



# Coast Guard Cutter *Polar Sea* Reactivation

*October 2, 2024*

Fiscal Year 2024 Report to Congress



**Homeland  
Security**

*United States Coast Guard*

# Foreword

October 2, 2024

I am pleased to present the following report, “Coast Guard Cutter *Polar Sea* Reactivation,” prepared by the U.S. Coast Guard.

This report was compiled in response to the Fiscal Year 2024 Department of Homeland Security Appropriations Act (P.L. 118-47), which directs the Coast Guard to assess the viability of reactivating Coast Guard Cutter *Polar Sea*, to include an analysis of the material condition of the hull and cost and timeline estimates for a full overhaul of the vessel.



Pursuant to congressional requirements, this report is provided to the following Members of Congress:

The Honorable Mark Amodei  
Chairman, House Appropriations Subcommittee on Homeland Security

The Honorable Lauren Underwood  
Ranking Member, House Appropriations Subcommittee on Homeland Security

The Honorable Chris Murphy  
Chair, Senate Appropriations Subcommittee on Homeland Security

The Honorable Katie Britt  
Ranking Member, Senate Appropriations Subcommittee on Homeland Security

Should you require additional assistance, please do not hesitate to contact my Senate Liaison Office at (202) 224-2913 or House Liaison Office at (202) 225-4775.

Sincerely,

A handwritten signature in blue ink that reads "L. L. Fagan".

Linda L. Fagan  
Admiral, U.S. Coast Guard  
Commandant



## Coast Guard Cutter *Polar Sea* Reactivation

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# I. Legislative Requirement

This report responds to direction within the Joint Explanatory Statement accompanying the Fiscal Year 2024 Department of Homeland Security Appropriations Act (P.L. 118-47).

The Joint Explanatory Statement states:

In addition, within 120 days of the date of enactment of this Act, the Coast Guard is directed to provide a report that assesses the viability of reactivating Coast Guard Cutter *Polar Sea*. The report shall include an analysis of the material condition of the hull and cost and timeline estimates for a full overhaul of the vessel, including the renewal of the cutter's propulsion, mechanical, electrical, communication, and support systems.

## II. Background

The Coast Guard is responsible for providing icebreaking capability for the Nation pursuant to Title 14 of the U.S. Code and National Security Presidential Directive 66 / Homeland Security Presidential Directive 25. The Coast Guard currently meets seasonal icebreaking demands in the Arctic and Antarctic with the Coast Guard Cutters *Polar Star* and *Healy* (one heavy and one medium icebreaker).

Coast Guard Cutter *Polar Sea*, commissioned in 1977 with a design service life of 30-years, is in an inactive status without a crew or maintenance since November 2011. Drydock availability to preserve the vessel for long-term lay-up was completed in May 2016. *Polar Sea* serves as the ready source for obsolete repair-parts and equipment to sustain heavy icebreaking operations on *Polar Star*.

*Polar Star*, commissioned in 1976 with a design service life of 30 years, provides the annual break-out of McMurdo Station in the Antarctic. Following a reactivation completed in 2013 and a 5-year Service Life Extension Program (SLEP), *Polar Star* is expected to remain operational until Polar Security Cutters are delivered.

*Healy*, commissioned in 2000 with a design service life of 30 years, primarily supports summer Arctic scientific research; however, it can perform a variety of missions to complement other national interests, including freedom of navigation and maritime domain awareness. The Coast Guard anticipates *Healy* will continue to support Arctic missions through her remaining service life.

In the January 2017 “*Polar Sea* Assessment” report to Congress, the Coast Guard concluded that reactivating *Polar Sea* would entail substantially more effort and subsequent technical, schedule, and cost risk than was experienced during reactivation of *Polar Star*.

### III. Report

Reactivation of *Polar Sea* would require significant resources in both time and funding to address the cutter's degraded material condition and obsolescence. Additionally, reactivating *Polar Sea* would negatively impact *Polar Star*'s current sustainment plan, posing a risk to the Coast Guard's ability to maintain current statutory icebreaking requirements. A full vessel overhaul including renewal of the cutter's propulsion, mechanical, electrical, communication, and support systems plus sustainment costs would require a minimum of 8 years of work and between \$1.3 billion and \$2.3 billion.

#### **A. Material Condition Summary**

*Polar Sea* remains in an inactive status and without a crew or maintenance since November 2011. The Coast Guard completed a material condition assessment and reported its findings to Congress in 2017. Like *Polar Star*, *Polar Sea*'s hull weathered over 30 years of heavy icebreaking service with no evidence of fatigue damage. However, the unique high-strength steel alloy used throughout the hull makes the vessel very difficult to modify or repair.

At the time of assessment, corrosion was present in areas inside *Polar Sea*'s hull and some structural deformation was noted, with 13 percent of the cutter's interior compartments requiring either major repairs or re-preservation. Approximately 25 percent of all areas surveyed tested positive for the presence of lead-based paint. Additionally, asbestos-containing materials were identified in several locations, including false-wood paneling in living areas and laboratory countertops. The pervasive presence of lead-based paint throughout mechanical spaces and asbestos-containing material in habitability spaces adds to any reactivation schedule and cost.

The Coast Guard concluded that reactivating *Polar Sea* would entail substantially more effort and subsequent technical, schedule, and cost risk than was experienced during the reactivation of *Polar Star*. In addition to reactivation efforts, *Polar Sea* will require SLEP phases like those invested in *Polar Star*, including a propulsion engine and ships service generator replacement.

