitute approximately three percent of the overall outstanding debt of the state's most populated MS4 community, Portland (9). The city plans to invest $2.64 million in bond money on the green infrastructure, stormwater outfall, culvert replacement, and other stormwater infrastructure improvement projects during 2020 fiscal year. Furthermore, $11.4 million in bond money will be spent on the combined sewer separation projects which will expand the city's MS4.

Four stormwater utilities generate funding for the stormwater programs and capital improvement projects in Augusta, Bangor, Lewiston, and Portland. Stormwater fee revenues were $6.7, $3.0, and $1.3 million for Portland, Lewiston, and Bangor utilities in 2019 fiscal year (10, 11, 12). The Greater Augusta Utility District (GAUD) administers the stormwater utility in Augusta, which is not a MS4 community. GAUD stormwater utility revenue was $3.9 million in 2019 calendar year (13). In addition to these stormwater utilities,

the Long Creek Watershed Management District, which was established under the residual designation authority of the EPA, also collects an annual impervious cover fee from the parcels and properties having more than one acre of impervious area within the Long Creek watershed, which is classified as an urban impaired stream watershed by DEP. The generated revenue, which is approximately $1.5 million per year, is disbursed on the stormwater management projects to improve the stream's water quality (17).

## FUTURE NEED

Forecasted decadal (2016-2026) population growth for Maine's five largest cities with regulated MS4s was 1% or less (14). For the same decade, population growth forecasted for York and Cumberland counties was 6% and 3%, respectively, whereas Lincoln County was estimated to lose 7% of its population between 2016 and 2026. Since these demographic trends will be an important factor driving the land development projects, the funding needs of Southern Maine MS4s are expected to increase in response to the expanding stormwater infrastructure with new development.

## OPERATION AND MAINTENANCE (O&M)

Overall stormwater infrastructure of the state 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 privately operated stormwater infrastructure that is regulated by the state. Most municipal MS4s require annual third-party inspections for the privately-owned stormwater control measures (SCMs) in their areas. A significant amount of the privately owned SCMs outside NPDES are not maintained properly due to the lack of dedicated funding/personnel and regulatory awareness.

Approximately one-third of Maine's developed land is regulated under MS4. While a comprehensive, statewide asset inventory for the MS4s is not readily available, each MS4 community is required to have an inventory to maintain their stormwater assets. According to the preliminary data available from seven Southern Maine MS4 communities, one square mile of urbanized area can have 30-140 catch basins/manholes, 2,600-35,000 linear feet of drainage pipe, and 750-10,000 linear feet of ditch. MaineDOT has 2,778 catch basins located in the regulated urbanized areas. From September 2017 to September 2018, MaineDOT cleaned 1,175 catch basins, and maintained 8.7 shoulder miles of roadside ditches (15).

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

## PUBLIC SAFETY AND RESILIENCE

Maine's stormwater conveyance structures must be designed to handle a 10-year storm at a minimum per DEP's statewide standard. Annual precipitation in the U.S. Northeast increased approximately five inches (0.4 inches per decade) between 1895 and 2011 (2). The sea level rose approximately one foot since 1900. Extreme precipitation events (heaviest 1% of all daily events) increased by 70% in the Northeast between 1958 and 2010, which is more than any other US region. Under the changing climate, it is highly likely that more frequent, extreme precipitation events will exceed the capacity of several MS4s and result in more flooding events. The flooding risk will be exacerbated for the coastal communities where the rising sea levels and storm surge will create the tailwater conditions hindering stormwater discharge at the outfalls. In Maine, many practitioners design the stormwater conveyances to handle 25-year storms versus the 10-year storm required by the statewide standard. This design practice is partly in response to meet the stricter local stormwater drainage design standards. The current design practice presumably increases the climate resilience of the newly built stormwater infrastructure.

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. Maine DOT modified its design guidance for large culverts in 2015 to a size that accommodates 100-year peak flows (19). Maine voters approved bond measures annually between 2015 and 2019 providing a total of $19.4 million for the ongoing culvert grant program: the program awarded approximately $10 million for 125 culvert upgrade projects so far (7). MaineDOT currently has 14 projects replacing existing bridges with longer/higher deck structures which can pass higher flows and reconnect Atlantic Salmon waters. On average, these improvements in bridge designs add $300,000-$350,000 in construction cost compared to an unimproved replacement structure.


# RECOMMENDATIONS TO RAISE THE GRADE

- An updated comprehensive Clean Watersheds Needs Survey including the stormwater category is essential to quantify the statewide funding needs of the stormwater infrastructure and programs including the condition assessment of the stormwater assets,
- Funding sources dedicated for stormwater management are limited to keep with the operation and maintenance needs and new development. For instance, only three of the 30 MS4 communities have stormwater utilities in Maine. Municipalities should be encouraged to develop dedicated stormwater funding sources such as stormwater utilities with the use of regulatory instruments and stakeholder involvement,
- Maine is in the Northeast region where the extreme precipitation events increased by 70% within the past five decades. This trend put stress on the capacity of the stormwater infrastructure and elevates the flooding risks. Increased public awareness, political support, and stakeholder collaboration are necessary to improve the stormwater infrastructure resiliency, and
- Establishment of a comprehensive database of stormwater infrastructure including condition, maintenance schedule, date of last maintenance/repair, probable year of replacement, and probable cost of replacement is recommended.


# SOURCES

(1) State of Maine. General Permit for the Discharge of Stormwater from Small Municipal Separate Storm Sewer Systems. Retrieved from https://www.maine.gov/dep/water/wd/ms4/2013_Municipal_MS4_GP.pdf

(2) Horton, R., Yohe, G. W., Easterling, W., Kates, R., Ruth, M., Sussman, E., ... Richmond, T. C. (2014). Climate Change Impacts in the United States: The Third National Climate Assessment. Retrieved from http://nca2014.globalchange.gov/report/regions/northeast

(3) State of Maine Department of Environmental Protection. (2018). 2016 Integrated Water Quality Monitoring and Assessment Report. Retrieved from https://www.epa.gov/sites/production/files/2018-03/documents/2016-me-

(4) National Municipal Stormwater Alliance. (2019). 2019 State of Stormwater Report. Retrieved from http://nationalstormwateralliance.org/wp-content/uploads/2019/04/2019-State-of-Stormwater-Report_Low-Res.pdf

(5) Maine Department of Environmental Protection. (2020). Clean Water State Revolving Fund Federal Fiscal Year 2020 Federal Fiscal Year 2020 Final Intended Use Plan. Retrieved from https://www.maine.gov/dep/water/grants/SRF/2020/Final%202020%20IUP.pdf

(6) US Environmental Protection Agency. Clean Watersheds Needs Survey (CWNS) – 2012 Report and Data. Retrieved from https://www.epa.gov/cwns/clean-watersheds-needs-survey-cwns-2012-report-and-data

