

# The Capacity of the Navy's Shipyards to Maintain Its Submarines

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# Outline

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- Options to Reduce Delays

# Summary

Delays at the shipyards adversely affect **operational readiness**.

Maintenance delays have **idled expensive ships** and their skilled crews and reduced the number of submarines that the Navy can put to sea.

The Navy's four shipyards have experienced significant delays in completing maintenance on its submarines.

Two main factors have caused the delays:

- The amount of maintenance required for each overhaul has increased.
- The Navy has not hired enough new workers to keep pace with the workload.

CBO projects that the submarine **fleet's size will exceed the yards' capacity** to maintain it over the next several years and in **25 of the next 30 years**.

Changing the shipyards' capacity or the size of the fleet would take several years, so delays would continue in the 2020s even if new policies were adopted.

# Background



All of the Navy's submarines (attack and ballistic missile) are nuclear-propelled, so their maintenance is a very specialized and sensitive function.

The Navy's policy is to perform **nearly all** maintenance of nuclear-powered ships at its own shipyards.

The Navy has been experiencing long delays—sometimes as long as several years—in submarine maintenance at its shipyards:

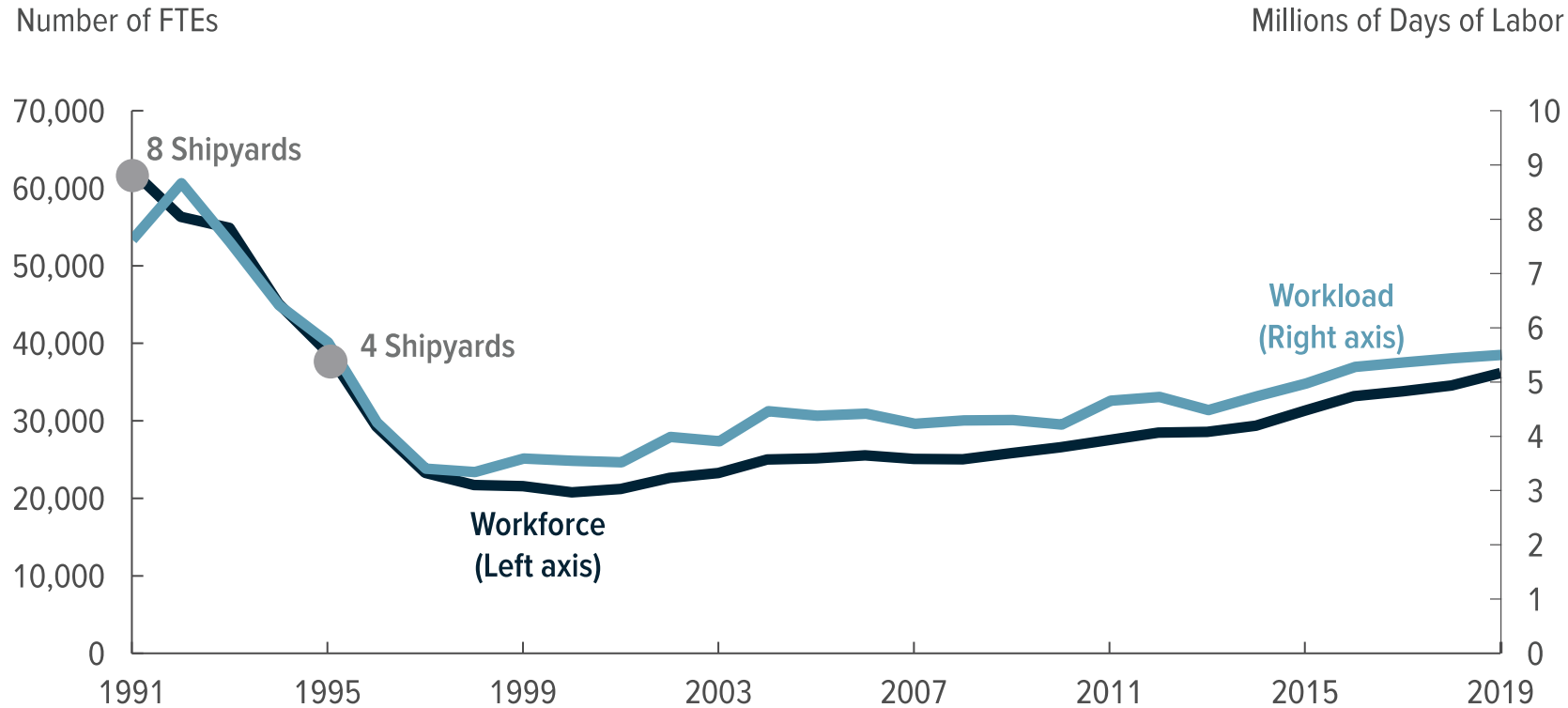
- The start of the maintenance is delayed one to two months, on average.
- The maintenance takes three to four months longer than expected, on average.

As a result of those delays, some attack submarines have missed deployments or have had them shortened.

