

# MAINE LIGHT STATION CLIMATE IMPACTS

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Results from the 2025 Survey of  
Maine Light Station Stewards



AMERICAN  
LIGHTHOUSE  
FOUNDATION

Storm and Mitigation Response Team  
*Shining a light on lighthouse resiliency*

## Rockland Breakwater Lighthouse

Photo by Dominic Trapani



The Maine Light Station Climate Impacts Survey Report was produced by the American Lighthouse Foundation's Storm and Mitigation Response Team.

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# Executive Summary

Maine’s historic light stations were deliberately established in harm’s way to protect mariners, vessels and cargoes from navigational perils along the Pine Tree State’s rock-bound coastline.

These lifesaving outposts have presided over low-lying peninsulas, remote islands and wave-swept ledges for upwards of two centuries. The unconditional service rendered by light stations to people of all races and creeds has proven incalculable.

However, over the past few years, more frequent and intense storms have battered Maine’s light stations with powerful winds, along with waves, storm surge and flooding, which is being exacerbated by sea level rise. Clearly, climate/weather impacts are exacting a heavy toll on these historic and cultural resources.

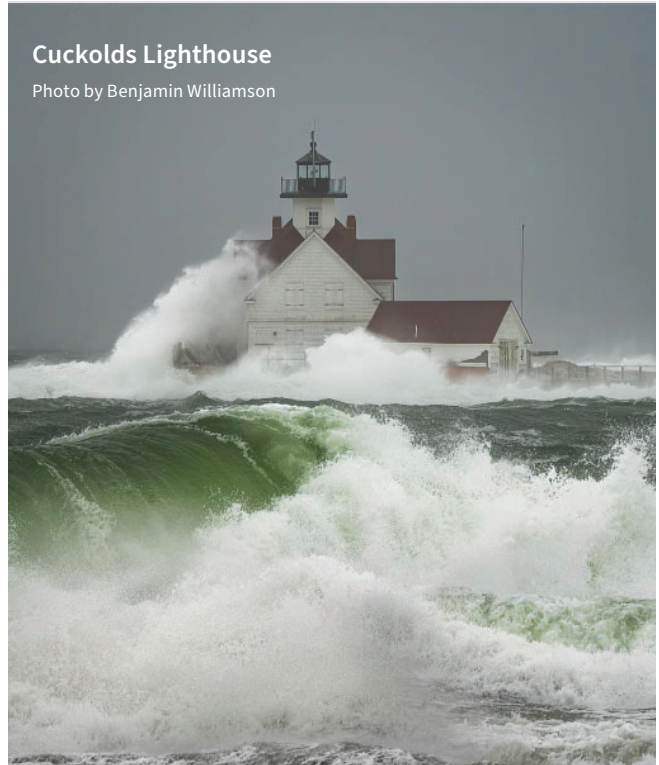
The wake-up call for Maine lighthouse stewards arrived in January 2024 when two powerful storms—just three days apart, caused harm to one-third of the state’s 66 light stations. The damage total was estimated at \$5.5 million dollars. The adverse effects of our changing climate on historic light stations, many of which are still active aids to navigation, were simply too vast to ignore any longer.

To ensure these timeless treasures and their indelible sense of place endure, the American Lighthouse Foundation formed a Storm & Mitigation Response Team in 2024 to assess the widespread scope of damage to Maine’s light stations, perform risk/vulnerability assessments and identify practical solutions for mitigating hazardous climate threats.

A systematic process led to the creation of a Light Station Climate Impacts Survey, which was sent to Maine lighthouse stewards in the nonprofit and government sectors, as well as to private light station owners. The survey proved key in identifying the current threats to light stations, recovery challenges facing stewards, as well as changing climatic conditions that light stations will face in the future.

The survey initiative will assist in guiding hazard mitigation and resiliency at Maine’s light stations through practical and innovative solutions, while also protecting the vast contributions of light stations to Maine’s cultural heritage, coastal safety, local and state economies, responsible environmental management and public education.

Maine’s historic light stations—and the people who care for them, have a compelling story to tell. By sharing experiences, learning together, and inspiring each other, the American Lighthouse Foundation’s Storm & Mitigation Response Team’s Light Station Climate Impacts Survey will aid in the design and implementation of meaningful adaptation strategies that ensure the sustainability of our irreplaceable lighthouse heritage.



Cuckolds Lighthouse

Photo by Benjamin Williamson

## Key Findings

- **Light station stewards require more funding options**
- **Light station stewards desire to identify available resources—technical, funding, etc.**
- **Light station stewards wish to better understand regulatory and permitting requirements**



**Petit Manan Lighthouse**

Photo by Bob Trapani, Jr.

# Introduction

Climate change-induced impacts are posing a serious threat to the sustainability of light stations in Maine and throughout the world. As we are witnessing, these vulnerable historic sites are bearing the brunt of more frequent and stronger storms. Combined with sea level rise and the sinking of land (subsidence), such climate change consequences are causing damage to both light stations and surrounding coastal infrastructure in our communities.

Light stations along coasts, rivers and lakes were built in harm's way at the fore of the elements, based on their need to warn vessels of navigational hazards in the vicinity. Due to their exposed locations, they are being subjected to increasing climate impacts. Erosion, wind, storm surge and higher water levels are causing economic and operational issues for light stations, many of which are still active aids to navigation. To date, the lighthouse towers themselves are faring better against climate change impacts than other light station structures. Presently, it is the ground the lighthouses sit on, along with the keeper's houses, oil houses, boat houses, walkways, ramps, stairs, utilities and other infrastructure that are suffering the majority of injury or destruction.

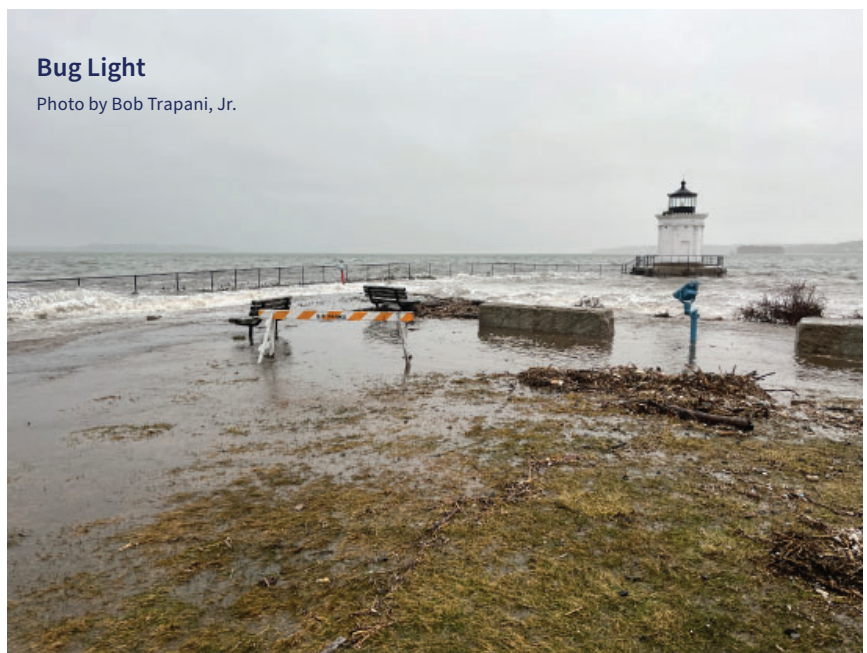
Damage to light stations is leading to economic and operational hardships for stewards (Federal, nonprofit and private) and inhibiting the public's enjoyment of the sites through educational programs and tourism. The harms are hardly confined to light station structures and the coastline upon which they preside. Climate/weather impacts are causing economic, cultural and social issues to numerous communities and regions as well.

