Congressional CBO Summary Budget OfficeMAY

Strategies for Maintaining the Navy's and Marine Corps' Inventories of Fighter Aircraft

The United States Navy and Marine Corps maintain a fleet of more than 1,100 tactical fighters that provide capabilities for air-to-air combat and air-to-ground attack. As of January 2010, that force consisted of about 640 F/A-18A/B/C/D Hornets, nearly 400 F/A-18E/F Super Hornets, and roughly 150 AV-8B Harriers. Current modernization plans call for replacing all of the Hornets and Harriers with about 100 more Super Hornets and 680 F-35B/C Joint Strike Fighters (JSFs).

The high usage rate of fighters in military operations over the past decade coupled with delays in the development of the JSF, however, have raised concerns within the Department of the Navy that its inventory of fighters will drop significantly below the level needed for the planned force structure over the next 10 to 15 years.[1] In particular, in the absence of modifications to their airframe structure, Hornets are now projected to reach the end of their service life faster than they can be replaced with JSFs. To mitigate potential inventory shortfalls, the department is investigating ways to extend the service life of its Hornets as well as changes it could make to how the fleet is organized and employed to reduce the number of aircraft needed for operations. The Navy could also reduce projected inventory shortfalls by purchasing more Super Hornets than current plans call for until the JSF can be delivered in large numbers.

At the direction of the House Committee on Armed Services, the Congressional Budget Office (CBO) examined the funding required for four alternative plans that might be adopted to reduce the projected decline in the fighter inventory. CBO did not construct alternatives to satisfy a particular inventory objective, nor did it attempt to judge the adequacy of a particular objective. The alternative plans consist of different combinations of three approaches:

- Extend the service life of Hornets by up to 600 flight hours (roughly two additional years) beyond the current 8,000-hour limit by modifying and inspecting F/A-18A-D aircraft in the high-flight-hour (HFH) program (comprising a series of structural repairs and more-frequent inspections);
- Implement a service-life extension program (SLEP) of more-extensive modifications, which would enable Hornets to reach 10,000 flight hours; and
- Purchase more Super Hornets than current plans call for.

As of January 2010, the Navy had completed HFH modifications on about 25 Hornets, and Super Hornets are now in production. In contrast, research and planning for the Hornet SLEP is not expected to be complete until 2014, although the Navy has indicated that it may begin SLEP modifications on some aircraft as early as 2012. In this analysis, CBO did not explore the potential of fielding other types of systems (such as unmanned aircraft) in lieu of fighters.[2]

1. The Navy and Marine Corps are the two military services within the Department of the Navy.

2. For a broader analysis of Navy, Marine Corps, and Air Force fighter inventories, see Congressional Budget Office, *Alternatives for Modernizing U.S. Fighter Forces* (May 2009).

Of the four alternatives that CBO analyzed, the first two are limited to extending the service life of existing Hornets. They are generally consistent with various plans the Navy has proposed or is considering:

- **Alternative 1:** Execute the HFH program on the 509 Hornets suitable for those modifications;
- **Alternative 2:** Execute the HFH program on 220 Hornets and the more-extensive SLEP on 289 Hornets.

The third and fourth alternatives would combine some service-life extensions for Hornets with changes in planned purchases of new aircraft:

- **Alternative 3:** Implement the HFH program in the same way that Alternative 1 would, but also increase purchases of Super Hornets by 126 aircraft (beyond the planned total of 515) and decrease purchases of JSFs by 93 aircraft between 2018 and 2023;
- **Alternative 4:** Modify 509 aircraft through the HFH process and purchase 126 additional Super Hornets, as in Alternative 3, but do not reduce purchases of JSF aircraft.

CBO measured the increase in inventory offered by those alternatives and the funding that each would require relative to a base case under which the service life of Hornets would not be extended and additional aircraft would not be purchased.[3] The costs cited in this report are those that would be incurred to make available a larger number of aircraft. They do not include the higher costs (for more fuel, for example) associated with operating a larger fleet of aircraft.

Under Alternative 1, CBO found that executing the HFH program on the 509 Hornets would increase the Navy's and Marine Corps' fighter inventory by an average of 66 aircraft over the 2011–2025 period (see Table 1). Relative to the cost of the base case (in which none of the three approaches are undertaken), the cost of Alternative 1 would be about $2.2 billion higher (in fiscal year 2010 dollars).[4] That cost corresponds to approximately $2.2 million per aircraft-year of additional service made available to the fleet.[5] Alternative 1 has the lowest total cost of the alternatives examined by CBO, but it provides the smallest increase in inventory.