The **total workforce** at the Navy's shipyards shrank from about **62,000** in 1991 to about **21,000** in 2001 after the service reduced the **number of its shipyards** from **eight to four** as part of the Base Realignment and Closure process in the 1990s.



# Workload and Workforce at the Navy's Shipyards

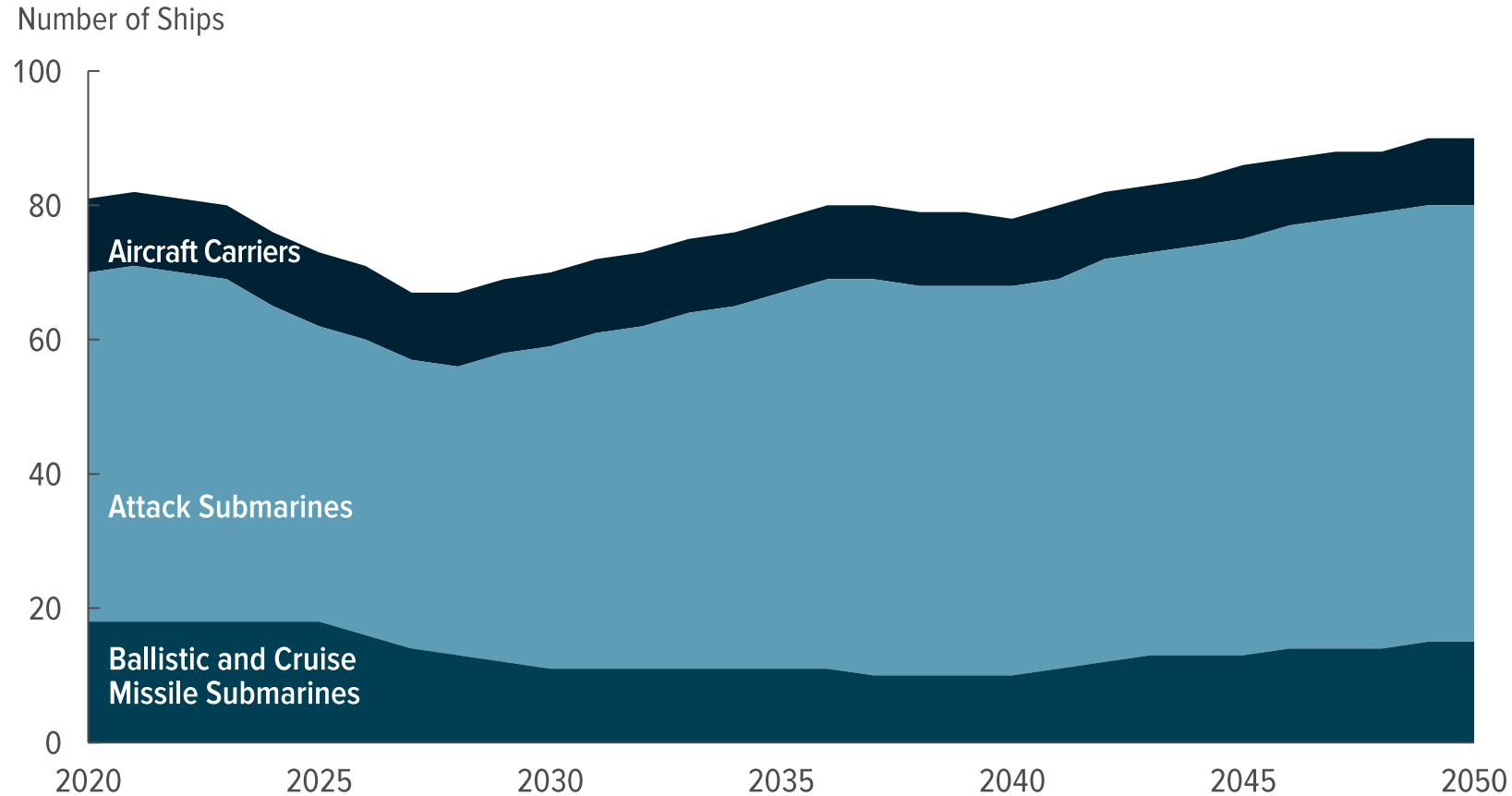


Although the shipyards have been hiring additional workers since the early 2000s as maintenance needs have grown, the growth of the workforce has not kept pace with the increasing workload.

The demand for maintenance is driven primarily by the **size of the fleet.**

The Navy's nuclear-powered fleet is projected to shrink from **80** ships in 2020 to **67** in 2028 and then grow to **90** ships in 2050.