(7) Maine Department of Environmental Protection. (2020). New round of stream crossing grants awarded by Maine DEP (Media Release). Retrieved from https://www.maine.gov/dep/news/news.html?id=2074634

(8) Maine Department of Environmental Protection. (2019). Nonpoint Source Management Program 2018 Annual Report. Retrieved from https://www.maine.gov/dep/water/grants/319-documents/reports/index.html

(9) City of Portland. (2019). Capital Improvement Plan FY 2020 – FY 2024. Retrieved from https://www.portlandmaine.gov/DocumentCenter/View/26951/Capital-Improvement-Plan-FY-2020—FY-2024–

(10) City of Portland. (2019). Comprehensive Annual Financial Report for the Fiscal Year Ended 6/30/2019. Retrieved from https://www.portlandmaine.gov/ArchiveCenter/ViewFile/Item/1048


# SOURCES (cont.)

(11) City of Bangor. (2019). Comprehensive Annual Financial Report for the Fiscal Year Ended 6/30/2019. Retrieved from https://www.bangormaine.gov/filestorage/422/424/952/954/FY19_-_Combined_Financial_Statements.pdf

(12) City of Lewiston. (2019). Comprehensive Annual Financial Report for the Fiscal Year Ended 6/30/2019. Retrieved from https://www.lewistonmaine.gov/ArchiveCenter/ViewFile/Item/4249

(13) Greater Augusta Utility District. (2020). Audited Financial Statements for the Year Ended 12/31/2019. Retrieved from https://bcms-files.s3.amazonaws.com/GeANpvML19-825/docs/2019_GAUD_audited_financial_statements.pdf

(14) Maine State Economist Department of Administrative and Financial Services. (2018). Maine Population Outlook 2016 to 2026. Retrieved from https://www.maine.gov/dafs/economist/sites/maine.gov.dafs.economist/files/inline-files/Maine Population Outlook to 2026.pdf

(15) Maine Department of Transportation. (2018). Municipal Separate Storm Sewer Systems General Permit Annual Report PY5. Retrieved from https://www.maine.gov/mdot/env/documents/2018RevisedPY5MS4report_F.pdf

(16) US EPA. Maine Water Quality Assessment Report. Retrieved from https://ofmpub.epa.gov/waters10/attains_state.control?p_state=ME#prob_source

(17) Long Creek Watershed Management District. Overview. http://www.restorelongcreek.org/pages/general/overview

(18) State of Maine Department of Environmental Protection. (2020) Nonpoint Source Management Program 2019 Annual Report. Retrieved from https://www.maine.gov/dep/water/grants/319-documents/reports/2019/2019%20NPS%20Annual%20Report.pdf

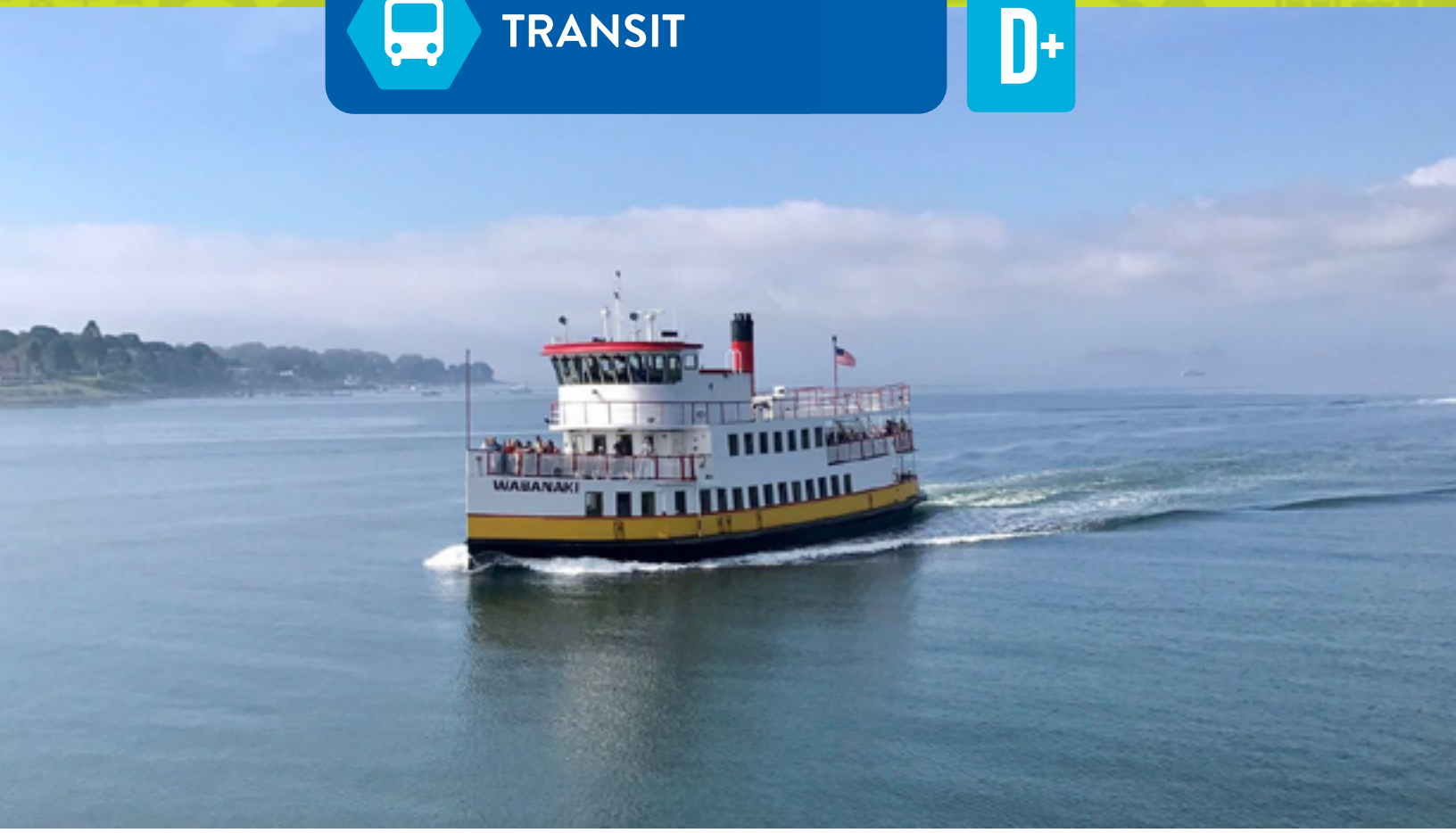
(19) Maine Department of Transportation (2015) Design Guidance: Culvert Sizing. Retrieved from https://www.maine.gov/dacf/municipalplanning/docs/TK02A%20MaineDOT-CulvertSizing52115.pdf

(20) 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.