A coastal storm in 2022, along with back-to-back storms in January 2024, caused significant damage to over one-third of Maine's 66 light stations. As of December 2025, some lighthouse stewards have made emergency repairs to impacted light stations, while others have completed a portion or all of the necessary permanent repairs. Few light stations have initiated mitigation efforts to increase the resilience of the facilities as a way to reduce potential damage from future storms.

## The Climate Impacts Survey

As a result of the Winter 2024 storms, the American Lighthouse Foundation formed a Storm & Mitigation Response Team in April 2024. The team is working to develop a series of solution-based strategies that will help lighthouses become more resilient in the face of future storms. To assist the Storm & Mitigation Response Team in identifying how light stations along the Maine coast are being impacted by climate events and what the most critical needs are for light station stewards, an online survey was sent to forty-seven Maine light stations in May 2025. Thirty-three survey responses were received for an exceptional response rate of around 70%. Light stations who received the survey are listed at the end of this report.

To more fully understand how light stations are being affected by intensifying weather events, what the resulting impacts of the incidents are, how stewards are moving to address repairs and make their light stations



**Bug Light**

Photo by Bob Trapani, Jr.

more resilient, and what the key impediments / issues are that stewards are facing, the survey questions were structured around the following key topic areas:

- **History of weather-related events**
- **Impacts from weather incidents**
- **Damage assessments and emergency and permanent repairs**
- **Funding for emergency and permanent repairs including resilience work**
- **Light station concerns, issues and obstacles**

The following section presents the survey results, with analysis, for the five key topic areas noted above.

## History of Weather-Related Events

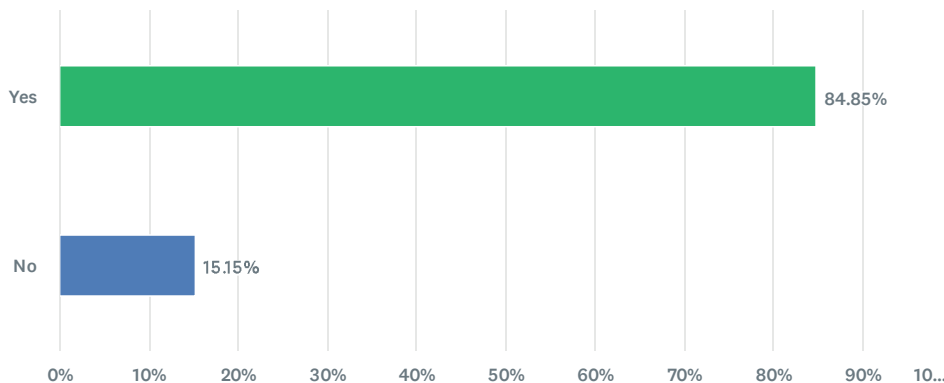
Respondents were asked if their light stations had been impacted by weather-related events over the last five years and if multiple weather events had occurred. Approximately 85% of those answering (**Figure 1**) said that their light stations had experienced weather incidents during that time period, and about 48% of the stewards noted that their light stations had seen more than one weather event (**Figure 2**).

Stewards were asked if they had had a third event during the five-year period and only one respondent noted that they had.

**Figure 1- Light Station Impact from Individual Weather Event**

Q3 In the last five years, has your light station been impacted by weather-related events?

Answered: 33 Skipped: 0

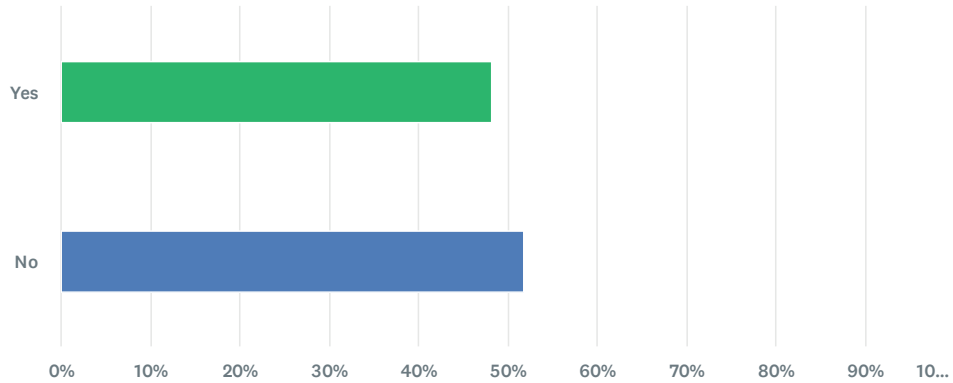


Answer Choices	Percentage	Responses
<input checked="" type="radio"/> Yes	84.85%	28
<input type="radio"/> No	15.15%	5

## Figure 2- Light Station Impact from Multiple Weather Events

Q13 Was there a SECOND weather-related incident during the last five years?

Answered: 27 Skipped: 6



Answer Choices	Percentage	Responses
<input checked="" type="radio"/> Yes	48.15%	13
<input type="radio"/> No	51.85%	14

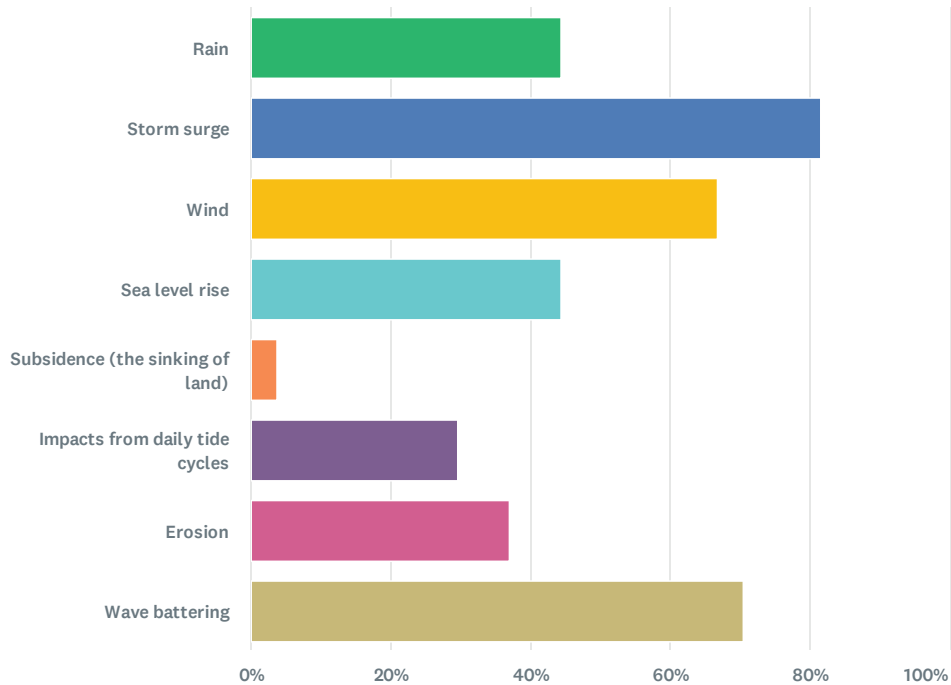
Egg Rock Lighthouse  
Photo by Bob Trapani, Jr.