# Projected Size of the Nuclear Fleet



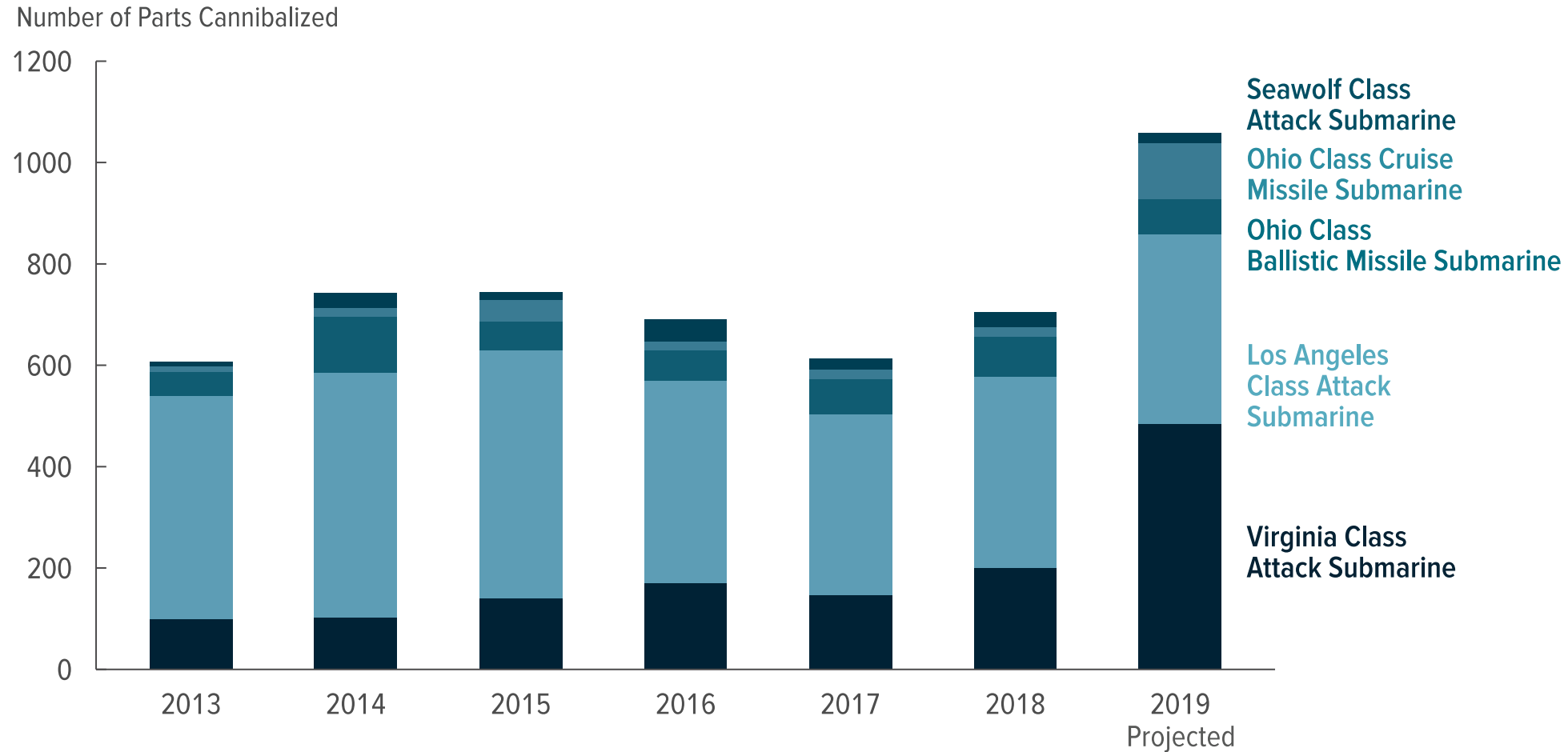
The number of nuclear submarines is projected to drop in the 2020s and increase thereafter.

The shipyards reported that **shortages of parts** also contributed to maintenance delays.

CBO was not able to quantify the effect of those shortages on delays.



