Calendar No. 197

119TH CONGRESS *1st Session*	SENATE	REPORT 119–86

FOG OBSERVATIONS AND GEOGRAPHIC FORECASTING ACT

R E P O R T

OF THE

COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION

ON

S. 1278

OCTOBER 21, 2025.—Ordered to be printed

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SENATE COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION

ONE HUNDRED NINETEENTH CONGRESS

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FOG OBSERVATIONS AND GEOGRAPHIC FORECASTING ACT

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Mr. CRUZ, from the Committee on Commerce, Science, and Transportation, submitted the following

R E P O R T

[To accompany S. 1278]

[Including cost estimate of the Congressional Budget Office]

The Committee on Commerce, Science, and Transportation, to which was referred the bill (S. 1278) to require the Under Secretary of Commerce for Oceans and Atmosphere to conduct a project to improve forecasts of coastal marine fog, and for other purposes, having considered the same, reports favorably thereon without amendment and recommends that the bill do pass.

PURPOSE OF THE BILL

The purpose of S. 1278 is to require the National Weather Service (NWS) to improve fog forecasting, with the goals of increasing vessel safety, helping the shipping industry, and keeping commerce flowing in and out of U.S. ports.

BACKGROUND AND NEEDS

Marine fog usually occurs when warm air moves over cooler ocean waters, or vice versa, resulting in moisture in the air condensing into fog.[1] Fog can reduce visibility for mariners to less than 1 mile and, in extreme cases, to just a few feet. Reducing visibility for mariners, especially in large vessels, is dangerous because it can take up to a mile for a vessel to come to a stop or change

[1] Ismail Gultepe, Jason A. Milbrandt, and Binbin Zhou, "Marine Fog: A Review on Microphysics and Visibility Prediction" in Darko Koracin and Clive Dorman (eds.) *Marine Fog: Challenges and Advancements in Observations, Modeling, and Forecasting*, Springer Atmospheric Sciences, February 1, 2017, *https://doi.org/10.1007/978-3-319-45229-6_7*.

direction.[2] Therefore, when visibility decreases to unsafe levels due to fog, vessels are forced to reduce speed or halt entirely, and ports may be temporarily closed to protect life and property.[3] Poor visibility, often fog-associated, significantly impacts maritime traffic safety with approximately 9 percent of ship collisions attributed to fog or other environmental conditions.[4]

These fog-related disruptions also pose a substantial risk to global supply chains. U.S. ports handle over 40 percent of the Nation's international trade volume, and delays at key facilities can ripple through the economy.[5] Even short port closures can result in heavy economic losses. For example, it was estimated that the U.S. economy lost $15 million a day after the collapse of the Francis Scott Key Bridge shut down Port of Baltimore operations.[6]

Though less visually dramatic than events like bridge collapses, weather-related disruptions such as dense fog can still bring port operations to a standstill. For example, fog along the U.S. Gulf Coast frequently disrupts operations at major ports, including the Houston-Galveston port complex and the Lake Charles Port in Louisiana, causing the Houston Pilots Association and the Lake Charles Pilots to suspended all vessel movements due to low visibility.[7] Similarly, Alaska experiences frequent coastal fog in late fall and winter, complicating maritime operations for cargo vessels and fishing fleets. Although complete port closures are less common, fog often delays the loading and unloading of vessels, an especially critical issue in Alaska, where communities depend on the timely arrival of fuel, food, and other essential supplies.[8] On the U.S. West Coast, San Francisco fog is particularly famous, causing traffic issues and ground stops at major airports.[9]

The NWS, under the National Oceanic and Atmospheric Administration (NOAA), provides weather data, forecasts, and impact-based decision-support services to U.S. ports.[10] To ensure the continued safety of maritime operations, especially in fog-prone regions, there is a need for additional marine-based observations. Instruments that measure visibility, temperature, dewpoint, wind, water levels, and the integration of real-time marine cameras are essential for improving situational awareness for mariners and improving forecasts. These observations, particularly when placed

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[2] Christina Hager, "How Difficult Is It To Operate a Massive Container Ship?," *CBS News*, March 27, 2024, *https://www.cbsnews.com/boston/news/baltimore-bridge-collapse-boston-reaction/*.

[3] National Weather Service, NOAA, "Boating in Fog," *https://www.weather.gov/safety/fog-boating*.