Alternative 2 would provide 220 HFH Hornets plus 289 SLEP Hornets, increasing the department's total inventory by an average of 106 aircraft over the 2011–2025 period, at a cost of about $7.7 billion. This alternative would provide the largest increase in inventory that can be achieved with the HFH and SLEP modifications currently being considered. At $4.8 million per aircraft-year, however, Alternative 2 is more than twice as costly per increment of additional service than is Alternative 1.

Alternative 3 is constructed to maintain an inventory of no less than that of Alternative 2 in any given year and to yield an inventory close to that of Alternatives 1 and 2 in 2025 (by shifting purchases of new aircraft to earlier years, when the inventory is projected to be the lowest). It would increase the average inventory by 128 aircraft through 2025 (see Figure 1).

Alternative 3 would provide larger increases in inventory than would Alternatives 1 and 2. Moreover, each additional Super Hornet provided under Alternative 3 would offer improved performance (a more-capable radar, longer range, and the ability to carry more weapons) than would a SLEP Hornet. The reduction in JSF purchases would result in fewer of the most advanced aircraft after 2020, however.

At about $3.8 billion to $4.8 billion higher than the cost of the base case, the total cost of Alternative 3 would fall between the costs of Alternatives 1 and 2.[6] The cost per increment of additional service—$2.0 million to $2.5 million per aircraft-year over the 2011–2025 period—would be comparable to that of Alternative 1.

3. The base case essentially posits minimal action being taken to mitigate impending inventory shortfalls. CBO selected this as its reference case for comparing alternatives because the Department of the Navy's plans remain fluid.

4. Costs for the HFH and SLEP modifications are based on estimates from the Department of the Navy. The cost of additional Super Hornets is based on actual costs for planned purchases under annual production contracts.

5. Aircraft-years are a measure of the service provided by an aircraft. One aircraft-year is equal to one year of service from one aircraft.

6. The upper end of the cost ranges for Alternatives 3 and 4 reflect F/A-18E/F purchases under annual procurement contracts at prices consistent with those assumed in the President's fiscal year 2011 budget request. The lower end of the range is based on prices consistent with those in a proposed multiyear procurement contract for F/A-18E/F aircraft that the Department of Defense plans to award by September 30, 2010.

Table 1.

Alternatives for Maintaining the Navy's and Marine Corps' Fighter Inventories

	Alternatives			
	1	2	3	4
		Number of Aircraft		
Hornets in High-Flight-Hour Program	509	220	509	509
Hornets in Service Life Extension Program	0	289	0	0
Additional Super Hornet Purchases	0	0	126	126
Change in Joint Strike Fighter Purchases	0	0	-93	0
Average Increase in Inventory, 2011 to 2025	66	106	128	148
Increase in Inventory Above Low Point from 2011 to 2025	71	135	174	191
		Additional Aircraft-Years of Service Relative to the Base Case		
Between 2011 and 2025	1,000	1,600	1,900	2,200
After 2025	0	0	-100	1,700
		Cost Above the Base Case (Millions of fiscal year 2010 dollars)		
Total, 2011 to 2015	1,100	3,700	10,300–11,300	10,300–11,300
Total, 2011 to 2025	2,200	7,700	3,800–4,800	11,600–12,600
Average per Aircraft-Year, 2011 to 2025	2.2	4.8	2.0–2.5	5.3–5.7
Average per Aircraft-Year, Lifetime	2.2	4.8	2.2–2.7	2.9–3.2

Source: Congressional Budget Office.

Notes: Under the base-case scenario, Hornets would be retired from service at 8,000 flight hours.

Aircraft-years are a measure of the service provided by an aircraft. One aircraft-year is equal to one year of service from one aircraft.

The additional costs are those incurred to make available a larger number of aircraft. They do not include the higher costs (for more fuel, for example) associated with operating a larger fleet of aircraft.

The higher costs shown for Alternatives 3 and 4 reflect prices consistent with annual procurement contracts for Super Hornets purchased in addition to those currently planned. The lower costs reflect prices consistent with a proposed multiyear procurement contract for Super Hornets that the Department of Defense plans to award.

In the near term, however, the cost would be substantially higher ($10.3 billion to $11.3 billion versus $3.7 billion for Alternative 2 over the 2011–2015 period, for example) because the savings from reducing JSF purchases would not offset the cost of new Super Hornet purchases until after 2017.