*Acknowledgments: Kristie Rabasca (Integrated Environmental Engineering Inc.), Douglas Roncarati (City of Portland), Frederick Dillon (City of South Portland), Zach Henderson (Woodard & Curran), Taylor LaBrecque (MaineDOT), Eric Ham (MaineDOT).*

# TRANSIT

D+




# TRANSIT
GRADE: D+

## EXECUTIVE SUMMARY

Maine has 23 transit systems that receive state or federal funding. Most areas in Maine do not have the population density to support typical transit services, but between 2013 and 2017 ridership in southern Maine has increased 13%, by more than half a million riders, counter to national trends. As Maine's population continues to age, and to improve sustainability into the future, transportation options will become increasingly important. However, the state only provides 86 cents annually per capita as an operational subsidy for transit services, much less than other New England states and 38th in the nation. In 2019, underfunding results in the fleet of 436 transit vehicles with 36% classified in good condition while more than 50% were fair or poor. An infusion of federal funds through CARES Act in 2020 should lessen the impact on operators during the current downturn in usage.

## BACKGROUND

Transit ridership in Maine is primarily composed of non-commuters. Non-commuters are not using transit for work purposes but rather tourism, shopping, medical appointments or other reasons. The majority of people in Maine commuting to work use individual vehicles, and most drive alone. While only 0.6% reported using public transportation,[1] Maine ranked 10th nationally with 4.4% of all commuters biking and walking to work in 2016.[2]

In addition to the 23 transit services listed below, the state ferry service, commuter and bicycle/pedestrian programs are included in this report.

**FIGURE 1. LIST OF ENTITIES THAT RECEIVE STATE OR FEDERAL FUNDS FOR TRANSIT SERVICES IN MAINE[3]**

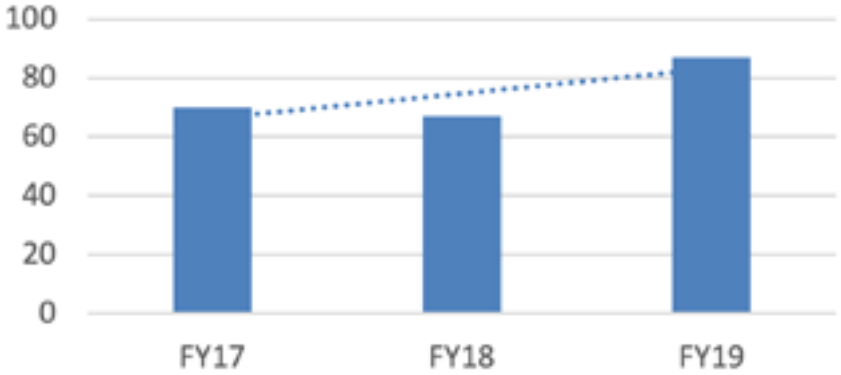
1. Aroostook Regional Transportation System – Rural demand response (flex route has ended)
2. Bath City Bus – Rural Flex Route
3. Downeast Community Partners – Rural Demand Response/Flex Route
4. Downeast Transportation – Rural Flex Route, Seasonal Rural Flex Route
5. KVCAP – Rural Flex Route, Demand Response
6. Mid-Coast Public Transportation – Rural Flex Route, Demand Response
7. Penquis – Rural Flex Route, Demand Response
8. Regional Transportation Program – Rural Flex Route, Demand Response
9. West's Transportation – Rural Flex Route, Intercity
10. Western Maine Transportation – Rural Flex Route, Demand Response
11. York County Community Action – Rural Flex Route
12. Southern Maine Planning $ Development - Urban Demand Response
13. Bangor – Urban Fixed Route
14. Biddeford-Saco-OOB Transit – Rural Commuter Route, Urban Fixed Route, Intercity
15. Casco Bay Lines – Rural Ferry, Urban Ferry
16. Cyr Bus Lines – Intercity
17. Greyhound – Intercity
18. Lewiston-Auburn – Urban Fixed Route
19. Portland Metro – Urban Fixed Route
20. South Portland Bus – Urban Fixed Route
21. Isle au Haut – Rural Ferry
22. Cranberry Isles – Rural Ferry
23. NNEPRA – Commuter Rail

## CONDITION AND CAPACITY

In 2019 there were 436 transit vehicles in Maine and only 36% were classified as in good condition[4]. MaineDOT is responsible for 327 transit vehicles, of which, 32% have more than 50% of their useful life remaining. Of the 327 transit vehicles, 105 are in good condition, 111 are in fair condition, and 111 are in poor condition. MaineDOT is in the process of replacing 55 to 67 vehicles for 2020, leaving approximately 52% of the MaineDOT fleet in fair or poor condition. Transit Operators are responsible for an additional 109 of the transit vehicles in Maine and only 54 of them have more than half of their useful life remaining. The other 55 vehicles have 50% or less of their remaining life and of those at least 23 vehicles have reached the end of their useful life.

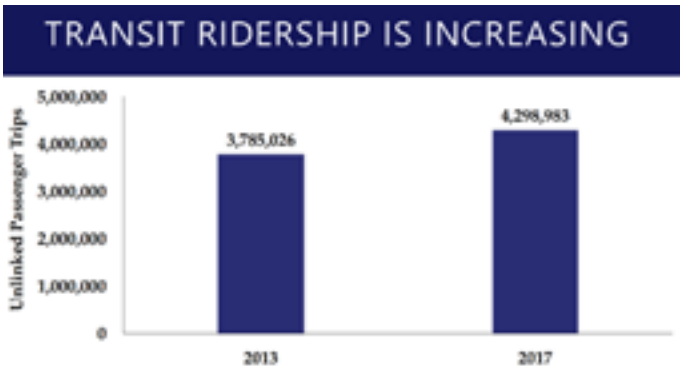

In 2019 passenger rail service was making five daily round trips on the Amtrak Downeaster between Brunswick and Boston, which is operated by Amtrak under a 20-year agreement with Northern New England Passenger Rail Authority (NNEPRA). The Downeaster's ridership has seen 15% growth over the past 10 years, with more than 547,000 riders in 2019. The Downeaster continues to receive high customer service ratings, recently obtaining a 91% rating, which was a significant improvement from the 80% rating received in 2015.[5] The cars and locomotives on the Downeaster line range in age from 18 to more than 43 years old. The three train sets currently in use have a typical seating capacity of 306. Amtrak refreshed all passenger coaches in 2017, including replacement of seats, flooring and lighting, and is procuring new train sets that will operate on the Downeaster line in three to five years. Recent and on-going major projects to extend tracks and add future additional trips are expected to increase the ridership.[6]