As a result of the weather-related events that occurred during the five-year period, respondents provided the following information concerning the issues that affected the light stations during the initial event and from follow-up incidents:

Storm surge (81%, 69%) and wind (67%, 77%) were identified as being the biggest impacts that have affected the light stations over time. Along with these impacts, wave battering (69%, 70%) and erosion (37%, 54%) to property were noted as being significant impacts over time (**Figures 3, 4**).

**Figure 3- Impacts from Initial Weather Incident**

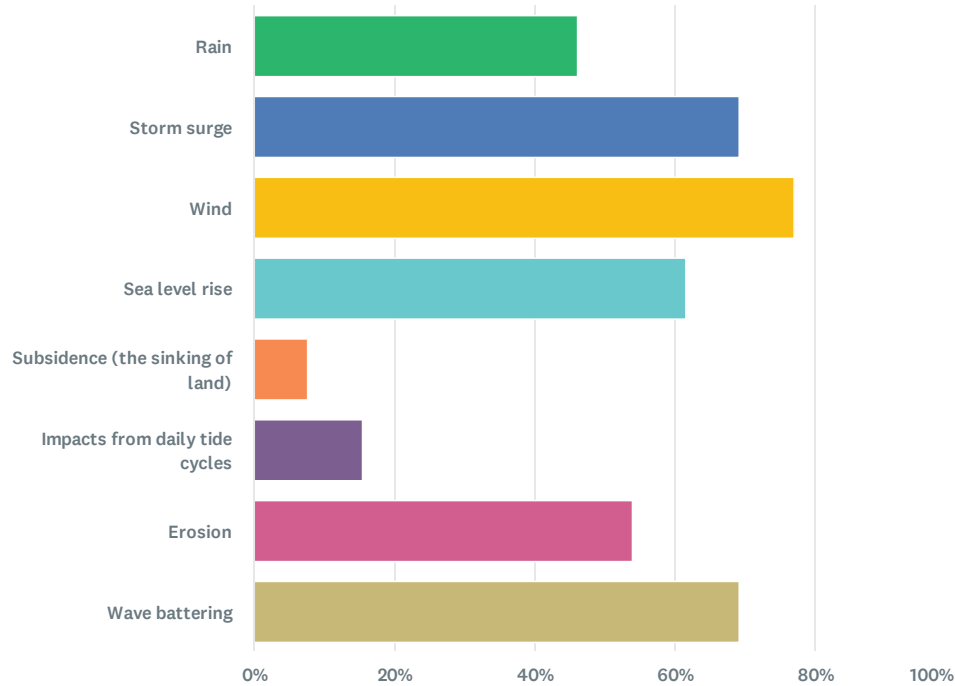


Answer Choices	Percentage	Responses
<span style="color: green;">●</span> Rain	44.44%	12
<span style="color: blue;">●</span> Storm surge	81.48%	22
<span style="color: yellow;">●</span> Wind	66.67%	18
<span style="color: teal;">●</span> Sea level rise	44.44%	12
<span style="color: orange;">●</span> Subsidence (the sinking of land)	3.70%	1
<span style="color: purple;">●</span> Impacts from daily tide cycles	29.63%	8

## Figure 4- Impacts from Subsequent Weather Events

Q15 Which of the following issues affected your site during this event?  
(check all that apply):

Answered: 13 Skipped: 20



Answer Choices	Percentage	Responses
<span style="color: green;">●</span> Rain	46.15%	6
<span style="color: blue;">●</span> Storm surge	69.23%	9
<span style="color: yellow;">●</span> Wind	76.92%	10
<span style="color: teal;">●</span> Sea level rise	61.54%	8
<span style="color: orange;">●</span> Subsidence (the sinking of land)	7.69%	1
<span style="color: purple;">●</span> Impacts from daily tide cycles	15.38%	2

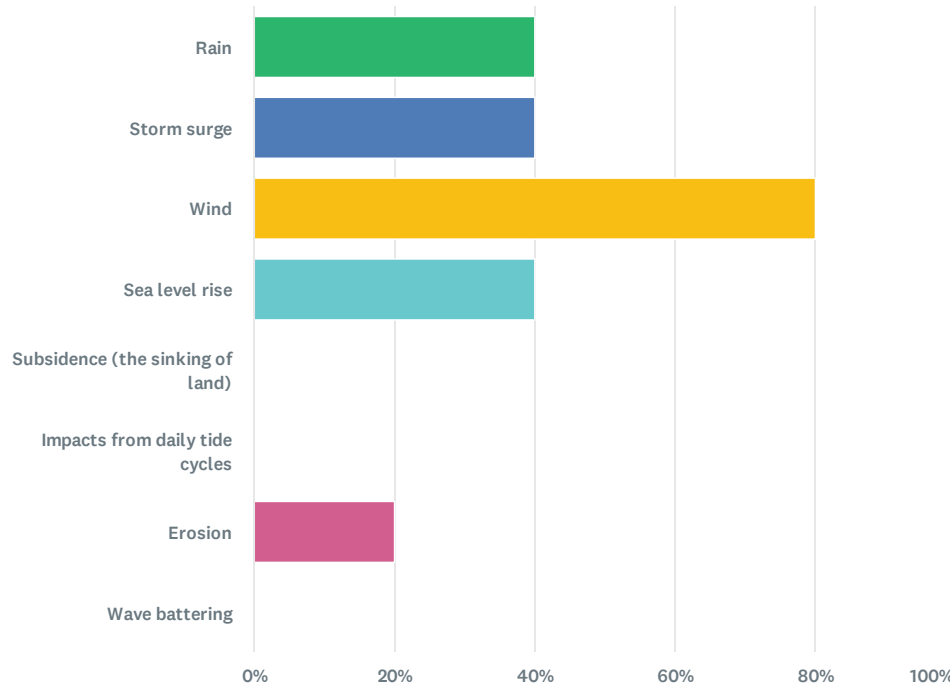
The answers provided above concerning actual impacts differ somewhat from responses to the question that asked stewards to identify issues that may threaten their light station or are of concern to them. While storm surge (40%), wind (80%) and rain (40%) were listed as primary theoretical concerns, storm surge impact from actual events was rated much higher. Impacts from erosion and wave battering were not noted as being notable concerns, versus their significance based on actual events; erosion concern (20%) vs. importance from actual events (37%, 54%); wave battering concern (0%) vs. importance from actual events (69%, 70%) (**Figure 5**).