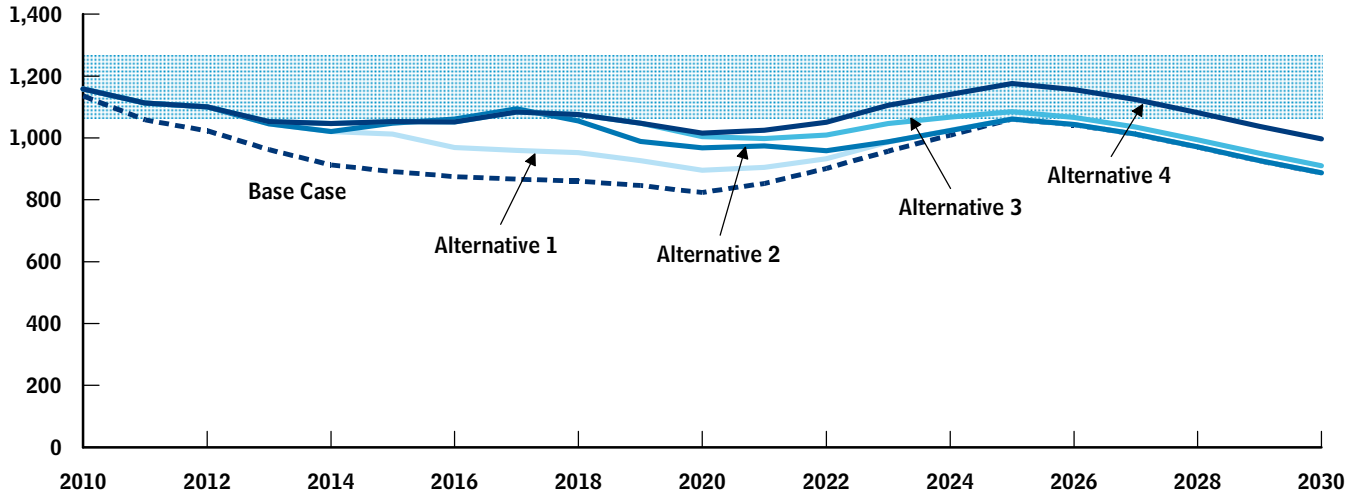
Under Alternative 4, the Department of the Navy would modify 509 Hornets and purchase 126 additional Super Hornets, as in Alternative 3, but would not reduce purchases of JSF aircraft. The increase in average inventory would be 148 aircraft between 2011 and 2025, 20 aircraft more than under Alternative 3. Alternative 4 would also provide increased inventory well beyond 2025, because additional purchases of Super Hornets would not be offset by fewer purchases of JSFs. (Unlike HFH and SLEP aircraft, which would be taken out of service by 2025, new Super Hornets could remain in the fleet for 25 years or longer.)

The advantages of new aircraft provided in Alternative 4 would come at a cost of $12 billion to $13 billion more than under the base case (nearly all of which would be incurred in the next five years). At a cost of $5.3 million to $5.7 million per aircraft-year, Alternative 4 would be the most expensive per increment of additional service provided between 2011 and 2025. If the aircraft-years of service after 2025 are included, the cost would be $2.9 million to $3.2 million per aircraft-year. Super Hornet service after 2025 may not have the same military value as service between 2011 and 2025, however.

Figure 1.

The Navy's and Marine Corps' Inventories of Fighter Aircraft Under Alternative Plans

(Total aircraft inventory)



Source: Congressional Budget Office.

Notes: Under the base-case scenario, Hornets would be retired from service at 8,000 flight hours. Under Alternative 1, 509 Hornets would receive modifications under the high-flight-hour (HFH) program, which would extend their service life by 600 flight hours. Under Alternative 2, 220 Hornets would receive HFH modifications; another 289 Hornets would receive more-extensive modifications under the service-life extension program, which would increase their service life to 10,000 hours. Under Alternative 3, 509 Hornets would receive HFH modifications; also, the Department of the Navy would purchase 126 additional Super Hornets but 93 fewer Joint Strike Fighters (JSFs). Under Alternative 4, 509 Hornets would receive HFH modifications, and the Navy would purchase 126 additional Super Hornets (but not reduce the number of JSF aircraft.)

The dotted band indicates a range of inventory objectives derived from information provided by the Navy.

Inventories are based on JSF purchase schedules as described in *Department of Defense 30-Year Aviation Plan* (February 2010).

CBO did not evaluate whether the inventories that would be realized under the various alternatives would be sufficient to meet the Navy's and Marine Corps' operational needs. A series of briefings since 2008 from the Department of the Navy to the Congress has explicitly or implicitly suggested sustained inventory objectives ranging from slightly more than 1,000 aircraft to as many as 1,240 aircraft (see the dotted band in Figure 1). None of the alternatives that CBO considered would provide inventories within that range of objectives for all years through 2025, although Alternatives 3 and 4 would come closest.

The inventories realized under all four alternatives would be lower, and any corresponding shortfall would be larger, if further delays were experienced with the JSF program. Under those circumstances, a greater increase in Super Hornet purchases could be incorporated into any of the alternatives if the Super Hornet production line was still in operation. Compensating for further delays in the JSF program by keeping Hornets in the fleet longer than envisioned with HFH or SLEP modifications would require much more extensive (and, probably, much more costly) modifications.