# Cannibalization of Parts by Submarine Class

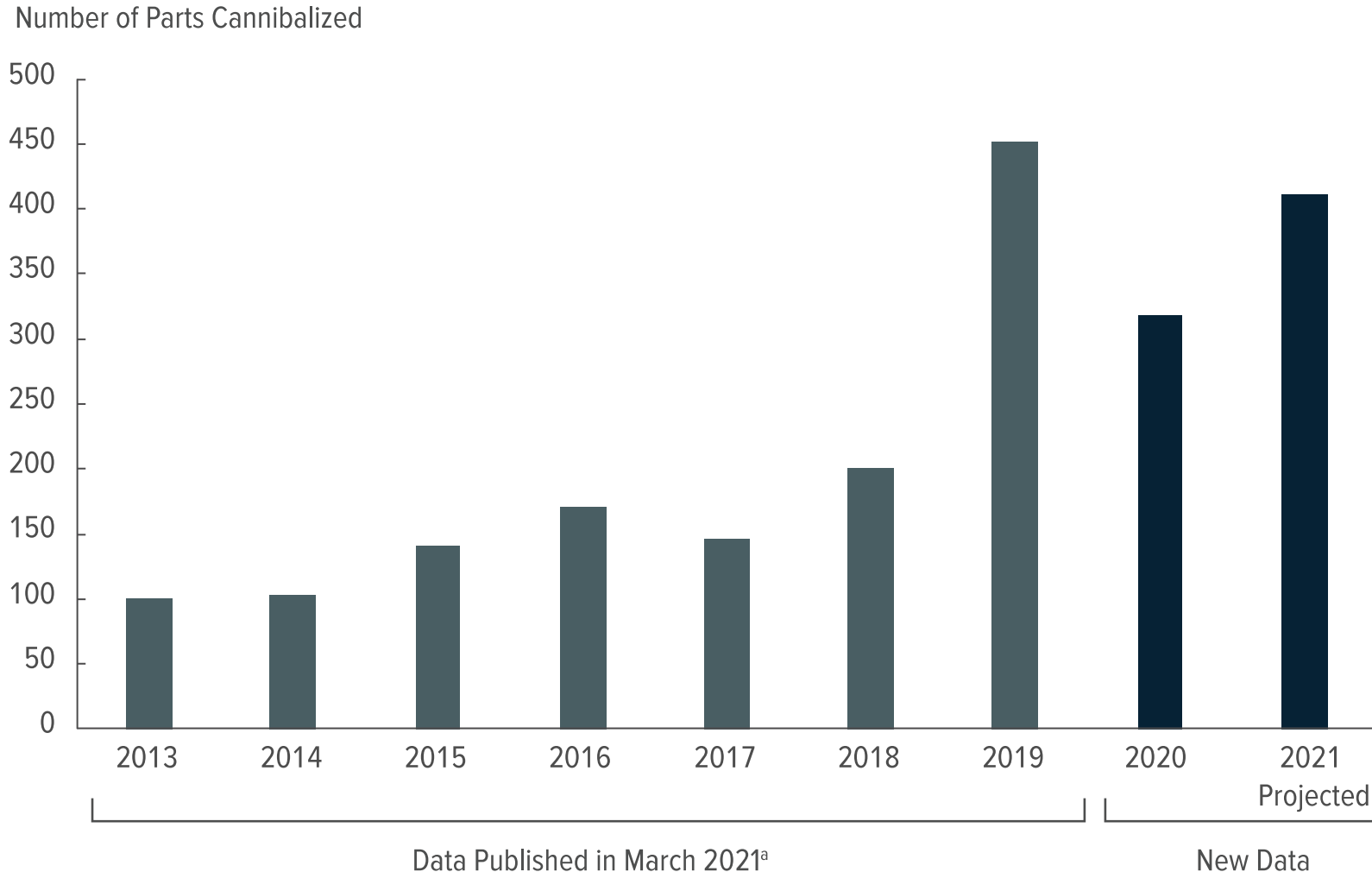


Occasions when shipyards “cannibalize,” or borrow, parts from one ship to complete maintenance on another have increased in recent years.



The **number of parts cannibalized** to maintain Virginia class submarines continues to **trend upward**.

# Cannibalization of Parts on Virginia Class Submarines



Fewer parts were cannibalized in 2020 and 2021 than in 2019, but the number of cannibalizations was still higher than in years before 2019.

a. For 2019, the value published in March 2021 was projected; the actual value, which has since become available, is shown here.

# **Maintenance Delays**

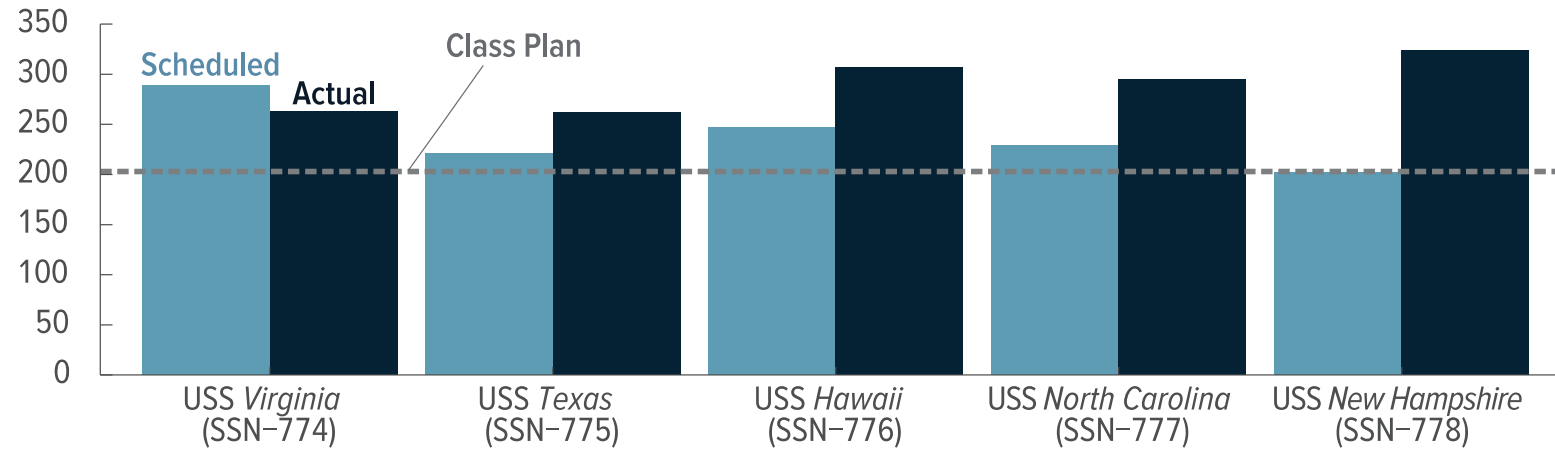
All ship classes have experienced delays in maintenance at the Navy's shipyards.