[4] Aggelos N. Pilatis et. al, "A Statistical Analysis of Ship Accidents (1990–2020) Focusing on Collision, Grounding, Hull Failure, and Resulting Hull Damage," *Journal of Marine Science and Engineering* 12, no. 1 (2024): 122, *https://doi.org/10.3390/jmse12010122*.

[5] "2025 Infrastructure Report Card," American Society of Civil Engineers, *https://infrastructurereportcard.org/wp-content/uploads/2025/03/Ports.pdf*.

[6] Tom Krisher, "Baltimore Bridge Collapse: Ships Carrying Cars and Heavy Equipment Need To Find a New Harbor," *AP News*, March 27, 2024, *https://apnews.com/article/baltimore-bridge-collapse-cargo-port-056eb1e7c5424f23ce4c049fe53bb02f*.

[7] Tray Swanson, "Persistent Fog Disrupts Ports in Texas, Louisiana," Argus Media, updated November 2, 2025, *https://www.argusmedia.com/en/news-and-insights/latest-market-news/2656716-persistent-fog-disrupts-ports-in-texas-louisiana*.

[8] Kun Wang et al., "Impacts of Arctic Sea Fog on the Change of Route Planning and Navigational Efficiency in the Northeast Passage during the First Two Decades of the 21st Century," *Journal of Marine Science and Engineering* 11, no. 11 (2023): 2149, *https://doi.org/10.3390/jmse11112149*.

[9] "Dense Fog for Bay Area Extended into Thursday," NBC Bay Area, December 18, 2024, *https://www.nbcbayarea.com/weather/dense-fog-advisory-second-day/3739520/*.

[10] "About NOAA's National Weather Service," National Weather Service, *https://www.weather.gov/about*.

strategically along busy shipping lanes and near ports, can offer critical insights into rapidly changing conditions that are not captured by satellite or radar alone.[11]

Improved high-resolution modeling capabilities driven by these observational inputs can lead to more accurate forecasts, allowing ports to utilize weather forecasts, particularly those predicting fog, to enhance maritime safety and operational efficiency.[12] By integrating real-time data from marine-based observation, ports can anticipate and respond to rapidly changing conditions. This proactive approach allows for better vessel traffic management, optimized port operations, and the implementation of safety protocols tailored to current weather conditions.[13]

SUMMARY OF PROVISION

S. 1278 would require NOAA to develop a project plan to improve marine fog forecasts with the goal of enhancing vessel safety and reducing economic impacts of fog.

LEGISLATIVE HISTORY

S. 1278 was introduced on April 3, 2025, by Senator Cruz (for himself and Senator Padilla) and was referred to the Committee on Commerce, Science, and Transportation of the Senate. On April 30, 2025, the Committee met in open Executive Session and, by voice vote, ordered S. 1278 reported favorably without amendment.

118th Congress

S. 5599, the Fog Forecast Improvement Act, was introduced on December 18, 2024, by Senator Cruz and was referred to the Committee on Commerce, Science, and Transportation of the Senate.

ESTIMATED COSTS

In accordance with paragraph 11(a) of rule XXVI of the Standing Rules of the Senate and section 403 of the Congressional Budget Act of 1974, the Committee provides the following cost estimate, prepared by the Congressional Budget Office:

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[11] National Ocean Service, NOAA, "Ports: NOAA's Role in Navigation and Commerce," *https://oceanservice.noaa.gov/navigation/ports*.

[12] Ibid.

[13] Lijun Hu et al., "Enhancing Maritime Safety and Efficiency: A Comprehensive Sea Fog Monitoring System for Ningbo Zhoushan Port," *Atmosphere* 14, no. 10 (2023): 1513, *https://doi.org/10.3390/atmos14101513*.

S. 1278, Fog Observations and Geographic Forecasting Act
As ordered reported by the Senate Committee on Commerce, Science, and Transportation on April 30, 2025

By Fiscal Year, Millions of Dollars	2025	2025-2030	2025-2035
Direct Spending (Outlays)	0	0	0
Revenues	0	0	0
Increase or Decrease (-) in the Deficit	0	0	0
Spending Subject to Appropriation (Outlays)	0	67	not estimated

Increases *net direct spending* in any of the four consecutive 10-year periods beginning in 2036?	No	Statutory pay-as-you-go procedures apply?	No
		Mandate Effects	
Increases *on-budget deficits* in any of the four consecutive 10-year periods beginning in 2036?	No	Contains intergovernmental mandate?	No
		Contains private-sector mandate?	No

S. 1278 would require the National Oceanic and Atmospheric Administration (NOAA) to develop and implement a project to improve forecasts of coastal marine fog. The project would involve collecting data from commercial sources, meteorological stations, drifting instruments, and satellites at marine locations affected by fog-related low visibility. The bill also would require NOAA to improve the dissemination of marine fog advisories to better inform the public about economic and safety risks.