**FIGURE 2: ON TIME PERFORMANCE FOR DOWNEASTER (%)**



There are 12 entities that offer year-round fixed route service including four intercity buses, NNEPRA, five urban fixed route bus systems & three ferry systems (one of the entities provides both intercity and fixed route bus). They operate according to a fixed schedule and a fare system. In Maine there are also six seasonal bus systems and two bus systems on the Native American reservations in Washington County. In 2018, there were just under 3.9 million passenger trips on the urban fixed route systems, which was an increase from 2017 of approximately 70,000.[7] Greater Portland Metro, the transit system for the greater Portland Area, recently expanded service to the west to better serve the University of Southern Maine system. Metro also expanded commuter bus service to Freeport, on a heavily commuted portion of I-295. The Community Connector, Bangor's regional bus service, is considering extending operating hours to service more of the population and increase service to the University of Maine.[8]

**FIGURE 3: SLIDE FROM GPCOG.ORG/TRANSIT-TOMORROW**



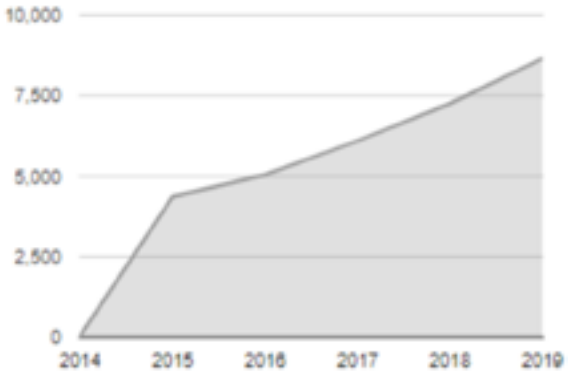

The Maine State Ferry Service (MSFS) provides service to over 450,000 passengers and more than 170,000 vehicles per year with seven ferries to Maine islands.[9] With their newest vessel coming into service in 2012, the age range for the fleet is from 8 years to 60 years old. Even with a new vessel, the average age of the fleet is 32.5 years old and the two spare vessels used to replace an active vessel when there are break downs or annual maintenance/inspections performed are both over 52 years old. This places one vessel in excellent condition and the remaining in fair or poor condition. The average useful life of a ferry is around 30 years, after which the maintenance costs become extensive in order to obtain the bi-yearly certificates of inspection to operate. Of the five active vessels used by the Casco Bay Island Transit District (CBITD) to provide over 1,120,000 passenger trips per year and nearly 42,000 vehicle trips, the oldest is 35 years old and the average age of the fleet is 23 years old.[10] Utilizing a new Transit Asset Management Plan which has the baseline service life to be 30 years, this establishes a poor condition rating for one of the vessels, with two considered to be in marginal condition. The remaining two vessel are in good or better condition.

Maine has 12 entities that provide demand response and flex routes in the rural parts of the state. In 2018, the demand response systems provided 302,120 passengers rides, which was a slight decline from 2017 total of 313,388 passenger rides.[11] The Maine Department of Health and Human Services and the MaineDOT support each other to assure necessary 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.

The GO MAINE program, and 52 Park and Ride lots across the state, encourage car and van pooling, walking, biking, taking the bus or telecommuting.[12]

According to Walk Score, the nine largest cities in Maine are not considered pedestrian friendly and have an average rank of 38 out of 100.[13] Maine has continued to slip in rank as a bicycle-friendly state from 9th in 2012 to 20th in 2019. Micromobility options such as electric scooters or bike share programs do not exist in Maine, except at seasonal based tourist locations.

FIGURE 4: MEMBERSHIP GROWTH OVER TIME FOR GO MAINE PROGRAM




## FUTURE NEED

As ridership increases, transit officials in the greater Portland area are currently working with MaineDOT to study the needs and determine priorities for increasing public transit infrastructure and accessibility.[14] Micromobility options do not exist in Maine. Portland has gone out for Request for Proposals twice for a bike share program in past several years with no success.

## FUNDING, OPERATIONS AND MAINTENANCE

In the 2020 Statewide Transportation Improvement Program, there is $86.9 million programed for transit agencies: $61.7 million in Federal Transit Administration (FTA) funding, $21.8 million local funding, and $3.1 million state funding. The 2019 Public Transportation 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 subsides. According to an Association of State Highway Officials (AASHTO) survey, the median level of state support is $5.17 per capita, while Maine is ranked 38th at $0.86 per capita in state funding.

The Downeaster had a $22.9 million operating expenses in 2019. Of the total budget, 45% came from ticket revenues, 7% from parking and food sales, 10% from MaineDOT and the remaining 38% from FTA funding. NNEPRA receives state of good repair formula funding from the FTA, as well as an allocation of state and federal funding from MaineDOT.

In 2018, operations and maintenance costs for the urban fixed route bus system was $23 million. The farebox recovery rate was just over 13%. The fixed route urban bus service receives funding from FTA, local municipalities, and MaineDOT.[15]

Transit agencies across the U.S. have seen dramatic revenue declines from decreased ridership due to the COVID-19 pandemic. On April 2, 2020, FTA announced that recipients of urbanized area and rural area formula funds will receive CARES Act funding with no local match required. MaineDOTwas awarded $60,373,374 for Section 5307 Urbanized Area, and $24,554,813 for Section 5311 Rural Area activities through the CARES Act.

The MSFS currently has a replacement ferry under construction and plans to put it into operation in late 2020. A second ferry is expected in 2022. If funding is secured, there are plans for an additional ferry in 2023 and another in 2025, which will significantly reduce the average age of the 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. CBITD

has over $16 million to replace the 33-year-old car ferry which should be placed in service in 2022. This new vessel is designed with a diesel electric hybrid propulsion system, on board energy storage and an automated rapid charging system. CBITD has funding in place to begin the design work on a second replacement vessel for a passenger ferry that is nearing the end of its useful life. Maintenance of an aging fleet for both MSFS and CBITD is costly, and funding subsidies will remain necessary for operation and maintenance budgets.

In 2018, operations and maintenance cost for the demand response systems was $7 million. The farebox recovery rate was 15.47%. The demand response systems receive FTA funding, local funding, state funding and funding through Medicare. In June 2020, MaineDOT received an $188,000 grant from USDOT to aid in increasing the availability of on-demand bus service in rural northern areas of the state.