The survey revealed that some light station stewards learned that long-held assumptions as to storm impacts on their site were altered by the weather events of January 2024. How the sea reacted, the effects of inundation—both reach and depth, and the southeasterly wind direction (versus the more common northeast direction during wintertime) have caused people to rethink their approach to hazard mitigation and resiliency.

**Figure 5- Threats and Concerns**

Q4 Which of the following issues may threaten or are concerns at your lighthouse? (check all that apply):

Answered: 5 Skipped: 28



Answer Choices	Percentage	Responses
<span style="color: green;">●</span> Rain	40.00%	2
<span style="color: blue;">●</span> Storm surge	40.00%	2
<span style="color: orange;">●</span> Wind	80.00%	4
<span style="color: teal;">●</span> Sea level rise	40.00%	2
<span style="color: red;">●</span> Subsidence (the sinking of land)	0%	0
<span style="color: purple;">●</span> Impacts from daily tide cycles	0%	0



**Whaleback Lighthouse**

Photo by Dominic Trapani

# Impacts from Weather Incidents

The location (shoreline, inland, off shore, elevated), layout (topography, wind direction) and the existing condition of buildings and infrastructure at light stations will play a role in how properties may fare from weather events. Experience has demonstrated that deferred maintenance is a factor as it relates to the ability of light station structures to absorb the battering associated with extreme weather events.

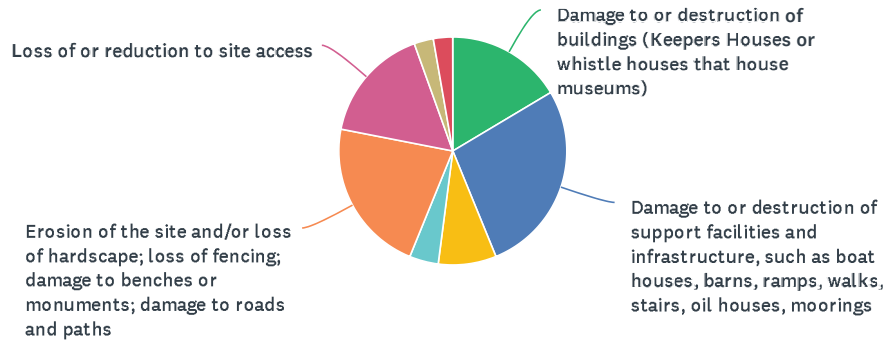
Light station stewards were asked to note how weather incidents have impacted their properties over time. Responses indicated that damage to, or destruction of, support facilities and infrastructure, such as boat houses, barns, ramps, walks, stairs, oil houses, moorings (77%) along with erosion of the site along with damage or loss of hardscape, fencing, damage to benches or monuments and damage to roads and paths (62%) has occurred from weather events (Figures 6, 7).



## Figure 6- Impacts from Initial Weather Event

### Q7 What was the impact on your property (check all that apply)?

Answered: 26 Skipped: 7

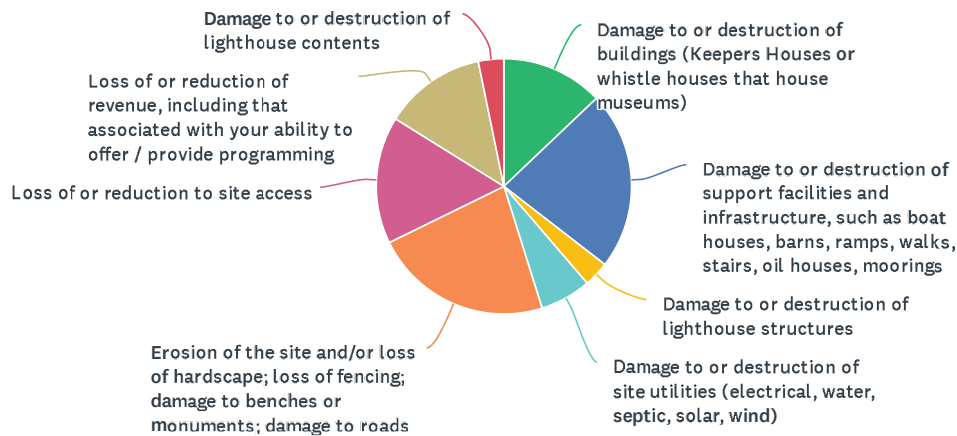


Answer Choices	Percentage	Responses
● Damage to or destruction of buildings (Keepers Houses or whistle houses that house museums)	46%	12
● Damage to or destruction of support facilities and infrastructure, such as boat houses, barns, ramps, walks, stairs, oil houses, moorings	77%	20
● Damage to or destruction of lighthouse structures	23%	6
● Damage to or destruction of site utilities (electrical, water, septic, solar, wind)	12%	3
● Erosion of the site and/or loss of hardscape; loss of fencing; damage to benches or monuments; damage to roads and paths	62%	16
● Loss of surrounding wetlands and marshes	0%	0
● Loss of or reduction to site access	46%	12
● Loss of or reduction of revenue, including that associated with your ability to offer / provide programming	8%	2
● Damage to or destruction of lighthouse contents	8%	2

## Figure 7- Impacts from Subsequent Weather Events

### Q16 What was the impact on your property (check all that apply)?

Answered: 12 Skipped: 21



Answer Choices	Percentage	Responses
● Damage to or destruction of buildings (Keepers Houses or whistle houses that house museums)	33.33%	4
● Damage to or destruction of support facilities and infrastructure, such as boat houses, barns, ramps, walks, stairs, oil houses, moorings	58.33%	7
● Damage to or destruction of lighthouse structures	8.33%	1
● Damage to or destruction of site utilities (electrical, water, septic, solar, wind)	16.67%	2
● Erosion of the site and/or loss of hardscape; loss of fencing; damage to benches or monuments; damage to roads and paths	58.33%	7
● Loss of surrounding wetlands and marshes	0%	0
● Loss of or reduction to site access	41.67%	5
● Loss of or reduction of revenue, including that associated with your ability to offer / provide programming	33.33%	4
● Damage to or destruction of lighthouse contents	8.33%	1

Stewards noted that while not as significant as damage to outbuildings and infrastructure, weather events have caused damage to Keepers houses, whistle houses and museums (46%). In a similar vein, even though weather events have caused damage to lighthouse structures themselves (23%), respondents indicated that the impacts have been less than those to other buildings and structures on their properties. Related to the damage or destruction of infrastructure, roads and paths, respondents stated that storms have led to the loss or reduction of site access (46%)

which can affect damage assessments, repairs and overall operations. Subsequently, the reduction or loss of site access has adversely impacted the steward’s ability to effectively utilize the historic site and maximize its earning potential through programmatic initiatives.