But attack submarines, which are the lowest priority, have experienced the longest delays, in terms of the percentage increase over the scheduled maintenance period.

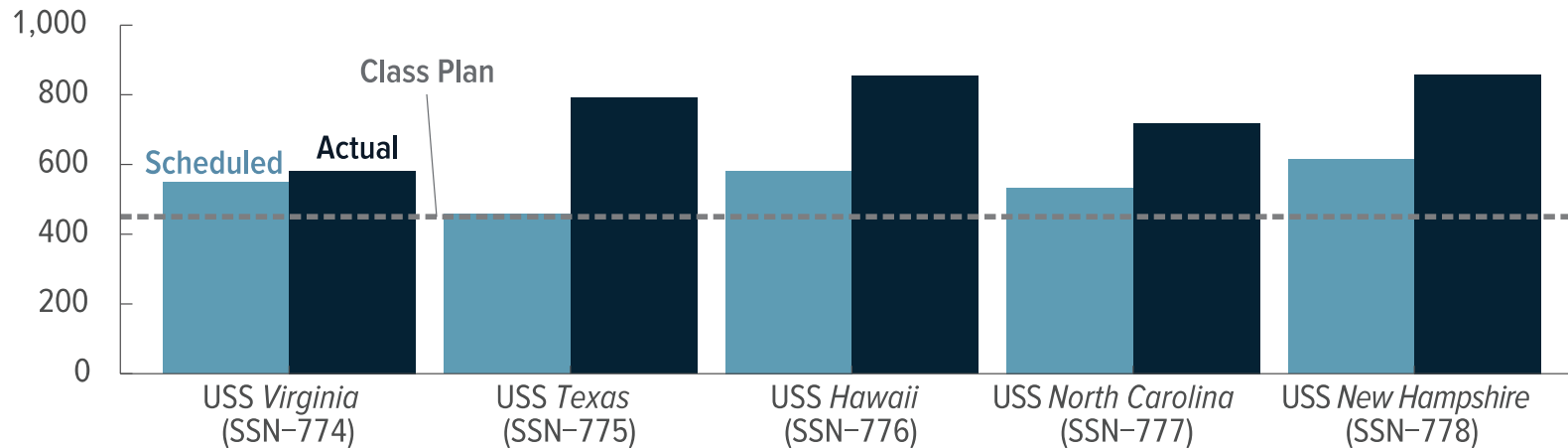


# Number of Days of Labor and Number of Days in Shipyard for Virginia Class Submarines, as of March 2021

Days of Labor (Thousands)