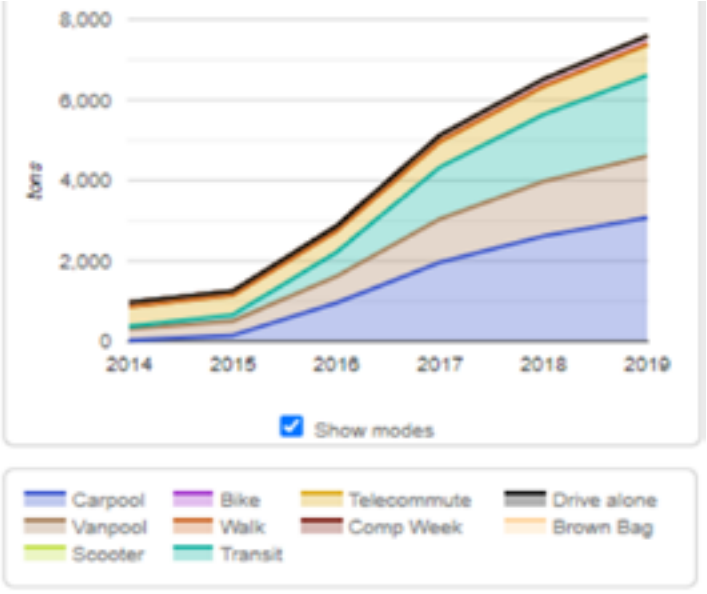
Historically, MaineDOT has committed about $2.3 million annually to support local efforts to improve bicycle/pedestrian access, connectivity and safety. The program requires a 20% non-federal match and prioritizes programs that support Sate Routes to Schools for grades K-8, address safety concerns, and improve access to education and employment for disadvantaged populations.[16]

## PUBLIC SAFETY

In the past 10 years, there have been 37 commuter rail and Amtrak incidents in Maine. There were 6 fatalities, 5 of which were trespassers.[17] Between 2015 and 2019 there were 910 crashes with bicycles, 10 of which were fatal. During this same time, there were 1,319 pedestrian crashes reported, 75 of which were fatal.[18] Starting in 2017, MaineDOT partnered with the Bureau of Highway Safety and the Bicycle Coalition of Maine to provide an ongoing statewide pedestrian safety education program called Heads Up! that seeks to stimulate grass-roots efforts to improve local infrastructure and change behaviors of both drives and pedestrians. This program has been recognized by the Federal Highway Administration (FHWA) and National Highway Traffic Safety Administration (NHTSA) as a best practice.[19]

## RESILIENCE

**FIGURE 5: IN 2019, GOMAINE ELIMINATED AT LEAST 2,437,000 VEHICLE MILES TRAVELED IN MAINE, SAVED 109,618 GALLONS OF GAS, AND REDUCED 1,074 TONS OF CARBON DIOXIDE.[1]**



The Maine Climate Council tasked a Transportation Working Group in 2020 to address climate and resilience issues. The final report recommended several things including vehicle electrification, expanding public transportation especially tourism based and other strategies that would reduce overall vehicle miles travelled.[20] Some actions are already in motion including in 2018, Maine was awarded a $2 million grant to purchase electric buses in the greater Portland area. The electric buses are expected to join the fleet in 2021. Another recent example is Maine's ferry services are both considering the use of hybrid technology on future vessels to reduce fossil fuel consumption thereby reducing CO2 emissions. CBITD is moving forward with final design so their next vessel has an electric hybrid propulsion with energy storage which would cut emissions by up to 800 metric tons per year and the MSFS is recommending a mechanical hybrid propulsion system for their next ferry. Both MSFS and CBITD will need to continue to work with the governor's office and utility companies to ensure that the system can supply reliable and affordable electricity to support this effort.

## INNOVATION

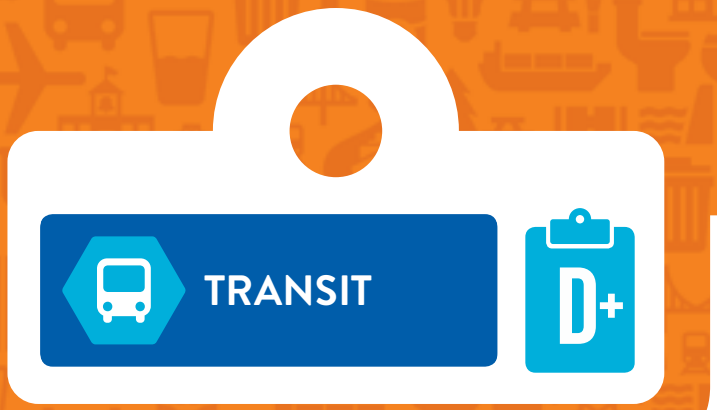
The Downeaster and Metro Breez worked together to create an integrated schedule and seamless fare structure. ADA compliant Passenger Information Display System (PIDS) signs were installed in all Maine stations in 2018-2019 to provide real-time train status information.[21]

The GO MAINE program is using an online program through Agile Mile for rideshare matching. Agile Mile is in the process of creating a trip planner that would allow users to enter a location and destination to see the modes of transportation available. GO MAINE also works with a vendor that provides vans, maintenance, and driver training to employers who wish to offer van pooling to their employees.[22]


# RECOMMENDATIONS TO RAISE THE GRADE

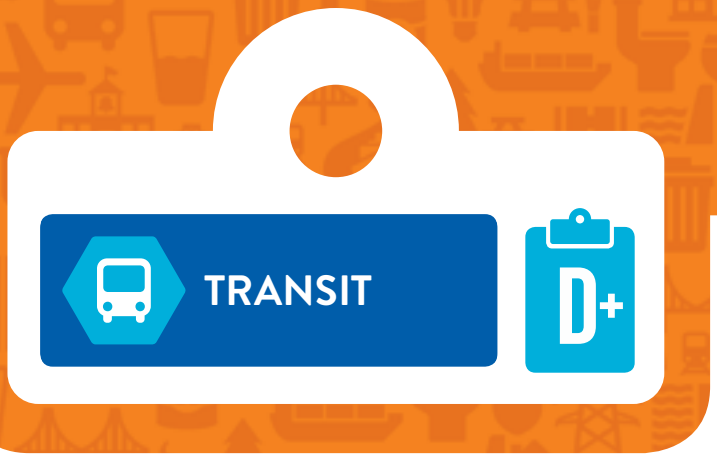
Maine ASCE's recommendations to increase the grade for Transit include:

- Adopt recommended priority strategies of the Public Transit Advisory Council outlined in 2019 report to Governor and Legislature including increasing state funding to local and regional operations to $5 per capita in order to meet the 20% unmet need for targeting level of service improvements;
- Based on funding complexities associated with public transit systems, the state should continue to work with and challenge federal, state and local entities to maximize the use of all funds without diminishing current levels of service or adding layers of administration;
- Encourage use of transit and/or carpooling by limiting parking or increasing parking fees in urban areas;
- Increase state funding to ferry services including assisting CBITD with COVID-19 related impacts;
- Increase funds and develop programs and projects to increase safety of pedestrians and bicyclists; and
- Increase replacement cycle of transit vehicles including replacing bus and other transit vehicles with electric or other clean energy vehicles.