For those light stations that suffered multiple weather events over a five-year period, the following categories of damage were noted by respondents as being the most significant for all events over time:

### Categories of Impact Over Time

Category	Initial Weather Event	Follow-Up Events
Damage to buildings (Keepers & Whistle houses, museums)	46%	33%
Damage to support facilities (boat houses, barns, ramps)	76%	59%
Damage to lighthouses	23%	8%
Damage to site utilities (electrical, water, septic, solar)	12%	17%
Erosion (roads, paths, fencing, hardscape)	61%	58%
Damage to wetlands, marshes	0	0
Site access issues reduced or lost	46%	42%
Loss of revenue	8%	33%
Damage to lighthouse contents	8%	8%



# Damage Assessments and Emergency and Permanent Repairs

## Damage Assessments

Responding to, and recovering from, powerful weather events at light stations requires understanding what the condition of the site is post-storm, documenting damages and if necessary, making emergency repairs to stabilize the historic structures and property. This work would then be followed by more permanent repairs, including efforts to make the light station more resilient to future storms.

An initial conditions assessment should identify if the property is even accessible and safe to enter. With access, stewards would conduct a preliminary damage assessment. Part of this work would determine the condition of all infrastructure and buildings. For buildings, it would be critical to assess what mitigation efforts were needed to help prevent further damage (boarding up windows, doors and roofs; covering foundation holes to prevent flooding; moving or removing property from buildings).

With initial emergency repairs underway, a more comprehensive assessment would be conducted to develop a longer-term repair and mitigation project list. The appraisal would include a prioritized list of work to be done, estimated costs, determining what proposed work would be required to undergo a Section 106 Consultation Review with the State Historic Preservation Office, potential funding sources and what permits and architectural-engineering work would be necessary.

Stewards were asked if damage assessments were conducted after either single or multiple weather events, when the work was conducted and who performed the assessments.

By a wide margin, light stations had damage assessments conducted after single or multiple weather events:

### Damage Assessments Conducted by Event Frequency

Frequency	Assessment Conducted	No Assessment Conducted
Single weather event	67%	32%
Multiple weather events	77%	23%

Concerning the length of time it took to initiate the assessments, light station stewards took about the same amount of time for either single or multiple events to initiate and conduct damage assessments:

### Time Before Damage Assessments Were Conducted

Time	Single Weather Event	Multiple Weather Events
One week	17%	22%
Two weeks	17%	11%
One month	16%	11%
More than one month	50%	56%

Concerning who conducted the damage assessments, survey respondents noted that light station stewards by and large conducted the appraisals following either single or multiple weather events:

### Parties Conducting Damage Assessments

Conducted By	Single Weather Event (responses)	Multiple Weather Events (responses)
Light station stewards	64% (16)	62% (8)
Insurance adjusters	12% (3)	15% (2)
Local officials	16% (4)	15% (2)
Federal officials	32% (8)	20% (3)
Other	32% (8)	15% (2)

Based on the survey responses, by a two to one margin, light station stewards—be they non-profits, private or governmental entities, have conducted damage assessments following weather events. The response time to perform the assessments varied from one week to more than one month. The one-month time frame could be due to weather conditions as well as accessibility and location (offshore sites proving more challenging in some cases). The 2024 storms occurred in January and access to even mainland properties could have delayed site visits.

### Emergency and Permanent Repairs

Respondents were asked if emergency repairs were required as a result of single and multiple weather events, and if more permanent repairs were made over time. Emergency repairs would include actions such as boarding up roofs, doors and windows, pumping out water, demolition, removal of debris and materials in order to stabilize and protect a facility.

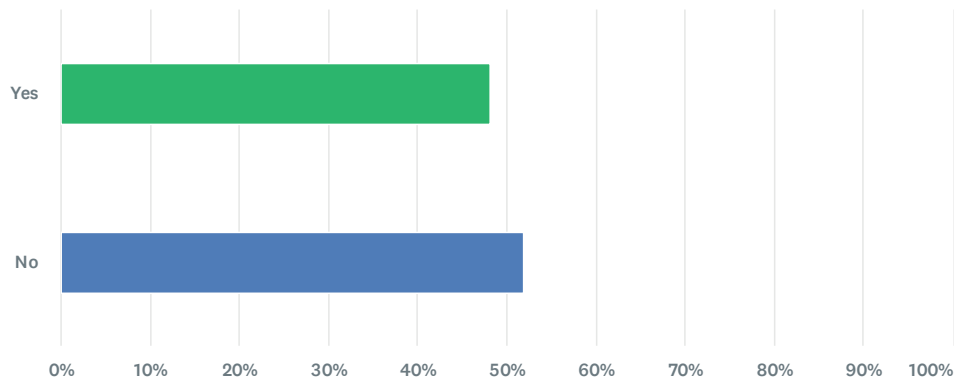
For emergency repairs and single weather events, 13 or almost 50% of those responding said that they had to undertake emergency repairs. For light stations that experienced multiple weather incidents, 7 stewards or almost 65% of those who responded noted that emergency repairs were initiated (**Figures 8, 9**). The survey did not ask how long after an event the emergency repairs were made nor what the specific repairs consisted of.



**Figure 8- Emergency Repairs Implemented for Initial Weather Event**

Q11 As a result of this weather-related incident, were emergency measures required (boarding up of roofs, doors, windows; pumping out water; demolition; removal of debris; etc.)

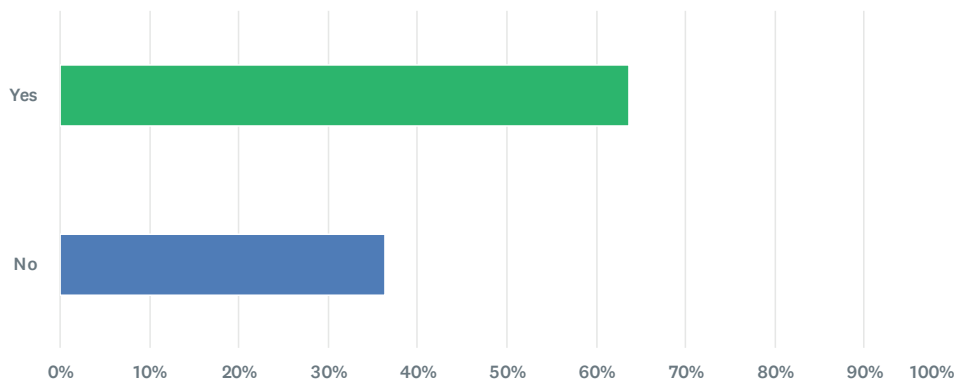
Answered: 27 Skipped: 6



**Figure 9- Emergency Repairs Implemented for Subsequent Weather Event**

Q20 As a result of this weather-related incident, were emergency measures required (boarding up of roofs, doors, windows; pumping out water; demolition; removal of debris; etc.)

Answered: 11 Skipped: 22



Permanent repairs include any work that will restore an historic building or infrastructure to its previous condition, and may improve its resilience and durability. Rebuilding a dock will again provide access but if the dock is reestablished with certain reinforced or streamlined features, then the dock may prove more resilient to storm surge and wave battering with subsequent storms. Similarly, if a boat house is repaired, and cabling and roof supports are integrated, then the structure may not suffer irreparable harm to wind or storm surge down the road.