Using information from NOAA, CBO estimates the following costs for the project:

- Development—$3 million in 2026 to perform an assessment of the current system; consult with experts, tribes, and other interested parties; and assess modeling and weather dissemination systems.
- Implementation—$19 million in 2027 for upfront costs to expand NOAA's data collection capabilities and procure the necessary technical equipment.
- Ongoing Annual Costs—Beginning in mid-2027, $16 million annually for ongoing costs, including $3 million for system and infrastructure maintenance, $10 million for computing capacity, and $3 million for 11 full-time employees (at an average annual cost of $250,000 each). Those estimated costs account for anticipated inflation each year.

CBO assumes that S. 1278 will be enacted near the end of fiscal year 2025 and that the estimated amounts will be available in each year. Based on historical spending patterns for similar activities, CBO estimates that implementing the bill would cost $67 million over the 2025–2030 period.

The costs of the legislation, detailed in Table 1, fall within budget function 300 (natural resources and environment).

TABLE 1.—ESTIMATED INCREASES IN SPENDING SUBJECT TO APPROPRIATION UNDER S. 1278

	By fiscal year, millions of dollars—						
	2025	2026	2027	2028	2029	2030	2025–2030
Estimated Authorization	0	3	27	16	16	16	78
Estimated Outlays	0	2	17	16	16	16	67

The CBO staff contact for this estimate is Aurora Swanson. The estimate was reviewed by H. Samuel Papenfuss, Deputy Director of Budget Analysis.

PHILLIP L. SWAGEL,
Director, Congressional Budget Office.

REGULATORY IMPACT STATEMENT

In accordance with paragraph 11(b) of rule XXVI of the Standing Rules of the Senate, the Committee provides the following evaluation of the regulatory impact of the legislation, as reported:

Number of Persons Covered

S. 1278, as reported, would not subject individuals to new regulations.

Economic Impact

S. 1278, as reported, is not expected to have any significant adverse impacts on the Nation's economy. The bill may have a positive economic impact by reducing the effect of marine fog on commercial maritime traffic delays.

Privacy

S. 1278, as reported, would not have any adverse impact on the personal privacy of individuals.

Paperwork

S. 1278, as reported, would not require a major increase in paperwork burdens. In the instance where the bill would require additional paperwork, it would require NOAA to develop a project plan outlining the specific research activity, resource needs, and timelines necessary to implement the goals of enhancing vessel safety and reducing the economic impacts of marine fog.

CONGRESSIONALLY DIRECTED SPENDING

In compliance with paragraph 4(b) of rule XLIV of the Standing Rules of the Senate, the Committee provides that no provisions contained in the bill, as reported, meet the definition of congressionally directed spending items under the rule.

SECTION-BY-SECTION ANALYSIS

Section 1. Short title.

This section would provide that the bill may be cited as the "Fog Observations and Geographic Forecasting Act".

Section 2. Project to improve forecasts of coastal marine fog.

This section would require NOAA to conduct a project to improve forecasts of coastal marine fog. The goal of this project would be

to enhance vessel safety and reduce the economic impact of coastal marine fog by expanding marine-based observations using Federal and commercial platforms, including: buoys, meteorological stations, stationary platforms or drifting instruments, vessels, unmanned systems, remote sensing technologies, and advanced algorithms that extract actionable information from observational data, including early detection and regular monitoring of marine fog.

This section would also require NOAA to engage with public and private stakeholders and Tribal representatives, throughout the planning, development, and implementation of the project. It would require the Under Secretary of Commerce for Oceans and Atmosphere to develop within 1 year a detailed project plan outlining specific research activities, resource needs, and timelines.

CHANGES IN EXISTING LAW

In compliance with paragraph 12 of rule XXVI of the Standing Rules of the Senate, the Committee states that the bill as reported would make no change to existing law.

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