# SOURCES


1. Maine 2018 American Community Survey, available at https://data.census.gov
2. 2018 League of American Bicyclists Benchmarking Report
3. Email from Lori Brann, MaineDOT July 15, 2020
4. Confirmed numbers with email from Nate Moulton, July 15, 2020
5. NNEPRA Media Advisory dated January 28, 2020, and Annual Reports on NNEPRA website
6. Email from Patricia Quinn, Executive Director of NNEPRA, dated March 11, 2020
7. Sara Devlin, Director of BACTS reviewing National Transit database and discussions with Nate Moulton/Lori Brann, MaineDOT
8. Information regarding METRO service or general bus service provided by Sara Devlin, Director of BACTS
9. Information regarding MSFS was provided by Mark Higgins, MSFS Manager
10. Information regarding Casco Bay Ferry Service was provided by Paul Pottle, CBITD
11. Sara Devlin reviewing National Transit Database
12. "Summary of Maine Park and Ride Lot Information" spreadsheet, updated 2-25-20, provided by Patrick Adams, Active Transportation Planner, MaineDOT on February 26, 2020
13. https://www.walkscore.com/ME/
14. Portland Press Herald, March 7, 2019
15. Sara Devlin reviewing the National Transit Database and talking to Nate Moulton/ Lori Brann, MaineDOT
16. Email from Patrick Adams, Active Transportation Planner, MaineDOT, dated February 26, 2020
17. https://safetydata.fra.dot.gov/OfficeofSafety/publicsite/Query/TenYearAccidentIncidentOverview.aspx




# SOURCES (CONT.)

18. Data extracted from the Maine DOT Maine Public Crash Query Tool at https://mdotapps.maine.gov/MaineCrashPublic/PublicQueryStats
19. Email from Patrick Adams, Active Transportation Planner, MaineDOT, dated February 26, 2020
20. https://climatecouncil.maine.gov/strategies/transportation
21. Email from Patricia Quinn, Executive Director of NNEPRA, dated March 11, 2020
22. Email from Rebecca Grover, Maine Turnpike Authority GO MAINE Administrator, dated February 13, 2020

# WASTEWATER

D+

SHORING OF THE $40M 3.5 MILLION GALLON BACK COVE COMBINED SEWER OVERFLOW STORAGE FACILITY IN PORTLAND, MAINE OCTOBER 2020

# WASTEWATER
GRADE: D+

## EXECUTIVE SUMMARY

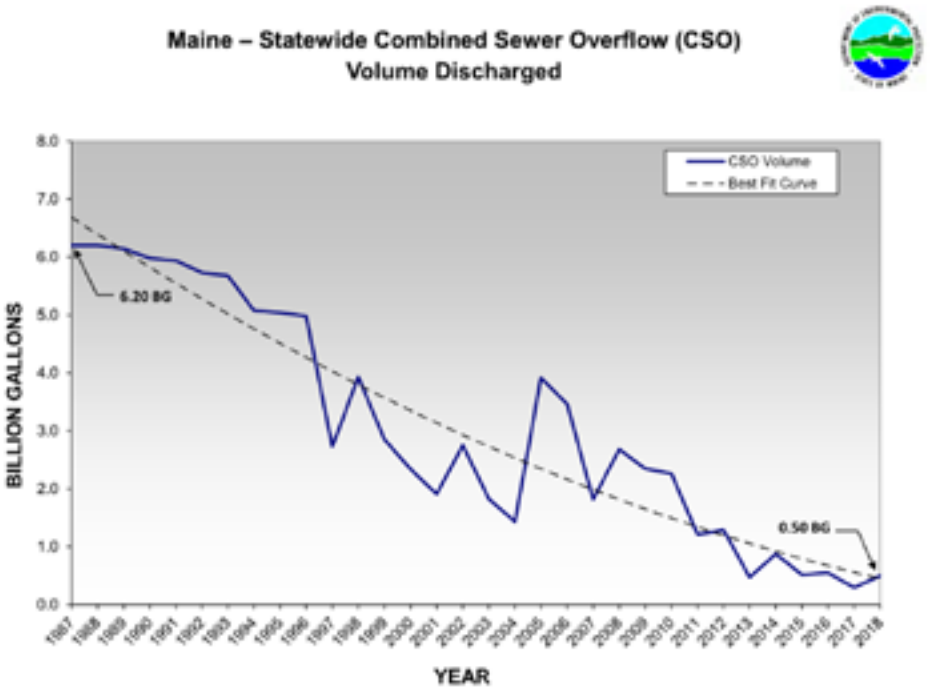
Maine faces challenges with aging municipal wastewater infrastructure including collection systems and treatment facilities. While many treatment plants were originally built in the 1970s and have not undergone significant upgrades, targeted improvements have reduced the volume of combined sewage and stormwater discharges from 6.2 billion gallons in 1987 to 0.5 billion gallons in 2018. However, funding needs are expected to increase as coastal water districts begin to prepare for or respond to the impacts of climate change. Marked with progress, Maine still lacks updated statewide assessment data for understanding the funding needs for the state's wastewater infrastructure.

## BACKGROUND

Maine defines itself as a state with pristine natural waters. The state's high level of water quality promotes public health through the prevention of disease and opportunities for outdoor recreation. Water quality is also an economic engine for Maine, and is the foundation for numerous industries including tourism, agriculture, craft brewing, and commercial fishing. Maintaining the excellent water quality that the state depends on requires consistent investment in the municipal wastewater infrastructure that protects it.

## CONDITION AND CAPACITY

The sewage needs of approximately 70% of the state's population are served by private septic systems (12). The remaining 30% relies on public infrastructure: the pipes and pump stations that transport sewage from our homes and businesses to publicly-owned treatment works (POTW). Many of the State's 163 POTW were originally built in the 1970s and have not undergone significant upgrades since. A critical job of a POTW is to reduce pollution below the National Pollution Discharge Elimination System, (NPDES) permit limits. In 2019, 97% of the state's 162 publicly owned treatment works were substantially compliant, meaning they had no more than one major or three minor violations in a six-month period (9). This highlights that, during normal operations, the condition and capacity of POTW is sufficient to minimize violations. Maine Department of Environmental Protection (MaineDEP) estimates that the majority of facilities are operating at 50 to 60-percent of capacity (12). However, aging treatment infrastructure may impact compliance if not adequately maintained.




Furthermore, failures or overloads, due, in part, to the aging infrastructure to these systems can lead to overflows of sewage, with negative consequences to public health and the environment. There are two types of overflows: Combined Sewer Overflows (CSO) which occur when collection systems that transport both sewage and stormwater are overwhelmed during rainstorms and Sanitary Sewer Overflows (SSO) which occur when pipes fail or become clogged.