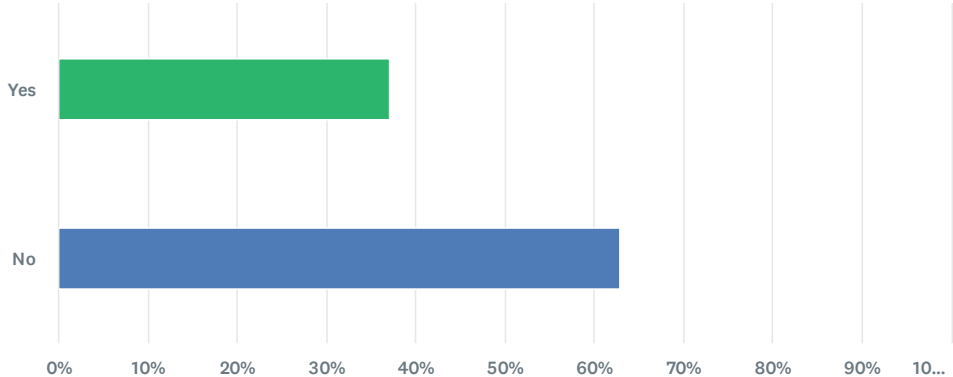
Stewards were asked about making permanent repairs, including efforts to increase the resiliency levels at their light stations, as a follow up to emergency repairs they implemented. For light stations that underwent single weather events, 37% of the respondents said they had made permanent repairs (**Figure 10**); for properties that experienced multiple weather events, 46% indicated that they had undertaken permanent repairs (**Figure 11**). The survey did not ask about specific measures that were done to increase resilience.

It is clear that more action was taken to make emergency repairs between initial and subsequent weather events (50% vs. 65%). A similar pattern exists for more permanent repairs having been made after a second weather event (37% vs. 46%), although the level of activity between emergency and permanent repairs is lower for permanent repairs. The survey did not ask about impediments to making permanent repairs (weather, funding, permitting, uncertainty about how to proceed, finding someone to do the work, etc.).

**Figure 10- Permanent Repairs Made for Initial Weather Event**

Q12 Based on this weather-related incident, were more permanent repairs made after emergency repairs, including efforts to increase resilience?

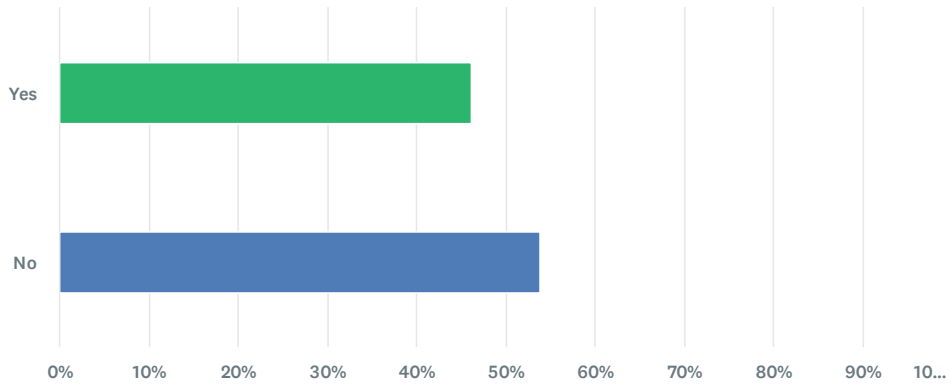
Answered: 27 Skipped: 6



## Figure 11- Permanent Repairs Made for Subsequent Weather Events-

Q21 Based on this weather-related incident, were more permanent repairs made after emergency repairs, including efforts to increase resilience?

Answered: 13 Skipped: 20



# Funding for Emergency and Permanent Repairs Including Resilience Work

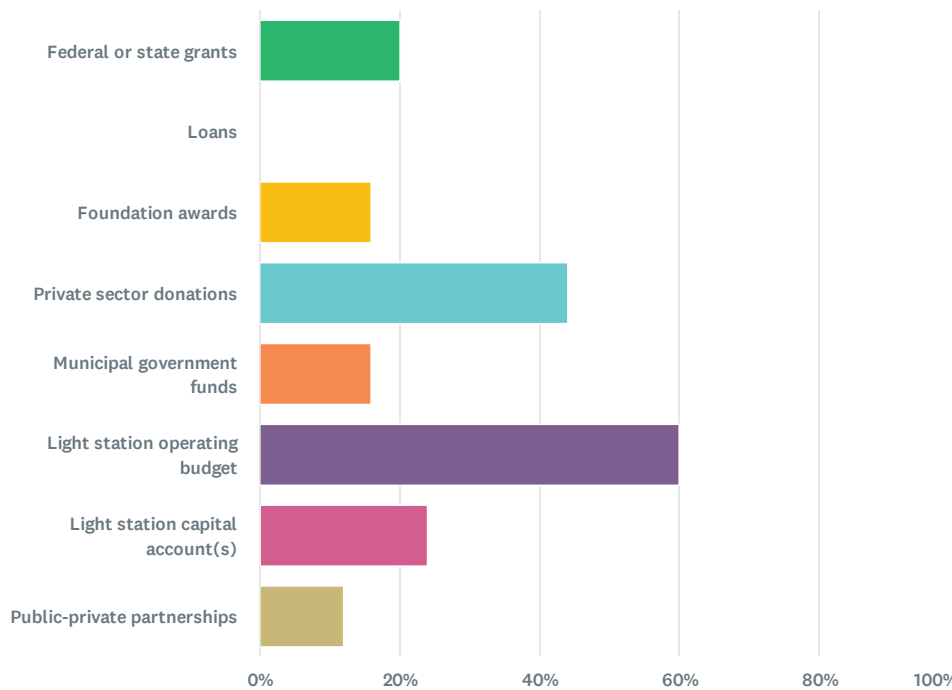
Recovery from more frequent and intensifying weather events can present a daunting financial task for non-profit, governmental and private light station owners. Integrating resilience measures as a hedge against future damage will add to the total cost of repair work via materials, engineering/design and permitting, but such investments will be both prudent and financially wise.

Survey respondents were asked about funding sources they are using (**Figure 12**) and/or are familiar with (**Figure 13**), to complete emergency and permanent repairs at their light stations.