Days in Shipyard

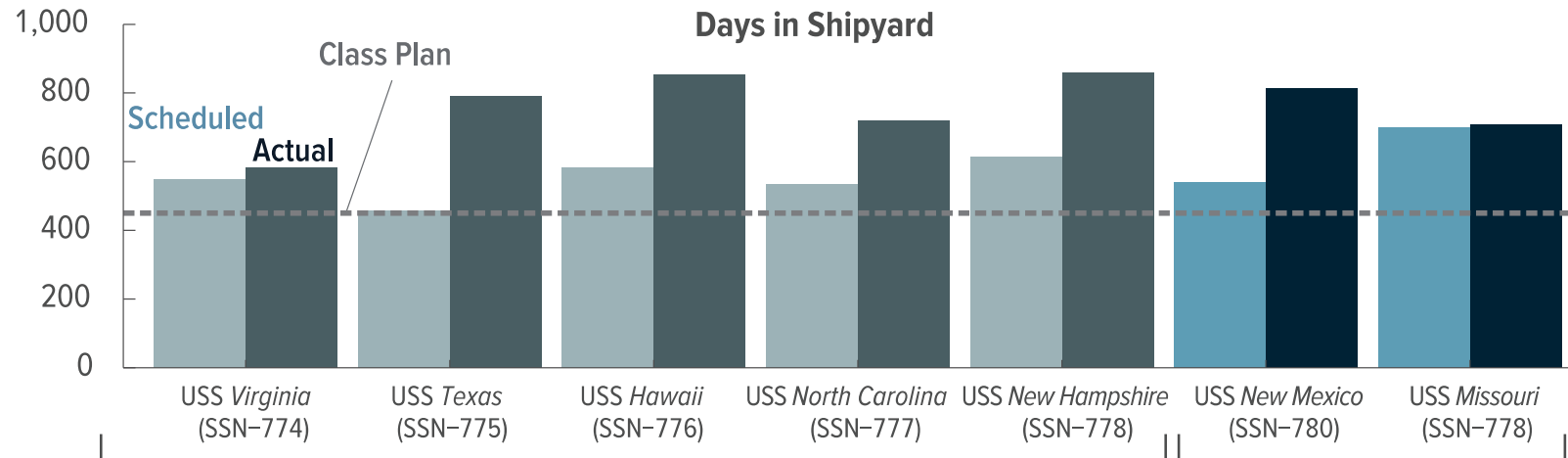
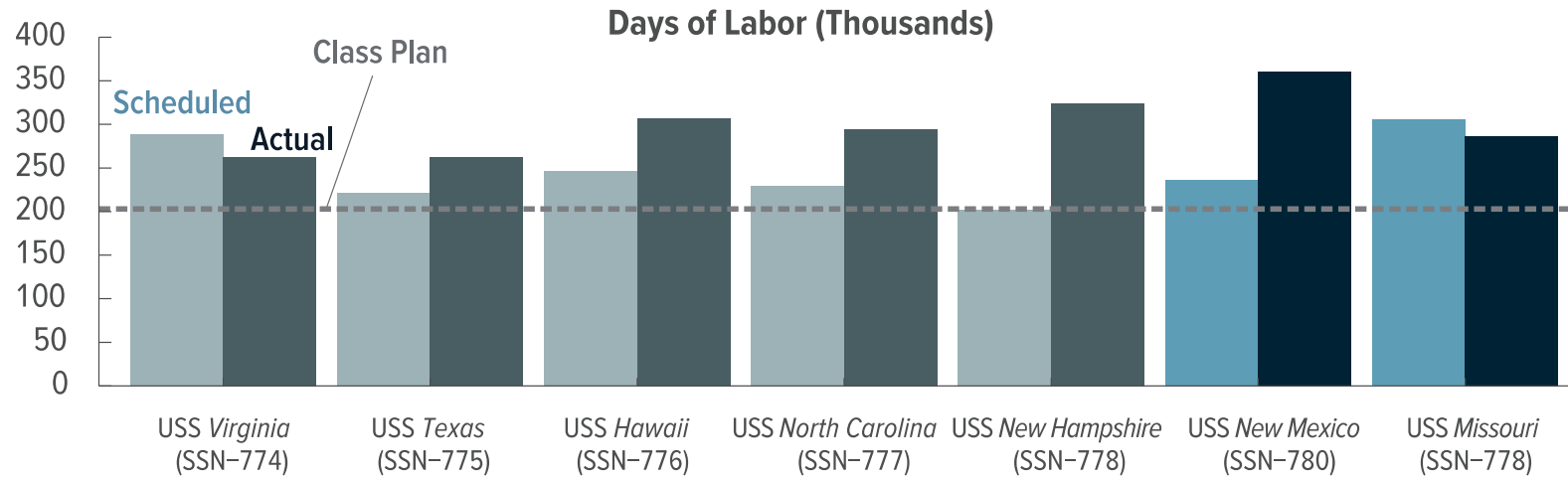


The Navy has taken longer, and put in more work than expected, to complete overhauls of the first five Virginia class submarines.

Data on Virginia class overhauls that became available after CBO published its March 2021 report show that **long delays have continued.**



# Number of Days of Labor and Number of Days in Shipyard for Virginia Class Submarines, Updated June 2021



Data Published in March 2021

New Data

Data on two more recent overhauls reveal a similar pattern, although the most recent overhaul was much closer to the Navy's schedule than the previous overhauls.

For every class, the average number of days of labor and the average amount of time ships spent in the yards **exceeded the scheduled amounts.**



# Average Actual Number of Days of Labor and Days in Shipyard Compared With Scheduled Amounts

| Class                                        | Number of Observations | Start Delay (Days) | Comparison With Schedule   |         |                         |         |
|----------------------------------------------|------------------------|--------------------|----------------------------|---------|-------------------------|---------|
|                                              |                        |                    | Overage (Days in shipyard) |         | Overage (Days of labor) |         |
|                                              |                        |                    | Days                       | Percent | Days                    | Percent |
| Virginia Class Attack Submarine <sup>a</sup> | 7                      | 43                 | 193                        | 36      | 24                      | 24      |
| Los Angeles Class Attack Submarine           | 76                     | 55                 | 82                         | 22      | 26                      | 26      |
| Ohio Class Ballistic Missile Submarine       | 13                     | 18                 | 124                        | 15      | 20                      | 20      |
| Nimitz Class Aircraft Carrier                | 54                     | 30                 | 25                         | 16      | 13                      | 13      |