Maine, like many northeastern states, has cities with older combined sewers that carry both sewage and stormwater. The extra water from rain events can overwhelm these combined sewers and overflow into surface water bodies. These events are called Combined Sewer Overflows or CSO. CSO are a significant source of pollution and are therefore the focus of regulatory and enforcement action. Thanks to a decades-long focus on reducing CSOs, Maine has reduced the volume of CSO discharges from an estimated 6.2 billion gallons in 1987 to 0.5 billion gallons in 2018 (16).

In addition to CSO, overflows of sewage can also occur due to issues in the collection system such as broken or clogged pipes or pumps. Municipalities are required to report these Sanitary Sewer Overflows (SSO) to the State. There were 529 reported SSO events between January 2016 through March 2020 (12). This data includes both municipal and commercial/industrial users. Additional information was not available; this number will be used as a benchmark for identifying trends in subsequent reports. Preventing SSO requires ongoing investment in wastewater collection and pumping system maintenance and operations.

## PUBLIC SAFETY

According to the state's water quality reports, surface waters that are impaired by wastewater sources have not changed noticeably within the short term. Namely, the municipal wastewater point-sources and combined sewer overflows were the predominant contributors to the bay and estuary impairment following the impact of legacy pollutants such as mercury. In 2018, 39 beaches in Maine (46% of total beaches sampled) were reported as potentially unsafe for public swimming because of high fecal contamination at least one day out of the year (22). High fecal contamination in the ocean water can be directly linked to sewer leaks, sanitary sewer overflows, combined sewer overflows, and discharge from publicly owned treatment works (POTW) not meeting permit limits. Similarly, in 2017, Laite Beach in Camden Harbor reported from one to 10 fecal contamination events annually over recent years, citing a primary pollution source as the Town's combined sewer and stormwater collection system (15). Finally, popular clamming flats such as Biddeford Pool have experienced recent decline in water quality in part due to failing sewer infrastructure in the surrounding area. According to a Portland Press Herald article from September 2019, the Maine Department of Marine Resources noted that bacterial contamination necessitated periodic closures of the flats in 2018 and 2019 (8). Failing septic systems and a leaking sewer pump station wetwell and forcemain are suspected sources. Without wastewater infrastructure improvements, surface water impairment in Maine will remain an issue.


## OPERATION, MAINTENANCE AND FUNDING

A comprehensive report of statewide wastewater funding needs has not been updated since the EPA's 2012 Clean Watersheds Needs Survey, which set the total funding need at approximately $1 billion. The Clean Watersheds Needs Survey is supposed to be updated every 4 years but was not funded in 2016. The state's major funding need was for combined sewer separation, at $375 million dollars. Separately, funding needs related to climate adaptation are expected to increase as water districts, especially in coastal areas, prepare or respond to the impacts of climate change (4).

The main funding sources for wastewater infrastructure improvement projects are local fees and federal sources including the CWSRF, Rural Development (RD), 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. The SRF affordability criteria states that a wastewater fee is unaffordable if it exceeds 2% of the municipalities median household income (MHI) (13). State-wide the average annual residential user fee is estimated to be $550 (12), which is 1.3% of the MHI, and therefore considered affordable for the majority of Maine households.

In 2020, the Maine DEP made $200,000 available for Wastewater Planning Grants in the state fiscal year 2020, with a maximum grant of $10,000 per applicant. DEP has also made $13,450,000 available for Wastewater Infrastructure Grants in the state fiscal year 2020. This grant can cover a maximum of 80% of eligible construction costs (14).

Rural Development funding from the USDA in 2018 included $46 million dollars, which was invested in three Maine communities: Southwest Harbor Water and Sewer District, the City of Rockland, and the Town of Bridgton (5). Additionally, the program provided a $6 million grant and $9.6 million dollar loan to assist with funding wastewater treatment upgrades in Presque Isle in 2019 (10).

The CWSRF provides interim funding for projects at a minimum interest rate of 1% for loans up to 30 years. Additionally, USDA's RD program offers a mix of loans and grants, with loan repayment periods of up to 40 years. RD funding is contingent upon the municipality population being no greater than 10,000 (24). Municipalities can use multiple funding sources (i.e. RD and CWSRF) to fully fund projects.

**RECENT IMPROVEMENTS AT THE WINTER HARBOR TREATMENT PLANT WERE FUNDED WITH ASSISTANCE FROM USDA AND DEP. ONGOING FUNDING IS NEEDED TO RESTORE AGING INFRASTRUCTURE AND PROTECT MAINE'S WATER RESOURCES.**

In addition to funding for publicly owned wastewater systems, there is funding available for privately owned septic systems. The Small Community Grant Program provides grants covering 25% to 100% of the construction costs to replace a septic system, depending on the owner's income (18). Funding for this grant program comes from the passage of an act to authorize a general fund bond to fund $2 million of wastewater infrastructure projects which was passed in 2018. In summary, wastewater infrastructure projects can be funded through multiple sources. Continuing to provide this is essential to keep up with Maine's need for infrastructure improvements.

## FUTURE NEED

Heightened awareness of the presence of PFAS (per-and poly-fluoroalkyl substances) in wastewater residuals has emerged as a significant issue facing POTW. In 2019, the DEP found that the majority of samples of raw and composted residuals exceeded screening levels for one or more PFAS compounds (19). As a result, many POTW that currently land-apply their residuals will need to find new outlets for these materials. These facilities will need to begin planning changes to their residual management strategies, and may incur engineering, capital, and operational costs as a result. Cybersecurity is another emerging issue for all public entities, including POTW. While there is growing awareness of the issue, there has not been a coordinated statewide effort to address it.

## RESILIENCY

Changing climate conditions have facilitated consideration of how aging infrastructure will handle the risk of floods from sea level rise and increased flows from severe storm events. To prepare for local climate impacts, the Municipal Planning Assistance Program of the Maine Department of Agriculture Conservation and Forestry has worked with nine planning commissions across the state to develop a wastewater management climate adaptation guide. It is recommended that municipalities use available resources and guidance to develop a vulnerability assessment for their respective service areas. Currently no studies have been conducted to assess the ability of POTW to handle extreme wet weather conditions.

## INNOVATION

Most examples of innovation in wastewater are related to renewable energy. The Saco Water Resource Recovery Facility has for the last decade used solar heat and effluent heat recovery for a portion of its heating demand and uses wind power to generate electricity. The Kennebec Sanitary Treatment District has recently installed a nearly 1MW solar photovoltaic array which will meet over 80-percent of the facility's electricity needs (17). Since 2012, The Lewiston-Auburn Water Pollution Control Authority has been using its anaerobic digester to reduce wastewater solids and generate enough electricity to offset approximately 55-percent of the facility's demand.