#### **B. Reactivation, Sustainment, and Workforce Costs**

Reactivation of *Polar Sea* would require between \$630 million and \$820 million, not including sustainment costs, which depends upon on desired service life. Specifically, \$630 million would support recapitalization of the vessel's existing propulsion plant (including the ALCO 251 engines, gas turbines, reduction gears, direct current propulsion motors and the controllable pitch propeller system), as well as recapitalization of the electrical distribution system, Machinery Control and Monitoring System, and other control and auxiliary systems with modern, supportable equipment. Recapitalization would extend the service life of *Polar Sea* out 7 to 10 years.

Alternatively, \$820 million would support recapitalization of *Polar Sea*'s entire propulsion plant, including removing turbines, installing new diesel-generators, removing the controllable pitch propeller system and replacing it with a fixed pitch propeller system. Newly available space would be used to install modern alternating current motors and associated control equipment extending *Polar Sea*'s service life 15 to 20 years.

In addition to direct reactivation costs, the following funding is required:

- \$12 million for motor control centers and major power panels;
- \$15 million for shafts and couplings;
- \$10 million for controllable pitch propeller hubs, a difficult and long lead time purchase from Germany;
- \$22 million for recapitalization of the high frequency, satellite communication, short range communications, a navigation suite; and,
- \$50 million in Navy-Type, Navy-Owned equipment tech refreshes.

This does not include funding for a Coast Guard machinery control system like the one *Polar Star* received during her recent SLEP.

If *Polar Sea* is reactivated, the Coast Guard will require additional funding to cover sustainment costs. A reactivated *Polar Sea* should expect \$640 million in sustainment costs over a 7-to-10-year reactivated service life, or \$1.4 billion in sustainment costs over a 15 to 20 year service life. Funding for sustainment covers unit-level manpower, unit operations, planned maintenance, support actions, continuing system improvement, indirect support via other Coast Guard support structures, facilities sustainment, and facilities maintenance to ensure mission readiness and performance.

Critical to the reactivation assessment is the opportunity cost of no longer having *Polar Sea* as a ready source of obsolete repair-parts and equipment to sustain *Polar Star*'s heavy icebreaking operations. *Polar Star* relies heavily on *Polar Sea*'s parts to ensure mission readiness and recover from mission limiting casualties. As such, reactivation of *Polar Sea* could contribute to future failure and degradation of *Polar Star*. Availability of spares from *Polar Sea* facilitated the successful reactivation and mission sustainment of *Polar Star* in 2011-2013 – a ready source which will not exist should *Polar Sea* be reactivated. Notably, more than half of all systems onboard *Polar Sea* are obsolete and require recapitalization. Of nearly 1,200 systems onboard identified with Navy part nomenclature, only approximately 200 parts were found to be supportable for the next 5 years or more. The remaining systems and components onboard are already obsolete or rapidly approaching obsolescence and would need to be replaced with supportable equipment.

Another abstract cost is the workforce cost to stand up *Polar Sea*'s crew. When *Polar Star* was reactivated in 2011, the *Polar Sea* was placed in “commission, inactive” status, and her crew was transferred to the *Polar Star* through the end of reactivation. This one-to-one transfer ensured an experienced and qualified crew was ready to sail when *Polar Star* was reactivated. Today the Coast Guard faces workforce shortages and operates in a budget-constrained environment. As such, crew assignments to *Polar Sea* would draw from *Healy* and *Polar Star*, which in turn would negatively impact operations, and remove critical knowledge and expertise from each of those assets.

### **C. Timeline**

Based on the time required to reactivate *Polar Star*, coupled with the 2017 *Polar Sea* Assessment report findings, reactivating *Polar Sea* would take an estimated 8 years to complete.

The projected 8-year timeline includes: 1 year of survey and design; 1 year of specification development; 1 year of contract actions (to include solicitation, contracting, and source selection);

and, 1 year of detailed design. Following those initial steps is an estimated 4 years of uninterrupted heavy industrial work, requiring long lead time material procurement and replacement of *Polar Sea's* existing propulsion plant, including the ALCO 251 engines, gas turbines, reduction gears, direct current propulsion motors, and controllable pitch propeller system. The electrical distribution system, machinery control and monitoring system, and other control and auxiliary systems require recapitalization or replacement with modern equivalents. This 8-year timeline would extend *Polar Sea's* service life by 7 to 10 years.

Reactivation for a service life of longer than 10 years would require further recapitalization of *Polar Sea's* propulsion system, as detailed in Section B. Longer industrial periods, higher corresponding costs, increased technical risk due to uncertainty related to new propulsion equipment dimensions, and intake and exhaust routing and environmental limitations are anticipated in this scenario. Reactivation for 15 to 20 years would require approximately 9 years to complete, to include 4 years total for survey and design, specification development, contracting actions and detailed design as in the previous scenario, plus 5 years of heavy industrial work.



## IV. Conclusion

The Coast Guard is committed to maintaining existing polar icebreaking capabilities until new heavy icebreakers can be delivered. In 2017, the Coast Guard determined the most feasible strategy was to pursue a tailored sustainment plan for *Polar Star*, which utilized *Polar Sea* as a ready source for obsolete repair-parts and equipment. Current analysis indicates the minimum reactivation threshold of *Polar Sea* requires at least 8 years to complete at a cost of \$630 million for reactivation and \$640 million in sustainment and would significantly increase operational risk and continued mission effectiveness of *Polar Star*. For these reasons the Coast Guard recommends against reactivating the *Polar Sea*.