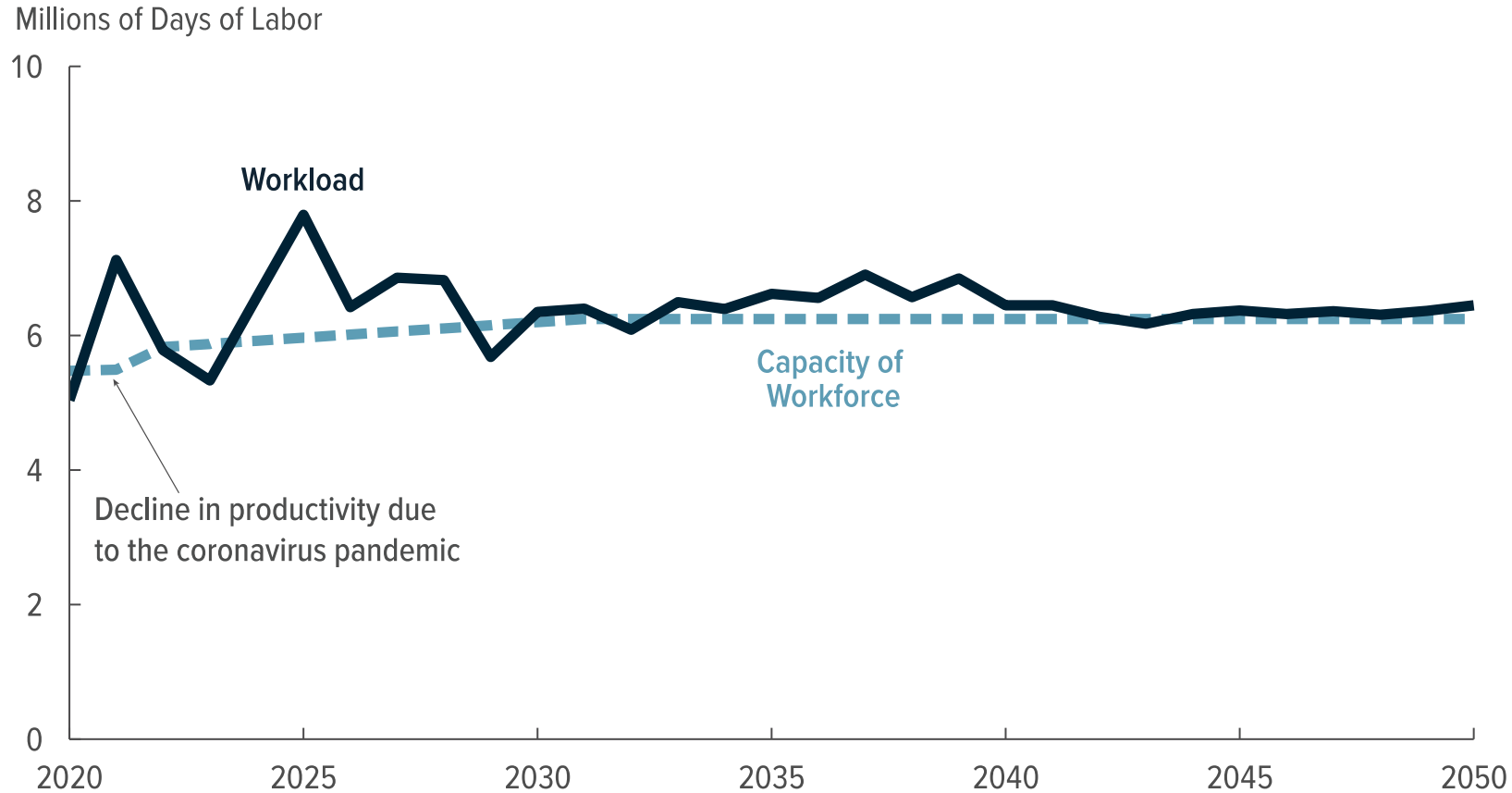
a. Values for Virginia class submarines have been updated since this table was published in March 2021 to reflect newly available data.

# **CBO's Projections of Shipyard Capacity**

CBO projects that the Navy will experience maintenance delays throughout the next 30 years because the **demand for labor is projected to exceed the shipyards' supply in 25 of the next 30 years.**

The average excess demand is roughly equivalent to falling behind each year by the number of days of labor required to complete an overhaul (that is, an extended docking selected restricted availability, or EDSRA) of a Virginia class submarine.