On the treatment side, in 2018 the Portland Water District brought secondary process upgrades online to save energy and proactively reduce nitrogen in its effluent. Two wastewater utilities (Anson-Madison and Greater Augusta) have completed pilot tests using peracetic acid as an alternative to chlorine for disinfection. This has the potential to reduce the cost of complying with a longer disinfection season.


# RECOMMENDATIONS TO RAISE THE GRADE

- **The top priority is to update the Clean Water Needs Survey to quantify the amount of funding needed to maintain and improve Maine's wastewater infrastructure;**
- **Funding for wastewater projects remains a priority both to maintain existing sewers, pump stations and POTW, and to prepare these facilities to address emerging issues including PFAS and climate change; and**
- **It is recommended that communities statewide complete a climate change-related vulnerability assessment in the near future to help each municipality understand how their facility may be impacted and to help prioritize capital improvements.**


# SOURCES

(1) Town of Freeport. (2009). *2009 Annual Report.* Retrieved from https://www.freeportmaine.com/sites/freeportme/files/uploads/freeport_ar2009_web.pdf

(2) State of Maine Department of Environmental Protection. (2017). *2014 Integrated Water Quality Monitoring and Assessment Report*. Retrieved from https://www.maine.gov/dep/water/monitoring/305b/2014/2014report-final.pdf

(3) State of Maine Department of Environmental Protection. (2018). *2016 Integrated Water Quality Monitoring and Assessment Report*. Retrieved from https://www.epa.gov/sites/production/files/2018-03/documents/2016-me-integrated-rpt.pdf

(4) (2019, June 21). Retrieved from http://www.mainesenate.org/bill-to-provide-stable-funding-for-vital-wastewater-infrastructure-sent-to-governor/

(5) Cannon, E. (2018, December 4). USDA Invests Over $46 Million to Improve Wastewater Infrastructure for Three Maine Communities. *Rural Development - U.S. Department of Agriculture.* Retrieved from https://www.rd.usda.gov/newsroom/news-release/usda-invests-over-46-million-improve-wastewater-infrastructure-three-maine

(6) National Association of Metropolitan Water Agencies. (2009). *Confronting Climate Change: An Early Analysis of Water and Wastewater Adaptation Costs.* Retrieved from https://www.amwa.net/galleries/climate-change/ConfrontingClimateChangeOct09.pdf

(7) State of Maine Department of Environmental Protection. (2015). *Dep Fact Sheet - Combined Sewer Overflows in Maine*. Retrieved from https://www.maine.gov/dep/water/cso/fs_cso.pdf

(8) Graham, G. (2019, September 30). Mysterious Biddeford Pool Pollution Forces Three Month Shellfish Closure. *Portland Press Herald.* Retrieved from https://www.pressherald.com/2019/09/30/mysterious-biddeford-pool-pollution-forces-three-month-shellfish- closure/

(9) Kavanah, B. (2019). *Status of Licensed Discharges.* State of Maine Department of Environmental Protection. Retrieved from https://www.maine.gov/dep/publications/reports/index.html

(10) Mahaleris, N. (2019, November 13). USDA Announces Multi-Million-Dollar Funding to Improve Presque Isle Wastewater Treatment Facility. *The County.* Retrieved from https://thecounty.me/2019/11/13/news/usda-announces-multi-million-dollar-funding-to-improve-presque-isle-wastewater-treatment-facility/

(11) Maine Adaptation Toolkit. (n.d.). Retrieved April 15, 2020, from https://www.maine.gov/dep/sustainability/climate/adaptation-toolkit.html#built4

(12) Maine, Department of Environmental Protection. (2020). E-mail conversation regarding SSO database and other statistics.


# SOURCES (cont.)

(13) Maine Municipal Construction Grant Program and Clean Water State Revolving Loan Fund. (n.d.). Retrieved April 15, 2020, from https://www.maine.gov/dep/water/grants/srfparag.html

(14) Environmental Finance Center Network. (2019). *Maine Water and Wastewater Funding Sources.* Retrieved from https://efcnetwork.org/wp-content/uploads/2019/07/ME-Water-Wastewater-Funds-2019.pdf

(15) Mustapich, S. (2017, July 27). Camden Harbor Water Quality: A Work in Progress. *VillageSoup - Knox*. Retrieved from https://knox.villagesoup.com/p/camden-harbor-water-quality-a-work-in-progress/1666990

(16) Riley, M. S. (2019). *Maine Combined Sewer Overflow 2018 Status Report.* State of Maine Department of Environmental Protection. Retrieved from https://www.maine.gov/dep/water/cso/

(17) Robbins, M. (2018, December 11). Solar Project at Kennebec Sanitary Treatment District on Target. *Morning Sentinel.* Retrieved from https://www.centralmaine.com/2018/12/11/solar-project-at-kennebec-sanitary-treatment-district-on-target-for-jan-1-launch/

(18) Small Community Grant Program (SCG). (n.d.). Retrieved April 15, 2020, from https://www.maine.gov/dep/water/grants/scgp.html

(19) Tipton, M., Beal, A., Belliveau, M., Brousseau, A., Farnham, D., Graham, L., ... Reid, J. (2020). *Managing Pfas in Maine - Final Report from the Maine Pfas Task Force. State of Maine - PFAS Task Force*. Retrieved from https://www.maine.gov/pfastaskforce/materials/report/PFAS-Task-Force-Report-FINAL-Jan2020.pdf

(20) Wright-Pierce. (2016). *Wastewater Treatment Facilities Sea Level Rise & Storm Surge Impact Assessment – Boothbay Harbor, Me.* Retrieved from https://www.bbhsd.org/sites/boothbaysewer/files/uploads/wastewater_treatment_facilities_sea_level_rise_storm_surge_impact_assessment-draft.pdf

(21) Water & Waste Disposal Loan & Grant Program. (n.d.). Retrieved April 15, 2020, from https://www.rd.usda.gov/programs-services/water-waste-disposal-loan-grant-program

(22) Weissman, G., & Rumpler, J. (2019). *Safe for Swimming? Water Quality at Our Beaches. Frontier Group & Environment America Research and Policy Center.* Retrieved from https://environmentamerica.org/sites/environment/files/reports/SafeForSwimming/WEB_AME_Safe-for-Swimming_Jul19_v080919.pdf

(23) US EPA. Maine Water Quality Assessment Report. Retrieved from https://ofmpub.epa.gov/waters10/attains_state.control?p_state=ME#total_assessed_waters

(24) USDA Rural Development Grant, Water & Wastewater Disposal Loans. Retrieved from https://www.rd.usda.gov/programs-services/water-waste-disposal-loan-grant-program