**Figure 12- Funding Sources Utilized for Repairs**

Q31 For emergency and post-weather incident repairs (emergency or permanent), as well as upgrades to your light station for increased resilience, please indicate how such work was or is being funded (check all that apply):

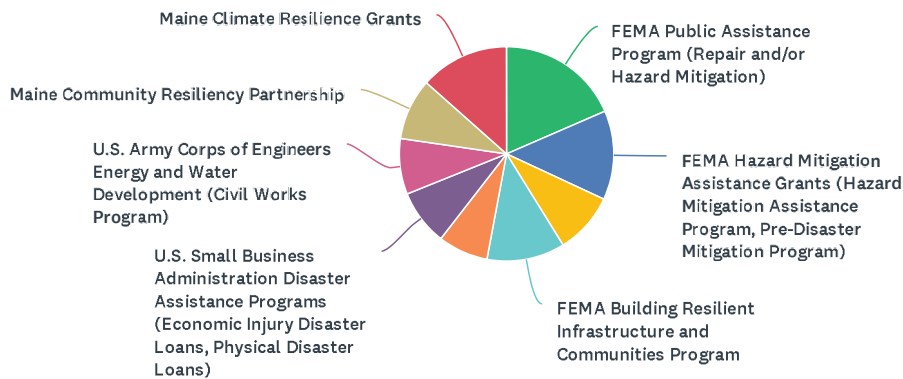
Answered: 25 Skipped: 8











**Figure 13- Familiarity with Potential Funding Sources**

Q32 Are you familiar with any of the following state and Federal grant programs for weather-related resilience and mitigation work for light stations (check all that apply):

Answered: 25 Skipped: 8



Answer Choices	Percentage	Responses
 FEMA Public Assistance Program (Repair and/or Hazard Mitigation)	88.00%	22
 FEMA Hazard Mitigation Assistance Grants (Hazard Mitigation Assistance Program, Pre-Disaster Mitigation Program)	64.00%	16
 National Flood Insurance Program Assistance (Flood Insurance, Flood Mitigation Assistance, Swift Current)	44.00%	11
 FEMA Building Resilient Infrastructure and Communities Program	56.00%	14
 U.S. Department of Housing and Urban Development (HUD) Community Development Block Grants (regular and Disaster Recovery programs)	36.00%	9
 U.S. Small Business Administration Disaster Assistance Programs (Economic Injury Disaster Loans, Physical Disaster Loans)	40.00%	10
 U.S. Army Corps of Engineers Energy and Water Development (Civil Works Program)	40.00%	10
 Maine Community Resiliency Partnership	44.00%	11

This funding question did not directly correlate responses by type of respondent, so it is not possible to determine which funding sources are being used by governmental, non-profit or private stewards. This would require additional analysis. Based on responses, stewards are using their operating budgets (60%) along with private donations (44%) to make repairs. Federal or state grants (20%) and light station capital accounts (24%) are also being utilized. While smaller in scale, respondents noted that funding also comes from public-private partnerships (12%), and foundation awards (16%). Moving forward, these last two funding sources could become more critical to assist with light station repairs and resilience work.



**Grindle Point Light Station**

Photo courtesy of Grindle Point Lighthouse Committee

Replies to the question asking about respondent’s knowledge of funding sources indicates that respondents are fairly familiar with an array of sources which could be pursued for financial assistance. Depending on the political and economic environment, it may make some of these options less viable over time. Moving forward, providing information to stewards on potential funding options, and how the programs can be pursued, will be a key goal for the ALF Storm and Mitigation Response Team.

## **Light Station Concerns, Issues and Obstacles**

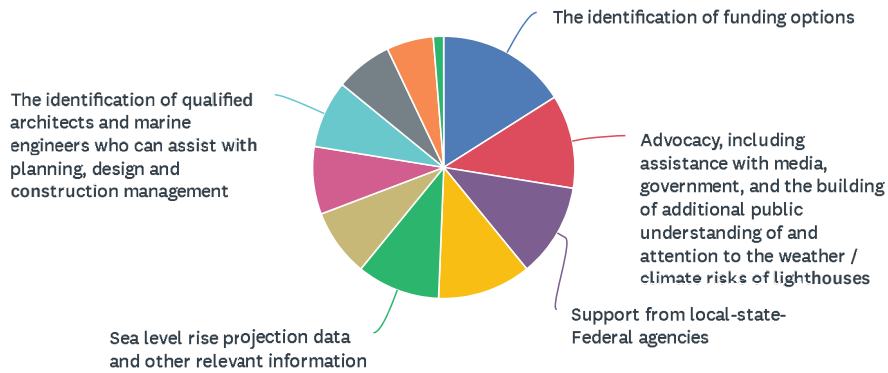
Climate change-induced weather events are causing people and institutions to try and figure out what is happening, where things are heading and what planning and responses are needed.

Light station stewards are grappling with recovering from previous weather incidents that caused damage, and are striving to understand what steps they can take to prepare for the next weather event in an attempt to minimize damage and financial / operational burdens. In light of that, stewards were asked to identify concerns, issues and obstacles that they are addressing or want to resolve (**Figures 14 and 15**).

**Figure 14 - Needs and Concerns**

Q33 What are the key things you need or want to know in order to address weather-related impacts at your light station? (check all that apply)

Answered: 31 Skipped: 2



Answer Choices	Percentage	Responses
<span style="color: blue;">●</span> The identification of funding options	81%	25
<span style="color: red;">●</span> Advocacy, including assistance with media, government, and the building of additional public understanding of and attention to the weather / climate risks of lighthouses	58%	18
<span style="color: purple;">●</span> Support from local-state-Federal agencies	58%	18
<span style="color: yellow;">●</span> An understanding of site and building issues, and how that may change over time, to help with the development of projects	58%	18
<span style="color: green;">●</span> Sea level rise projection data and other relevant information	52%	16
<span style="color: olive;">●</span> Staff augmentation to plan, manage, and implement measures to address actual or potential impacts (i.e., additional administrative capacity)	42%	13
<span style="color: pink;">●</span> A broader understanding about what other light station owners are implementing solution-wise and the level of effectiveness of said measures	42%	13
<span style="color: cyan;">●</span> The identification of qualified architects and marine engineers who can assist with planning, design and construction management	42%	13

By large margins, stewards responded that the above topics were key for them. Of the 10 choices presented in the question, stewards identified the following issues as being critical:

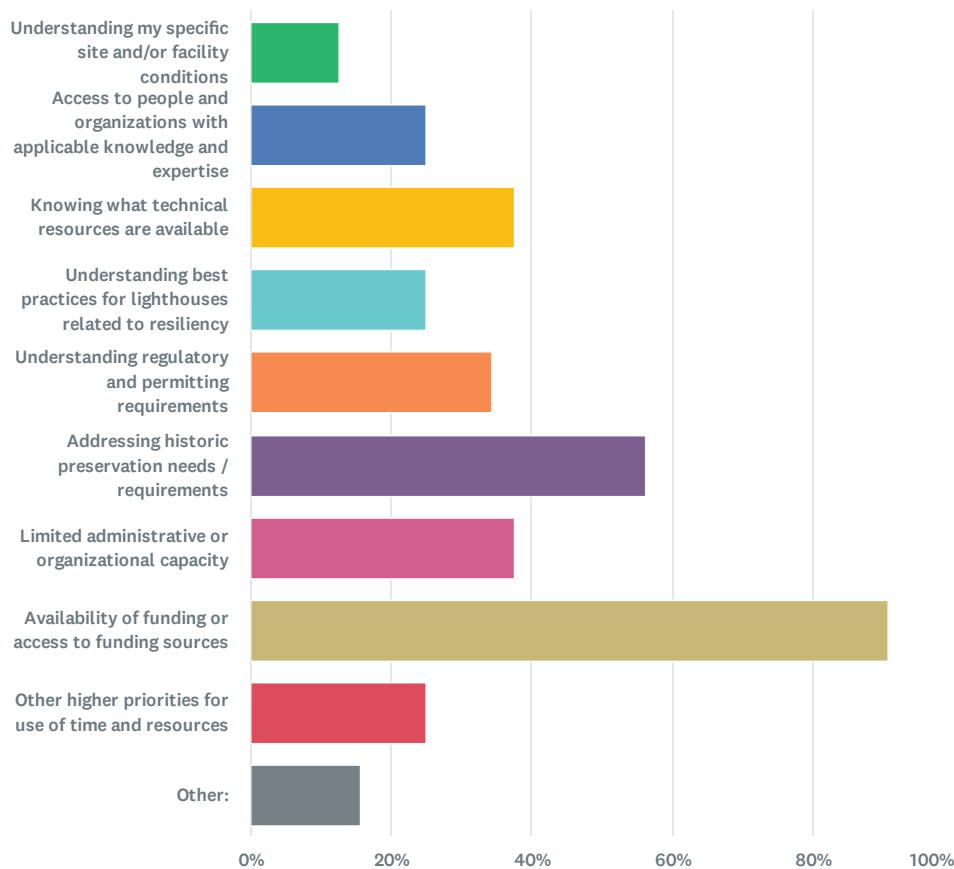
### Important Needs and Concerns

Topic	Percentage
Funding options	81%
Advocacy to increase understanding of damage to light stations	58%
Understanding of buildings and site issues	58%
Support from local-state-Federal agencies	58%

**Figure 15- Obstacles and Impediments**

Q34 What, if any, are the most critical obstacles you face that make it difficult to address the resiliency needs of your lighthouse(s) in the face of weather and climate risk? Please identify all that apply, but at a minimum please select your top four (4).

Answered: 32 Skipped: 1



Concerning obstacles and impediments, respondents were asked to select the top four issues that are stalling or hindering addressing resilience needs. Those issues were:

### Obstacles and Impediments

Issue	Percentage
Funding options	91%
Addressing historic preservation needs & requirements	56%
Identifying available technical resources	38%
Understanding regulatory & permitting requirements	34%

Each of the above impediments or obstacles can forestall, hinder, or result in additional damage from subsequent weather incidents.



**Wood Island Light Station**

Photo by Wil Kochtitzky, Ph.D., UNE

# Conclusions

Based on the American Lighthouse Foundation Storm & Mitigation Response Team's Light Station Climate Impacts Survey, it is quite evident that climate/weather impacts are exacting a heavy toll on Maine's light stations. Without targeted and timely action, the adverse effects of severe storms and rising sea levels on light stations will only exacerbate the existing plight.

It is equally clear that the people who serve as stewards of Maine's historic light stations are collectively a resolute and talented group. Their site experience, understanding of the issues and overall savvy to bring about solutions is very encouraging for the present and future well-being of the Pine Tree State's light stations.

That said, light station stewards are not hiding from the extensive challenges posed by climate change-induced impacts. Sustaining Maine's light stations is a tall order unto itself. Add in disaster recovery efforts and the urgent need to integrate resiliency into the fabric of these historic treasures, and it quickly becomes apparent that moving forward, light stations will require substantially more resources (funding, people, partnerships, etc.) and technical expertise.

The Light Station Climate Impacts Survey is an important step towards better understanding the scope of challenges facing stewards and how best to prioritize resources and implement solution-based strategies that can help guide hazard mitigation and resiliency efforts.

The survey's findings will also strengthen the American Lighthouse Foundation's advocacy efforts with policymakers, academic partnerships and public / private supporters. In addition, the data will aid in identifying technical solutions that can be integrated into a light station's master plan to help ensure that facilities are protected and continue to meet their missions.

In a word, the Light Station Climate Impacts Survey is groundbreaking. The data is not only proving invaluable to Maine stewards, it will also be a helpful resource for light stations stewards throughout the United States, and around the world.

In the wake of the survey, the conversation centered on climate change-induced impacts and mitigation/resiliency will be expanded to include how wave action—one of three primary components of storm surge (wind-forcing, pressure set-up & wave action) is the foremost cause of structural damage and shoreline erosion at light stations.

According to NOAA and the National Weather Service, "Due to large ocean waves, water is forced shoreward by the momentum of the waves causing water to pile up along the shore. This effect usually goes unnoticed at tide gauges since they are quite often located in bays and estuaries quite distant from the surf zone."

In the months ahead, the ALF Storm & Mitigation Response Team will also explore the effects of bathymetry on wave action, which is the study of submarine topography. Better understanding bathymetry in relation to light station sites will provide stewards with added insight on how the submarine topography affects wave run, and what can be done from a resiliency perspective to help protect against its destructive action.

In conclusion, helping light stations become more resilient is not a goal that can be achieved during a single moment in time. Rather, it is a journey that should be undertaken with a sense of imperativeness. By working together and remaining committed to the aim of ensuring light stations are made stronger amidst our changing climate, we will sustain the cherished heritage of light stations in Maine and beyond.

The American Lighthouse Foundation Storm & Mitigation Response Team wishes to thank all of the Maine light station stewards who participated in the Light Station Climate Impacts Survey. Your care and time helped make this endeavor—an historic one at that, a resounding success.

# Appendix A

## Light Stations Receiving the Survey

Baker Island Lighthouse	Marshall Point Lighthouse
Bass Harbor Lighthouse	Matinicus Rock Lighthouse
Boon Island Lighthouse	Moose Peak Lighthouse
Browns Head Lighthouse	Mount Desert Rock Lighthouse
Burnt Coat Harbor Lighthouse	Nash Island Lighthouse
Burnt Island Lighthouse	Owls Head Lighthouse
Cape Elizabeth Lighthouse	Pemaquid Point Lighthouse
Cape Neddick “Nubble” Lighthouse	Perkins Island Lighthouse
Deer Isle Thorofare Lighthouse	Petit Manan Lighthouse
Doubling Point Lighthouse	Portland Breakwater Lighthouse (Bug Light)
Dyce Head Lighthouse	Portland Head Lighthouse
Eagle Island Lighthouse	Prospect Harbor
Egg Rock Lighthouse	Ram Island Ledge Lighthouse
Fort Point Lighthouse	Ram Island Lighthouse
Franklin Island Lighthouse	Rockland Breakwater Lighthouse
Goat Island Lighthouse	Seguin Island Lighthouse
Goose Rocks Lighthouse	Spring Point Ledge Lighthouse
Great Duck Lighthouse	Squirrel Point Lighthouse
Grindle Point Lighthouse	Two Bush Island Lighthouse
Halfway Rock Lighthouse	Whaleback Lighthouse
Isle au Haut Lighthouse	Whitehead Lighthouse
Kennebec River Range Lights and Fiddlers Reach Fog Signal	Whitlocks Mill Lighthouse
Libby Island Lighthouse	Wood Island Lighthouse
Little River Lighthouse	

# Marshall Point Lighthouse

Photo by Bob Trapani, Jr.