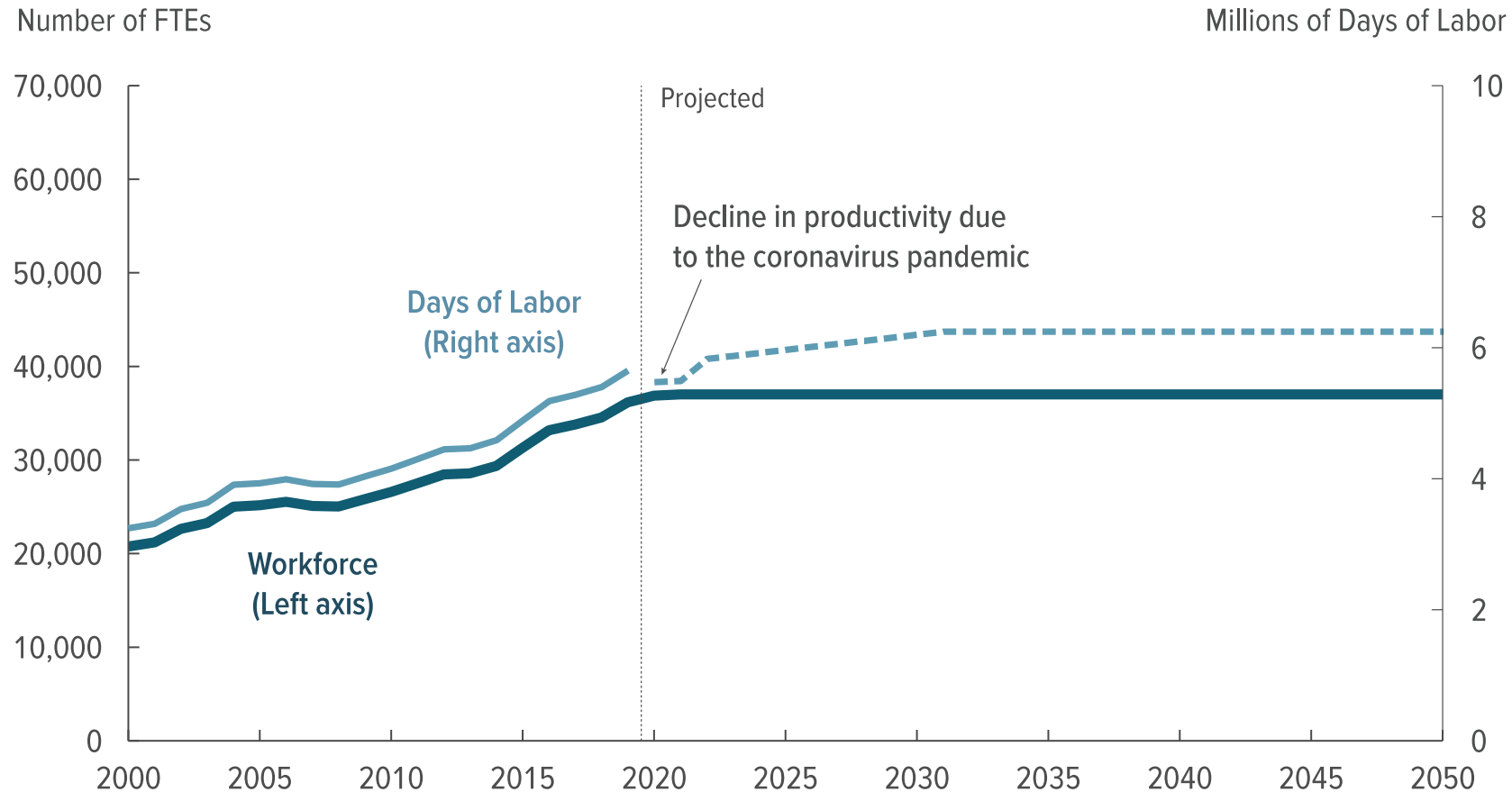
# Projected Workload and Workforce Capacity



The number of hours of labor required to maintain the nuclear fleet is projected to exceed the capacity of the workforce at the shipyards in most future years.

The shipyard optimization plan and other improvements in efficiency are expected to **increase productivity by 8 percent** over the next 10 years.

# Projected Number of Days of Labor for Nuclear Ships After Improvements in Productivity



In CBO's projections, anticipated improvements in shipyards' infrastructure and increased automation over the next decade result in a onetime gain in productivity amounting to the equivalent of about 0.4 million days of labor per year from 2022 to 2031.

# **Options to Reduce Delays**

**Option 1:** Improve the accuracy of maintenance projections and adjust ships' operating schedules accordingly.

**Option 2:** Increase the shipyards' workforce from about 37,000 to about 39,500.

**Option 3:** Shift additional maintenance of the nuclear fleet to private shipyards.

**Option 4:** Reduce the size of the nuclear fleet.



Hiring and training workers or changing the size of the fleet **would take several years**, so there would be a lag between implementing those options and reducing delays.

The Navy faces several **challenges** in improving submarine maintenance that could lead to **longer delays** than CBO projects.

# Challenges the Navy Faces

- Efficiency initiatives might not yield expected results.
- Some upgrades to the shipyards, such as improvements to dry docks, could delay some ship overhauls.
- Inactivating Los Angeles class submarines might take longer than projected.
- Overhauling Virginia class submarines might take more labor than projected as the fleet ages.
- Private yards might also experience delays.
- Unexpected work might result in higher workloads than projected.